The Effect of Financial Inclusion on Household Welfare in China

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Abstract:

Financial inclusion is one of the key factors contributing to household welfare. We explore this effect in China utilizing a unique household survey panel data. Financial inclusion is measured by owning a transaction account at formal financial institutions. We employ an innovative method of heteroscedasticity-based identification recently developed by Klein and Vella (2009a; 2010) to identify the causal effect of financial inclusion. We find that welfare effects of financial inclusion varied across urban and rural areas and income groups. Financial inclusion significantly increased overall consumption, but the impact was greater among urban than rural households. The effect was stronger in the case of food consumption. Financial inclusion also decreased consumption inequality but only among urban households. The uneven effect of financial inclusion across level of urbanization and commodity types have important policy implications for promoting financial inclusion not only in China but also in other developing countries.

Keywords: Financial inclusion; Consumption; Inequality; Welfare.

JEL Classification Codes: G21; I31; D14; D12.

1. Introduction

Financial inclusion is one of the most important factors contributing to the overall economic development of a country. It creates opportunities for consumption smoothing, especially for the poor, by acting as an insurance to build resilience against shocks. It also helps get access to other basic needs such as education and health services, and is crucial for investment opportunities for entrepreneurs (Bruhn and Love, 2009). The most significant beneficiaries of financial inclusion are the marginalized and poor individuals, who lack this opportunity at the first place (World Bank, 2019).

Notwithstanding its crucial role, financial inclusion has only recently gained attention to the policymakers in both developing and developed countries.[1] Financial inclusion is sometimes confused with financial development and it is imperative to clarify the distinction between the two concepts. Financial inclusion is characterized by households and businesses using financial services. According to World Bank (2015), financial inclusion is defined as "individuals and businesses have access to useful and affordable financial products and services that meet their needs—transactions, payments, savings, credit and insurance—delivered in a responsible and sustainable way." Financial inclusion is measured at the micro level by the access to financial instrument (such as transaction account) of an individual or a household. Financial development, on the other hand, is a process of reducing the costs of acquiring information, enforcing contracts and making transactions by establishing financial institutions.[2] Thus, the two concepts are quite distinct although there may be a high correlation between them.

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[1] For example, in November 2015 the State Council of the Chinese government detailed the guiding principles and goals in the *Promoting Financial Inclusion Plan 2016-2020* to promote financial inclusion (The State Council of P. R. China, 2015). In 2015, the United Kingdom established the Financial Inclusion Commission to promote financial inclusion with two core objectives that include advocating financial inclusion as a public policy priority, and working with policymakers and stakeholders to come up with deliverable policy proposals (The Financial Inclusion Commission of the United Kingdom, 2015).

[2] Financial development is usually measured by indicators such as the ratio of private credit, stock market capitalization or M2 to GDP, and the number of ATMs or bank branches per capita. These aggregate indicators are not informative about how individuals or households are able to take advantage of financial opportunities, particularly when financial services are available.

Research on the effect of financial inclusion on development outcomes at the individual or household level is scant.[3] Fitzpatrick (2015), using a household survey data for the 1995-2008 period for the UK, finds that owning a bank account improves access to credit (in terms of credit card ownership) and increases consumption of household appliances. However, Amendola, Boccia, Mele and Sensini (2016) failed to find any effect on the consumption of non-durable goods. Zhang and Posso (2019) constructed an indicator of financial inclusion using the information on transactions and payments, savings, credit and insurance, and find a strong positive effect on household income in China. Dimova and Adebowale (2018), in the context of Nigeria, find that financial inclusion, measured as owning a bank account, increases per capita expenditure but also increases intra-household inequality. Adebowale and Lawson (2018) find that financial inclusion reduces transient poverty in the same context as in Dimova and Olabimtan (2018). DeLoach and Smith-Lin (2018), in the context of Indonesia, find that financial inclusion measured in terms of access to savings and credit enables households to borrow or liquidate assets in response to adult health shocks.[4]

In this paper, we investigate the effect of financial inclusion on different categories of consumption and their inequality at the household level in China. To the best of our knowledge, this is the first paper to investigate the impact of financial inclusion on these two important welfare indicators at the household level. Given that consumption patterns vary across households depending on, among others, their income level, investigation of different types of consumption and also by income groups helps understand the beneficiaries of financial inclusion. Understanding consumption inequality for different items is important because inequality in consumption of necessary goods such as food are more worrying from welfare perspectives than inequality in other types of consumption (Attanasio and Pistaferri, 2016). In addition, investigation in the context of China is justified by its large share in the world

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[3] Research has predominantly focused on the effect of financial development at the macroeconomic level. Some examples include, but not limited to, King and Levine (1993) on economic growth; Clarke et al. (2003) and Beck et al. (2007) on income inequality; Burgess, Pande and Wong (2005) and Jalilian and Kirkpatrick (2005) on poverty; Mallick (2014) on business-cycle volatility. Other notable works on this topic include, among others, Li et al. (1998), Levine (2005), Beck and Demirgüç-Kunt (2008) and Jeanneney and Kpodar (2011). For a literature review on the effect of financial development on inequality and poverty, see Zhuang et al. (2009).

[4] It is also important to appreciate that there is a large and vibrant literature on the effect of microfinance on many aspects of economic development ranging from poverty alleviation to women empowerment. However, microfinance is a special type of financial inclusion targeted to a specific type of the population mainly by non-government development organizations.

population. Since the outline of the *Promoting Financial Inclusion Plan 2016-2020* in November 2015, various programs, such as establishing village banks and microcredit units, have been implemented to promote financial inclusion throughout the country. By the end of 2017, five state-owned commercial banks, six joint-stock commercial banks, over 1600 rural and county banks and 17 private banks in China had established financial inclusion division (Li, Ye, Zeng and He, 2018). This signifies the importance of financial inclusion to the Chinese government.

We analyze the China Household Finance Survey (CHFS) dataset for three waves—2011, 2013 and 2015 (detailed discussion in Section 2) comprising a household level panel dataset. The dataset contains detailed information on household financial products as well as income, expenditures and a rich set of demographic characteristics. We focus on three broad categories of consumption, namely, food, utilities and (non-food) necessities. To understand the effect on overall consumption, we aggregate these three consumption categories. Financial inclusion is measured by a binary variable indicating whether a household owns a transaction account at any formal financial institution (that includes commercial bank, credit union and postal bank, among others), which in our study context is mainly a bank. This measure is consistent with the advocate and aim of the global financial inclusion movement. According to the World Bank (2019), "being able to access a transaction account is a first step toward broader financial inclusion" because a transaction account enables people to store money, and send and receive payments. In other words, a transaction account serves as a gateway to other financial services.[5] For robustness check, we also augment the measure of financial inclusion by owning a credit card.

Given the endogeneity of financial inclusion and that finding an external instrument is a daunting challenge in our context, we employ an innovative identification method recently developed by Klein and Vella (2009a; 2010) that does not rely on exclusion restriction but exploits heteroscedasticity for identification (discussed in detail in Section 3.2). Our results show that financial inclusion increases overall consumption by about 100%. The effect is greater in urban (82%) than in rural areas (58%), and more pronounced among the lower income households in urban areas. The effect is stronger in the case of food consumption. We also find that financial inclusion decreases consumption inequality. The effect is limited only

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[5] The Universal Financial Access 2020 Goal, initiated by The World Bank Group, envisions that by 2020, adults who currently are not part of the formal financial system, have access to a transaction account to store money, send and receive payments as the basic building block to manage their financial lives.

in urban areas, especially the lower income households therein. There is no effect on consumption inequality in rural areas. The uneven welfare improving effects of financial inclusion across different level of urbanization and income groups have important policy implications for promoting financial inclusion not only in China but also in developing countries in general.

The rest of the paper proceeds as follows. Section 2 describes the data and reports some key descriptive statistics. Empirical strategy including the identification method is explained in Section 3. The results are presented in Section 4. Finally, Section 5 concludes and discusses policy implications.

2. Data and Descriptive Statistics

Our analysis draws on the dataset from the China Household Finance Survey (CHFS). The CHFS is a biennial longitudinal representative household survey developed by the Survey and Research Center for China Household Finance at the South-Western University of Finance and Economics (SWUFE). It employs a stratified three-stage Probability Proportion to Size (PPS) random sample design. The first stage selected 80 counties out of the 2,585 primary sampling units (including county level cities and districts) from all provinces and municipalities in the mainland China except Hong Kong, Macau, Tibet, Xinjiang and Inner Mongolia. The second stage selected four residential committees/villages from each of the 80 counties at the first stage. The third stage selected 20 to 50 households from each of the selected residential committees/villages depending on the level of urbanization and economic development. Every stage of sampling is carried with the PPS method and weighted by its population size.[6] The CHFS contains detailed information on household financial products, income, expenditures and demographic characteristic of the households. In this study, we use all available waves—2011, 2013 and 2015.[7]

We focus on three broad categories of consumption, namely, food, utilities and other non-food necessities. Food refers to expenditures on all food items including dinning out. Utilities refers to expenditures on water, electricity, fuel and property management fees.[8] Necessities

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[6] See Gan et al. (2014) for detailed description about this dataset.

[7] We drop the top and bottom 5% of the observations based on total consumption because of non-reporting (missing values) and some households have unusually large ceremonial expenditure such as wedding.

[8] In some parts of China, especially in urban area, utilities bill can be paid through bank account. Electronic transaction is becoming increasingly popular and widespread in rural areas. Paying utility bills through bank

refers to non-food daily necessary items such as toiletries and detergent. The respondents were asked to recall food and necessity expenditures for last 30 days from the day of the survey. We include only these items to avoid any recall bias; expenditures on others items that are purchased infrequently are harder to recall for the respondents, so there is a higher chance of reporting bias. Note that utility bills are usually paid once a month and receipts are preserved so that expenditures can easily be verified. All expenditures are annualized. For comparison over time, each category of consumption is deflated by the respective CPI and separately for rural and urban areas.[9] We aggregate these three broad categories of (real) consumption to construct the "*total*" consumption.

For each category of consumption (including the total), we construct inter-household consumption inequality as:

$$CI_{ijt} = \left(\frac{C_{ijt} - C_{jt}}{C_{jt}} \right)^2 \tag{1}$$

where C_{ijt} denotes consumption of household i of category j at time t, and C_{jt} is the median consumption expenditure for each j. This measure of consumption inequality (*CI*) is similar to the poverty measure in which a household's consumption deviates from the poverty line consumption. Poverty (headcount) index is calculated as the sum of the deviations across all households; in our case, inequality at the household level is calculated as the deviation of an individual household's consumption from the median consumption. The deviation is squared so that larger weight is assigned to the household whose consumption deviates more from the median consumption.[10] By construction, *CI* is symmetric around the median; two households, one with consumption higher and another with consumption lower than the median consumption by the same magnitude will have the same inequality score. Consumption

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account minimizes transaction costs, such as costs of transportation and time to travel to the billing station, and is also incentivized by utility providers and banks (or payment platforms) through discount on the amount to be paid (Huang, 2019); this extra saving potentially allows people to spend more on utilities.

[9] Consumer Price Index are obtained from the National Bureau of Statistics of China http://data.stats.gov.cn (accessed on 18 August 2019).

[10] Note that without squaring, this *CI* index would simply be a transformation of C_{ijt}, and would contain no information about inequality.

inequality decreases when consumption of a household moves closer to the median consumption level.[11]

Our measure of financial inclusion is whether a household owns a transaction account at any formal financial institution.[12] We also augment this measure by including credit card ownership—whether a household owns a transaction account or a credit card. We do not consider credit card ownership separately as an alternative measure of financial inclusion as only about 6% of the households in our data owned a credit card.

Insert Tables 1A and 1B

Table 1A provides some key descriptive statistics for all three surveys combined, and Table 1B provides these by year. Sixty two percent of all sample households own a transaction account.[13] The ownership is higher in urban than rural areas (70% vs. 47%) and remains almost the same between 2011 and 2013 and increases considerably in 2015 (from 57% in 2011 to 70% in 2015). Food consumption constitutes the major share in our measure of total consumption as shown by the mean values of (logarithm) different categories of consumption expenditures, which may be because of the items included in our study. All categories of consumption increase over time, and are higher in urban than in rural areas. Consumption inequality is greater in rural than urban areas, and more or less stable over time except for food for which it is increasing.

3. Empirical Strategy

3.1. Empirical Specification

The empirical specification is given as:

$$Y_{ijt} = \alpha + \beta FI_{it} + \gamma' \mathbf{X_{it}} + \lambda_r + \tau_t + \varepsilon_{ijt}, \; \forall j \tag{2}$$

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[11] This also holds when consumption of a household above the median decreases. However, we rule out this possibility. We show that financial inclusion increases consumption of all types of households but benefits more the households with lower level of consumption (see section 4.1 and Figures 1-4).

[12] In many developing countries, transaction account is sometimes known as checking account or current account. For example, in China, individuals can open a current account in a commercial bank, deposit and receive interests. This account functions both as saving account and transaction account.

[13] In 2014, 62 percent of adults worldwide had an account at a bank or another type of financial institution or with a mobile money provider (Demirguc-Kunt, Klapper, Singer and Van Oudheusden, 2015).

where Y_{ijt} denotes the outcome (dependent) variables for household i of consumption category j at time t—these are logarithm of consumption expenditure (C_{ijt}) and consumption inequality defined in equation (1). FI_{it} refers to financial inclusion measuring access to financial instruments in terms of owning a transaction account (for robustness check, we also include credit card ownership). This is a binary variable equals 1 if a households owns a transaction account and 0 otherwise. λ_r and ι_t are geographic region (such as province, rural-urban and Hukou) and time fixed effects, respectively.[14]

Our key interest is β, the coefficient of FI_{it}. The extent to which a household is able to consume and also achieve consumption smoothing depends on the tools at its disposal to allocate resources over time. Transaction account is such a tool with which households are not only able to absorb adverse shocks with their savings in it but also receive interpersonal and government transfers. On the other hand, variation in the ownership of such tools may potentially give rise to inequality in consumption. Looking at consumption inequality across specific components of consumption is also interesting for a number of reasons. First, the analysis of different type of commodities with different income elasticities can be useful to understand the likely effects of the nature of shocks and about mechanisms for smoothing consumption. Second, disparities in consumption of food and non-food necessary items may be more concerning from a welfare point of view than disparities in the consumption of luxuries (Attanasio and Pistaferri, 2016).

The vector **X** consists of demographic characteristics at the household level that include age, gender and marital status of the household head, (average) education level of all (adult) household members, family size, (log of) annual household disposal income and

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[14] Note that we do not include individual fixed effects in equation (2). In the data (also shown in Table 1.B), about 58% households have a bank account in all three periods (binary variable coded as 1), and about 30% households did not have a bank account in any of the three periods (coded as 0). Therefore, for about 88% households, financial inclusion (having a bank account or not) is a fixed effect (time invariant). The Fixed Effect (FE) (mean differencing or LSDV) estimation will use information from only the remaining 12% households, for which financial inclusion varies over time. The same applies to first-differencing estimation. We are indeed interested in the coefficient of this (near) fixed effect, so controlling for individual fixed effect will discard most information from the data. Our estimated coefficient is interpreted as the difference in the consumption between financially included and excluded households (with and without owning a transaction account). On the other hand, the coefficient estimated by FE regression would refer to the change in own consumption of a household after owning a transaction account.

political alignment (communist party membership). Income is considered to be the most important factor determining household consumption. Although permanent income would be more appropriate to determine current consumption (Friedman, 1957), such income measure is unavailable, and we are unable to construct using our survey data. Therefore, we control current income that includes salaries, revenues from family agricultural and/or business productions, investment income, and transfer payments such as subsidies to maintain minimum living standard for all household members. When consumption inequality is the dependent variable, we also include a dummy variable indicating whether a household's consumption is above or below the median consumption.

Geographical factors (captured by λ_r) are also important to determine household consumption (and consumption inequality) and related to financial inclusion. These factors include rural/urban, province and the Hukou. The Chinese economy is characterized by a remarkable rural-urban division (Knight and Song, 1999). The rural areas lag far behind the urban areas in terms of basic infrastructure such as roads, wastewater services, water supply and sanitation. This uneven development in turn leads to uneven access to financial instruments across rural and urban areas, and therefore, the effect of financial inclusion on outcome variables might differ depending on the level of urbanization. The same argument applies to provinces as well. Another reason for rural-urban division in China is the unique Hukou system of household registration. Before the economic reform in 1978, the household register was used mainly to control population mobility caused by food shortages. Households who could produce their own food were classified as agricultural Hukou, and those who receive food from the government were classified as non-agricultural Hukou. Traditionally, most agricultural Hukou households live in rural areas and most non-agricultural Hukou households live in urban areas. The strict restrictions on permanent migration from rural to urban Hukou and vice versa is still in place in many parts of China. The Hukou system generates remarkable socioeconomic gap between rural and urban residents because of government's discriminatory policies.[15]

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[15] The Hukou system has recently been reformed but the restrictions on permanent migration are still in place. Households registered in rural Hukou are allowed to move to urban Hukou (and indeed many households did) for only temporary employment. It is also worth mentioning that rural-urban division and the Hukou division are not exactly the same, although there is a substantial overlap between these two. In the data, their correlation is 0.65.

3.2. Identification Strategy

The pooled panel OLS estimation of equation (2) will give biased and inconsistent estimates of the β coefficient because of endogeneity of financial inclusion. Endogeneity may arise from any or all of the following sources. There might be unobserved factors that simultaneously influence a household's access to finance and consumption expenditure. Although we control for a rich set of variables including household income, these may not be sufficient to account for all omitted variables. Higher demand for consumption may determine someone's decision to open a transaction account, thus leading to reverse causality. One might argue that our proxy (owning a transaction account), although consistent with World Bank (2015) definition of financial inclusion, may not fully capture the broader dimensions of financial inclusion, and thus suffer from measurement error.[16]

To address the endogeneity, we need external instrument for financial inclusion but the challenge is daunting to find a suitable instrument. We employ an innovative identification strategy recently proposed by Klein and Vella (2009a; 2010; henceforth, K-V) that does not rely on exclusion restrictions for identification but exploits heteroscedasticity to construct instruments from the existing data.[17] This method requires that the endogenous variable be binary. It exploits non-spherical disturbances arising in the determination of the endogenous variable. The main argument behind this identification is that, when there is substantial heteroscedasticity in the equation relating the endogenous variable to the exogenous variables, the changing variance in the residual acts as a "probabilistic shifter" of the endogenous variable. Similar to the instrumental variables, this probabilistic shifter helps identify the causal relationship between the dependent variable and the endogenous variable. Consider the following equations (for consumption category *j*):

$$Y_{it} = \alpha + \beta FI_{it} + \boldsymbol{\delta}'\mathbf{Z}_{\mathbf{i}t} + \varepsilon_{it} \tag{3}$$

$$FI_{it} = \mu + \boldsymbol{\gamma}'\mathbf{Z}_{\mathbf{i}t} + u_{it}, \tag{4}$$

where Y_{it} is the consumption expenditure or inequality and FI_{it} is the financial inclusion. $\mathbf{Z}_{\mathbf{i}t}$ includes the elements in vector $\mathbf{X}_{\mathbf{i}t}$ and the fixed factors in equation (2). Equations (3) and (4) do not satisfy the exclusion restriction. However, Klein and Vella argue that β can be

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[16] We recognize that consumption can also be measured with errors. However, given that consumption is our dependent variable, this measurement error does not affect the estimated coefficients.

[17] This method has also been employed by Berg, Emran and Shilpi (2013) and Millimet and Roy (2016), Bakshi, Mallick and Ulubaşoğlu (2019), among others.

consistently estimated if the residuals u_{it} are heteroscedastic. Assume that residuals are heteroscedastic in the following way:

$$u_{it} = S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})\overline{u}_{it}, \tag{5a}$$

$$\varepsilon_{it} = S_\varepsilon(\tilde{\mathbf{Z}}_{\mathbf{i}t})\overline{\varepsilon}_{it} \tag{5b}$$

where $\overline{u}_{it}$ and $\overline{\varepsilon}_{it}$ are zero mean homoscedastic residuals, $\tilde{\mathbf{Z}}_{\mathbf{i}t}$ is a subset of (or equal to) $\mathbf{Z}_{\mathbf{i}t}$, and $S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})$ is a non-constant positive function. The requirement for identification is that some residuals are heteroskedastic in that $S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})/S_\varepsilon(\tilde{\mathbf{Z}}_{\mathbf{i}t})$ varies across observations and the conditional correlation between the underlying homoscedastic portion of the residuals is fixed.[18]

We can write equation (4), where the probability of the financial inclusion (binary endogenous indicator) is given by

$$\Pr(FI_{it}^p = 1) = P\left(\frac{\tilde{\mathbf{Z}}_{\mathbf{i}t}}{S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})}\right), \tag{6}$$

where $P(.)$ is the distribution function for $\overline{u}_{it}$. With homoscedastic errors, $S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})$ is a constant, and identification depends on possible non-linearity of the $P(.)$ function, such as normal distribution. However, this identification relies on a small fraction of the data because it is based on the non-linearity in the tails of the distribution, and hence, in general, not considered as credible. In contrast, when there is heteroscedasticity, the function $S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})$ is not a constant, and identification exploits data from the region where $P(.)$ is linear. The variables $\dfrac{\tilde{\mathbf{Z}}_{\mathbf{i}t}}{S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})}$ determine financial inclusion of a household but do not affect the mean impact of financial inclusion on household consumption (or consumption inequality) specified in equation (3). Therefore, conditional on heteroscedasticity in the residuals, the predicted probability of equation (6) works as a valid instrument of the binary endogenous variable (Klein and Vella, 2009a; 2010).

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[18] Note that both $S_u(\tilde{\mathbf{Z}}_{\mathbf{i}t})$ and $S_\varepsilon(\tilde{\mathbf{Z}}_{\mathbf{i}t})$ are written as a function of $\tilde{\mathbf{Z}}_{\mathbf{i}t}$, but there is no restrictions on which variables may enter each of these terms (Millimet and Roy, 2016).

In our estimation, we assume (following Millimet and Roy, 2016, and Farré et al., 2013) that the heteroskedastic functions follows $S_u(\tilde{\mathbf{Z}}_{it}) = \exp(-\tilde{\mathbf{Z}}'_{it}\boldsymbol{\theta})$. We implement the K-V estimator as follows. First, we estimate equation (4) by heteroskedastic probit regression to generate the predicted probability of financial inclusion (variables generating heteroscedasticity discussed in next section).[19] This predicted probability is then employed as an instrument for the binary financial inclusion. Therefore, our endogeneity correction follows three stages in which the background (or zero) stage involves generating the instrument, and then estimating the standard 2SLS method employing the instrument constructed in the background stage.

4. Results and Discussions

4.1 Pooled OLS Estimation: The Effect on Consumption

The results are presented in Table 2 for the full sample and also disaggregated by the rural and urban samples. In all cases and for all categories of consumption, the coefficient of financial inclusion is positive and significant at any conventional level. For example, in the full sample financially included households (that is owning a transaction account) has about 14% higher consumption than financially excluded households. Among different categories, the highest effect of financial inclusion is found on food consumption in all samples. However, these results are biased and inconsistent because of endogeneity of financial inclusion discussed in Section 3.2.

Insert Table 2 and Figures 1-4 here

Before presenting endogeneity-corrected results, we estimate the effect for different quantiles, which will be crucial to explain our results for the consumption inequality. The quantile regression results are displayed in Figures 1-4. As shown in Figure 1, the effect of financial inclusion, although positive and significant for quantiles, secularly diminishes with higher level of consumption. The same is true for food and utility consumption (Figures 2 and

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[19] Similar steps have also been followed by Berg, Emran and Shilpi (2015) and Bakshi, Mallick and Ulubaşoğlu (2019).

3 respectively). In the case of (non-food) necessity consumption, the effect varies across consumption quantiles but the pattern still weakly holds. Although these results clearly indicate that financial inclusion decreases consumption inequality, endogeneity correction is required for a proper assessment that we conduct in Section 4.2.2.

4.2 Heteroscedasticity-based IV estimation

Before presenting the results, it is imperative to discuss the construction of the instrument at the background stage. Ideally, variables that are considered to generate heteroscedasticity are included in $\tilde{\mathbf{Z}}$, but identifying these variables is not always an easy task. Therefore, several studies, including Klein and Vella (2009b), include all variables in the $\mathbf{Z}$ vector in the background stage ($\mathbf{Z} = \tilde{\mathbf{Z}}$) that we also follow in our baseline estimation. Nonetheless, we need to understand mechanisms through which (some of) these variables in $\mathbf{Z}$ contribute to heteroscedasticity.

Households differ in their access to financial services depending on the overall economic and financial development of where they reside. Given the level of development in a particular location/region, households also differ in their access to financial services depending on their economic and demographic characteristics.

In any country, level of economic development is usually not uniform across regions. In the case of China, this is more pertinent as, even with increasing contribution of the private sector, development process is still heavily regulated and planned by the government. For example, regions especially in the coastal areas are more industrialized than the rest of the country (a notable example is creation of the export processing zones); access to banking and other financial institutions is also greater in these regions. Another source of regional disparity is the Hukou (discussed in the previous section), which is a unique household registration system in China that restricts migration within the country. The rural Hukous are very much underdeveloped compared to their urban counterparts, and households registered in one type of Hukou are not generally allowed to permanently migrate to another type, thus permanently dividing households in their financial inclusion. Therefore, the geographic variations are potentially important factors contributing to heteroscedasticity.

At the household level, income is one of the most important factors that generates heteroscedasticity; higher income households need better access to financial institutions to manage financial transactions. Financial literacy or knowledge is also important for financial

transactions, thus education is another factor that potentially generate heteroscedasticity across households in their access to financial institutions.[20]

Insert Table 3 here

To verify the above arguments in the data, we first estimate equation (4) by the heteroscedasticity probit regression by including all of the explanatory variables, that is, $\mathbf{Z} = \tilde{\mathbf{Z}}$. We find that income, education, and geographic variation (province and Hukou) are among the factors contributing to residual variance (Column 2 in Table 3). The results are in line with our arguments above. Additionally, we find that family size and marital status also contribute to heteroscedasticity. In our robustness exercise, we include only these significant variables as the sources of heteroscedasticity at the background stage (i.e., $\tilde{\mathbf{Z}}_{it}$) to construct instrument. To reconfirm their role in contributing to heteroscedasticity, we re-estimate the heteroscedasticity probit model including only these variables and find that their contributions remain robust in this alternative specification (Column 3 in Table 3).[21] The null hypotheses of homoscedasticity of the residuals are rejected at any conventional level in both cases.

4.2.1 IV Estimation: The Effect on Consumption

The results for the full sample are presented in Table 4.1, Panel A. The coefficient of financial inclusion is positive, large in magnitude and statistically significant at any conventional level. In the case of total consumption, the coefficient is 1.01 implying that financially included households have about 100% higher consumption than financially excluded households. The effect varies across different consumption categories ranging from the highest 112% for food to the lowest 48% for (non-food) necessities. To understand if the

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[20] Sen and De (2018) argue that in India the poor are constrained to access banking because of their financial illiteracy and adverse geographical location. Therefore, even though they get government social welfare benefits through their bank accounts, they spend less on children education compared to the households receiving cash transfers.

[21] When the heteroscedasticity probit model is estimated separately for rural and urban, and by income groups, the variables generating heteroscedasticity are not uniform across specifications. The variables that generate heteroscedasticity in each case are mentioned in the notes for Tables B1.1 to B2.3 in Online Appendix B. We do not report the heteroscedasticity probit regression for these cases, but it must be mentioned that in all cases the null of homoscedasticity is rejected at any conventional level.

effects vary across income groups, we estimate the results separately for households in the bottom and top 50 income percentiles. Panels B and C report the results for these two income groups, respectively. The coefficients of *FI* are larger for the top 50 income percentile compared to bottom 50 income percentile for all categories of consumption except necessities although for both groups the magnitudes are smaller compared to those in the full sample. It is worth mentioning that the background stage regressions to construct the instrument are estimated separately for each income percentile. The 2SLS estimations give different LATE (local average treatment effect) estimates for the two groups and therefore they are not strictly comparable.[22]

Insert Tables 4.1-4.3 here

Given that rural and urban households differ greatly in terms of their financial inclusion (discussed in Section 2, also Table 1), and also that rural-urban disparity in economic development is enormous in China (discussed in Section 3), we now estimate the results for the rural and urban samples separately.[23] The results for the rural sample are presented in Table 4.2. Financial inclusion increases total, food and necessary consumption by 58%, 80% and 56%, respectively, but there is no effect on utilities (Panel A). In the urban sample, financial inclusion increases all categories of consumption, and magnitude of the coefficients are larger than those obtained in the rural sample (Table 4.3). These magnitudes are comparable with those in Fitzpatrick (2015) who found that financial inclusion increases consumption of household appliances by 62%, and Dimova and Adebowale (2018) who found that financial inclusion increases per capita expenditure by 62%-67%.

There is also economic inequality (and consequently variation in financial inclusion) within both rural and urban areas and it is more severe in urban areas (Gustafsson, Shi and Sicular, 2008). When the rural sample is disaggregated by bottom and top 50 income percentiles, we do not find any effect in either income percentiles (Table 4.2, Panels B and C). In contrast, the effect in the urban sample is significant only in bottom 50% income percentile (Table 4.3, Panels B and C).

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[22] The magnitudes of the LATE estimates are also not comparable with the OLS estimates in Table 2, which are much smaller. Fitzpatrick (2015) also reported big differences in these two sets of estimates.

[23] We divide our sample into rural and urban following the classification from the National Bureau of Statistics China.

In general (Table 4.1-4.3), the effect of financial inclusion on consumption is greater on food than other two categories. The effect is greater in urban than rural areas and more pronounced among the lower income households in urban areas.

The instruments constructed in the background stage are relevant in all cases. This is evaluated by the values of the *F*-statistics in the first-stage regressions that regress the endogenous variable (financial inclusion) on the instrument (and the set of controls) that these are well above 10 in all cases (Stock, Wright and Yogo, 2002).

4.2.2 IV Estimation: The Effect on Consumption Inequality

We construct the consumption inequality for each category *j* separately for full, rural, urban and different income groups. It is worth reiterating that *CI* in equation (1) is symmetric around the median, and consumption inequality decreases when consumption of a household moves closer to the median consumption level (see footnote 11). However, in Section 4.1 (and Figures 1-4), we have shown that the effect of financial inclusion is larger for households with lower level of consumption and secularly decreases with consumption. Therefore, a negative coefficient on *FI* in the regression of consumption inequality would imply that financial inclusion benefits more (less) the households below (above) the median consumption level.

Insert Tables 5.1-5.3 here

The results for the full sample are presented in Tables 5.1 (Panel A). The coefficients of financial inclusion are negative and statistically significant suggesting that financial inclusion benefits more to the households below than above the median consumption level. Although the estimated coefficients differ by large magnitudes (ranging from -0.34 to -9.3) across different consumption categories, their standardized coefficients (reported in brackets) differ by smaller magnitudes. One standard deviation increase in access to financial instrument decreases consumption inequality by about 0.15 percentage points in the case of food and necessities, respectively, and 0.26 percentage points for utilities. This inequality-reducing effect is more pronounced among the top 50 income percentile; for them inequality decreases for food and utilities, while for the bottom 50 income percentile inequality decreases for necessities (Panels B and C).

However, financial inclusion has no effect on consumption inequality in the rural sample (Table 5.2). In the urban sample, in contrast, consumption inequality decreases for food,

and when further disaggregated by income percentiles, it decreases for utilities in the case of bottom 50 income percentile (Table 5.3, Panels B and C).

In all cases, the *F*-statistic from the first-stage regressions are well above 10 suggesting the relevance of the instrument.

4.2.3 Robustness Checks

We check the robustness of the benchmark results discussed in Sections 4.2.2 and 4.2.3 in a variety of ways. Our first two robustness checks retain the same measure of financial inclusion. The first exercise involves including the squared value of original instrument as an additional instrument (see, Millimet and Roy (2016) for a similar exercise). These results are presented in Online Appendix A. For the second robustness exercise, we construct instrument by including only those variables in the background stage regression that are found to generate heteroscedasticity (see Section 4.2). The results are presented in Online Appendix B. Finally, we augment the measure of financial inclusion as owning a transaction account or a credit card. It is important to note that in almost all cases households owning a credit card also own a transaction account. For example, 62% of the sample households own a bank account, while 63% own either a bank account or credit card. There is no considerable difference between urban and rural areas in terms of the two measures of financial inclusion (70% vs. 72% in urban; 47% vs. 48% in rural). The results are presented in Online Appendix C. In all cases, the results are strongly robust to the benchmark results both in terms of the magnitudes of the coefficients of financial inclusion and their significance level.

4.2.4 Overtime Changes in Consumption Inequality

The previous results document that financial inclusion decreases consumption inequality. The effect is pronounced in the case of food consumption. From welfare perspective it is also important to understand whether consumption inequality changes over time. Our panel data allows us to address this issue by separately analyzing the three waves of survey—2011, 2013 and 2015.

Insert Table 6 here

The results are summarized in Table 6. We estimate only for the full sample to exploit a large sample size, and report only the standardized coefficients. The effect on total consumption inequality decreases over time; one standard deviation increase in financial

inclusion decreased consumption inequality by 0.73 percentage points in 2011, while the same change in financial inclusion decreased consumption inequality by 0.35 and 0.37 percentage points in 2013 and 2015, respectively. More importantly, the effect on food consumption inequality ceases to exist in subsequent periods. These results suggest that the diminishing effects over time of financial inclusion. This may be due to smaller scope for further reducing consumption inequality once it is already low, a concept similar to diminishing marginal returns. For other two consumption categories, there is no clear pattern.

5. Concluding Remarks

The impact of financial inclusion on household welfare is a very relevant but an unexplored area of research. This paper investigates this important question in the context of China. It uses a unique dataset that contains three waves of household survey and corrects the endogeneity of financial inclusion employing an innovative method developed by Klein and Vella that does not rely on exclusion restrictions but exploits heteroscedasticity to estimate the causal effect.

The results indicate that financial inclusion almost doubles household consumption. This effect is greater in developed urban than underdeveloped rural areas. In general, the effect is stronger for food consumption. Financial inclusion decreases inequality in overall and food consumption, but this effect is concentrated mainly to the urban households. These findings are very important from welfare perspectives signifying the crucial role played by financial inclusion since inequality in food consumption is more concerning than inequality in consumption in durable or luxury goods. Although, we did not investigate the consumption of durable and luxury goods, it would be an interesting extension for further research.

Regional or geographic (including rural vs. urban) variation in the impact on consumption and its inequality is a direct consequence of uneven development. In this regard, the role of the government is to ensure the universal opportunity for financial inclusion for all citizens. A prominent example is The Prime Minister's *Jan Dhan Yojana* (PMJDY), a scheme launched in 2014 by the Indian government, to ensure, among others, universal access to banking facilities with at least one basic bank account for every household, financial literacy and access to credit, insurance and pension facility (PMJDY, 2019). The impact of such universal financial inclusion initiative on household welfare, especially on inequality, would be an interesting topic for future research.

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Tables and Figures

Table 1A: Descriptive statistics

Variable	Full sample		Urban		Rural		T-test
	Mean	SD	Mean	SD	Mean	SD	p value
Annual expenditures on food (log)	9.223	0.766	9.454	0.648	8.822	0.788	0.000
Annual expenditures on utilities (log)	7.352	0.909	7.622	0.779	6.883	0.929	0.000
Annual expenditures on non-food daily necessities (log)	6.661	1.014	6.827	0.989	6.379	0.993	0.000
Annual total expenditures (log)	9.500	0.692	9.722	0.585	9.115	0.694	0.000
Consumption inequality of food	0.428	0.587	0.404	0.661	1.753	4.044	0.000
Consumption inequality of utilities	1.110	6.557	1.343	8.167	4.011	27.062	0.000
Consumption inequality of necessities	1.664	12.518	4.466	32.592	4.881	31.666	0.000
Consumption inequality of total	0.370	0.477	0.301	0.398	1.072	2.395	0.000
Annual household disposable income (log)	10.362	1.222	10.596	1.158	9.957	1.224	0.000
Owning a transaction account (1=yes; 0=no)	0.616	0.486	0.699	0.459	0.471	0.499	0.000
Average education level	3.448	1.381	3.886	1.417	2.688	0.905	0.000
Household size	3.626	1.602	3.331	1.411	4.137	1.777	0.000
Gender of hh head	0.785	0.411	0.735	0.441	0.873	0.333	0.000
Marital status of the hh head (1=married; 0=otherwise)	0.905	0.293	0.896	0.305	0.920	0.271	0.000
Rural Hukou (1=yes; 0=no)	0.559	0.497	0.339	0.473	0.940	0.237	0.000
Communist party membership (1=yes; 0=no)	0.209	0.406	0.265	0.441	0.111	0.314	0.000

Data sources: CHFS 2011, 2013, 2015 and authors' calculation. ^: Inequality calculated using Equation (1) in the text. *t*-test tests on the equality of means for the rural and urban samples under the assumption of unequal variances.

Table 1B: Summary statistics of some key variables by year

Variable	2011		2013		2015	
	Mean	SD	Mean	SD	Mean	SD
Transaction Account	0.577	0.494	0.592	0.491	0.698	0.459
Food exp (log)	9.125	0.763	9.289	0.744	9.283	0.780
Utilities exp (log)	7.192	0.935	7.408	0.899	7.510	0.848
Necessity exp (log)	6.323	0.936	6.808	0.997	6.936	1.009
Total exp (log)	9.367	0.698	9.572	0.670	9.601	0.679
CI_{food}	0.521	0.826	0.714	1.123	0.889	1.424
$CI_{utilities}$	2.020	10.481	2.267	12.699	2.815	18.509
$CI_{necessities}$	4.092	34.700	2.495	16.408	3.853	25.489
CI_{total}	0.514	0.792	0.517	0.766	0.487	0.686
Income	10.138	1.195	10.471	1.218	10.548	1.215

Table 2: The impact of financial inclusion on consumption (pooled OLS)

	(1)	(2)	(3)	(4)
	Total	Food	Utilities	Necessities
Panel A: Full Sample				
Financial Inclusion	0.140***	0.153***	0.096***	0.129***
	(15.117)	(14.299)	(7.245)	(8.350)
Observations	17653	17625	17507	16951
Panel B: Rural Sample				
Financial Inclusion	0.150***	0.165***	0.084***	0.145***
	(9.222)	(8.710)	(3.746)	(5.900)
Observations	6446	6436	6384	6259
Panel C: Urban Sample				
Financial Inclusion	0.123***	0.132***	0.098***	0.116***
	(11.220)	(10.508)	(6.099)	(5.827)
Observations	11207	11189	11123	10692

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table 3: Background stage regression: Identifying variables generating heteroscedasticity

Variable	Level	Residual Squared	Residual Squared
	(1)	**(2)**	**(3)**
Income	0.139***	-0.069***	-0.070***
	(4.071)	(-4.117)	(-4.210)
Education	0.147***	0.112***	0.106***
	(3.872)	(5.535)	(5.648)
Size	-0.035***	0.041***	0.042***
	(-3.447)	(2.736)	(2.838)
Male	0.058**	-0.026	
	(2.347)	(-0.537)	
Marry	0.002	-0.142**	-0.153**
	(0.062)	(-2.021)	(-2.225)
Hukou	-0.074***	0.008	
	(-2.659)	(0.122)	
Communist Party	0.049*	-0.058	
	(1.803)	(-1.100)	
Year Fixed Effects	Yes	Yes	Yes
Rural-Urban Fixed Effects	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes
Background Stage: Heteroskedastic Probit		122.052	120.48
LR test of homoscedasticity χ^2 and p-value		0.000	0.000

*, **, *** represent significance level at 1, 5, 10 percent level, respectively. Robust t-statistics reported in parentheses.

Table 4.1: The impact of financial inclusion on consumption (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	1.005***	1.118***	1.010***	0.475***
(K-V estimator)	(10.673)	(10.472)	(7.696)	(3.391)
First-stage F		128.406		
Observations	17653	17625	17507	16951
Panel B: Bottom 50%				
Financial Inclusion	0.552***	0.653***	0.354*	0.610***
	(4.075)	(4.183)	(1.834)	(2.645)
First-stage F		49.570		
Observations	8877	8861	8791	8512
Panel C: Top 50%				
Financial Inclusion	0.891***	0.997***	1.051***	0.038
	(6.901)	(6.615)	(6.104)	(0.196)
First-stage F		35.709		
Observations	8325	8314	8269	8002

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table 4.2: The impact of financial inclusion on consumption (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.576***	0.797***	0.403	0.554*
	(2.692)	(3.138)	(1.313)	(1.677)
First-stage F		36.310		
Observations	6446	6436	6384	6259
Panel B: Bottom 50%				
Financial Inclusion	0.253	0.371	-0.124	-0.201
	(1.145)	(1.488)	(-0.402)	(-0.633)
First-stage F		14.891		
Observations	2902	2896	2869	2790
Panel C: Top 50%				
Financial Inclusion	0.219	0.309	0.364	0.307
	(1.164)	(1.415)	(1.489)	(1.107)
First-stage F		17.516		
Observations	2885	2882	2865	2823

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table 4.3: The impact of financial inclusion on consumption (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.822***	0.914***	0.628***	0.362**
	(7.805)	(7.723)	(4.162)	(2.111)
First-stage F		61.276		
Observations	11207	11189	11123	10692
Panel B: Bottom 50%				
Financial Inclusion	0.702***	0.628***	0.940***	0.665**
	(4.536)	(3.769)	(4.168)	(2.529)
First-stage F		25.689		
Observations	4921	4913	4875	4683
Panel C: Top 50%				
Financial Inclusion	0.164	0.138	-0.032	0.234
	(1.318)	(0.930)	(-0.186)	(0.941)
First-stage F		15.801		
Observations	4798	4792	4768	4552

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table 5.1: The impact of financial inclusion on consumption inequality (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.885*** [-0.571]	-0.344* [-0.149]	-7.448*** [-0.261]	-9.332** [-0.166]
	(-6.882)	(-1.881)	(-2.905)	(-2.368)
First-stage F	129.817	129.512	125.621	127.403
Observations	17653	17653	17653	17653
Panel B: Bottom 50%				
Financial Inclusion	-0.967*** [-0.364]	-0.458	-0.491	-24.780*** [-0.286]
	(-2.810)	(-1.055)	(-0.077)	(-3.218)
First-stage F	51.798	50.944	48.666	49.864
Observations	8877	8877	8877	8877
Panel C: Top 50%				
Financial Inclusion	-0.310*** [-0.407]	-0.166* [-0.159]	-4.110*** [-0.234]	-7.152
	(-4.485)	(-1.875)	(-3.220)	(-1.453)
First-stage F	35.713	36.227	34.818	35.353
Observations	8325	8325	8325	8325

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Standardized coefficients in brackets—reported only for statistically significant coefficients.

Table 5.2: The impact of financial inclusion on consumption inequality (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.980	-0.324	10.041	-9.988
	(-1.063)	(-0.216)	(0.570)	(-1.441)
First-stage F	37.727	38.001	36.124	36.217
Observations	6446	6446	6446	6446
Panel B: Bottom 50%				
Financial Inclusion	-0.387	-0.505	20.369	-4.271
	(-0.324)	(-0.256)	(0.632)	(-0.919)
First-stage F	14.857	14.884	14.441	14.683
Observations	2902	2902	2902	2902
Panel C: Top 50%				
Financial Inclusion	-0.265	-0.342	-3.677	4.019
	(-0.749)	(-0.757)	(-0.810)	(1.298)
First-stage F	18.364	18.569	17.740	17.417
Observations	2885	2885	2885	2885

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table 5.3: The impact of financial inclusion on consumption inequality (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.472*** [-0.545]	-0.558*** [-0.390]	-0.154	-3.016
	(-5.994)	(-4.803)	(-0.106)	(-0.581)
First-stage F	61.118	62.016	59.751	60.778
Observations	11207	11207	11207	11207
Panel B: Bottom 50%				
Financial Inclusion	-0.370*** [-0.335]	-0.077	1.313	-12.489** [-0.212]
	(-2.656)	(-0.430)	(0.564)	(-2.111)
First-stage F	26.046	26.411	25.130	26.260
Observations	4921	4921	4921	4921
Panel C: Top 50%				
Financial Inclusion	-0.033	0.116	-0.204	10.181
	(-0.535)	(1.306)	(-0.128)	(1.321)
First-stage F	15.674	15.859	15.317	15.338
Observations	4798	4798	4798	4798

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Standardized coefficients in brackets—reported only for statistically significant coefficients.

Table 6: Change over time of the impact of financial inclusion on consumption inequality: Standardized coefficient (only for the full sample)

	Total	Food	Utilities	Necessities
2011	-0.733***	-0.280**	-0.542***	-0.110
2013	-0.349***	-0.021	-0.035	-0.247**
2015	-0.370***	0.084	-0.242***	0.016

*, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Figures

Figure 1: Quantile regression results for (log) total consumption
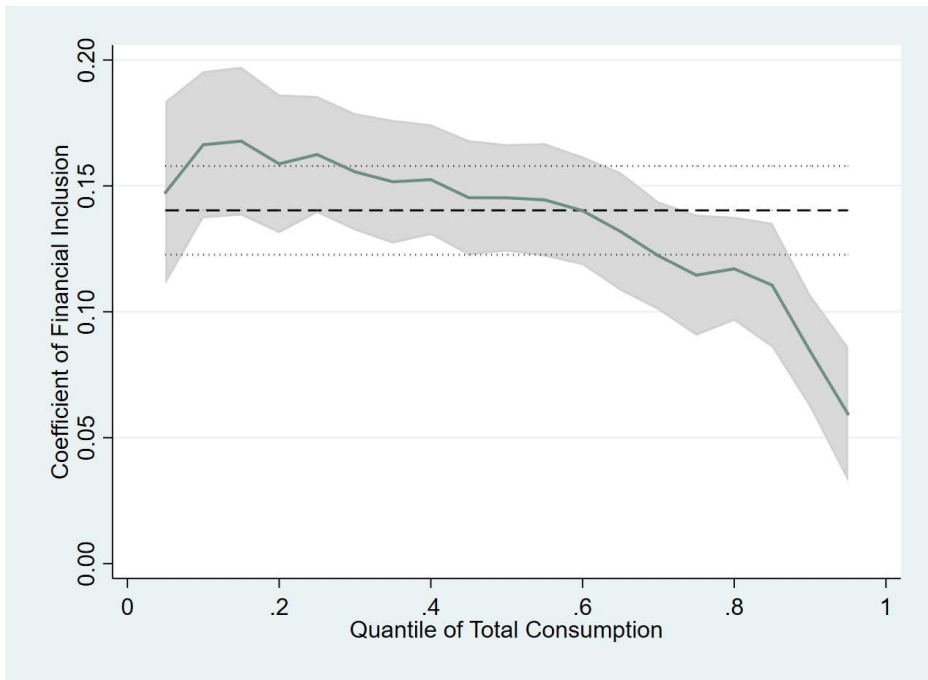
Figure 2: Quantile regression results for (log) food consumption
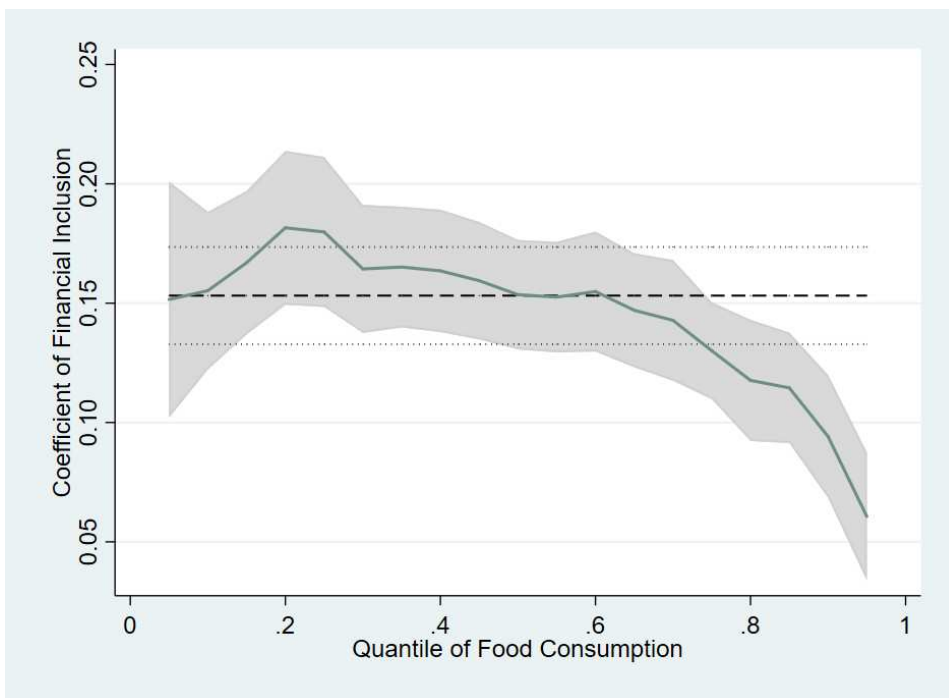
Figure 3: Quantile regression results for (log) utility consumption
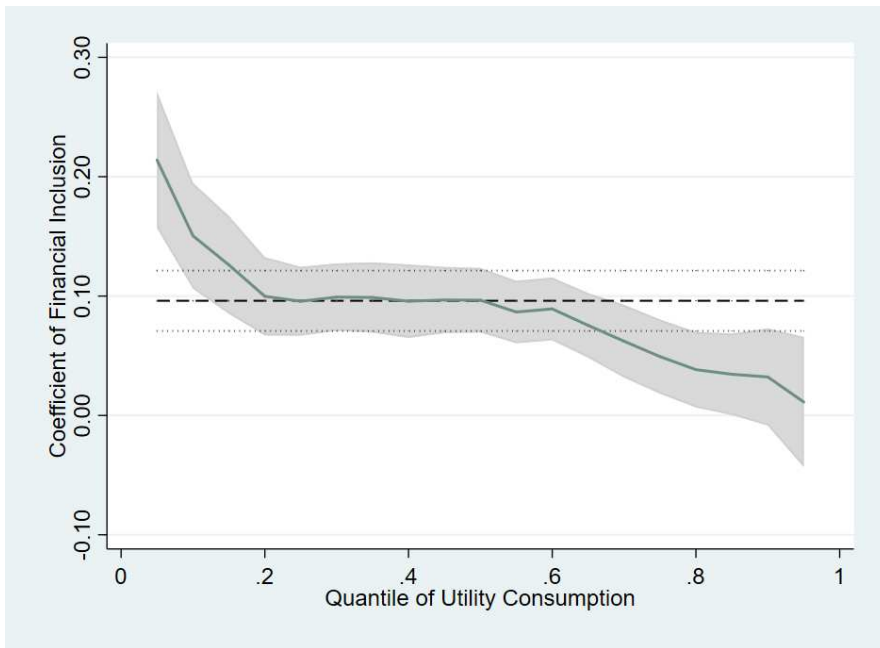
Figure 4: Quantile regression results for (log) necessity consumption
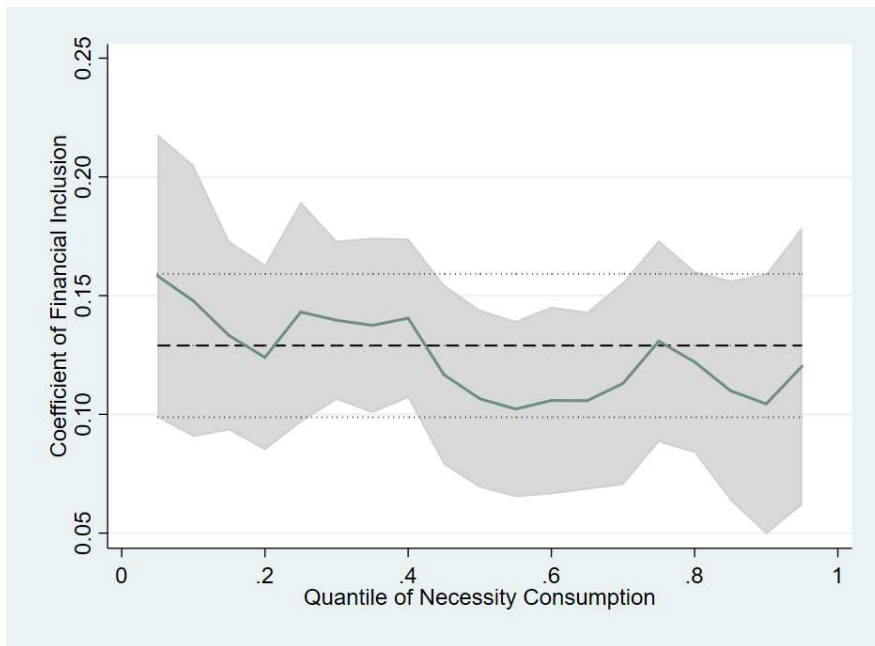
Appendix (For Online Publication Only)

Appendix A: KV Estimation of Tables 4.1 - 5.3 (predicted value in the background stage and its square are the IVs)

Table A1.1: The impact of financial inclusion on consumption (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	1.000***	1.112***	1.010***	0.462***
	(10.630)	(10.428)	(7.695)	(3.300)
First-stage F		124.994		
p-value of Hansen J-stat	0.057	0.058	0.738	0.007
Observations	17653	17625	17507	16951
Panel B: Bottom 50%				
Financial Inclusion	0.548***	0.644***	0.359*	0.605***
	(4.051)	(4.134)	(1.859)	(2.627)
First-stage F		48.232		
p-value of Hansen J-stat	0.500	0.260	0.043	0.141
Observations	8877	8861	8791	8512
Panel C: Top 50%				
Financial Inclusion	0.892***	0.996***	1.050***	0.032
	(6.902)	(6.602)	(6.104)	(0.167)
First-stage F		35.362		
p-value of Hansen J-stat	0.442	0.294	0.975	0.349
Observations	8325	8314	8269	8002

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table A1.2: The impact of financial inclusion on consumption (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.567***	0.790***	0.400	0.554*
	(2.659)	(3.118)	(1.304)	(1.678)
First-stage F	35.200			
p-value of Hansen J-stat	0.589	0.664	0.407	0.646
Observations	6446	6436	6384	6259
Panel B: Bottom 50%				
Financial Inclusion	0.252	0.375	-0.109	-0.214
	(1.144)	(1.505)	(-0.354)	(-0.674)
First-stage F	14.645			
p-value of Hansen J-stat	0.949	0.848	0.423	0.418
Observations	2902	2896	2869	2790
Panel C: Top 50%				
Financial Inclusion	0.232	0.318	0.344	0.277
	(1.248)	(1.476)	(1.431)	(1.009)
First-stage F	17.088			
p-value of Hansen J-stat	0.651	0.808	0.642	0.332
Observations	2885	2882	2865	2823

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table A1.3: The impact of financial inclusion on consumption (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.793***	0.885***	0.651***	0.332*
	(7.633)	(7.567)	(4.339)	(1.944)
First-stage F	59.570			
p-value of Hansen J-stat	0.000	0.003	0.013	0.001
Observations	11207	11189	11123	10692
Panel B: Bottom 50%				
Financial Inclusion	0.699***	0.618***	0.937***	0.632**
	(4.526)	(3.723)	(4.162)	(2.417)
First-stage F	24.960			
p-value of Hansen J-stat	0.269	0.276	0.450	0.039
Observations	4921	4913	4875	4683
Panel C: Top 50%				
Financial Inclusion	0.169	0.134	-0.024	0.302
	(1.364)	(0.903)	(-0.138)	(1.222)
First-stage F	16.128			
p-value of Hansen J-stat	0.655	0.632	0.127	0.005
Observations	4798	4792	4768	4552

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively..

Table A2.1: The impact of financial inclusion on consumption inequality (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-1.040***	-0.703***	-7.095***	-9.085**
	(-8.033)	(-3.869)	(-2.768)	(-2.315)
First-stage F	126.435	126.155	122.386	124.091
p-value of Hansen J-stat	0.000	0.000	0.002	0.503
Observations	17653	17653	17653	17653
Panel B: Bottom 50%				
Financial Inclusion	-1.117***	-0.607	2.853	-23.665***
	(-3.249)	(-1.437)	(0.455)	(-3.224)
First-stage F	50.418	49.602	47.398	48.545
p-value of Hansen J-stat	0.000	0.135	0.009	0.629
Observations	8877	8877	8877	8877
Panel C: Top 50%				
Financial Inclusion	-0.330***	-0.186**	-4.073***	-9.202**
	(-4.768)	(-2.101)	(-3.205)	(-1.983)
First-stage F	35.368	35.881	34.499	35.034
p-value of Hansen J-stat	0.000	0.000	0.751	0.212
Observations	8325	8325	8325	8325

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table A2.2: The impact of financial inclusion on consumption inequality (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.113	0.263	12.736	-7.650
	(-0.124)	(0.175)	(0.728)	(-1.321)
First-stage F	36.626	36.883	35.052	35.138
p-value of Hansen J-stat	0.000	0.000	0.205	0.540
Observations	6446	6446	6446	6446
Panel B: Bottom 50%				
Financial Inclusion	0.086	-0.065	19.367	-5.982
	(0.073)	(-0.033)	(0.809)	(-1.438)
First-stage F	14.621	14.638	14.208	14.440
p-value of Hansen J-stat	0.000	0.002	0.963	0.409
Observations	2902	2902	2902	2902
Panel C: Top 50%				
Financial Inclusion	-0.324	-0.379	-3.548	3.990
	(-0.920)	(-0.845)	(-0.782)	(1.290)
First-stage F	17.904	18.089	17.304	16.988
p-value of Hansen J-stat	0.215	0.510	0.653	0.838
Observations	2885	2885	2885	2885

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table A2.3: The impact of financial inclusion on consumption inequality (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.556***	-0.668***	-1.255	-3.650
	(-7.079)	(-5.954)	(-0.902)	(-0.715)
First-stage F	59.418	60.295	58.129	59.099
p-value of Hansen J-stat	0.000	0.001	0.010	0.506
Observations	11207	11207	11207	11207
Panel B: Bottom 50%				
Financial Inclusion	-0.394***	-0.117	1.057	-9.990*
	(-2.833)	(-0.659)	(0.456)	(-1.810)
First-stage F	25.292	25.643	24.433	25.510
p-value of Hansen J-stat	0.076	0.032	0.197	0.227
Observations	4921	4921	4921	4921
Panel C: Top 50%				
Financial Inclusion	-0.045	0.113	-0.234	4.933
	(-0.739)	(1.283)	(-0.149)	(0.778)
First-stage F	16.001	16.140	15.643	15..666
p-value of Hansen J-stat	0.092	0.184	0.914	0.231
Observations	4798	4798	4798	4798

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Appendix B: KV Estimation of Tables 4.1 - 5.3 (only the variables generating heteroscedasticity included in the background stage)

Table B1.1: The impact of financial inclusion on consumption (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	1.016***	1.129***	1.015***	0.470***
	(10.732)	(10.521)	(7.708)	(3.333)
First-stage F			128.282	
Observations	17653	17625	17507	16951
Panel B: Bottom 50%				
Financial Inclusion	0.550***	0.666***	0.344*	0.517**
	(3.999)	(4.186)	(1.762)	(2.218)
First-stage F			49.338	
Observations	8877	8861	8791	8512
Panel C: Top 50%				
Financial Inclusion	0.847***	0.955***	0.972***	0.050
	(6.348)	(6.121)	(5.449)	(0.249)
First-stage F			35.511	
Observations	8325	8314	8269	8002

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Variables in the background stage (heteroscedasticity probit regressions): Panels A – province fixed-effects, year fixed effects, rural-urban fixed effects, income, education, size, marry; Panel B - province fixed-effects, year fixed effects, rural-urban fixed effects, income, education; Panel C – income, size.

Table B1.2: The impact of financial inclusion on consumption (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
	Panel A: All			
Financial Inclusion	0.500**	0.708***	0.364	0.594*
	(2.352)	(2.817)	(1.180)	(1.792)
First-stage F	36.202			
Observations	6446	6436	6384	6259
	Panel B: Bottom 50%			
Financial Inclusion	0.255	0.341	-0.102	-0.049
	(1.136)	(1.344)	(-0.316)	(-0.148)
First-stage F	14.667			
Observations	2902	2896	2869	2790
	Panel C: Top 50%			
Financial Inclusion	0.240	0.334	0.373	0.307
	(1.223)	(1.475)	(1.458)	(1.070)
First-stage F	16.692			
Observations	2885	2882	2865	2823

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Variables in the background stage (heteroscedasticity probit regressions): Panels A – province fixed-effects, year fixed effects, income, education, Hukou; Panel B - province fixed-effects, year fixed effects, marry, Hukou; Panel C - province fixed-effects, year fixed effects, education, male.

Table B1.3: The impact of financial inclusion on consumption (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.842***	0.938***	0.668***	0.328*
	(7.691)	(7.572)	(4.229)	(1.857)
First-stage F			60.570	
Observations	11207	11189	11123	10692
Panel B: Bottom 50%				
Financial Inclusion	0.732***	0.658***	0.956***	0.611**
	(4.572)	(3.860)	(4.138)	(2.257)
First-stage F			25.492	
Observations	4921	4913	4875	4683
Panel C: Top 50%				
Financial Inclusion	0.086	0.128	-0.256	-0.049
	(0.631)	(0.814)	(-1.316)	(-0.181)
First-stage F			15.192	
Observations	4798	4792	4768	4552

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Variables in the background stage (heteroscedasticity probit regressions): Panels A - province fixed-effects, year fixed effects, income, education; Panel B - province fixed-effects, year fixed effects, income, education, size; Panel C - province fixed-effects, year fixed effects.

Table B2.1: The impact of financial inclusion on consumption inequality (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.906***	-0.361**	-7.501***	-9.689**
	(-6.983)	(-1.960)	(-2.947)	(-2.424)
First-stage F	129.718	129.408	125.509	127.281
Observations	17653	17653	17653	17653
Panel B: Bottom 50%				
Financial Inclusion	-0.853**	-0.368	0.050	-24.703***
	(-2.474)	(-0.860)	(0.008)	(-3.239)
First-stage F	51.610	50.755	48.438	49.642
Observations	8877	8877	8877	8877
Panel C: Top 50%				
Financial Inclusion	-0.281***	-0.185**	-4.211***	-6.424
	(-3.927)	(-1.993)	(-3.264)	(-1.284)
First-stage F	35.527	36.022	34.628	35.158
Observations	8325	8325	8325	8325

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Variables in the background stage (heteroscedasticity probit regressions): Same as in Table B1.1.

Table B2.2: The impact of financial inclusion on consumption inequality (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-1.109	-0.639	22.205	-9.975
	(-0.724)	(-0.279)	(0.705)	(-0.720)
First-stage F	36.450	36.851	34.812	34.861
Observations	6446	6446	6446	6446
Panel B: Bottom 50%				
Financial Inclusion	-1.462	-2.122	22.336	-1.320
	(-1.131)	(-1.033)	(0.633)	(-0.264)
First-stage F	14.630	14.671	14.226	14.472
Observations	2902	2902	2902	2902
Panel C: Top 50%				
Financial Inclusion	-0.567	-0.540	-7.759*	4.474
	(-1.524)	(-1.165)	(-1.947)	(1.341)
First-stage F	17.503	17.740	16.895	16.657
Observations	2885	2885	2885	2885

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively. Variables in the background stage (heteroscedasticity probit regressions): Same as in Table B1.2.

Table B2.3: The impact of financial inclusion on consumption inequality (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
	Panel A: All			
Financial Inclusion	-0.472***	-0.534***	-0.154	-3.356
	(-5.785)	(-4.502)	(-0.106)	(-0.588)
First-stage F	60.476	61.387	59.088	60.091
Observations	11207	11207	11207	11207
	Panel B: Bottom 50%			
Financial Inclusion	-0.412***	-0.151	1.397	-13.900**
	(-2.913)	(-0.861)	(0.534)	(-2.473)
First-stage F	25.848	26.238	24.947	26.059
Observations	4921	4921	4921	4921
	Panel C: Top 50%			
Financial Inclusion	-0.088	0.135	-0.479	4.113
	(-1.326)	(1.455)	(-0.278)	(0.624)
First-stage F	15.108	15.267	14.729	14.754
Observations	4798	4798	4798	4798

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.
Variables in the background stage (heteroscedasticity probit regressions): Same as in Table B1.3.

Appendix C: KV Estimation of Tables 3.1 - 4.3 (financial inclusion redefined to include credit card ownership)

Table C1.1: The impact of financial inclusion on consumption (full sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.998***	1.106***	0.977***	0.493***
	(11.133)	(10.901)	(7.734)	(3.580)
First-stage F	153.195			
Observations	17518	17490	17374	16825
Panel B: Bottom 50%				
Financial Inclusion	0.559***	0.662***	0.359*	0.576**
	(3.986)	(4.123)	(1.804)	(2.512)
First-stage F	55.437			
Observations	8836	8820	8751	8474
Panel C: Top 50%				
Financial Inclusion	0.949***	1.048***	1.110***	0.145
	(7.615)	(7.190)	(6.550)	(0.745)
First-stage F	41.107			
Observations	8235	8224	8180	7918

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table C1.2: The impact of financial inclusion on consumption (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
	Panel A: All			
Financial Inclusion	0.637***	0.826***	0.636**	0.693**
	(3.083)	(3.402)	(2.106)	(2.183)
First-stage F	40.162			
Observations	6428	6418	6367	6241
	Panel B: Bottom 50%			
Financial Inclusion	0.234	0.349	-0.181	-0.086
	(1.028)	(1.360)	(-0.559)	(-0.266)
First-stage F	15.398			
Observations	2902	2896	2869	2790
	Panel C: Top 50%			
Financial Inclusion	0.264	0.357	0.446*	0.326
	(1.380)	(1.582)	(1.817)	(1.149)
First-stage F	18.654			
Observations	2869	2866	2850	2807

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table C1.3: The impact of financial inclusion on consumption (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	0.814***	0.902***	0.611***	0.379**
	(8.075)	(7.946)	(4.114)	(2.243)
First-stage F		72.131		
Observations	11090	11072	11007	10584
Panel B: Bottom 50%				
Financial Inclusion	0.710***	0.641***	0.934***	0.677**
	(4.459)	(3.730)	(4.016)	(2.558)
First-stage F		28.354		
Observations	4886	4878	4841	4652
Panel C: Top 50%				
Financial Inclusion	0.278**	0.253	0.221	0.168
	(2.132)	(1.590)	(1.191)	(0.646)
First-stage F		16.614		
Observations	4730	4724	4700	4489

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table C2.1: The impact of financial inclusion on consumption inequality (full sample)

	(1)	(2)	(3)	(4)
	Total	**Food**	**Utilities**	**Necessities**
Panel A: All				
Financial Inclusion	-0.712***	-0.156	-7.539***	-9.993***
	(-5.655)	(-0.847)	(-2.850)	(-2.745)
First-stage F	155.423	154.824	150.267	152.628
Observations	17518	17518	17518	17518
Panel B: Bottom 50%				
Financial Inclusion	-0.895**	-0.172	-1.536	-29.083***
	(-2.492)	(-0.383)	(-0.215)	(-2.976)
First-stage F	58.538	57.468	54.551	56.042
Observations	8836	8836	8836	8836
Panel C: Top 50%				
Financial Inclusion	-0.316***	-0.144	-4.333***	-9.322*
	(-4.458)	(-1.601)	(-3.308)	(-1.836)
First-stage F	41.517	41.906	40.225	40.840
Observations	8235	8235	8235	8235

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table C2.2: The impact of financial inclusion on consumption inequality (rural sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.569	0.126	9.608	-6.804
	(-0.627)	(0.085)	(0.614)	(-0.968)
First-stage F	42.113	42.172	40.135	40.289
Observations	6428	6428	6428	6428
Panel B: Bottom 50%				
Financial Inclusion	-0.999	-1.369	17.211	-3.232
	(-0.806)	(-0.683)	(0.508)	(-0.718)
First-stage F	15.432	15.372	14.948	15.215
Observations	2902	2902	2902	2902
Panel C: Top 50%				
Financial Inclusion	-0.087	-0.115	-3.272	4.058
	(-0.232)	(-0.236)	(-0.722)	(1.394)
First-stage F	19.984	20.142	19.075	18.700
Observations	2869	2869	2869	2869

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.

Table C2.3: The impact of financial inclusion on consumption inequality (urban sample)

	(1) Total	(2) Food	(3) Utilities	(4) Necessities
Panel A: All				
Financial Inclusion	-0.389***	-0.447***	-0.202	-4.244
	(-5.033)	(-4.050)	(-0.134)	(-0.964)
First-stage F	72.569	73.202	70.592	71.674
Observations	11090	11090	11090	11090
Panel B: Bottom 50%				
Financial Inclusion	-0.332**	-0.019	2.162	-11.469**
	(-2.373)	(-0.099)	(0.951)	(-2.207)
First-stage F	29.054	29.294	27.838	29.042
Observations	4886	4886	4886	4886
Panel C: Top 50%				
Financial Inclusion	-0.020	0.107	2.337	4.150
	(-0.304)	(1.164)	(1.075)	(0.499)
First-stage F	16.884	16.938	16.135	16.259
Observations	4730	4730	4730	4730

Robust t-statistics in parentheses: *, **, *** represent significance level at 1, 5, 10 percent level, respectively.