Financial inclusion and patience: Longitudinal evidence from Indonesia

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Dec 2019

Abstract: Financial development plays a key role in economic growth, but there is little evidence on how greater access to financial services affects households' patience when making intertemporal choices. Theory suggests that such choices are guided by interest rates when individuals freely access banking services and reflect underlying time preference parameters when individuals are credit constrained. This may lead to a reduction in the patience of individuals when the financial system expands, especially when saving in banks increases. This study is the first to empirically examine the effect of greater financial inclusion on patience using longitudinal data. Analyzing two waves of the Indonesian Family Life Survey that spans a period of rapid expansion of bank branches to rural villages, I find that a commercial bank branch in the village reduces measured patience, and the result remains robust using matching estimators. I also find evidence that financial access affects patience mainly by increasing access to deposit services rather than loans.

Key words: financial inclusion, patience, credit constraint

JEL code: G51, D15, G40

1. Introduction

Promoting greater financial inclusion to further both growth and equity objectives has become a major goal for many developing countries. Recently, developing countries such as China, India, Indonesia, etc. have undergone unprecedented financial reform and liberalization, aiming to include as many people as possible in the financial system. For example, Indonesia has experienced a rapid bank expansion between 2007 and 2014, with a sudden acceleration occurring in 2010 (see Figure 1). However, evaluation of the impact of financial inclusion is incomplete. The important role of financial inclusion for poverty reduction, income equality, and economic development has been recognized (Park and Mercado, 2015; Bruhn and Love, 2014). Yet little is known about how financial inclusion affects individuals' intertemporal choices, in particular their patience. Patience is of great significance in economic development, as it influences saving, investment in human capital, occupational choice, etc. (Sutter et al., 2013).

Asking questions about intertemporal choices, specifically choices between a smaller earlier payment versus a larger delayed payment, is the most widely used method to elicit time preference. Previous studies often use the answers to such questions to directly measure the rate of time preference (Falk et al., 2019; Chuang and Schechter, 2015; Andreoni et al., 2017). However, scholars are increasingly recognizing that this elicitation method only reflects a person's time preference parameter under "narrow bracketing" models, which assume the intertemporal choice is made without considering real world consumption and the cost of saving and borrowing (Frederick et al. 2002; Andreoni and Sprenger, 2012; Dean and Sautmann, 2019). In fact, intertemporal choices reflect the full set of reasons for discounting the future, including uncertainty, changing tastes, and differential marginal utility arising from changing consumption levels (Callen, 2015). To make a clear distinction, I use *patience* to refer the propensity to prefer delayed payments when answering intertemporal choice questions,

which is of greatest behavioral relevance, and *time preference* to refer to the underlying time preference parameters of individuals.

Financial access can strongly influence how individuals discount the future. It can do so by changing the cost of saving and borrowing (Dean and Sautmann, 2019), alleviating liquidity constraints (Carvalho et al., 2016; Cassidy, et al., 2017), or facilitating saving and investment (Howden et al., 2016). It can even change individuals' time preference parameters fundamentally, for example, Becker and Mulligan (1997) posit that financial instruments, such as a piggy bank, can divert one's attention to the future.

In this paper, I show both theoretically and empirically how financial inclusion affects patience, how the influence is heterogeneous for credit-constrained and not-constrained people, and under what circumstances patience can reflect individuals' rate of time preference. Similar to Dean and Sautmann (2019), I first incorporate intertemporal choices into a utility maximization model. The cost of saving and borrowing influences the intertemporal choice between current or delayed payments by changing the outside options. With unconstrained saving and borrowing at a fixed interest rate, individuals maximize the two-period utility function by equalizing the marginal utility of current consumption with the marginal utility of future consumption. Since participants can freely allocate the payment assumed in the intertemporal game between the present and future, optimal utility is achieved when the measured patience is exactly reflects the interest rate. Therefore, for individuals with full access to the financial market, patience decreases with the interest rate.

Under a partial financial market where only saving is possible or the cost of borrowing is much larger than saving, increasing the interest rate on deposits (or return to saving) makes delayed payments in the intertemporal choices less appealing. If the interest rate in real life exceeds the return rate in the intertemporal choice problem, it is possible for a patient person to behave impatiently. She chooses the earlier payment not due to a high rate of time preference

but because she can earn more by saving the earlier payment in the bank than taking a later payment. Similarly, people who are usually patient (low rate of time preference) may behave impatiently if they are currently credit constrained. Carvalho et al. (2016) and Cassidy, et al. (2017) study an RCT and quasi-experiment to show how liquidity constraints make people more likely to choose present rewards. In such cases, access to loans has an opposite effect to access to deposits, as loan access can alleviate liquidity constraints and make people behave more patiently. However, no previous research has examined such behaviour in a real-world context, which is a limitation given questions about the external validity of experiments.

Another prediction made by the model is about the correlation between measured patience and individuals' underlying time preference parameters. For people who lack access to loans but who are not liquidity constrained, choices between present and future payments should be guided entirely by the return to saving. However, credit-constrained individuals will consume some proportion of the present payment immediately, and how much they allocate to today versus tomorrow reflects their underlying time preference parameters.

To test the theoretical predictions, I combine intertemporal choices from an individual longitudinal dataset (Indonesian Family Life Survey 2007 and 2014) with the number of commercial banks reported in Indonesia's village census (Village Potential Study 2006 and 2014). I especially focus on those individuals living in rural villages in the 2007 wave and follow them even if they migrate to another community. Rural individuals in 2007 were a financially under-served population, with almost no rural villages having commercial bank branches, so increased financial inclusion is expected to have substantial effects on their economic behaviors and preferences. Bank expansion to a person's village is treated as a natural experiment, and its impact on the change in measured patience is examined while controlling for individual fixed effects. Banked and unbanked villages show parallel pre-trends for a wide variety of characteristics, and no changes in household or community level

characteristics can be found that is both correlated with bank expansion and influences changes in measured patience.

The key empirical finding is that bank expansion has a significantly negative impact on measured patience. The existence of a commercial bank branch makes villagers less patient by 0.14 standard deviations. The negative impact remains robust using a matching estimator that matches banked villages with villages that remain unbanked. The overall negative impact is consistent with the prediction of the theory that raising the return to savings increases the likelihood that individuals choose immediate payments in intertemporal choice problems. This explanation is also supported by the empirical evidence. We find that when a new bank is established in a village, the availability of deposit services is greatly improved and the proportion of households who save increases significantly. In contrast, bank expansion has a limited impact on borrowing. Even though formal credit services increase when banks are established, bank expansion doesn't change households' borrowing propensity or whether they believe they can borrow from banks. These contrasting effects of bank expansion can be explained by households' priorities in using savings and loan products of the bank. Households rank formal banks as their first choice when saving because they care about the safety of money, however they may not meet the requirements for obtaining loans or feel that formal loans are unattractive because the terms of the loan are inflexible or the application costs are high (for example, time spent applying, cost of delay in receiving the loan).

Theoretical predictions concerning the heterogenous impacts of access to savings and borrowing are also supported. Bank expansion shows a more significantly negative impact on patience for non-credit-constrained people (those whose wealth is above the median). This is in line with evidence that bank expansion leads to a more significant increase in saving among those who are non-credit-constrained, but a more significant increase in borrowing for those who are credit-constrained.

As a further investigation, I test how the patience of credit-constrained and non-constrained families responds differently to the families' agricultural origins. Measured patience of credit-constrained families shows a positive correlation with the growth cycle of main crops at village level, which is consistent with Galor and Özaka's (2016) findings. In contrast, the impact of agricultural origins is minimum and insignificant for non-constrained families. The heterogenous empirical findings are consistent with the theoretical prediction that measured patience is only correlated with underlying time preference parameters for credit-constrained people.

There are two papers on patience that are related to this study. Dean and Sautmann (2019) present a similar model to mine to study how the cost of saving and borrowing affects measured time preference. Their model, like mine, predicts that for non-credit constrained households, measured patience decreases with interest rate. In their empirical analysis of data on workers in Mali, they find that increases in saving are associated with greater patience and assume interest rates decline endogenously with saving, although given the lack of exogenous variation, higher saving could as well be associated with higher exogenously set interest rates or changes in other factors.

Carvalho et al. (2016) find that households who received randomized help to open saving accounts are more patient in their intertemporal choices one year later. This treatment differs from mine (expansion of bank branches) so is not directly comparable.[1] However, my finding that increased financial access increases saving and reduces measured patience contrasts with their findings and that of Dean and Sautman, both who find a positive association between savings and patience. However, if one distinguishes between access to savings and loan products and allow for differences in the degree to which households are credit constrained,

[1] Also, the RCT is conducted in one Nepalese village and all the households have female heads, so t may be hard to generalize their conclusions to other settings.

my model actually can rationalize both sets of results. For example, if opening a savings account also decreases the cost of obtaining a loan or leads to a sufficiently large increase in savings, then the share of households who are credit constrained and have high demand for immediate use of funds will decline, which could lead to an increase in measured patience.

Compared to the previous literature, this study makes several new contributions. To begin with, it is the first study of the impact of financial inclusion on patience using a representative large-scale national survey. Previously, variation in financial inclusion is either generated in a lab or using an RCT, which allows for a carefully controlled environment but may lack external validity in real world settings. In contrast, my paper exploits variation in external financial access through an important real world process -- bank expansion. My paper also uses a much larger sample size, that covers areas with larger variation in financial inclusion and can be representative of most provinces of Indonesia.

Because of its generality, this paper not only has policy implications for the Indonesian government, its conclusions can be applied to other developing countries as well. It's important to learn about how increased access to savings and borrowing service may stimulate or reduce investment. This research highlights the fact that when the government makes cash transfers or provides subsidies to encourage investment in human capital or consumption of certain goods, the outside options in the financial market must be taken into account.

My paper also contributes to a broader body of literature on the determinants of individual preferences, and time preference in particular. On the one hand, it's the first study of the determinants of time preference using long-term longitudinal data, and also among a handful of studies that use individual panel data to study any economic preferences. To the best of my knowledge, there is only one other paper that has exploited such panel data; it studied the consequence of Japanese earthquake on individual risk preferences (Hanaoka et al., 2017).

On the other hand, my paper validates the use of intertemporal choice questions to measure time preference in developing countries and provides a more comprehensive framework to interpret the answers to such questions. Even though many scholars have raised doubts about the narrow bracketing model and argued that external economic circumstances can determine intertemporal choice (Chuang and Schechter, 2015; Dean and Sautmann, 2019), my paper is the first to show that intertemporal choices can reflect underlying time preferences when households are credit-constrained. I also test the heterogenous impact of greater access to savings and borrowing separately.

The remainder of this paper is organized as follows. The second section introduces the financial system in Indonesia. In the third section, I present a theoretical model to illustrate how financial inclusion affects measured patience. Section 4 presents the data and the identification strategy. The estimated impact of financial inclusion on patience and robustness check are reported in Section 5 and Section 6 respectively. The last section concludes.

2. The Indonesian financial system

Financial access in Indonesia is characterized by a low inclusion level and continuing expansion. Access to financial services is considered to be low compared to other Asian countries (Soejachmoen, 2016). According to the Financial Inclusion Report (World Bank, 2017), the share of the Indonesian adult population with bank accounts was only 19.6% in 2011, increasing to 36.1% in 2014, both well below the averages for the East Asia and Pacific region as a whole (55% and 69%). Lack of formal banking is even more serious in rural Indonesia. In 2006, only 3.7% of rural villages had commercial banks, and this number increased to 12.2% by 2014 (calculated from PODES 2006 and 2014). Although the level of bank coverage is still modest, the rapid increase over this period reflects a rapid expansion of banks, especially after 2010. As shown in Figure 1, nationally the number of commercial banks per 100,000 adults is below 8 before 2010, but rises to 18 in 2014 (World Bank).

Another feature of Indonesian's financial market is that formal institutions and informal institutions play different roles in the deposit and credit markets. Formal institutions include government owned and non-government owned commercial banks, including BRI (Bank Rakyat Indonesia) which is the dominant bank in rural Indonesia. It is estimated that commercial banks account for 75% of the entire Indonesian financial system in 2011 (Bank Indonesia, 2011). Informal institutions refer cooperatives, credit unions and pawn shops etc., which can play an important role at the village level.

Based on a World Bank report sampling ten provinces in Indonesia (World Bank, 2010), 68% of population save and 47% save in banks. The proportion of formal saving increases with monthly per capita expenditure, with only 30% of the poorest decile having savings accounts compared to 90% for the richest decile. In terms of borrowing, 60% of total population borrow but only 17% borrow from banks. The possibility of having a bank loan also increases with per capita expenditure, however, less obviously, with the proportion of formal borrowing accounting for 3% and 30% for the poorest and richest deciles, respectively.

In the Survey on Financial Inclusion and Access (SOFIA) conducted in 2017, the above observations are confirmed. Banks are much more favoured in the deposit market than the credit market. SOFIA also asked for the main factors determining where to save. Safety of money is ranked as the most important factor, followed by quick access to saving, and being near to home. Among reasons why respondents choose to borrow the way they do, simple/easy process, want the money quickly and low interest rate are ranked as the top three considerations.

Since 2011, the Indonesian government has implemented a Financial Inclusion Strategy which seeks to promote poverty reduction, financial stability and economic growth. The Indonesian government also aims to promote branchless banking and e-money. However, the actual effects of these policies began from 2014 or 2015, making them less relevant to my study period.

3. Theoretical Framework

I assume a two-period utility model. Patience is negatively measured by a varying level of *x* which makes receiving *m* dollars in the first period achieve the same utility as receiving *x* dollars in the second period. The earlier payment *m* is set as a fixed amount, while the later payment *x* is chosen by individuals. People who choose a larger *x* are less patient, since it means it's more difficult to divert their attention from present to future. Using *x* to measure patience not only reflects the real-life investment choice, but is consistent with the time preference elicitation technique, which usually offers two options--a smaller earlier payment or a larger delayed payment. Let's call the choice of earlier payment Option A and the choice of later payment Option B.

Individuals try to maximize total utility. Define c_1, y_1 and s_1 to be consumption, income and saving in the first period, while c_2, y_2 and s_2 are consumption, income and saving in the second period. δ is the discount factor which is inversely related to the rate of time preference; a person with a low δ puts less weight on future utility and consumes more today. r^s is the interest rate. The optimization problem can be written as

$$\text{Max } U(c_1) + \delta U(c_2) \qquad (1)$$

Under Option A, a hypothetical payment *m* adds to income in the first period. Then the budget constraint for period 1 and period 2 can be written as

$$c_1 + s_1 = y_1 + m$$

$$c_2 = y_2 + s_1(1 + r^s)$$

Substituting for s_1, we can derive the following budget constraint:

$$c_2 + c_1(1 + r^s) = y_2 + (y_1 + m)(1 + r^s) \qquad (2)$$

Under Option B, *x* is added to income in the second period, so following the same procedure we derive a slightly different budget constraint:

$$c_2 + c_1(1 + r^s) = y_2 + y_1(1 + r^s) + x \qquad (3)$$

The budget lines under Option A and Option B have the same slope (-$(1 + r^s)$), but may differ in the intercepts, depending on the difference between $m(1 + r^s)$ and x.

3.1 Partial financial market

In reality, most rural people in developing countries like Indonesia face a partial financial market in which they can save at a given interest rate but loan access is limited or nonexistent. For simplicity, I assume people can save at the interest rate r^s ($r^s \geq 0$) but cannot borrow from the bank.[2]

The partial financial market assumption imposes $s_1 \geq 0$. As shown in Figure 2, the solid blue line AC is the budget line under Option A, with consumption in the first period c_1 falling between zero and $y_1 + m$. The budget line under Option B is drawn as the dashed red line DE, under which consumption in the first period cannot exceed y_1. The level of x is shown as the difference between $y_2 + x$ and y_2.

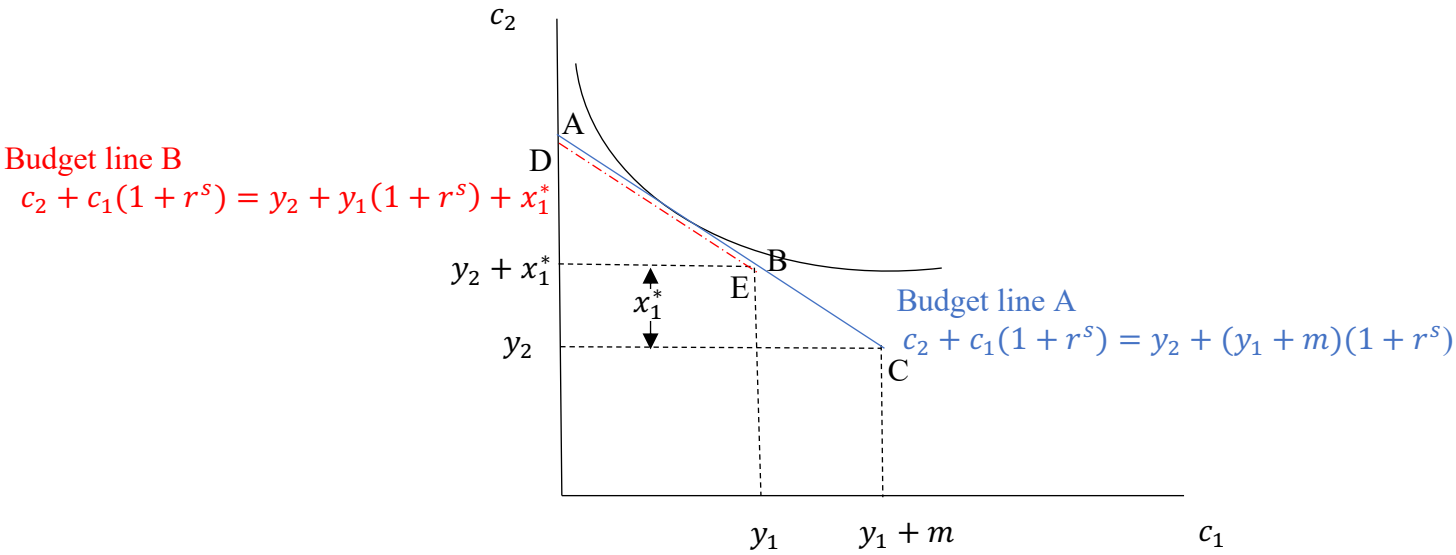

Figure 2: Utility maximization under partial financial market (not constrained households)

[2] The predictions are the same if loans are possible up to a binding credit limit or if it is possible to borrow but at a higher rate, that is $r^s \geq r^B$.

Depending on their specific financial situation, households can be categorized into two groups—credit constrained and not credit constrained. For households who are not credit constrained, their indifference curve intersects with the budget line between A and B if they choose to receive *m* in the first period. To make individuals indifferent between receiving *x* in the second period or *m* in the first period, the budget line DE would need to overlap with AB and thus share the same intercept, which implies that

$$y_2 + (y_1 + m)(1 + r^s) = y_2 + y_1(1 + r^s) + x_1^* \qquad (4)$$

It's easy to solve $x_1^* = m(1 + r^s)$ and derive the following prediction:

Prediction I. For people who are not credit constrained, patience decreases with the interest rate.

It's straightforward to show that $\frac{\partial x_1^*}{\partial r^s} = m > 0$. Since x is a negative measurement of patience, that means patience decreases with the interest rate. The negative correlation implies that people are less likely to make future investments if they have a better saving product as an outside option, regardless of their underlying time preference.

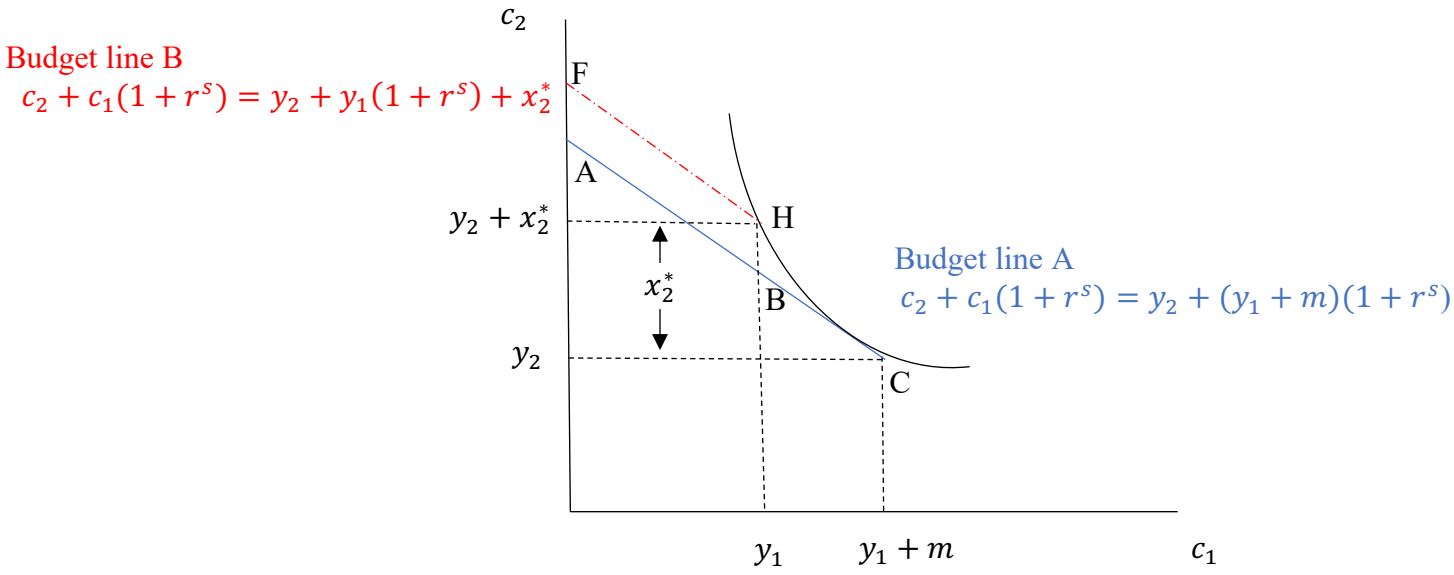

Figure 3: Utility maximization under partial financial market (credit constrained households)

For households who are initially credit-constrained but the hypothetical payment *m* relaxes their constraint, the indifference curve intersects the budget line between B and C (see Figure 3). Since c_1 is lower than y_1 under Option B, to achieve the same utility level as Option A, the budget line must be moved upward to FH and touch the indifference curve at point H.

The intersection point H can be determined by the following equation, which equates the utility of the optimal consumption bundle under Option A, which is $(y_1 + \beta m, y_2 + (1-\beta)m * (1+r^s))$, with $0 \leq \beta \leq 1$, and the utility of the optimal consumption bundle under Option B, which is $(y_1, y_2 + x_2^*)$:

$$\mathrm{U}(y_0 + \beta m) + \delta \mathrm{U}[y_1 + (1-\beta)m * (1+r^s)] = \mathrm{U}(y_0) + \delta \mathrm{U}(y_1 + x_2^*) \qquad (5)$$

Prediction II. If the payment in the intertemporal choice question relaxes the credit constraint for initially constrained people, their patience also decreases with the interest rate.

Using the implicit function theorem to differentiate Eq. (5) with respect to r^s yields

$$\frac{\partial x_2^*}{\partial r^s} = -\frac{\partial R/\partial r^s}{\partial R/\partial x_2^*} = -\frac{-(1-\beta)m\delta \mathrm{U}'_{r^s}[y_1+(1-\beta)m*(1+r^s)]}{\delta \mathrm{U}'_x(y_1+x_2^*)} > 0 \qquad (6)$$

where $\mathrm{R} = \mathrm{U}(y_1) + \delta \mathrm{U}(y_2 + x_2^*) - \mathrm{U}(y_1 + \beta m) - \delta \mathrm{U}[y_2 + (1-\beta)m * (1+r^s)]$.

If borrowing is enabled for credit-constrained households in Figure 3, the budget line FH can be extended until it intersects the horizontal axis. Then we need to move down FH and its extended line to AC so that the optimal utility achieved under Option A and B are equivalent. The solution under this scenario is equal to $x_1^* = m(1+r^s)$. A higher budget line represents a larger *x*, so it's easy to show that

$$x_2^* > x_1^*$$

Prediction III. Access to credit makes credit-constrained people behave more patiently.

For credit-constrained individuals, a new borrowing opportunity makes people more patient by relaxing the credit constraint. This prediction is consistent with the empirical literature that credit-constrained individuals exhibit greater present bias (Carvalho et al., 2016; Cassidy, et al., 2017).

In addition to the slope of budget line, the intersection point H is also determined by the shape of the indifference curve, which means that for those who are credit constrained, patience is correlated with the discount factor.

Prediction IV. For credit constrained people, patience is negatively correlated with the discount factor.

Similarly, using the implicit function theorem to differentiate Eq. (5) with respect to δ yields

$$\frac{\partial x_2^*}{\partial \delta} = -\frac{\partial R/\partial \delta}{\partial R/\partial x_2^*} = -\frac{\mathrm{U}(y_1+x_2^*)-\mathrm{U}[y_1+(1-\beta)m*(1+r^s)]}{\delta \mathrm{U'}_x(y_1+x_2^*)} < 0 \qquad (7)$$

where $\mathrm{R} = \mathrm{U}(y_1) + \delta\mathrm{U}(y_2 + x_2^*) - \mathrm{U}(y_1 + \beta\mathrm{m}) - \delta\mathrm{U}[y_2 + (1-\beta)m * (1+r^s)]$

This prediction validates using the intertemporal choice question to measure individuals' underlying time preference parameter under certain circumstances.

In the case in which people remain credit constrained after receiving the payment *m*, e.g. $\beta = 1$, their optimal utility is stuck at point C. The Option B budget line needs to move further up to meet the new indifference curve at $(y_1, y_2 + x_3^*)$. In this case, the patience level is solely determined by the discount factor and is uncorrelated with the slope of the budget line (r^s).

$$\frac{\partial x_3^*}{\partial r^s} = 0$$

$$\frac{\partial x_3^*}{\partial \delta} = x(\delta) < 0$$

3.2 Complete financial market

In a complete financial market, people can save and borrow at the same interest rate. This scenario is similar to non-constrained people facing a partial financial market. The only difference is that s_1 could be negative and the upper limit on c_1 is removed. Similarly, x is determined by the value which makes the budget lines under Option A and B identical.

$$y_2 + (y_1 + m)(1 + r^s) = y_2 + y_1(1 + r^s) + x_4^* \qquad (8)$$

The solution is familiar: $x_4^* = m(1 + r^s)$.

Prediction V. In a compete financial market, patience decreases with the interest rate.

The predictions in the above scenarios can be summarized in Table 1. For people who are not constrained by credit, including those who are sufficiently wealthy in a partial financial market and those who face a complete financial market, patience is a negative function of the interest rate r^s.

Table 1: Summary of x^* under different scenarios

	Partial financial market $r^s \geq 0, r^b = +\infty$	Full financial market $r^s = r^b$
Not constrained	$x_1^* = m(1 + r^s)$	$x_4^* = m(1 + r^s)$
Previously constrained	$x_2^* = x(\delta, r^s)$	
Always constrained	$x_3^* = x(\delta)$	

For people who are initially constrained by credit but are no longer constrained after the hypothetical payment, their change in patience is co-determined by the interest rate and the discount factor. Similar to unconstrained people, patience decreases with the interest rate. However, if individuals gain access to credit they also behave more patiently as their decisions are no longer driven by high demand for immediate consumption caused by the binding credit constraint. Finally, for people who are always credit-constrained, patience reflects their discount rate only, and is unaffected by changes in the interest rate.

Improvement in the financial market is often associated with a higher saving interest rate (especially compared to storing cash at home for which the interest rate is zero) and easier access to borrowing. The overall impact of the saving interest rate on patience is negative, but

for credit-constrained people, access to credit is expected to have a positive effect on measured patience.

4. Data and Identification Strategy

4.1 Data

I use a longitudinal dataset, the Indonesian Family Life Survey (IFLS), for the main analysis. The Indonesian Family Life Survey was initiated in 1993 and follows 7,224 households and their split-off families in 1997, 2000, 2007 and 2014. Its sampling frame covers 13 out of 27 provinces and 83% of the total population (see spatial distribution in Figure 4). The 2014 wave successfully re-contacted over 90% of the original households in 1993 and their split-off families. In each wave, IFLS collects detailed information at the individual, household and community levels. The individual and household questionnaires cover nearly every aspect of life, including but not limited to basic demographics, income and consumption, economic activities, health, etc.

IFLS initially interviewed residents in 311 randomly selected communities, which we call the IFLS original communities. In 2007, 113 of the original communities were rural villages. I especially focus on rural samples since their financial inclusion was initially very low and bank expansion is expected to have a substantial impact on their lives. All of the individuals living in rural villages in 2007 are included in the sample even if they had moved by 2014. In total, my sample includes 7,500 individuals age 15 and above with observations in both 2007 and 2014.

I supplement the IFLS community information by using the Village Potential Statistics (PODES henceforth) dataset. PODES is conducted in conjunction with the periodic censuses (Agriculture, Economy, Population) and collects detailed information on each of the nearly 70,000 village-level communities in the country. It is conducted every three or four years since

1993. The 2006 and 2014 waves are used in this study and are linked to the data from IFLS 2007 and IFLS 2014. There are 111 rural IFLS communities that are successfully matched with the PODES data, with 2 communities unmatched due to code reassignment or mergers with other villages. In each wave of PODES, village officials report the exact number of commercial banks and other types of financial institutions located in the village. The existence of commercial banks is employed to capture financial inclusion. A descriptive summary is shown in Table 2. There are 11 villages which gain a bank branch between 2007 and 2014, 99 maintain the same status (always have a bank or always don't have a bank) and one village used to have a bank but lose it by 2014. In terms of patience change, people become more patient by 0.011 and 0.219 standard deviations in unchanged villages and unbanked villages respectively, and less patient by 0.126 standard deviations in banked villages. Descriptive statistics suggest that bank expansion is negatively correlated with patience change.

4.2 Measurement of patience

In 2007 and 2014 waves of IFLS, a time preference module was asked of all individuals aged 15 years or above. The module consists of two sets of step-wise questions, each of which offers four options between a fixed amount of money today and a larger amount of money at a later date. In the first set if questions, the delayed payment is one year later in amounts ranging from 1 million to 6 million rupiah. In the second set, the delayed payment is 5 years later in amounts ranging from 0.5 million to 10 million rupiah.

Two ordinal variables can be constructed from the answers to these questions (see details in Appendix 1). $Patient_1$ and $Patient_2$ range from 1(least patient) to 5 (most patient). The two measurements are positively correlated. Around 67% and 76% of respondents have a score of 1 in the first and second sets of questions, respectively. Combining the information from both measurements, I construct a single variable Patient by taking the average of $Patient_1$ and $Patient_2$, and standardizing the score to be in terms of standard deviations from the mean.

Using data from this time preference module has both weaknesses and strengths. The main weakness is that the data are from survey questions rather than an experiment, so lack material incentives. However, IFLS still has a number of unique advantages over other datasets. First, IFLS is a national representative sample with a very large sample size that spans populations with great variation in their economic environments. Lab or field experiments are more carefully controlled and better incentivized, but involve small, and often homogenous samples. Secondly, the payment base in this time preference module is one million rupiah (approximately 110 USD in 2007 and 84 USD in 2014), which is one third of the average annual wage in Indonesia in 2015. In contrast, experiments usually provide much smaller payments due to budget limitations. Thus, the IFLS measurements provide a more realistic payment scale which could really relax liquidity constraints faced by individuals.

4.3 Estimation model

I adopt a difference-in-differences estimation strategy. As is shown in Equation (9), p_{ivt} is the patience of individual *i* in community *v* at time *t*, which is affected by the existence of a commercial bank CB_{ivt}, other community characteristics X_{vt}, unobserved time-invariant individual factors Y_i and time-varying shocks and unobservables μ_{ivt}. Taking the difference between the two periods yields Equation (10).

$$p_{ivt} = \beta_0 + \beta_1 CB_{ivt} + \beta_2 X_{vt} + Y_i + \mu_{ivt} \quad (9)$$

$$p_{ivt} - p_{ivt-1} = \beta_0 + \beta_1 \Delta CB_{ivt} + \beta_2 \Delta X_{vt} + \mu_{ivt} \quad (10)$$

I put the patience level at *t-1* on the right-hand side in Equation (11) to allow for changes in measured patience to be state-dependent, for example due to mean reversion. This dynamic specification is the same as regressing changes in patience on lagged patience and changes in other variables, and so effectively controls for individual fixed effects. Controlling for demographic features N_i, such as gender, age in 2007 and education level in 2007 absorbs heterogenous trends in patience for people with differences in these characteristics.

$$p_{ivt} = \beta_0 + \beta_1 \Delta CB_{ivt} + \beta_2 \Delta X_{vt} + \beta_4 p_{ivt-1} + \beta_5 N_i + \mu_{ivt} \quad (11)$$

Employing the difference-in-differences estimator relies heavily on the assumption of parallel pre-trends. If banked villages and unbanked villages initially have different trends in patience even before banks are introduced, it's hard to draw any causal inference. Unfortunately, IFLS only measures time preference in the 2007 and 2014 waves. However, it is possible to examine trends of other individual and community characteristics using the 1993, 1997, 2000 and 2007 waves. Earlier waves of Indonesia's village census (PODES) are also available, which makes it possible to construct shorter pre-trends from 2000 to 2006 for the variables available in PODES. Using the 2007 IFLS and the 2006 PODES data as baselines, Appendix 2 shows the pre-trends for banked villages and un-banked villages for a series of characteristics, including community means of personal characteristics (education level, employment type), community means of household characteristics (income per capita and asset per capita) and community-level attributes (financial institutions, population density, urban infrastructures, etc.). Even though villages which experienced bank expansion between 2007 and 2014 are different from unbanked villages, their pre-trends are not significantly different from each other. Parallel pre-trends make it more plausible to view the correlation between bank expansion and changes in patience as causal.

Another concern associated with the difference-in-differences strategy is that both bank expansion and changes in patience may be correlated with other village-level changes. I test the extent to which bank expansion is correlated with changes in other village-level indicators, reporting the results in Appendix 3. Only changes in two variables, the percentage of agricultural households and the existence of a shopping complex are correlated with bank expansion to the village. Villages that experienced greater reductions in agricultural households or greater increases in shopping malls have a higher probability to gain a new commercial bank branch. Both are expected to create market conditions attractive to banks.

However, there is no theoretical or empirical literature that suggests that either factor should influence people's patience, especially after controlling for individuals' economic activities and household background variables. To be safe, I control for these variables in the main regression and check whether including them has any impact on the estimation results.

To check the robustness of the diff-in-diff estimates, I employ the Propensity Score Matching (PSM) method and compare the change in patience of individuals in rural villages that experience bank expansion with a more comparable comparison group. Being banked during the period between 2007 and 2014 is the treatment, with villages don't have bank at 2007 as control group. The outcome of interest is the change of patience level, and the estimator measures the difference in outcomes between individuals in treated villages and control villages matched using the propensity score, namely, the average treatment effect on the treated (ATT).

In practice, I match each individual in treated villages to ten nearest neighbors with replacement within the same region (five regions in my sample) and set the value of caliper to be 0.01 to obtain the PSM estimators[3]. To predict the propensity of being treated, I use a logistic model in which the predictors include individual, household, and community characteristics in 2007, including patience, gender, age, education, employment type, working in agriculture, income per capita, assets per capita, percent of agricultural income in total income, existence of other financial institutions, percent of agricultural households in the village, existence of shopping complex, etc..

5. Results

About 10% of my sample moved away from their original village to a new location by 2014. In the main analysis, I keep these migrants in the sample and test how bank expansion

[3] The estimates are insensitive to other matching methods, including radius matching, kernel matching, and local linear regression matching.

in their "original" community affects patience. I don't use their current status for granted because migration decision may be correlated with bank expansion in previous communities and it's hard to say how they are connected with previous communities. So the obtained estimator is an overall impact of bank expansion on patience. In Section 6, I will show that bank expansion doesn't affect migration rate, nor the characteristics of migrants. I will also show that bank accessibility in original community has a more significant impact on migrants' patience than current community.

5.1 Impact of bank expansion on patience

The diff-in-diff estimates of the impact of commercial bank expansion on patience are reported in Table 3. Controlling for individual characteristics and province dummies, the presence of a bank branch in the village negatively affects patience, reducing patience by 0.14 standard deviations. According to the theory, the return to savings has a negative impact on patience and access to borrowing has a positive impact. The overall negative impact of bank expansion suggests that new access to savings products dominates new access to loans in influencing the patience of rural residents. It's notable to see patience level at 2007 has a positive correlation with patience level at 2014. That implies the mean reversion problem and validates employing a dynamic model with lagged patience being controlled.

The negative impact of bank expansion remains robust and stable after controlling for more time-varying individual, household and community characteristics. A detailed explanation of each control variable can be found in Appendix 4. Improved wealth conditions, which are captured by changes in income per capita and assets per capita, could influence patience by relaxing credit constraints. Economic activities, such as being employed[4], working in the agricultural sector, and the percent of agricultural income over total income also are

[4] Reference group is people who are self-employed or not working. The results don't change if not working group is dropped.

added to the regression, with results presented in column 2. The impact of employment can be explained in two ways. The first and most direct explanation is it increases cash flow and relaxes credit constraints for those who may previously have been credit constrained. If this is the case, being employed should have a positive effect on patience. On the other hand, being employed can also affect one's time preference parameter since employment is associated with a shorter reward cycle than self-employment. In this case, being employed should have a negative effect. Our empirical result is that being employed has a negative impact on patience, with the coefficient being -0.04, suggesting that the latter explanation dominates the former explanation.

Although other financial institutions, including rural banks and savings and loan cooperatives occupy a much smaller share of the financial market, I control for their existence in villages in the third column. They have a positive but insignificant impact on patience, the positive effect suggesting that they may provide easier access to loans. The opposite effects of commercial banks and other financial institutions on patience is consistent with the fact that commercial banks are more preferred in the deposit market but not in the lending market. In the fourth column, change in two community level variables correlated with bank expansion--change in the percentage of agricultural households and change in the existence of shops--are controlled for. They have a minimal and insignificant impact on patience, and their inclusion does not affect the influence of bank expansion on change in patience.

The negative sign of bank expansion implies the small probability of reverse causality. First, it is likely difficult for banks to even observe differences in time preference of populations in different villages. To the extent that they can, perhaps through savings or other observable behaviors, one would expect banks to desire expanding to places where people are more patient and save more, so that they can collect more deposits. If that were the case, the correlation between patience and bank should be positive rather than negative.

5.2 Impact of bank expansion on saving and borrowing

The existence of a commercial bank can increase the supply of financial services and the cost of using such services. However, this does not mean that all individuals gain access to all bank services. People may be unaware of a new bank's existence, banks may not offer all of their products in every branch, and individuals may still face barriers to using financial products of the bank (e.g., application or collateral requirements, transaction costs). There may exist heterogeneities in the access of the poor versus the rich and in access to different financial products (savings versus loans).

To shed greater light on how banks actually affect financial access, I first investigate the impact of bank expansion on the availability of deposit and loan services using information from the IFLS community survey. The availability of deposit services in 2014 is captured by an indicator variable (Deposit_2014) equal to one if there is deposit service available in village, whether provided by commercial banks or other financial institutions. Similarly, availability of loan services is measured by a dummy variable (Loan_140) for whether loan services are provided by any financial institution in the village. As is shown in the first and fourth columns of Table 4, with a new commercial bank in the village, the availability of deposit services increases significantly by 41%, while loan services are also increased by 30%.

Secondly, I examine the impact of financial institutions on households' actual economic behaviors and perceptions. The saving rate of my sample increases from 15% to 21% during the period between 2007 and 2014. The increase is more substantial in banked villages (second column of Table 4). It is estimated that a bank in the village increases the likelihood that people save by 6.5%, controlling for household characteristics and village economic structure. Having a bank branch in the village substantially reduces the transaction cost of bank transactions of villagers, likely provide a higher return on savings (the deposit interest rate) than readily available alternatives. As a placebo test, I also examine the impact of bank expansion on other

assets per capita (excluding savings). As is shown in Column (3), other assets per capita, which include land, houses, jewelry etc., decreases by 85% with bank expansion. The negative sign implies that households reallocate assets from other forms to formal savings after the introduction of a commercial bank.

Columns (5) and (6) examine the impact of bank expansion on borrowing propensity and perceived borrowing opportunity. Borrow_14 is equal to one if the family has successfully secured a loan during the past year, even though such borrowing could be from formal or informal sources. Perception_14 is a question about whether the household thinks they can borrow from a bank[5]. I find that the impacts on borrowing and perception of the ability to obtain loans from banks are positive but not statistically significant. The differential impact of bank expansion on saving and borrowing is in line with the overall negative impact of bank expansion on patience.

The theory predicts credit-constrained and non-constrained people to respond differently to bank expansion. Non-constrained people's patience is more sensitive to bank expansion, because total amount of payment assumed in the intertemporal choice questions are ready for saving, while credit-constrained people may consume part of or all of them. Credit-constrained families are hard to identify with great accuracy. Since most loans require collateral, a household's assets may directly influence the household's ability to borrow. Therefore, I use assets per capita at 2007 to proxy for households' access to credit. I define families with assets per capita below the median to be poor and those above the median to be rich. As seen in Table 5, bank expansion has a more negative impact on the patience of the rich, consistent with the rich being less credit-constrained and have fuller access to bank deposit services. But in terms

[5] The question is "does any family member know a place to borrow? "And "what type of place is this?"

of actual savings, bank expansion only has positive and significant impact for poor people. That's because the saving rate is already high among rich people in the 2007 wave.

The first and second theoretical predictions of a negative impact of the saving interest rate on patience for non-constrained people and credit-constrained people are supported. However, there is no direct evidence supporting the third prediction, which predicts access to credit makes credit-constrained people more patient.

5.3 Correlations with true time preference

Another heterogeneity implied by the theory is that measured patience is correlated with the true time preference parameter when households are credit constrained. Galor and Özaka (2016) have shown that time preference has agricultural origins: people who plant crops with longer growth cycles are more patient and being patient can be transmitted from one generation to the next. They posit that longer growth cycles increase patience because the longer is the time one must wait from planting to harvest, the larger is the return to being patient. Since land suitability can be viewed as an exogenous attribute, I use the growth cycle of main crops grown in the village[6] to capture the agricultural origins of time preference. The growth cycles of main crops reported in IFLS village survey in 2007 and 2014 are positively correlated, providing evidence that agricultural origins are a relatively stable attribute of land.

Column 1 of Table 6 reports the impact on patience of the growth cycle and its interaction term with the wealth dummy pooling the two waves of cross-sectional data. Rich group are defined as those whose assets per capita are above the median for the pooled sample. Consistent with Galor and Özaka (2016), growth cycle shows a positive impact on patience for the poor. As the main crop's growth cycle increases by one month, poor villagers' patience increases by 0.015 standard deviations. However, the effect on rich families is close to zero,

[6] Number of harvests for the main crop per year is reported by village officials. The reported frequencies in 2014 and 2007 are highly correlated, which indicates that it's a stable attribute for each village.

echoing the Prediction IV that measured patience is correlated with underlying time preferences only for credit-constrained people. I also use the panel data to test whether improved liquidity conditions make agricultural origins less influential for previously constrained people. External bank expansion and internal wealth accumulation are two possible ways to alleviate the credit constraint. As is shown in Column (2), for those who were poor in the first wave (ass_per07 below the median), the impact of the growth cycle on patience declines as banks expand or families become richer. The interaction term between growth cycle and becoming rich at 2014 is negative and significant. So is the interaction term with bank expansion. The triple interaction term between growth cycle, bank expansion and becoming rich is positive and insignificant, that indicates increasing wealth and greater access to bank may play substitute roles in relaxing credit constraint. In contrast, for previously rich people (ass_per07 above the pooled median) in Column (3), the impact of growth cycle on patience is not significantly affected by bank expansion or increasing wealth.

6. Robustness checks

6.1 Matching estimator

One concern about the diff-in-diff estimates of the impact of bank establishment on changes in patience is that banked villages and unbanked villages may not be highly comparable. As discussed earlier, banked villages experienced faster decline in the percent of agricultural households and greater increase in shopping complexes. Although they have parallel pre-trends, banked villages are generally more developed than unbanked villages based on several economic indicators. To address this concern, I use a propensity score matching (PSM) method to match individuals in banked villages to comparable peers in unbanked villages. All the individual, household, and village background variables used in the main analysis are included in the matching variables, and so are controlled for in the PSM estimation. Since villages located on different Indonesian islands (or regions) are inherently different, I

enforce exact matching on region, which means that treatment villages must be matched to villages in the same region. Even though all regions have at least one treated village, the total number of villages is small in two of them. Only treated villages located in Java, Sumatra and Nusa Tenggaru, which accounts for 88% of the sample, are easily matched[7], so I restrict attention to the observations in those three islands in the main estimation, and also run the estimation using the entire sample.

Table 7 reports the estimation results of bank expansion on patience after matching. Coefficients reported are based on ATT with standard errors adjusted for clustering. The first column imposes exact matching within region and only reports results using three regions (Java, Sumatra and Nusa Tenggaru). The ATT on patience at 2014 is negative and significant, with the coefficient being lower (-0.119) than the diff-in-diff estimate (-0.134). The result confirms that the observed disparities in patience change in Table 3 are not merely driven by observable factors that group individuals into banked villages or that differ between banked villages and unbanked villages. In the second column, I relax exact matching within region and expand matching to the full sample. The PSM estimator is -0.114, which is slightly lower than diff-in-diff estimate (-0.134). In both columns, the outcome variable is patience in 2014, just as is the main regression results. Figure 5 shows the distribution of propensity scores for those in the (matched) treatment and control groups using whole sample. The mean bias after matching has been reduced from 18.8 to 4.7, which means treated and control groups are quite balanced.

6.2 Migration

Migrants account for 10% of total populations. If bank expansion affects how many people migrate, who migrate and where they migrate, then the observed impact of bank

[7] Most treated individuals (295 out of 298 on Java island, 127 out of 177 on Sumatra island, 71 out of 90 on Nusa Tenggaru island have been matched to control group successfully.

expansion on patience needs to be treated with caution, since bank expansion may act as a signal that implies population structure change rather than having direct impact on patience.

First of all, as is shown in the first column of Table 8, bank expansion shows no significant correlation with migration rate. Secondly, bank expansion in original community has no significant impact on financial access in new destination (see column (2)). Thirdly, I test whether migrants from banked villages are different from migrants from other villages in personal or household characteristics. As is shown in Appendix 5, migrants are disproportionately male, more educated, younger, higher income earners, more patient, and more likely to be employed in non-agricultural sectors. However, migrants in banked villages are not significantly different from migrants in unbanked villages. The above analysis rules out sample selection as a mechanism for bank expansion to affect patience.

Whether stayers and migrants are influenced by bank expansion to the same extent? Are migrants' patience more affected by bank expansion in original community or financial access in new location? The first and second column of Table 9 display the estimation results of bank expansion in original community on stayers and migrants' patience respectively. In the third column, bank expansion between original community and new community is constructed by taking the difference between bank existence in new location and bank existence in original community. The negative impact of bank expansion on stayers' patience is consistent and robust. Interestingly, bank expansion in original community has a significantly negative impact, while financial access change using new location has no significant impact. It implies that migrants still stay connected to their original communities and so are aware of using financial services available there. Another possibility is that migrate after new bank branches are established and so change their behavior before they leave their village with those changes persisting even after they migrate. For instance, they may have already opened a bank account

or learned about banking services before they migrated, and keep the bank account even after leaving.

7. Conclusions

Even though intertemporal choices of citizens are of great significance for aggregate savings, investments, and growth, in practice it is difficult to observe how households make trade-offs between future consumption and present consumption, and even harder to test how financial inclusion affects their investments in real life. Over 70% households rate "have no money" as the main reason why they don't use financial services (World Bank, 2010). The intertemporal choice questions used to elicit time preferences create hypothetical circumstances in which individuals choose between early payments and larger delayed payments. These choices between the future and the present look very similar to investment choices encountered in real life, for example, whether to sacrifice present consumption to to invest in more education that will increase income in the future.

This paper examines the impact of financial inclusion on measured patience both theoretically and empirically. Exploiting a longitudinal sample in Indonesia, which experienced a rapid expansion of bank branches to rural areas, I find a negative impact of financial inclusion on measured patience. The result is robust to using Propensity Score Matching methods. I also find that financial inclusion significantly increases access to savings but not borrowing. Consistent with the theoretical prediction that access to deposits and access to loans may have heterogenous impacts on credit-constrained and non-constrained families, I find that access to deposit services has a more negative effect on the rich than the poor, and that well-known determinants of time preferences predicts the degree of patience of the poor, who are more likely to be credit constrained, but are not correlated with the patience of the rich, who are likely to be non-credit-constrained and making intertemporal choices based on the

interest rate. Overall, these insights provide a new perspective on understanding the impacts of financial development on economic development.

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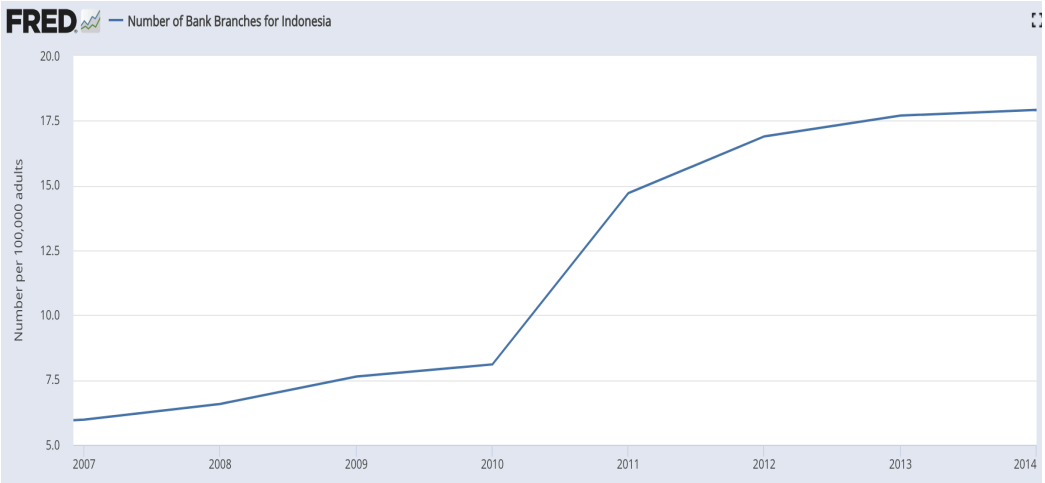

Figure 1: Number of commercial bank branches over time in Indonesia

Data source: World Bank

Figure 4: Spatial distribution of sampled provinces in IFLS

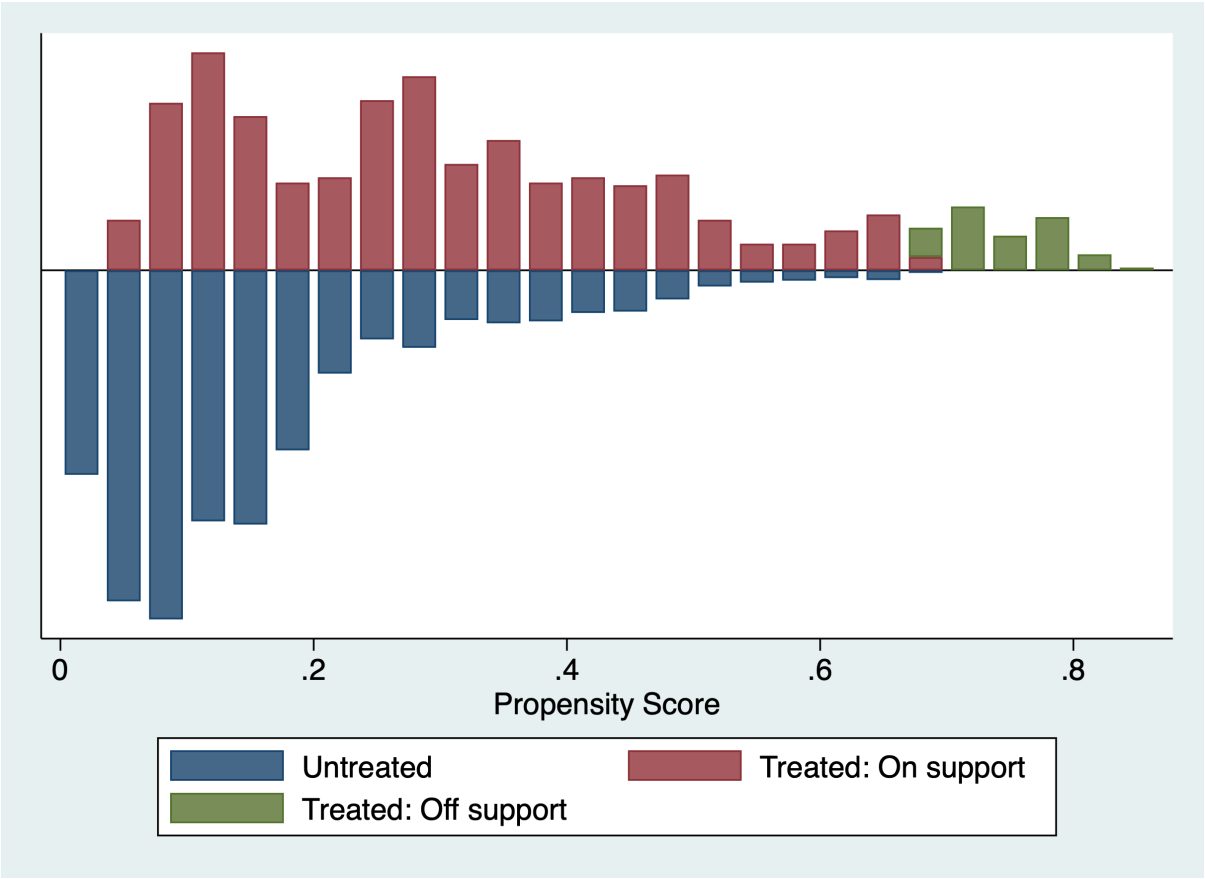

Figure 5: Propensity score for treatment group and control group (using all the regions)

Table 2: Summary statistics of individuals

	Δ CB =0	Δ CB =1	Δ CB =-1
Num of villages	99	11	1
Num of individuals	6,856	726	71
Δ Patience (standardized)	0.011	-0.126	0.219
Δ Income per capita (thousand rupiah)	357	335	265
Age at 2007	37.211	36.949	39.539
Male	0.461	0.466	0.563
Education level above high school at 2007	0.218	0.301	0.239
Migrate to another village between 2007 and 2014	0.094	0.107	0.155

Note: Δ CB =0 refers to villages that either have commercial banks in both waves or don't have in both waves. Δ CB =1 refers to villages that don't have commercial bank at 2007 but have at least one at 2014. Δ CB =-1 refers to villages that used to have commercial banks at 2007 but don't have at 2014.

Table 3: Estimation results of bank expansion on patience

	(1)	(2)	(3)	(4)	(5)
DV	P_14	P_14	P_14	P_14	P_14
Δ CB	-0.142***	-0.144***	-0.142***	-0.131***	-0.134***
	(0.0334)	(0.0332)	(0.0326)	(0.0405)	(0.0390)
Δ Employed		-0.0413*			-0.0444*
		(0.0223)			(0.0227)
Δ Agricultural sector		-0.0130			-0.00160
		(0.0214)			(0.0206)
Δ Inc_per		0.00477			0.00481
		(0.00410)			(0.00432)
Δ Ass_per		-0.00477			-0.00757
		(0.00792)			(0.00807)
Δ % of agr inc		-0.000728			-0.00291
		(0.00594)			(0.00611)
Δ Other financial institutions			0.0327		0.0292
			(0.0307)		(0.0338)
Δ % of agr hhs				0.0745	0.0666
				(0.0671)	(0.0702)
Δ Shop				-0.00429	0.00105
				(0.0297)	(0.0301)
P_07	0.0766***	0.0771***	0.0769***	0.0795***	0.0801***
	(0.0139)	(0.0139)	(0.0138)	(0.0147)	(0.0147)
Male	-0.00455	-0.00437	-0.00478	-0.00324	-0.00266
	(0.0214)	(0.0215)	(0.0214)	(0.0218)	(0.0218)
Age_07	0.00200**	0.00189*	0.00201**	0.00219**	0.00209**
	(0.000966)	(0.000963)	(0.000968)	(0.000985)	(0.000982)
High school_07	0.0236	0.0257	0.0219	0.0377	0.0371
	(0.0312)	(0.0313)	(0.0315)	(0.0315)	(0.0320)
Constant	-0.281***	-0.273***	-0.286***	-0.288***	-0.282***
	(0.0552)	(0.0563)	(0.0559)	(0.0514)	(0.0541)
Observations	7,547	7,538	7,547	7,286	7,277
R-squared	0.018	0.019	0.018	0.018	0.019

Note: Robust standard errors in parentheses are clustered at community level.
Province dummies are controlled.
P_14 and P_07 are standardized patience level at 2014 and 2007.
Agriculture sector is a dummy variable indicating whether the individual works in agriculture.
% of agr inc is a continuous variable indicating the percent of agricultural income over the total income at household level.
% of agr hhs is a community level variable indicating how many percent of households are defined as agricultural households.
Shop is a dummy variable indicating whether there is shopping complex in village.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Estimation results of bank expansion on savings and borrowing

DV	(1) Deposit_14	(2) Save_14	(3) Other_per14 (logged)	(4) Loan_14	(5) Borrow_14	(6) Perception_ 14
Mean of DV	0.364	0.212	11.849	0.532	0.246	0.711
Δ CB	0.413**	0.0645**	-0.855***	0.312*	0.0315	0.0343
	(0.200)	(0.0261)	(0.261)	(0.166)	(0.0241)	(0.0308)
Deposit_07	-0.0136					
	(0.136)					
Save_07		0.177***				
		(0.0198)				
Other_per07(logged)			0.145***			
			(0.0226)			
Loan_07				0.0597		
				(0.126)		
Borrow_07					0.158***	
					(0.0248)	
Perception_07						0.167***
						(0.0270)
Constant	0.333**	0.120***	9.968***	0.577***	0.235***	0.646***
	(0.162)	(0.0386)	(0.458)	(0.187)	(0.0466)	(0.0499)
Observations	107	7,291	7,291	107	7,291	7,291
R-squared	0.279	0.092	0.064	0.337	0.043	0.108

Note: Robust standard errors in parentheses are clustered at community level.
All the variables in the Column (5) of Table 3 are controlled.
Deposit_14 (Loan_14) equals to one if there is deposit (loan) service in village at 2014. Save_14 (Borrow_14) equals to one if households report they save (borrow) during the past year. Other_per14 is logged form of other asset per capita (excluding savings) at 2014.Perception_14 equals to one if the individual think he can borrow from bank.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Heterogenous impact of bank expansion on rich and poor people

Panel A: Poor Ass_per07 below median				
	(1)	(2)	(3)	(4)
DV	P_14	Save_14	Borrow_14	Perception_14
Δ CB	-0.111**	0.0901***	0.0503	0.0392
	(0.0463)	(0.0327)	(0.0310)	(0.0343)
P_07	0.0650***			
	(0.0187)			
Save_07		0.121***		
		(0.0331)		
Borrow_07			0.175***	
			(0.0362)	
Perception_07				0.131***
				(0.0304)
Constant	-0.267***	0.0822***	0.215***	0.656***
	(0.0658)	(0.0294)	(0.0463)	(0.0523)
Observations	4,232	4,241	4,241	4,241
R-squared	0.021	0.068	0.050	0.116

Panel B: Rich Ass_per07 above median				
	(5)	(6)	(7)	(8)
DV	P_14	Save_14	Borrow_14	Perception_14
Δ CB	-0.163**	0.0323	0.00847	0.0238
	(0.0728)	(0.0335)	(0.0344)	(0.0540)
P_07	0.101***			
	(0.0223)			
Save_07		0.165***		
		(0.0243)		
Borrow_07			0.138***	
			(0.0320)	
Perception_07				0.166***
				(0.0372)
Constant	-0.321***	0.294***	0.260***	0.744***
	(0.0873)	(0.0656)	(0.0891)	(0.0577)
Observations	3,045	3,050	3,050	3,050
R-squared	0.026	0.120	0.043	0.107

Note: Robust standard errors in parentheses are clustered at community level.
All the variables in the Column (5) of Table 3 are controlled. Province dummies are controlled. Poor and rich group are defined by whether asset per capita 2007 is above or below the median. Deposit_14 (Loan_14) equals to one if there is deposit (loan) service in village at 2014. Save_14 (Borrow_14) equals to one if households report they save (borrow) during the past

year. Perception_14 equals to one if the individual think he can borrow from bank.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Heterogenous impact of agricultural origin on rich and poor people

	(1)	(2)	(3)
DV	P	P_14	P_14
	Pooled	Poor_07	Rich_14
GrC	0.0158**	0.0204**	0.0223
	(0.00638)	(0.00817)	(0.0180)
Rich	0.0558		
	(0.0529)		
GrC*Rich	-0.0122**		
	(0.00612)		
Δ CB		0.107	-0.260
		(0.104)	(0.314)
GrC*Δ CB		-0.0313*	-0.00387
		(0.0175)	(0.0431)
Rich_14		0.186*	0.142
		(0.0972)	(0.124)
GrC*Rich_14		-0.0264**	-0.0265
		(0.0113)	(0.0176)
Δ CB *Rich_14		-0.149	-0.316
		(0.309)	(0.253)
GrC*ΔCB*Rich_14		0.0250	0.0473
		(0.0369)	(0.0356)
P_07		0.0641***	0.101***
		(0.0190)	(0.0229)
Constant	-0.379***	-0.442***	-0.444***
	(0.131)	(0.0748)	(0.155)
Observations	13,910	4,058	2,994
R-squared	0.018	0.024	0.029

Note: Robust standard errors in parentheses are clustered at community level.
All the variables in the Column (5) of Table 3 are controlled. Province dummies are controlled.
The first column pools 2007 and 2014 waves as cross-sectional data. Rich group is defined as those with asset per capita above the pooled median.
The second and third column treat samples as panel data and divide them into poor and rich group based on asset per capita at 2007. Rich_14 equals to one if asset per capita at 2014 is above the pooled median.
GrC is a continuous variable representing growth cycle of main crop.
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Estimation results of bank expansion on patience after PSM

	(1)	(2)
DV	P_14	P_14
	Java, Sumatra and Nusa Tenggaru	All regions
Δ CB	-0.119**	-0.114*
	(0.037)	(0.051)
Observations	2,934	2,949

Note: All the variables in the Column (5) of Table 3 are controlled, including patience level at 2007. Province dummies are controlled in Panel B.
Column (1) only use samples in Jawa, Sumatra and Nusa Tenggaru. Column (2) use samples in all regions.
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Impact of bank expansion on migration rate and migration destination

	(1)	(2)
DV	Mig_14	Δ CB_new
	Whole	Migrants
Δ CB	0.00450	0.136
	(0.0216)	(0.136)
Male	0.0209***	0.0809**
	(0.00654)	(0.0334)
Age_07	-0.00439***	-0.00511**
	(0.000314)	(0.00200)
High school_07	0.0464***	0.0282
	(0.0122)	(0.0418)
Constant	0.293***	0.446***
	(0.0291)	(0.101)
Observations	7,564	719
R-squared	0.069	0.078

Note: Robust standard errors in parentheses are clustered at community level.
Province dummies are controlled.
Mig_14 equals to one if individual is found in a different place at 2014.
Δ CB_new is constructed by taking difference between bank existence in new location at 2014 and bank existence in original community at 2007.

Table 9: Heterogenous impact of bank expansion on stayers and migrants

	(1)	(2)	(3)
DV	P_14	P_14	P_14
	Stayers	Migrants	Migrants
Δ CB	-0.111**	-0.223*	
	(0.0430)	(0.118)	
Δ CB_new			0.0318
			(0.118)
P_07	0.0788***	0.0980**	0.0969**
	(0.0151)	(0.0449)	(0.0453)
Constant	-0.309***	-0.768***	-0.773***
	(0.0569)	(0.174)	(0.173)
Observations	6,525	687	689
R-squared	0.021	0.067	0.061

Note: Robust standard errors in parentheses are clustered at community level.
All the variables in the Column (5) of Table 3 are controlled. Province dummies are controlled. The first column restricts regression to stayers, who are defined as people found in the same village at 2007 and 2014. The second and third column use migrant sample, who are defined as people found in different villages at 2014.
*** p<0.01, ** p<0.05, * p<0.1

Appendix 1: Labelling rule of first round of time preference module

Figure below demonstrates the labeling path based on different choices in the first round. After answering all the four questions (a, b, c, d), every respondent will come to one of the five terminals. Patience level is labeled as P_1, ranging from 1 to 5. Patience level equals to 5 if the individual chooses delayed payment in Question a, representing the most patient group who are willing to switch to delayed payment with zero return. Patience level equals to 4 if the individual is willing to switch to later payment at 2 million rp (through the path of a1-b2-d2). Patience level equals to 3 if the individual is willing to switch to later payment at 3 million rp but not at 2 million rp (through the path of a1-b2-d1). Patience level equals to 2 if the individual is willing to switch to later payment at 6 million rp (through the path of a1-b1-c2). Patience level equals to 1 if the individual never switches to later payment (through the path of a1-b1-c1). The larger amount required to switch to later payment, the less patient the respondent is.

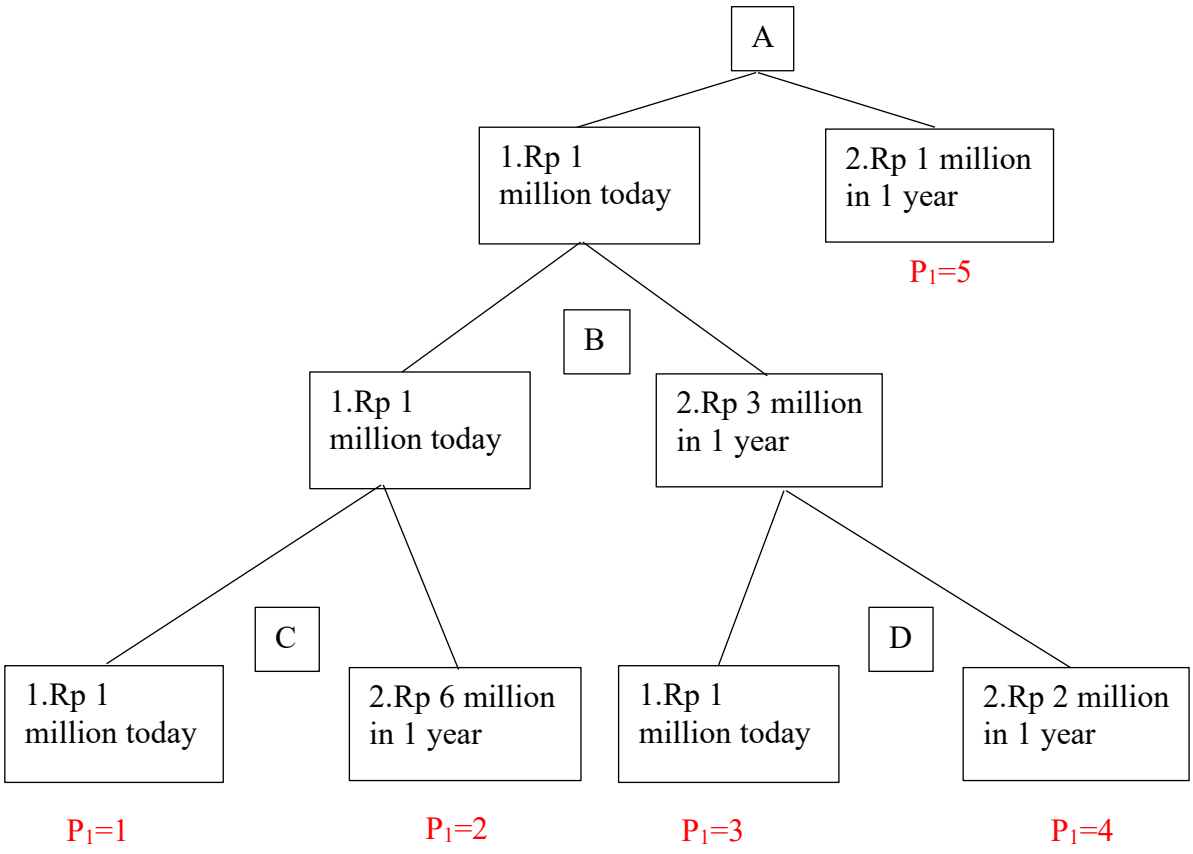

Figure A1: Labelling rule of first round of time preference module

Appendix 2: Pre-trends of a variety of variables

Table A1: Pre-trends using IFLS variables in between 1993 and 2007

	(1)	(2)	(3)	(4)	(5)
DV	Inc_per	Sav_per	Ass_per	% agr inc	Edu
Banked	0.241	0.183	0.267	-0.0793	0.164
	(0.281)	(0.570)	(0.248)	(0.0683)	(0.154)
1993.year	-1.159***	-1.985***	-7.447***	0.164***	
	(0.159)	(0.427)	(0.351)	(0.0287)	
1997.year	-0.663***	-1.273***	-0.396***	0.0341	-0.784***
	(0.0798)	(0.421)	(0.0969)	(0.0286)	(0.0807)
2000.year	-0.489***	-0.505	-0.427***	0.0739***	-0.424***
	(0.0906)	(0.392)	(0.0948)	(0.0283)	(0.0850)
Banked*1993	-0.569	0.944	0.952	0.0113	
	(0.436)	(0.847)	(0.771)	(0.101)	
Banked*1997	-0.0301	0.102	0.124	-0.0193	0.0888
	(0.322)	(0.991)	(0.317)	(0.0980)	(0.203)
Banked*2000	-0.0137	1.162	-0.0795	-0.00283	0.0785
	(0.330)	(0.873)	(0.337)	(0.0973)	(0.223)
Constant	12.78***	6.917***	13.43***	0.531***	3.724***
	(0.147)	(0.765)	(0.391)	(0.0570)	(0.0872)
Observations	448	448	448	448	336
R-squared	0.243	0.217	0.768	0.204	0.451

Note: Robust standard errors in parentheses are clustered at community level.
Province dummies are controlled.
Year 2007 is the reference group.
*** p<0.01, ** p<0.05, * p<0.1

Table A2: Pre-trends using PODES variables in between 2000 and 2006

DV	(1) Commercial bank	(2) Other financial inst	(3) Pop density	(4) % agr hhs	(5) Senior h sh
Banked	-0.0245	0.184	0.750***	-0.0227	0.338**
	(0.0245)	(0.168)	(0.257)	(0.0474)	(0.131)
2000.year	-0.0189	0.119*	-0.0393	0.0122	
	(0.0226)	(0.0663)	(0.150)	(0.0257)	
2003.year	0.00472	-0.0829	0.0326	0.0145	-0.0680
	(0.0258)	(0.0511)	(0.142)	(0.0232)	(0.0537)
Banked*2000	0.0190	-0.293	0.202	-0.105	
	(0.0362)	(0.207)	(0.326)	(0.0688)	
Banked*2003	0.0961	-0.269	0.0659	-0.0472	0.109
	(0.105)	(0.189)	(0.291)	(0.0577)	(0.201)
Constant	0.000306	0.00155	5.650***	0.790***	0.241**
	(0.0137)	(0.0335)	(0.343)	(0.0533)	(0.103)
Observations	285	285	285	285	205
R-squared	0.080	0.163	0.542	0.187	0.341

DV	(6) Shop	(7) Hhs with electricity	(8) # of small businesses	(9) Disaster
Banked	0.224	0.137*	6.336	0.237
	(0.162)	(0.0701)	(18.44)	(0.156)
2000.year	-0.127***	0.0351		
	(0.0446)	(0.0430)		
2003.year	0.0358	0.0140	-5.917	-0.102
	(0.0567)	(0.0391)	(16.66)	(0.0646)
Banked*2000	0.0652	-0.136		
	(0.226)	(0.122)		
Banked*2003	-0.102	-0.0722	-14.64	-0.235
	(0.206)	(0.0946)	(26.87)	(0.198)
Constant	0.0346	0.783***	9.831	0.0915
	(0.0487)	(0.0505)	(8.438)	(0.0773)
Observations	285	285	205	205
R-squared	0.151	0.255	0.063	0.104

Note: Robust standard errors in parentheses are clustered at community level.
Province dummies are controlled.
Year 2006 is the reference group.
*** p<0.01, ** p<0.05, * p<0.1

Appendix 3: Correlation between community level changes and bank expansion between 2007 and 2014

DV	(1) Δ CB	(2) Δ CB	(3) Δ CB	(4) Δ CB	(5) Δ CB	(6) Δ CB	(7) Δ CB
Δ Inc_per	0.0153						
	(0.0271)						
Δ Ass_per		-0.0599					
		(0.0655)					
Δ Employment			0.0287				
			(0.380)				
Δ Agriculture				0.0697			
				(0.250)			
Δ % of agr inc					-0.0296		
					(0.0467)		
Δ Other financial institutions						-0.00543	
						(0.0761)	
Δ Pop density							0.0490
							(0.0420)
Constant	0.104	0.146	0.110	0.110	0.130	0.112	0.110
	(0.114)	(0.135)	(0.116)	(0.113)	(0.109)	(0.113)	(0.111)
Observations	111	111	111	111	111	111	103
R-squared	0.111	0.116	0.110	0.110	0.112	0.110	0.132

DV	(8) Δ CB	(9) Δ CB	(10) Δ CB	(11) Δ CB	(12) Δ CB	(13) Δ CB	(14) Δ CB
Δ % agr hhs	-0.249**						
	(0.124)						
Δ Senior h sh		0.0217					
		(0.0471)					
Δ Shop			0.146**				
			(0.0735)				
Δ Electricity				-0.0251			
				(0.108)			
Δ small business					0.000140		
					(0.000181)		
Δ Disaster						-0.0125	
						(0.0490)	
Δ Road							-0.0183
							(0.0422)
Constant	0.0980	0.111	0.111	0.112	0.111	0.110	0.113
	(0.118)	(0.112)	(0.112)	(0.112)	(0.112)	(0.113)	(0.113)

Observations	107	111	111	107	111	111	111
R-squared	0.149	0.111	0.150	0.114	0.114	0.110	0.110

Note: Robust standard errors in parentheses are clustered at community level.
Province dummies are controlled.
*** p<0.01, ** p<0.05, * p<0.1

Appendix 4: Explanation of variables

Variable name	Explanation	Level	Type
P	Standardized patience level	Individual	Continuous
Δ CB	Difference between bank existence at 2007 and 2014 for original community	Community	-1,0,1
Δ CB_new	Difference between bank existence in new location at 2014 and bank existence in original community at 2007	Community	-1,0,1
Employed	Being employed rather than self-employed or not working	Individual	0,1
Agricultural sector	Work in agricultural sector	Individual	0,1
Inc_per	Logged form of income per capita after inflation adjustment	Household	Continuous
Ass_per	Logged form of asset per capita after inflation adjustment	Household	Continuous
% of agr inc	Agricultural income divided by total income	Household	Continuous
Other financial institutions	Existence of rural bank or saving and loan cooperatives	Community	0,1
% of agr hhs	Percent of agricultural household over total household	Community	Continuous
Shop	Existence of shopping complex	Community	0,1
Deposit	Has deposit service provided by any party	Community	0,1
Loan	Has loan service provided by any party	Community	0,1
Save	Saved during the past year	Household	0,1
Borrow	Borrowed during the past year	Household	0,1
Other_per	Logged form of other asset (excluding savings) per capita after inflation adjustment	Household	Continuous
Perception	Think they can borrow from bank	Individual	0,1
GrC	Growth cycle in months of main crops	Community	Continuous
Rich	Asset per capita above the median	Household	0,1
Male	Gender	Individual	0,1
Age_07	Age at 2007	Individual	Continuous
High school_07	Education level is high school or above at 2007	Individual	0,1

Note: In regressions, some variables appear with 07 or 14 as suffix, that means the variable is measured in 2007 wave or 2014 wave. Some variables appear with Δ as prefix, that means taking the difference between 2007 wave and 2014 wave.

Appendix 5: Checking difference between migrants from banked villages and unbanked villages

DV	(1) Male	(2) High school_07	(3) Age_07	(4) P_07	(5) Inc_per07
Mig	0.0571***	0.186***	-11.78***	0.0531	0.122
	(0.0189)	(0.0258)	(0.740)	(0.0412)	(0.0970)
Δ CB	-0.0273	0.0505	-0.0670	0.00194	-0.107
	(0.0190)	(0.0329)	(1.054)	(0.0583)	(0.232)
Mig*Δ CB	0.0302	0.0465	-0.311	0.0179	-0.707
	(0.0573)	(0.0716)	(1.909)	(0.127)	(0.531)
Constant	0.462***	0.338***	38.99***	-0.0350	12.01***
	(0.0136)	(0.0445)	(0.699)	(0.0841)	(0.276)
Observations	7,653	7,564	7,653	7,650	7,653
R-squared	0.005	0.057	0.074	0.030	0.025

DV	(6) Save_07	(7) % of agr inc_07	(8) Employed_07	(9) Agriculture_07
Mig	0.0105	-0.268***	0.0426**	-0.198***
	(0.0171)	(0.0824)	(0.0185)	(0.0193)
Δ CB	-0.00394	-0.396	0.0274	-0.102*
	(0.0286)	(0.281)	(0.0346)	(0.0586)
Mig*Δ CB	0.0640	-0.243	0.0337	-0.0316
	(0.0566)	(0.287)	(0.0687)	(0.0564)
Constant	0.106***	2.376***	0.188***	0.608***
	(0.0345)	(0.406)	(0.0480)	(0.105)
Observations	7,651	7,653	7,653	7,653
R-squared	0.017	0.075	0.025	0.059

Note: Robust standard errors in parentheses are clustered at community level.
Province dummies are controlled.
*** p<0.01, ** p<0.05, * p<0.1