

The role of financial regulation in financial inclusion: The case of a lending rate restriction on microfinance institutions

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Abstract

Financial regulations play a definitive role in determining a market structure and behaviors of financial institutions. In April 2017, an interest rate cap policy at 18% was newly introduced in the Cambodian microfinance sector, where there was no restriction on lending rates previously. The policy was aimed at mitigating a rising issue of over-indebtedness for borrowers. However, in the literature of interest rate cap, there are mixed results with effects of this policy on loan provision of financial institutions. In this regard, we provide empirical evidence on effects of the policy by exploiting unique MFI-district pair-wise data in Cambodia. The data allows us to investigate changes in geographical outreach of MFI's lending. As a result, we find that the policy introduction negatively affected MFI loan provision in the sense that MFIs were likely to maintain profits by reducing the growths of number of borrowers and increasing loan sizes. In particular, MFIs with higher pre-regulated interest rates are more likely to reduce loan provision after the policy implementation. In the meantime, the policy did not necessarily have harmful effects on MFIs' outreach. After the policy introductions, MFIs with lower pre-regulated interest rate were likely to increase growths of amounts of loans and numbers of borrowers in less developed areas. These results suggest that interest rate cap policy affect MFIs differently depending on pre-regulated interest rate they charge on borrowers, and MFIs with higher pre-regulated interest rates are more likely to be affected and to reduce the loan provision and increase the size of loans in order to maintain the lending policy toward profit-orientation. However, MFIs with lower pre-regulated interest rate circumvented the policy, and further increase loan provision to the people in less developed areas. In other words, the policy lead to reduction in outreach of MFIs with higher pre-regulated interest rate, while such reduction was compensated by increases in outreach of MFIs with lower pre-regulated interest rate.

Keyword: Microfinance, Outreach, Lending behavior, Interest rate ceiling, Cambodia

JEL Codes: G28, L31, O1

1. Introduction

Financial regulation plays a crucial role in determining a market structure and a behavior of financial institutions. Financial regulation limits the amount of market power that financial institutions can exercise over their customers. Thus, the adequate level of regulation could improve the market welfare by

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curbing the monopolistic behavior of financial institutions. However, implementing adequate regulation requires careful investigation on demand and supply sides of the financial market.

In April, 2017, National Bank of Cambodia (NBC), the central bank of Cambodia, implemented the interest rate cap policy on Cambodian microfinance sector. This policy controls interest rates on lending below 18% over all registered microfinance institutions (MFIs). MFIs in Cambodia are well regulated and most of entities which are engaged in microfinance business are registered and supervised by NBC. Before the interest rate cap policy was in effect, almost all of MFIs were extending loans at more than 18%. Thus, the new policy might have significant impact on Cambodian MFIs— particularly those with a focus on the poorest clients in remote regions.

This policy was aimed at improving the operation of MFIs and also reducing the over-indebtedness issue in Cambodian households. However, there is a concern that poor rural clients may lose access to funds from regulated industry, and instead seek to borrow funds from informal money lenders at less transparent rates. According to experiences of other countries, it has been also observed that introduction of interest rate cap policy lead to a rise in interest rates (Mamibo & Gallogos, 2014). In particular, even though Cambodian MFIs are regulated, entry barriers are not high. In fact, the number of MFIs has been increasing in recent years. This high intensity of competitiveness in the Cambodian microfinance sector could drive MFIs to reduce loans to the poor in response to the introduction of interest rate cap policy.

Although interest rate cap policy (sometimes also referred to as interest rate ceiling or usury laws) is a widely common practice in both of developed and developing countries, a strand of the literature presents mixed results of real effects of this policy on financial institutions and accumulation of evidence is not sufficient. Alessie et al. (2005) find a positive impact on credit supply in Italian consumer markets, and Benmelech & Moskowitz (2010) and Rigbi (2013) find a negative impact in U.S. loan markets of firms and consumers. The theoretical argument of the regulation on the banking sector suggests that an interest rate cap policy could have positive and negative effects, although the effect depends on the competitiveness of loan markets and current policy. Thus, further empirical investigation into the effects of interest rate cap is needed in the literature of interest rate cap policy.

In addition, it is noted that there is a paucity of studies on effects of financial regulation on MFIs. Most of prior empirical studies are focused on developed countries, especially on behaviors of commercial banks and pay day loan markets. However, discussion in previous studies are not directly applicable to financial systems in the developing countries, where MFIs play a significant role in providing credits with the poor and SMEs. Originally, MFIs are aimed at addressing poverty reduction issues, and the nature of MFIs is not only pursuing the profit, but also improving outreach to extend loans to the poor. Thus, regulations on MFIs should be implemented with consideration of this MFI's nature. However, there is no systematic investigation into the effect of interest rate cap policy on MFIs. Our empirical findings are useful for the policy-makers and shed a light on the debate on the effectiveness of financial regulation on the MFI sector.

Using unique data, this paper investigates the effects of newly introduced interest rate cap policy on lending behaviors of microfinance institutions. Specifically, we employ MFI-district pair-wise data from 2015Q4 to 2018Q1 on a quarterly basis. We also consider the empirical model with an advantage of the nature of this policy implementation as a natural experience. Since the policy was announced in March 2017 and implemented in April 2017, it is not possible for most of MFIs to anticipate and prepare for this policy beforehand. Furthermore, even though the policy affects all of MFIs, there is a variation in the effects of the policy depending on the pre-regulated interest rate. Thus, for some MFIs with higher pre-regulated interest rates are likely to be strongly affected by the policy, while the policy could have almost no effects

on MFIs with lower pre-regulated interest rates. In an empirical strategy, we use difference-in-difference-in-difference estimation technique to exploit a variation of pre-regulated interest rates to identify the effects of the interest rate cap policy on three MFI's lending characteristics: growth rates of loan outstanding, number of borrowers, and average sizes of loans.

We also carry out a set of robustness tests of our results against the potential biases from economic shocks on demand sides. First, we include time-district fixed effects to remove any time-variant region-level demand shocks on MFI's lending. Second, we include a proxy variable to capture such demand shocks and estimate the effect of interest rate cap more precisely. Lastly, we carry out another empirical tests including financial institutions which are exempt from the interest rate cap policy (i.e. commercial banks) in difference-in-difference framework.

As a result of our analyses, at aggregated-level in the whole microfinance sector, we find that MFIs increased the amounts of loan outstanding and the number of borrowers in the relatively developed areas after the introduction of interest rate cap policy, while they tended to decrease sizes of loan per borrower in the areas. It suggests that overall MFIs' lending shifted toward people in richer areas to sustain their business with interest rate restriction.

When we look at individual behaviors of MFIs, we find that the policy introduction negatively affected MFI loan provision in the sense that MFIs were likely to maintain profits by reducing the growths of number of borrowers and increasing loan sizes. In particular, MFIs with higher pre-regulated interest rates are more likely to reduce loan provision after the policy implementation. In the meantime, the policy did not necessarily have harmful effects on MFIs' outreach. After the policy introductions, MFIs with lower pre-regulated interest rate were likely to increase growths of amounts of loans and numbers of borrowers in less developed areas. These results suggest that interest rate cap policy affect MFIs differently depending on pre-regulated interest rate they charge on borrowers, and MFIs with higher pre-regulated interest rates are more likely to be affected and to reduce the loan provision and increase the size of loans in order to maintain the lending policy toward profit-orientation. However, MFIs with lower pre-regulated interest rate circumvent the policy, and further increase loan provision to the people in less developed areas. These results might translate into that reduction of outreach of MFIs with higher pre-regulated interest rate was compensated by the increase in the outreach of MFIs with lower pre-regulated interest rate.

Interestingly, we find that the policy has different effects on MFIs with lower pre-regulated interest rate. While MFIs with lower pre-regulated interest rate decreased growths of outstanding and borrowers in more developed areas after the policy implementation, while they increased the growths of number of borrowers in less developed areas. Furthermore, average sizes of loans increased more rapidly in developed areas after the policy implementation. These results suggest that interest rate cap policy changed MFIs' lending behaviors to concentrate more developed areas, implying that MFIs might shift toward more profitability-oriented operation.

This paper is to exclusively investigate loan provision from a formal financial sector. In other words, loans from an informal sector, such as pawn shop, small lender, and relatives/friends, are out of scope of this paper. Theoretically, the substitution from formal to informal funding sources could occur if households and SMEs cannot receive enough credits from formal finance. However, informal lenders are normally impose higher funding costs and amounts of funds are also limited for those funding sources. Furthermore, the NBC has been actively regulating small lenders in rural areas, and 70 MFIs and 200 small lenders are registered as rural credit operators (NBC, 2018). In addition, the NBC regularly revokes licenses of small lenders which violate the regulation (Vannak, 2018; Pisei, 2018). Thus, even though there are still informal

funding sources available to some extent, a decline in formal credit might not be perfectly substituted by informal funding sources in Cambodia.

The rest of the paper is structured as follow. Section 2 describes the institutional background of the Cambodian microfinance sector and implementation of interest rate cap policy. In Section 3, we develop hypotheses, and Section 4 presents empirical strategy to test our hypotheses. Section 5 shows empirical results, and Section 5 concludes with policy recommendations.

2. Institutional background of interest rate cap policy in Cambodia

The Cambodian banking sector is regulated by National Bank of Cambodia (NBC). According to NBC (2018), The Cambodian banking sector is composed of three types of financial institutions as of 2017: 39 commercial banks, 15 specialized banks, 76 microfinance institutions (MFIs), 313 rural credit institutions, 11 financial lease companies². Rural credit institutions are in general small NGO, and normally operating in rural areas. They receive loans from MDIs or non-MDI to provide credits to rural households. MFIs are further divided into 7 deposit-taking microfinance institutions (MDIs), and 69 non-deposit-taking microfinance institutions (Non-MDIs). Regulations on MDIs and non-MDIs, such minimum capital requirement, solvency ratio, and liquidity ratio, are different. The minimum capital requirement is USD 30 million for MDIs, and it is 1.5 million for non-MDIs. The minimum solvency ratio for MDIs is 15%, and minimum liquidity ratio for MDIs is 70%. MDIs are further required the reserve requirement ratio of 8%.

An interest rate cap policy was announced in March 3rd, 2017, and has been implemented since April 1st, 2017 (NBC, 2018). According to NBC (2017, 2018), the regulation requires MDIs, non-MDIs and rural credit institutions under the NBC's supervision to set the interest rate on loan not to exceed 18% per year for any maturity. This interest rate ceiling is applied for new credit contracts as well as restructured loan and refinancing, which requires the institutions to comply from 1 April 2017.

As of 2018, no MFIs have withdrawn from Cambodia due to interest rate cap. If the Government intends to keep the cap at the current level, the CMA has suggested some solutions. These are related to reducing the operating costs of microfinance institutions as a long term goal. In the near term, any effort to providing discounted/concessional sources of funding in Khmer Riel to the microfinance sector would be relief to the sector.

As responses, the regulator and policy makers especially the NBC and Ministry of Economy and Finance have issued a circulation to support Microfinance sector as following: On 27 September 2017, National Bank of Cambodia has issued a circulation of "Terms and Conditions for Banks and Financial Institutions Apply for Securities Registration in Cambodia Securities Exchange". This circulation aims to empower institutions to mobilize and raise funds for expansion to contribute to Cambodia's economic development.

On 27 October 2017, Ministry of Economy and Finance issued a circulation on "Withholding Tax on Interest for Non- resident to MFI", which aims to help ease the MFIs' funding costs from overseas to keep sustainability of Microfinance sector and aims to provide partial preferential treatment of withholding tax on interest of MFI's foreign loans. Under withholding tax of 14%, MFIs shall carry out a tax deduction

² There are also 11 foreign bank representative offices, and 1 credit bureau company in Cambodia. Those institutions are not engaged in banking activities in Cambodia, but are required to report their activities to NBC.

of 10% from interest paid to non-resident taxpayers and the remaining 4% of the withholding tax is deemed to be the responsibility of a government to provide support to the microfinance sector.

3. Hypotheses

3.1 Causing a distortion of market mechanism

Theoretically, the effects of lowering interest rate by interest rate cap policy depend on the extent of market competition. Theoretically, financial institutions set interest rates based on cost structure, such as funding costs, operational costs, and also credit risks (Saunders et al., 2000; Maudos et al., 2004; Gambacorta, 2008). In addition, as well as other ordinary industries, market condition also matters in the banking sector, and financial institutions with higher market power set higher interest rates. Saunders et al. (2000) also find that, apart from credit risks, regulations on financial institutions also affect the interest rates. If financial institutions have large a market power, the intervention to restrict the interest rate could work to increase loan provision by reducing a market power.

However, if the loan market is competitive, interest rate cap policy could result in decreasing the lending by excluding the potential borrowers from the loan market. In other words, if MFIs originally set the interest rates that they cannot make a large profit, a reduction in profit by interest rate cap policy would negatively affect the MFI's lending growth. In this case, the interest rate cap policy would distort the social welfare by reducing the interest rate from optimal rate. All in all, we formulate the following hypothesis to be tested.

H1: Introduction of interest rate cap policy will decrease MFI's lending.

3.2 Reducing the incentive of poverty reduction

Another potential effects of interest rate cap could be to reduce MFI's incentive to provide loans to the poor. The financial sector is subject to intense information asymmetry. Financial institutions are usually screening customers, and ration credits from risky customers, so that the supply-curve is back-ward bending (Stiglitz & Weiss, 1981). If this is the case, loan provision is determined at the optimal level in terms of return and risks for financial institutions, not at the intersection with demand curve. In other words, too much loan provision reduces profit of financial institutions, and too little loan provision also reduce profit. In that case, the deviation from interest rate could reduce the loan provision, since financial institutions ration credit from the risky borrowers to maintain their profit.

However, even though there is intense information asymmetry, some of social-oriented MFIs might cross-subsidize clients to extend loans to the poor. They make a profit in lending to the rich, and extend loans to the poor at a lower interest rate even if it makes a loss. (McIntosh, 2005). Since interest rate cap would reduce the profit of MFIs, MFIs would reduce loan provision to the poor in order to sustain their business in response to the policy implementation. In other words, MFIs would ration credit from risky borrowers to keep a profit after the policy implementation. Previous empirical findings have also confirmed this theory. Capera, Murcia, and Estrada (2011) find a negative association of interest rate cap policy with financial depth in 18 Latin American countries from 1980-2008. Similarly, using data from online lending marketplace in US, Rigbi (2013) estimates the effects of changes in usury laws that increased to 36% of the

maximum interest rate charged to borrowers. He finds that increase in interest rate caps associated with an increase in probability of being funded, especially for borrowers who are not funded previously.

H2: MFIs would reduce the loan provision for risky or poor borrowers.

In addition to amounts of loans, MFIs might reduce the number of risky or poor borrowers to adopt to the interest rate cap policy, and even increase the number of safe or richer borrowers.

H3: Introduction of interest rate cap policy will decrease the number of risky or poor borrowers.

As well as other aspects of lending behaviors, the interest rate cap policy would affect average loan sizes of MFIs. Since normally there could be a certain fixed cost or sunk cost to provide loans to individuals, smaller amounts of loans have to be put with higher interest rates. Thus, providing larger sizes of loans is one of the possible strategy to maintain a profit under the strict interest rate cap policy.

H4: Introduction of interest rate cap policy will increase average sizes of loans.

Loophole might exist, and allow MFIs to circumvent the restriction from this interest rate cap policy by a central bank. For example, Microfinance institutions have moved to charging regular fees, to cover the administration costs of loans, since this restriction only caps nominal interest rates. However, although anecdotal evidence suggests that MFIs takes such a practice, they cannot perfectly compensate the reduction in interest rate on loans. In addition, the NBC has recently announced it will be conducting on-site audits of the fees charged to ensure the fees are not “unfairly” high (NBC, 2018). Thus, even though there could be loophole for MFIs, still it is likely that the policy would affect MFIs’ lending behaviors.

4. Methodology

4.1 Empirical model

4.1.1 Effects on MFI's lending growth

We first examine effects of the interest rate cap policy on lending growths of MFIs. If MFIs do not have a large market power, the introduction of interest rate cap policy negatively affect the MFI's lending growth after the policy implementation (H1). However, empirically identifying the treatment effect of interest rate policy is difficult, since all of MFIs are affected by the interest rate cap policy. We can only see the average treatment effect of treated sample in this study. To circumvent this problem, we use difference-in-difference (DD) estimation with exploiting heterogeneity in the effect of interest rate cap policy, and controlling for other characteristics. In a setting of a model, we follow Mora (2014), who investigated the effect of changes in reserve requirement ratio on loan growth of Lebanese banks with exploiting dependence of the effects policy change on how much share of foreign currency Lebanese bank have in their deposits. Even though regulatory changes affect all of MFIs in Cambodia, its effects could vary across MFIs. Regarding interest rate cap policy, MFIs which impose higher interest rates before the

policy implementation would be more likely to be affected, since they adjust their loan portfolio to meet the policy. All in all, to examine the effect of interest rate cap policy, we estimate the following specification.

$$\begin{aligned} \text{Log. Loan Growth}_{ikt} \\ = \alpha + \delta \cdot \text{interest rate}_{i,2016Q4} \cdot \text{Policy}_t + \tau_t + \nu_k + \mu_i + u_{ikt} \end{aligned} \quad (1)$$

where i represents an individual MFI, k represents a district, and t represents a period. we define $\text{Log. Loan Growth}_{i,k}$ as $\ln\left(\frac{\text{Loan}_{i,k,t}}{\text{Loan}_{i,k,t-1}}\right)$, and $\text{interest rate}_{i,2016Q4}$ represents the implicit interest rates of each MFIs, which defined as interest income over amounts of loans. Policy_t takes one after 2017Q2 when the interest rate cap policy is in effect. We also control for time-fixed effects τ_t region-specific time-invariant effect ν_k , and MFI-fixed effect μ_i . If δ (the coefficient of interaction term $\text{interest rate}_{i,2016Q4} \cdot \text{Policy}_t$) is significantly not zero, it indicates that interest rate cap policy affected the MFI's lending behaviors. Even though estimating the average treatment effects is difficult, we can examine whether interest rate cap policy negatively affected the MFI's lending behaviors. In particular, if the policy makes MFIs reduce the loan provision especially for MFIs with higher interest rates, δ would be negatively estimated. In the section of empirical results, we further show robustness of our estimation by including time-district-fixed effects in above equation to clear the biases from demand shocks.

4.1.2 Effects on MFI's outreach

Next we assess the impact of the interest rate cap policy on outreach of MFI's lending behaviors using the same empirical strategy. The definition of outreach is crucial for this study. Previous studies define MFI's outreach as average size of loans, or number of borrowers. However, these measures are vague, since in reality some MFIs cross-subsidize between the poor and rich borrowers to expand their outreach. In that case, average size of loans could be large. In this study, we employ more precise measure to capture MFI's outreach. We capture the MFI's shift toward safe and richer borrowers by looking into changes in geographical loan allocation at regional level, since borrowers in less developed areas are relatively poor and risky. Even though our data only capture regional differences and cannot observe the composition of poor and rich borrowers within regions, MFIs are likely to distinguish the borrower type by regions where borrowers live in.

Specifically, we examine the correlation between the growth of loans and regional economic development using the following model.

$$\begin{aligned} \text{Log. Loan Growth}_{ikt} \\ = \alpha + \omega \cdot \text{Policy}_t \cdot \text{Economic Development}_k + \tau_t + \nu_k + \mu_i + u_{ikt} \end{aligned} \quad (2)$$

where i represents an individual MFI, k represents a district, and t represents a period. $\text{Economic Development}_k$ represents economic development level of the district k . If $\text{Economic Development}_k$ is large, district is more developed. The interest rate cap policy makes it difficult for MFIs to make a profit, and to reduce lending in the areas of risky and poor borrowers (H2). If this is the case, the coefficient of the interaction term of $\text{Policy}_t \cdot \text{Economic Development}_k$ is negatively estimated ($\omega < 0$).

To measure the development level of the district, we use the average loan size per borrower in the district in 2016Q4. as a proxy. Since richer people can generally borrow larger amounts due to a low risk to fail to repay, the average loan size of borrowers could be a good proxy for the economic development level of districts.

4.1.3 Effects on Number of Borrowers and Average Loan Sizes

Another possible consequence is that MFIs can mitigate the impact of the policy by reducing the number of borrowers, and by increasing average loan sizes (H3 and H4).

$$\begin{aligned} \text{Log. Growth of number of borrowers}_{ikt} \\ = \alpha + \delta \cdot \text{interest rate}_{i,2016Q4} \cdot \text{Policy}_t + \tau_t + \nu_k + \mu_i + u_{ikt} \end{aligned} \quad (3)$$

$$\begin{aligned} \text{Log. Growth of number of borrowers}_{i,k,t} \\ = \alpha + \omega \cdot \text{Policy}_t \cdot \text{Economic Development}_k + \tau_t + \nu_k + \mu_i + u_{i,k,t} \end{aligned} \quad (4)$$

where i represents an individual MFI, k represents a district, and t represents a period.

As well as number of loans, we also test the effect of interest rate cap on average loan sizes of MFIs using following specification.

$$\begin{aligned} \text{Log. Growth of Avg. Loan Size}_{ikt} \\ = \alpha + \delta \cdot \text{interest rate}_{i,2016Q4} \cdot \text{Policy}_t + \tau_t + \nu_k + \mu_i + u_{ikt} \end{aligned} \quad (5)$$

$$\begin{aligned} \text{Log. Growth of Avg. Loan Size}_{ikt} \\ = \alpha + \omega \cdot \text{Policy}_t \cdot \text{Economic Development}_k + \tau_t + \nu_k + \mu_i + u_{ikt} \end{aligned} \quad (6)$$

where i represents an individual MFI, k represents a district, and t represents a period.

4.2 Data

The dataset used in our study is comprised of two data sources: (1) data of loan amounts at MFI-district level provided by Cambodia Microfinance Association (CMA), which is non-profit organization, and (2) supervisory annual report published by NBC. CMA collects the amounts of loans and deposits by regions from all of MFIs registered in CMA on a quarterly basis. We use the CMA data from 2015Q 4 to 2018Q1 to capture trends of loan provisions before and after the policy implementation. As of 2018Q1, there are 74 financial institutions registered in CMA, and out of 74 financial institutions, there are 2 commercial banks, 7 MDIs, 59 non-MDIs, 4 leasing company, and 2 rural credit operators in the CMA data.³ All of MFIs in the data provide amounts of loans and deposits by districts. In Cambodia, there are 197 districts in the period of 2015Q4-2018Q1.⁴

³ Sathapana Bank was transformed from an MFI to a commercial bank in April 2016.

⁴ In the history, there have been merger and separation of districts several times in order to balance the increased population across districts. However, in the study period of this paper, there was no merger and separation of districts.

We define implicit interest rates as interest income over amounts of outstanding loans as of 2016. The data of interest income and amounts of outstanding loans are available. In Figure 1, we present the implicit interest rate of each MFI before the policy implementation. MFIs in Figure 1 are listed in an ascending order based on asset size. Interestingly, there is wide variation in the extent of implicit interest rates of MFIs, and a lot of MFIs imposed interest rates above 18% on average of their loan portfolios. It is noteworthy that some MFIs are not registered in NBC, but are registered in CMA, and vice versa. Thus, some MFIs are excluded from Figure 1, and also from the empirical analysis in the next section. Nonetheless, they are small ones and do not affect the main results of our paper.

In the analysis, we exclude financial institutions which are not registered in NBC.⁵ Since these non-MFIs are not subject to the interest rate cap policy. As well, we excluded the financial institutions which are categorized into commercial banks (2 commercial banks), since commercial banks are not subject to this policy. Furthermore, to reduce the potential biases from the existence of outliers, we winsorize dependent variables at 99%. Figure 2 shows the distributions of dependent variables after we winsorized at 99%.

5. Empirical Results

5.1 Benchmark results from aggregated data

Before presenting the regression results, we look into the impacts of policy implementation at aggregated data of MFIs, by showing trends of MFIs' lending behaviors before and after policy implementation. We believe that showing an aggregated-level results might help avoid misinterpretation of the regression results.

Figure 1 presents show pre- and post-event trends of lending behaviors of MFIs with higher pre-regulated interest rates and those with lower pre-regulated interest rates. We divided sample into MFIs with interest rate higher than 25% per annum (the 'higher interest rate' group), and those with interest rate lower than 25% per annum (the 'lower interest rate' group). It is noteworthy that the total numbers of borrowers have decreased or been stable after 2016Qa, especially for the higher interest rate group (Panel B of Figure 1). It is mainly because CMA issued a circulation that warns MFIs of an over-indebtedness problem, and that also instructs them not to lend borrowers who already have more than two loans from multiple sources. After the issue of CMA's circulation, the number of borrowers in the microfinance sector have constantly decreased. In the meantime, we find that the number of borrowers became stable after the implementation of the interest rate cap policy, indicating that MFIs' behaviors might change in response to the policy implementation.

Changes in the loan default risks could reflect changes in borrower's conditions in response to external shocks, such as natural disasters. From 2016Q2 to 2017Q1, we find that there is a significant increase in the ratio of loans of PAR30 to total loans (Panel D of Figure 3). It mainly reflects the serious droughts which occurred over the country in 2016Q2. This natural disaster devastated the crop yields and

⁵ We excluded Aceda Bank and Sathapana Bank from our analysis, even though these banks provide the data to CMA. Since these two banks are categorized into commercial banks according to the Cambodian banking law, they are not subject to the interest rate cap policy.

livestock of MFIs' clients. Thus, many of MFIs' clients experienced serious decline in their income, making it for them difficult to repay debts.

In order to investigate differences in lending behaviors by regions, we next present the results for four regional group based on economic development (Figure 2). As also explained in Section 4, as a proxy for economic development, we use the average loan size per borrower in the district in 2016Q4. We categorized 194 districts into (1) Area 1, the group of districts in the first quantile of distribution of economic developments, (2) Area 2, the group of districts in the second quantile, (3) Area 3, the group of districts in the third quantile, and (4) Area 4, the group of districts in the fourth quantile. Area 1 is the group of the least areas and Area 4 is the group of the most developed areas. While total numbers of borrowers have constantly decreased before the introduction of the interest rate cap policy, the decline of the number is alleviated after the policy introduction. However, Area 4 is an exception from this trend, and the number of borrowers has prominently increased in Area 4 after the policy introduction. Furthermore, the amount of outstanding loans in Area 4 became larger than Area 3 after the policy introduction, and the growth of average loan size became slower than other regions. Since information asymmetry is generally more intense and monitoring costs are higher in the less developed areas. For MFIs, it is less costly to extend loans to developed areas. Those findings might suggest that MFIs changed the lending policy to extend loans to developed areas to keep a profit in response to the reduction of profit by interest rate cap policy.

5.2 Regression results

To assess our hypotheses, we run empirical model as explained in section 4.1. Table 1 shows the regression results of equation 1, 3 and 5, of which dependent variable are growths of amounts of outstanding loan, number of borrowers, and average loan size. In Table 1, we present the results with different specifications and with sub-samples. All models in (1)-(6) are estimated using OLS with clustered standard errors within regions. We present both of the results without and with time-fixed, district-fixed, and MFI-fixed effects. Column 1, 3, 5 of Table 1 show the results without time, district, and MFI dummies, and column 2, 4, 6 show the results of with time-fixed, district-fixed, and MFI-fixed effects.

We find that the coefficient of pre-regulated interest rate ($interest\ rate_{i,2016Q4}$) is negative at 1% significance in the models of which dependent variables are log. loan growth and log. growth of number of borrowers (column 1 and 3). It means that, before the interest rate cap policy was introduced, MFIs with higher pre-regulated interest rate are likely to provide less loans than MFIs with higher pre-regulated interest rate. In the meantime, there is no significant correlation between growths of average loan size and pre-regulated interest rates.

Regarding the trend of lending after the introduction of interest rate cap (column 1, 3, 5), although the results might reflect other macroeconomic factors, the coefficient of $Policy_t$ are significantly estimated as negative in growths of amounts of loans, positive in growths of number of borrowers, and negative in growths of average loan sizes. It means that growths of amounts of outstanding loans have declined on average after the introduction of interest rate cap policy, while MFIs increased the growths of numbers of borrowers and reduced the average loan sizes.

Regarding interaction terms of $Policy_t$ and $interest\ rate_{i,2016Q4}$, we find no significant results in column 1 and 2, while it is significantly negative in the growths of numbers of borrowers and positive the average loan sizes. It means that MFIs with higher pre-regulated interest rate were more like to reduce the

number of borrowers and to increase average loan sizes, while they kept the growths of amounts of loan as high as MFIs with lower pre-regulated interest rates. It implies that interest rate cap policy negatively affected the MFI' lending if the MFI's pre-regulated interest rates are higher, while they mitigated the negative effects on their profitability by increasing average loan sizes and reducing the number of borrowers.

In Table 2, we divided sample into MFIs with interest rate higher than 25% per annum (column 1,3, 5), and those with interest rate lower than 25% per annum (column 2, 4, 6), we find that interaction terms are significantly estimated at 1 percent significance for sub-sample of MFIs with interest rate higher than 25%. In contrast, we do not find significant results in the MFIs with interest rate lower than 25% per annum. The results suggest that MFIs with pre-regulated interest rate higher than 25% are in particular affected by the interest rate cap policy, and they reduced loan provisions, and increased loan sizes in response to interest rate cap policy.

Regarding the effect of interest rate cap policy on outreach of MFIs, we presented the results of estimation of equation 2, 4, 6 in Table 3. First, we find that *Economic Development_k* is positively associated to growths of amounts of loan outstanding and numbers of borrowers (column 1 and 3). It implies that MFIs have tendency to increase loan provision in more developed areas in recent years. Next, we find that *Policy_t* is significantly and negatively associated with growths of numbers of borrowers, and positively with growths of average loan sizes, while we find no significant results with growth of amounts of loans. It suggests that

Interestingly, we find no evidence that outreach of MFIs is damaged by the policy, while MFIs, especially with lower pre-regulated interest rates, rather enhanced the lending policy toward outreach-orientation. We find that interaction terms of *Policy_t* and *Economic Development_k* is negatively associated with growths of amounts of loans and number of loans, and average loan sizes (Table 3). The findings suggest that the policy introduction did not necessarily hurt the MFI's lending policy in terms of outreach. Furthermore, when we divided MFIs into sub-sample based on levels of pre-regulated interest rates (Table 4), we find that the interaction terms of *Policy_t* and *Economic Development_k* is only found significantly estimated in the sample of MFIs with pre-regulated interest rates lower than 25%. It means that those MFIs somehow circumvented the negative effects of restriction by the policy, and had tendency to increase loan provision in less developed areas after the policy implementation. In the meanwhile, MFIs with higher pre-regulated MFIs did not change the lending policy toward more developed areas after the policy implementation. These findings might suggest that the policy lead to reduction in outreach of MFIs with higher pre-regulated interest rate, while such reduction was compensated by increases in outreach of MFIs with lower pre-regulated interest rate.

5.3 Robustness tests

5.3.1 Including time-district fixed effects

In the previous sub-section, it is found that the introduction of interest rate cap policy negatively affected loan provision of MFIs with higher pre-regulated interest rates. However, there is still a concern that the results could be contaminated by regional time-variant factors such as drought and flooding. While demand shocks by the natural disasters could also affect the MFI's loan provision, we did not control the such region-specific time-variant factors in the estimations shown previous sub-sections. To address this issue, we additionally carried out the regressions with time-district fixed effects. Khawaja and Mian (2007) proposed this method to clear any firm's time variant factors when the author estimate the effect of bank

factors on loan provision using bank-firm pair-wise data. We applied their method to detangle the region-specific time-variant factors from the effect of interest rate cap policy on MFI's lending behaviors. Table 5 shows the results. We estimate the equation 1, 3, and 5 with OLS, and we calculated standard errors with a clustering approach within regions. Column 1-3 are the results of estimation of equation 1 with all the sample (column 1), sub-sample of MFIs with pre-regulated interest rate higher than 25% (column 2), and sub-sample of MFIs with pre-regulated interest rate lower than 25% (column 3). Likewise, we presented the results for equation 3 and 5 in column 4-9.

In all the sample of MFIs, we confirm the statistical significances in the coefficients of interaction terms of $Policy_t$ and $interest\ rate_{i,2016Q4}$ for all three dependent variables. Furthermore, the statistical significances were only confirmed for sub-samples of MFIs with pre-regulated interest rate higher than 25% if we divided sample into the two sub-samples based on levels of pre-regulated interest rates. These results are same as we found in Table 1 and 2. We confirmed that our results in Table 1 and 2 are robust even after we control for region-specific time-variant effects. It suggests that our results are not caused by the flooding or drought.

5.3.2 Controlling for potential effects of economic shocks by including ratio of PAR30

Since including both of the interaction terms of $Policy_t$ and $Economic\ Development_k$ and time-district dummies causes multi-collinearity problem, we could not apply the method of Khwaja and Mian (2008) to check the robustness of Table 3 and 4. To circumvent this problem, we employ a proxy variable to capture the regional demand-side shocks. Specifically, we employ the ratio of PAR30 in the districts. If the natural disasters affected the people living in the region, it would alleviate the default rates of loans. Thus, the ratio of PAR30 in the regions could be a good proxy to capture such a demand-side shocks in the regions. We present the results in Table 6. We estimate the equation 1, 3, and 5 with OLS, and we calculated standard errors with a clustering approach within regions. Column 1-3 are the results of estimation of equation 1 with all the sample (column 1), sub-sample of MFIs with pre-regulated interest rate higher than 25% (column 2), and sub-sample of MFIs with pre-regulated interest rate lower than 25% (column 3). Likewise, we presented the results for equation 3 and 5 in column 4-9.

We find that the coefficients of interaction terms of $Policy_t$ and $Economic\ Development_k$ in Table 6 are same as we found in Table 3 and 4. We confirm that our results in Table 3 and 4 are robust after we control for the demand-side factors which affect MFI's lending.

5.3.3 Including commercial banks as placebo

We also check the robustness of our results by comparing MFIs and commercial banks which are registered in Cambodia Microfinance Association (CMA). The interest rate cap policy was only applied to the financial institutions which are registered as MFIs in National Bank of Cambodia (NBC). However, two commercial banks, Aceda and Sathapana Bank, are registered in CMA, and engage in microfinance business as MFIs are doing. CMA data also allow us to divide loans of Aceda and Sathapana Bank into large loans and small loans. Thus, we use the small loans from Aceda and Sathapana Bank as control groups, and loans from MFIs as treatment groups. We use the following specification to estimate the effect of interest rate cap policy.

$$y_{ikt} = \alpha + \delta \cdot Policy_t \cdot Placebo_i + \tau_t + \nu_k + \mu_i + u_{ikt} \quad (7)$$

$$y_{ikt} = \alpha + \beta \cdot Placebo_i \cdot Economic\ Development_k + \gamma \cdot Policy_t \cdot Economic\ Development_k + \delta \cdot Policy_t \cdot Placebo_i + \omega \cdot Policy_t \cdot Placebo_i \cdot Economic\ Development_k + \tau_t + \nu_k + \mu_i + u_{i,k,t} \quad (8)$$

where i represents an individual MFI, k represents a district, and t represents a period. y_{ikt} is an outcome variable: (1) growths of amounts of loans, (2) growths of numbers of borrowers, and (3) growths of average loan sizes. $Placebo_i$ takes one if the financial institutions are commercial banks, and otherwise it takes zero. $Economic\ Development_k$ represents economic development level of the district k . $Policy_t$ takes one after 2017Q2 when the interest rate cap policy is in effect. We also control for time-fixed effects τ_t , region-specific time-invariant effect ν_k , and MFI-fixed effect μ_i .

Table 7 shows the results of the estimation of equation 7. In Table 7, we find that the coefficient of interaction term of $Policy_t \cdot Placebo_i$ is significantly positive for growths of amounts of loans and numbers of borrowers in the results of all the sample (column 1, 4, 7). Those results means that growths of amounts of loans, and numbers of borrowers of MFIs decreased compared to commercial banks after the policy introduction. However, interestingly, we find that the interaction term of $Policy_t \cdot Placebo_i$ is significantly negative for MFI with higher pre-regulated interest rates. It implies that those MFIs increased the average loan sizes in the regions after the policy introduction even compared with commercial banks. This results reinforce our findings in the section 5.1.1.

In Table 8, we present the results of estimation of equation 8. We find that the interaction term of $Policy_t \cdot Placebo_i \cdot Economic\ Development_k$ is significantly negative for growths of amounts of loans, average loan sizes in the estimation with all the sample, suggesting that, compared to commercial banks, MFIs tended to reduce loan growths and increase average size of loans if the regions are developed after the policy introduction. These results are stronger when we compared commercial banks with MFIs with pre-regulated interest rate higher than 25%. All in all, those results are similar to the results in Table 3 and 4, and we confirm the robustness of the results with the different empirical approach.

6. Conclusion

In this paper, we explored the effects of newly introduced interest rate cap policy using unique data of MFIs in Cambodia. MFIs has been constantly attracting policy makers, academic researchers, and socially responsible investors, as the effectiveness for poverty reduction is widely recolonized. However, there is a paucity of studies on effects of financial regulation on MFI in the literature of financial regulations. MFIs play a significant role in providing credits with the poor and SMEs. Originally, MFIs are aimed at addressing poverty reduction issues, and the nature of MFIs is not only pursuing the profit, but also improving outreach to extend loans to the poor. Thus, regulations on MFIs should be implemented with consideration of this MFI's nature. Our empirical findings could be useful for the policy-makers and shed a light on debate on the effectiveness of financial regulation on the MFI sector.

We found that the policy introduction negatively affected MFI loan provision in the sense that MFIs were likely to maintain profits by reducing the growths of number of borrowers and increasing loan sizes.

In particular, MFIs with higher pre-regulated interest rates are more likely to reduce loan provision after the policy implementation. In the meantime, the policy did not necessarily have harmful effects on MFIs' outreach. After the policy introductions, MFIs with lower pre-regulated interest rate were likely to increase growths of amounts of loans and numbers of borrowers in less developed areas. These results suggest that interest rate cap policy affect MFIs differently depending on pre-regulated interest rate they charge on borrowers, and MFIs with pre-regulated interest rates are more likely to be affected and to reduce the loan provision and increase the size of loans in order to maintain the lending policy toward profit-orientation. However, MFIs with lower pre-regulated interest rate circumvent the policy, and further increase loan provision to the people in less developed areas. In other words, the policy lead to reduction in outreach of MFIs with higher pre-regulated interest rate, while such reduction was compensated by increases in outreach of MFIs with lower pre-regulated interest rate.

Our results further imply that, although financial institutions could theoretically circumvent the restriction on a lending rate, our results suggest that MFIs did not completely cover a decrease in interest rate with fee and commission. For example, MFI could set off the negative shock in their interest incomes by charging higher fee and commission. In fact, there is an anecdotal evidence that some MFIs charged higher fee and commissions after the introduction of interest rate cap policy. However, our results confirmed that the substitution effects to alternative ways are not strong.

A limitation of our analysis in this paper is, however, the true effect of a type of price cap policy, such as interest rate cap we analyzed in this paper, are dependent on competitiveness of a market. Meanwhile, our analysis was done on one of the competitive market of microfinance lending. Therefore, even though our arguments are not always applicable to all of MFI's lending market, our results might be helpful to understand how restrictive policies works for the MFI sector, where profitability is not only the target of operation.

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Figure 1: Implicit interest rate on loans for each MFI as of 2016Q4 (interest income/loans).

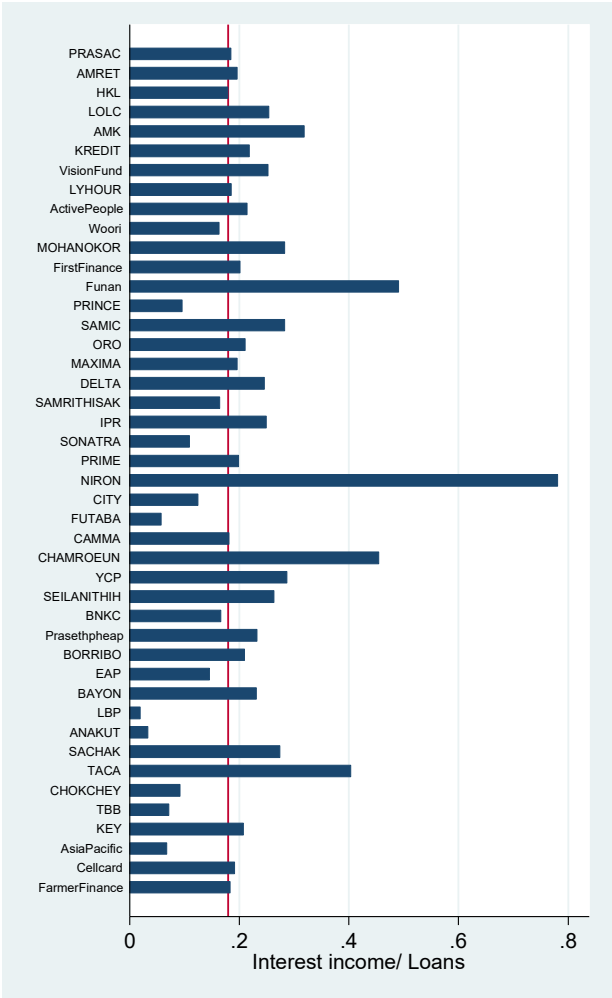
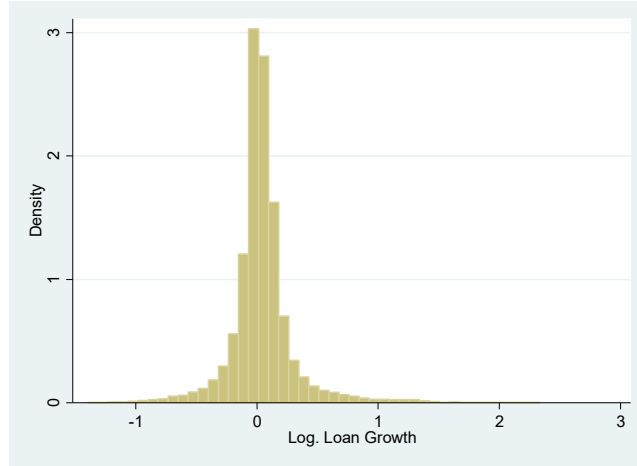
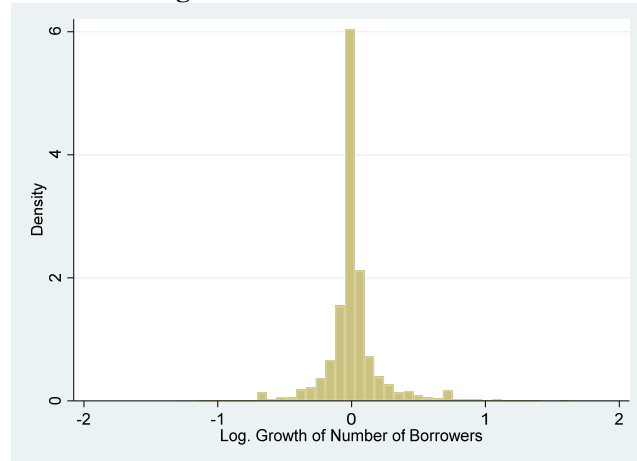


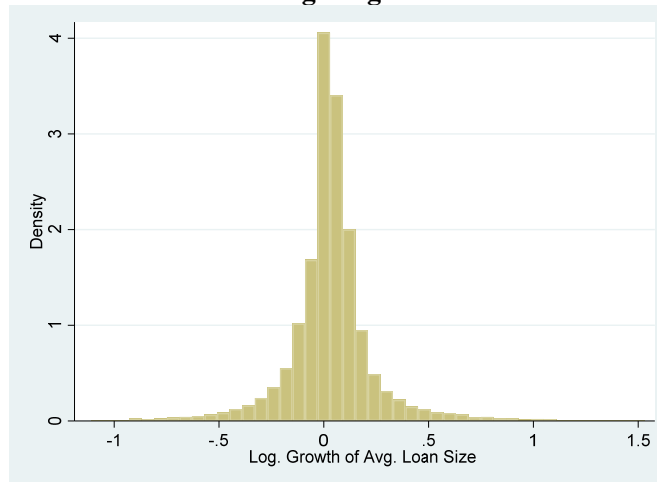
Figure 2: Sample Distributions
Panel A: Log. Loan Growths



Panel B: Log. Growths of Number of Borrowers



Panel C: Log. Avg. Loan Sizes



Note: Panel A shows distributions of logarithm of loan growths. Panel B shows distributions of logarithm of growths of number of borrowers. Panel C shows distributions of logarithm of growths of average loan sizes. Time ranges of all of figures here are from 2015Q4 to 2018Q1, and unit of sample is a MFI-district pair. To reduce the potential biases from the existence of outliers, sample was winsorized at 99% of the distributions of the logarithm of average of loan sizes.

Figure 3: Pre- and post-event trends of average lending behaviors by interest rate levels.

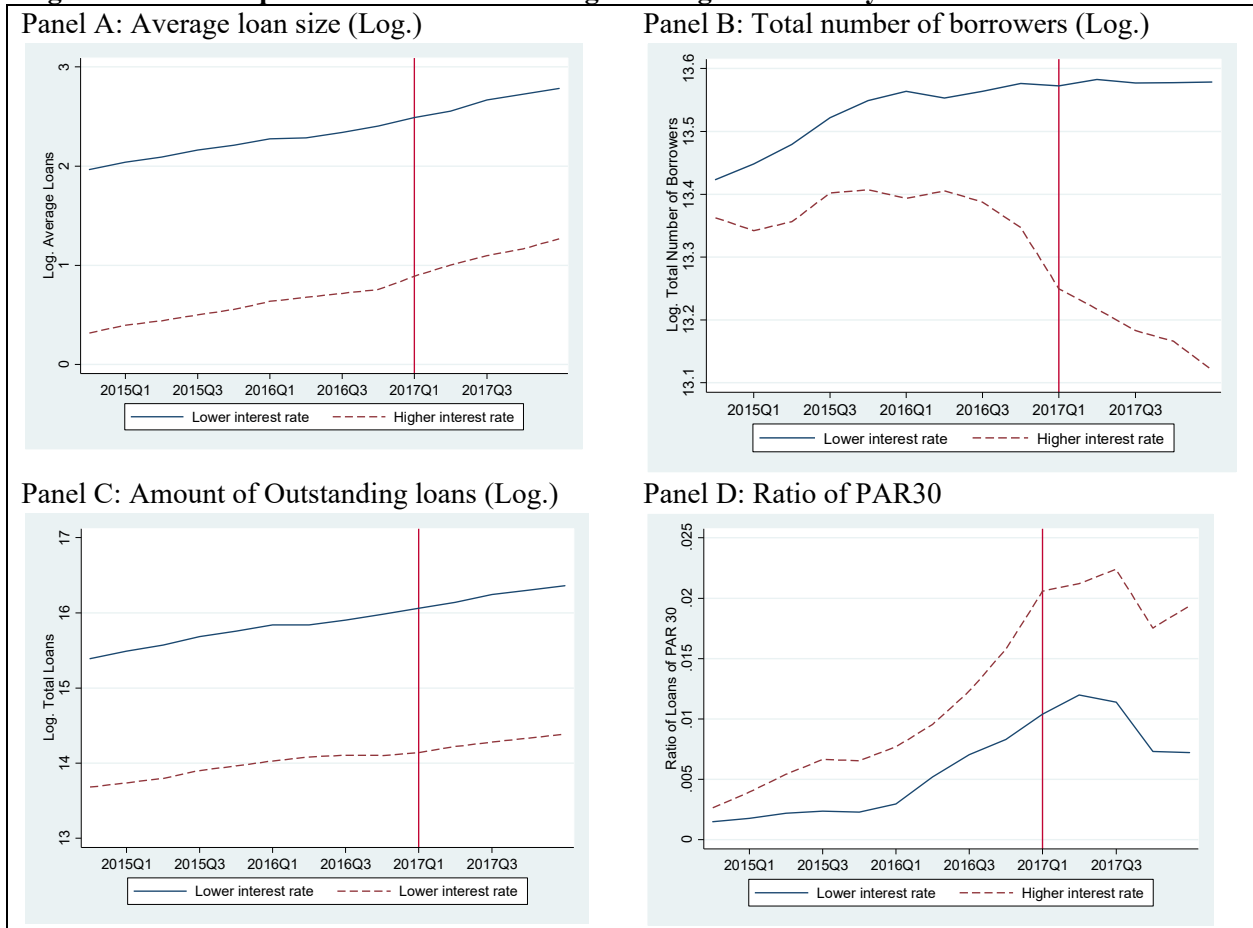
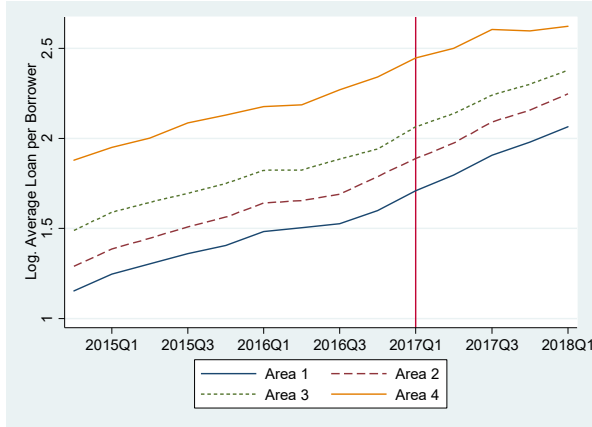
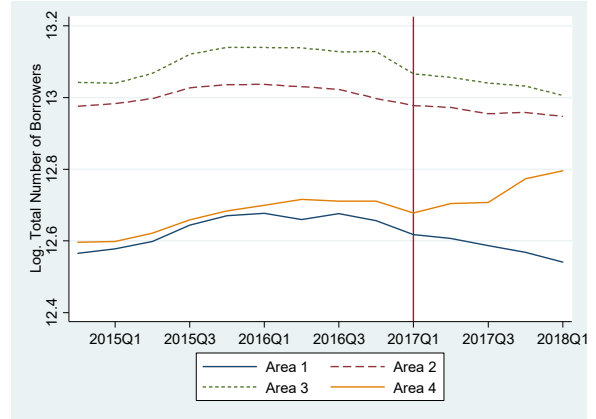


Figure 4: Pre- and post-event trends of average lending behaviors of large and small MFIs.

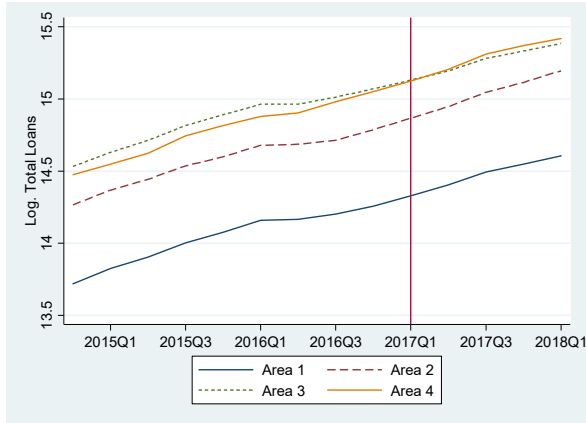
Panel A: Average loan size (Log.)



Panel B: Total number of borrowers (Log.)



Panel C: Amount of Outstanding loans (Log.)



Panel D: Ratio of PAR30

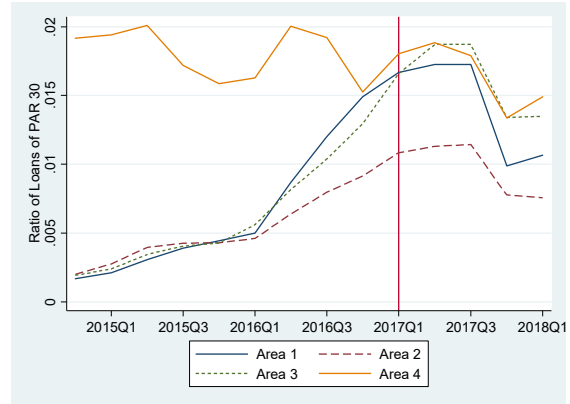


Table 1: Regression Results (Interest rate)

Dependent variable:	Log. Loan Growth		Log.Growth of Number of Borrowers		Log. Growth of Average Loan Size	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	All	All	All	All	All
	OLS	OLS	OLS	OLS	OLS	OLS
Interest rate	-0.151*** (0.015)		-0.146*** (0.013)		-0.003 (0.009)	
Policy	-0.016* (0.009)		0.026*** (0.007)		-0.044*** (0.005)	
Policy * Interest rate	0.045 (0.030)	-0.043 (0.029)	-0.198*** (0.023)	-0.190*** (0.023)	0.269*** (0.019)	0.183*** (0.019)
Time dummies	No	Yes	No	Yes	No	Yes
District dummies	No	Yes	No	Yes	No	Yes
MFI dummies	No	Yes	No	Yes	No	Yes
Constant	0.093*** (0.006)	0.117*** (0.007)	0.057*** (0.005)	0.072*** (0.006)	0.031*** (0.003)	0.059*** (0.004)
R-Squared Adjusted	0.006	0.077	0.030	0.087	0.018	0.102
R-Squared	0.006	0.085	0.030	0.095	0.018	0.111
Observations	28042	28042	27854	27855	26115	26115

Note: *, **, and *** represents significance levels at 10%, 5%, and 1%, respectively. Values in parentheses represent standard errors. All models in (1)-(7) are estimated using OLS with clustered standard errors within regions. In column (1)-(2), all the MFIs are included in estimation. In (3)-(4), MFIs with more than 25% of interest rates are included in the estimation. In (5)-(6), MFIs with less than 25% of interest rates are included in the estimation. In column (7), quadratic terms of an interest rate is included.

Table 2: Regression Results

Dependent variable:	Log. Loan Growth		Log.Growth of Number of Borrowers		Log. Growth of Average Loan Size	
	(1)	(2)	(3)	(4)	(5)	(6)
	>25%	<25%	>25%	<25%	>25%	<25%
	OLS	OLS	OLS	OLS	OLS	OLS
Policy * Interest rate	-0.229*** (0.037)	-0.016 (0.264)	-0.302*** (0.030)	0.067 (0.172)	0.115*** (0.023)	-0.147 (0.155)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
MFI dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.173*** (0.012)	0.099*** (0.010)	0.078*** (0.010)	0.074*** (0.007)	0.096*** (0.007)	0.049*** (0.006)
R-Squared Adjusted	0.113	0.071	0.124	0.064	0.141	0.057
R-Squared	0.130	0.084	0.141	0.077	0.158	0.071
Observations	11420	16622	11223	16633	10742	15373

Note: *, **, and *** represents significance levels at 10%, 5%, and 1%, respectively. Values in parentheses represent standard errors. Models in (1)-(6) are estimated using OLS with clustered standard errors within regions.

Table 3: Regression Results (Equation 3)

Dependent variable:	Log. Loan Growth		Log.Growth of Number of Borrowers		Log. Growth of Average Loan Size	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	All	All	All	All	All
	OLS	OLS	OLS	OLS	OLS	OLS
Economic Development	0.002** (0.001)		0.001* (0.001)		0.001 (0.000)	
Policy	0.006 (0.009)		-0.017** (0.007)		0.028*** (0.006)	
Policy* Economic Development	-0.002** (0.001)	-0.002** (0.001)	-0.002** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001** (0.001)
Time dummies	No	Yes	No	Yes	No	Yes
District Dummies	No	Yes	No	Yes	No	Yes
MFI dummies	No	Yes	No	Yes	No	Yes
Constant	0.030*** (0.008)	0.138*** (0.007)	0.012* (0.006)	0.097*** (0.006)	0.018*** (0.005)	0.061*** (0.004)
R-Squared Adjusted	0.001	0.076	0.005	0.083	0.002	0.099
R-Squared	0.001	0.084	0.005	0.091	0.002	0.107
Observations	32491	32491	32173	32173	30148	30148

Note: *, **, and *** represents significance levels at 10%, 5%, and 1%, respectively. Values in parentheses represent standard errors. Models in (1)-(9) are estimated using OLS with clustered standard errors within regions.

Table 4: Regression Results (Equation 4)

Dependent variable:	Log. Loan Growth		Log.Growth of Number of Borrowers		Log. Growth of Average Loan Size	
	(1)	(2)	(3)	(4)	(5)	(6)
	>25%	<25%	<25%	>25%	>25%	<25%
	OLS	OLS	OLS	OLS	OLS	OLS
Policy* Economic Development	0.001 (0.001)	-0.004*** (0.001)	-0.000 (0.001)	-0.002*** (0.001)	0.001 (0.001)	-0.002** (0.001)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
District Dummies	Yes	Yes	Yes	Yes	Yes	Yes
MFI dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.214*** (0.011)	0.101*** (0.009)	0.134*** (0.010)	0.074*** (0.007)	0.102*** (0.007)	0.050*** (0.006)
R-Squared Adjusted	0.093	0.071	0.108	0.064	0.135	0.057
R-Squared	0.107	0.085	0.122	0.077	0.150	0.071
Observations	15869	16622	15541	16632	14775	15373

Note: *, **, and *** represents significance levels at 10%, 5%, and 1%, respectively. Values in parentheses represent standard errors. Models in (1)-(6) are estimated using OLS with clustered standard errors within regions.

Table 5: Robustness check (Including time-district fixed effects)

Dependent variable	Log. Loan Growth			Log. Growth of Number of Borrowers			Log. Avg. Loan Sizes		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Policy * Interest rate	-0.059** (0.029)	-0.228*** (0.038)	-0.140 (0.269)	-0.202*** (0.023)	-0.301*** (0.030)	-0.012 (0.179)	0.181*** (0.019)	0.112*** (0.023)	-0.117 (0.157)
MFI dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-District Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.048*** (0.013)	0.054*** (0.016)	0.066** (0.026)	0.085*** (0.028)	0.057*** (0.020)	0.104*** (0.039)	0.069*** (0.023)	0.082*** (0.007)	0.078** (0.038)
R-Squared Adjusted	0.078	0.118	0.068	0.089	0.133	0.062	0.103	0.147	0.055
R-Squared	0.093	0.151	0.093	0.104	0.166	0.0872	0.118	0.179	0.080
Observations	28042	11420	16622	27854	11222	16632	26115	10742	15373

Note: We applied their method to detangle the region-specific time-variant factors from the effect of interest rate cap policy on MFI's lending behaviors. Table 5 shows the results. We estimate the equation 1, 3, and 5 with OLS, and we calculated standard errors with a clustering approach within regions. Column 1-3 are the results of estimation of equation 1 with all the sample (column 1), sub-sample of MFIs with pre-regulated interest rate higher than 25% (column 2), and sub-sample of MFIs with pre-regulated interest rate lower than 25% (column 3). Likewise, we presented the results for equation 3 and 5 in column 4-9.

Table 6: Robustness check (Controlling for potential effects of regional economic shocks)

Dependent variable	Log. Loan Growth			Log. Growth of Number of Borrowers			Log. Avg. Loan Sizes		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Policy* Economic Development	-0.004*** (0.001)	-0.003* (0.002)	-0.005*** (0.001)	-0.003*** (0.001)	-0.002 (0.001)	-0.002** (0.001)	-0.002*** (0.001)	-0.001 (0.001)	-0.002*** (0.001)
Policy* Interest rate	-0.053* (0.029)	-0.229*** (0.037)	-0.103 (0.260)	-0.195*** (0.023)	-0.301*** (0.030)	0.021 (0.175)	0.179*** (0.019)	0.115*** (0.023)	-0.190 (0.155)
Regional Ratio of PAR 30	-0.030** (0.012)	-0.111*** (0.021)	-0.001 (0.015)	-0.043** (0.018)	-0.040 (0.026)	-0.048*** (0.018)	0.069*** (0.009)	0.120*** (0.028)	0.052*** (0.009)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MFI dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.119*** (0.007)	0.176*** (0.012)	0.101*** (0.009)	0.074*** (0.006)	0.080*** (0.010)	0.075*** (0.007)	0.059*** (0.004)	0.095*** (0.007)	0.049*** (0.006)
R-Squared Adjusted	0.077	0.114	0.071	0.087	0.124	0.064	0.102	0.141	0.057
R-Squared	0.086	0.131	0.085	0.096	0.141	0.078	0.111	0.157	0.072
Observations	28042	11420	16622	27854	11222	16632	26115	10742	15373

Table 7: Robustness check (Using commercial banks as placebo)

Dependent variable	Log. Loan Growth			Log. Growth of Number of Borrowers			Log. Avg. Loan Sizes		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Policy* Placebo	0.022*** (0.006)	0.009 (0.007)	0.036*** (0.007)	0.018*** (0.004)	0.030*** (0.005)	0.008 (0.005)	0.003 (0.005)	-0.023*** (0.006)	0.027*** (0.006)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MFI dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.124*** (0.006)	0.144*** (0.007)	0.114*** (0.007)	0.058*** (0.004)	0.073*** (0.007)	0.042*** (0.005)	0.058*** (0.005)	0.085*** (0.006)	0.051*** (0.006)
R-Squared Adjusted	0.097	0.124	0.076	0.093	0.122	0.064	0.115	0.155	0.058
R-Squared	0.107	0.140	0.092	0.104	0.137	0.081	0.126	0.173	0.076
Observations	25321	13793	13840	25223	13666	13871	21940	11893	12034

Table 8: Robustness check (Using commercial banks as placebo)

Dependent variable	Log. Loan Growth			Log. Growth of Number of Borrowers			Log. Avg. Loan Sizes		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%	All	Interest rate >25%	Interest rate <25%
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Placebo*Economic Development	-0.007*** (0.001)	-0.008*** (0.002)	-0.006*** (0.002)	-0.002* (0.001)	-0.004** (0.002)	-0.001 (0.001)	-0.008*** (0.001)	-0.007*** (0.002)	-0.007*** (0.002)
Policy* Economic Development	-0.003*** (0.001)	-0.002 (0.002)	-0.005*** (0.001)	-0.002** (0.001)	-0.002 (0.001)	-0.002*** (0.001)	-0.002** (0.001)	-0.001 (0.001)	-0.002* (0.001)
Policy*Placebo	-0.008 (0.019)	-0.004 (0.022)	-0.007 (0.020)	-0.000 (0.013)	0.013 (0.015)	-0.017 (0.014)	-0.037** (0.017)	-0.055*** (0.019)	-0.013 (0.018)
Policy* Placebo*Economic Development	0.003* (0.002)	0.002 (0.002)	0.005** (0.002)	0.002 (0.001)	0.002 (0.002)	0.003** (0.001)	0.005*** (0.002)	0.004** (0.002)	0.005** (0.002)
Time dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MFI dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.127*** (0.006)	0.147*** (0.007)	0.118*** (0.007)	0.059*** (0.004)	0.075*** (0.007)	0.043*** (0.005)	0.061*** (0.005)	0.087*** (0.006)	0.054*** (0.006)
R-Squared Adjusted	0.098	0.125	0.077	0.094	0.122	0.065	0.116	0.156	0.059
R-Squared	0.108	0.141	0.093	0.104	0.138	0.081	0.127	0.173	0.077
Observations	25285	13757	13804	25187	13630	13835	21908	11861	12002

Appendix

Figure A1: Pre- and post-event trends of average lending behaviors of large and small MFIs.

