UNIVERSITY OF EXETER

Economics Department Discussion Papers Series

ISSN 1473 – 3307

Incentives and Performance of Agents in a Microfinance Bank

Surajeet Chakravarty, Sumedh Dalwai, and Pradeep Kumar

Paper Number: 20/02

URL Repec page: http://ideas.repec.org/s/exe/wpaper.html

Incentives and Performance of Agents in a Microfinance Bank*

Surajeet Chakravarty†, Sumedh Dalwai‡, and Pradeep Kumar§

May 29, 2020

Abstract

An important aspect of providing credit to the poor is the mechanism adopted by the credit institutions to do so. Most microfinance banks use field agents to acquire new borrowers, manage the account and collect repayments. How does the supply of credit change with a change in incentives provided to such field agents? Mann Deshi Bank, a microfinance bank in India, changed its remuneration scheme from a pure commission based to a mixed scheme with a combination of a base salary and other incentives. This paper examines the effect it had on the effort and the performance of the agents by using a rich panel data on the bank's joint liability lending product. The results show that the change in the contract form with a large flat wage and reduced incentives improved performance of the agents in terms of the quantity (increase in the number of borrowers acquired) and quality (the borrowers acquired had fewer delays in repayments). We find evidence of mixed contract agents exerting significantly more effort than the pure commission agents to ascertain borrower quality.

Keywords:

Micro-finance institutions, joint liability loans, labor contracts, moral hazard.

JEL Classifications: G21, O12, J41.

.

* We like to thank Chetna Sinha, founder of Mann Deshi Bank, and Rekha Kulkarni, CEO of Mann Deshi Bank, for useful discussions and insights into the bank operations. We would also like to thank the management of Mann Deshi Bank for providing us with the data. We would like to thank Climent Quintana-Domeque, Rakesh Banerjee and the seminar participants at ACEGD 2019 at ISI, Delhi and University of Exeter BID workshop for useful comments.

†University of Exeter, email: S.Chakravarty@exeter.ac.uk

‡University of Exeter, email: S.Dalwai@exeter.ac.uk

§University of Exeter, email: P.Kumar@exeter.ac.uk

1 Introduction

Recently provision of credit to the poor has received a lot of attention among development economists (Bertrand et al. (2010), Dupas et al. (2017)). A key reason for this is that credit provision has been identified as an important mechanism to improve the current and future welfare of the poor. Over the last two decades, micro-credit have been adopted as one of the key institutions to increase credit to the poor by policy makers and by the social sector. An important determinant in supply of credit is the cost and mechanism of providing credit. Providing credit to the poor is fraught with adverse selection, moral hazard and lack of collateral. These factors have been studied both theoretically and empirically in developing countries (Conning and Udry (2007), Karlan and Morduch (2009)). While these studies have mainly focused on transaction cost between the borrower and the lender, in this paper, we specifically study the transaction cost of handing out loans and collecting repayments through field agents who deal directly with the borrowers on behalf of the bank.

Microfinance banks employ field agents whose task is to get new borrowers, manage loans and collect repayments. We empirically analyse here how these agents can be organised to achieve the objective of the microfinance bank to lend to the poor. While loan repayments and borrower behaviour have been widely studied (Field and Pande (2008) and Cason et al. (2012)), how organisation of provision of micro-credit affects credit provision has not been much analysed. With access to detailed contract data for financial field agents hired by a microfinance bank operating in rural western India and the data of the individual credit contracts handled by these field agents, we study the effectiveness of two kinds of contract, a mixed contract (consisting of incentives on two outcomes and a flat part) and a pure commission contract (with incentives on one outcome). The pure incentive contract is written on repayment collections alone whereas the mixed contract has a significant part in flat wage combined with smaller incentives provided on repayment and accounts maintained.

This paper addresses and makes contribution in two following areas: One, analyses mechanisms to improve provision of credit among poor in developing countries and provides empirical evidence on how incentives work when the agent is required to perform multiple tasks in low-income scenarios and two, we quantify transaction costs from delayed payments. The problem of providing credit and identifying reasons for the failure of credit market has been studied in detail. Various papers have highlighted transactions costs in credit markets arising due to asymmetry of information between borrowers and lenders in developing countries (Karlan and Zinman (2009)). Dupas et al. (2012), Dupas et al. (2017)

studied the transaction costs arising in Malawi, Uganda and Chile. We contribute to this discussion by analysing another aspect of transaction cost in credit provision and ask the question: how should the field agents, who are engaged in handing out loans and collecting repayments, be incentivised? We want to know if by changing the contract structure of these field agents credit market outcomes can be improved (more borrowers, less delinquency and at a lower cost to the microfinance bank).

In our analysis we also quantify the cost of delayed repayments. Although a stylized fact in microfinance is that most borrowers pay back the amount they have borrowed, but it is often overlooked that a delay in repayments can have significant cost implications as well. Interestingly, we find that almost half of the borrowers in our data are likely to delay at least two repayments. We measure this delay as delinquency cost. The delay depends not only on the type of the borrowers and the borrowers effort but also on the effort exerted by the field agent. A field agent can impact delinquency cost by judiciously screening high risk loan applicants as well as nudging existing borrowers for timely repayments. We find that field agents on pure commission contracts are associated with higher delinquencies compared to the mixed contract agents.

This leads to our second contribution, analysing effect of incentives in the presence of multiple tasks in low income settings. More specifically, we analyse the effect of a change in the contract structure from a pure incentive contract, written on one verifiable outcome, to a mixed contract with a significant flat part and weak incentives on two verifiable outcomes. There has been some evidence about how individuals respond to incentive contracts (Murphy (1999), Lazear (2000), Paarsch and Shearer (2000)). There has also been evidence on incentives and performance in multi-task settings (Hong et al. (2018), Fortin et al. (2010) and Philippis (2015)). Hong et al. (2018) in a field experiment find that the trade-off the agents make between tasks with incentives and without incentives is limited. According to the authors, this can be explained by the fact that given the repeated nature of the interaction the agents are aware that over a long period of time the principal will come to know about the unrewarded dimension. In Fortin et al. (2010) authors find that the contract structure plays an important role in determining the effort choice made by the agents by analysing a piece rate and mixed contract (per task and a flat wage component). Dumont et al. (2008) study how physicians in Canada respond to a change in the contract structure in a multi-tasking environment. And more generally, Chen et al. (2006) look at how an incentive contract can induce greater risk taking. Here we provide analysis of incentives in multiple tasks within a social enterprise and in a low income setting.

The organisation we study is Mann Deshi Bank. This is one of the largest microfinance banks in India, located in the western state of Maharashtra, India. This bank lends exclusively to women and operates as a cooperative bank. Mann Deshi Bank which started off paying its agents, who disburse loans and collect payments, pure commission based on recollection changed its remuneration contract to a mixed one with a combination of a base salary and incentives on a few tasks. We use a rich monthly panel data of 39 agents who worked on the bank's Joint Liability Group (JLG) lending product for five years. We have data on the agents as well as data on the borrowers and individual loan contracts the agents dealt with. The results show that not only the bank was able to reduce its wage bills for the loan product, it improved performance of the agents. The supply of credit to new borrowers increased, both in terms of the rate of reaching out to new borrowers as well as the loan amount disbursed to them. Also, borrowers delay their repayments less with the mixed contract agents as compared to the pure commission based agents. We find in our analysis that although the default rate is very low, borrowers can have significant delays in repayments which can be quite costly for the bank.

Subsequently, we explore potential mechanisms driving the behaviour of field agents. One of the more labour intensive part of an agent's job is to verify the physical assets and financial information provided by the borrower on the loan application form. To this end, we analyse the text data in the loan application form by constructing simple measures of the effort exerted. Our results support that agents who are likely to be more risk averse show improved performance in case of contracts with a fixed wage. These agents put in significantly more effort in verifying the borrower information. This additional effort can lead to two possible outcomes. First, an improved quality of borrowers with fewer delays in repayments in the portfolio of mixed contract agents. Second, by spending more time per borrower, mixed contract agents may have less time left for promotion and acquiring new borrowers. Both of these hypotheses are inline with our findings. We also conducted an agent-level survey to measure any differences in the motivation or ability between the two agent types, but we do not find any significant differences.

The rest of the paper is organized as follows. Section 2 describes Mann Deshi Bank, Section 3 explains the agency cost we are studying, Section 4 provides a description of the data, Section 5 gives the results and lastly we conclude.

2 Mann Deshi Mahila Bank

2.1 An overview

Mann Deshi Mahila Sahakari Bank, founded in 1997, is a co-operative and non-profit bank run by and for women. It serves mainly in Mann Taluka, of Satara District in the Deccan plateau of Western Maharashtra. Mann Taluka, is known to be a land of goat shepherds and it receives one of the lowest annual rainfalls in India. The bank provides access to savings and credit to the rural poor women of the region. Credit is provided through both, group lending and individual lending. The bank also undertakes other activities such as training, support and empowerment programs for women of the region.

The bank is headquartered in Mhaswad, a village in the Mann block. Currently, the bank operates seven branches. The first six branches are in Satara district, namely Mhaswad, Dahiwadi, Gondawale, Lonand, Satara and Vaduj whereas the latest branch was opened in Pune district at Dhayri in 2013. Its operations cover more than 150 villages in eastern Satara, as well as parts of Solapur and Sangali districts. The bank enlarged the number of customers from 3,800 to 200,000 since 2000. The bank manages a high repayment rate of 98% and is financially stable.[1] The bank lends to individuals as well as groups. Individuals can receive loans of less than 15,000 rupees with the signature of two other women, who also serve as guarantors. The bank also lends to groups and this is similar to the 'Grameen model' (described below as the Joint Liability Group Loans).

There are four major types of products served by the bank through agents, namely, pygmy savings, pygmy savings-linked loans, joint liability group (JLG) loans and weekly market credit. The two pygmy schemes are for individual borrowers whereas the last two loans are for group borrowers. Finally, there is the weekly market loans, where the money is distributed at the place of work (markets/ bazars) of the borrowers. All the products are handled by the field agents who are bank employees. We focus on the agents who work only on the JLG product. This product forms the largest section of the loans provided by the bank.

[1]The Reserve Bank of India requires a co-operative bank to lend 60% to the sections of people who are designated as 'priority sector'. Mann Deshi Mahila Sahakari Bank surpasses the expectations as 85% of its borrowers come from this sector. 70% of its borrowers come from the backward castes. Roughly half of its borrowers are street vendors or day labourers and the other half mainly own small enterprises, including tailoring, rope making and dairies.

2.2 Joint Liability Group Loans

The Joint Liability Group (JLG) lending product was launched in May 2011. It requires a group of minimum 4 and maximum 7 women who have their residences or work places within the radius of not more than one kilometer. The borrowers, who are mostly entrepreneurs, have to be between the ages of 18 and 58 at the date of application. Applicants should be either married, widow or separated. Relatives are not allowed to be in the same group. All members should be agreeable and willing to give guarantee of repayment of other members' loans. If an applicant already has an existing loan with the bank, she would not be eligible for a JLG loan. The loan amount is in a range of Rs 10,000 to Rs 20,000. The frequency of repayment can be weekly or monthly. Normally for loans of Rs 15,000, it takes one year to repay and for loans above Rs 15,000, it takes 1.5 or 2 years. The interest rate is 24% per annum.

Over the period from May 2011 to January 2016, the product has formed the key part of the bank's portfolio. There were in total 17,700 JLG loans issued. Though most of the loans were served by agents, 1% of these loans were served by employees due to some administrative issues such as the initial stage the JLG product launch. The monthly average number of JLG loans issued was 316 while the maximum number being 715 in October 2013. Figure 1 and Figure 2 show an upward trend of the number of loans issued over the period with an annual cyclical pattern. Growth rate of the number of loans issued in Figure 3 shows that the monthly growth rate in terms of the number of loans issued had been relatively stable apart from July and August 2011 which are in the trial period. The average monthly growth rate of number of loans was 9% with standard deviation of 0.45 after excluding the initial trial period. The loan amounts have similar patterns as the number of loans.

By the end of January 2016, the number of loans issued to new borrowers was 12,219 out of 17,700 (total number of loans). This indicates this product is growing with a large base of new customers. Among 17,700 borrowers, 8,487 of them only had the first loan and did not apply for the second loan by the end of the sample period. But 7,207 accounts are still live accounts. This indicates that the product is still growing with strong customer base and these borrowers could potentially come back for the second loan once the current loan ends.

2.2.1 The JLG bank agents

The agents play key roles in servicing JLG loans. Agents are recruited through interviews by the branch managers and JLG head, based on their experience, education background and potential. The recruited agent deals only with JLG product/loans. The bank then assigns the areas to agents, according to the banks vacancy and need. The area assigned to an agent consists of a group of villages which does not overlap with other agents' areas. Before they start the job, a 'caution deposit' needs to be deposited to reduce the risk of the bank against payments collected but not deposited. Once the areas are decided, the agent promotes the JLG products in the area by distributing flyers and organising meetings with potential borrowers to explain the process of loan application. Meanwhile, the agent verifies basic information about borrowers in various ways including talking to them, visit their home and talking to their neighbours. Once the due diligence is performed, the agent is able to recommend the identified prospective "good borrower" to the bank. This is the screening duties the bank expects the agent to perform so as to avoid any adverse selection of borrowers. Once the loan contract is signed, the agent starts to collect repayment as per the contract. It can be either weekly or on a monthly schedule. However, the agent does not collect repayment from each group member. Instead, the agent visits the premises of the group coordinator (each group has a group coordinator), who collects the installment for the period from all the members of her group and makes the repayment to the agent. The loan officers and the JLG head follow up and monitor the performance of agents and their loan profiles. In the whole process, the JLG agents remain in touch with the borrowers very frequently.

From May 2011, since the beginning of the product, till May 2013, whoever was appointed as a JLG agent would earn a commission of 3% of the repayment amount collected over the period of the past month. As shown in Table 1, after May 2013 the bank decided to use a compensation scheme with a combination of a base salary of Rupees 8000 and other incentives so as to reduce costs. The bank's senior management believed that the pure commission contract is not cost effective for the bank as the portfolio size of the existing agents have been growing. Hence, they decided to hire new agents on a mixed contract without any high powered incentives. Given the low-income labour market, having a flat part in the wage which brings reduction in uncertainty was also considered a plus by the senior management.[2] This obviously creates selection issues which we discuss later. Agents were not allowed to shift between the two compensation schemes.

[2]Our interviews with the agents confirm this.

There are in total 42 JLG agents who have served since the product was launched in May 2011 until January 2016. The average employment period is 19 months. As of April 2016, there were 29 agents employed by the bank. Among them, 23 are under the new mixed scheme with a base salary and other incentives. The rest 6 are under the pure commission scheme. Among the ones who left, there were 8 agents under pure commission and 5 under the new mixed scheme. The average monthly payment to an agent is Rs.10,367. The nominal average daily wage for regular rural workers with above secondary education in India is Rs. 298.26 (monthly Rs. 8,948) according to the 2011-12 NSSO data.[3]

3 Data description

We have complete data on 39 agents from different sources including our questionnaires (regarding agent specific details), saving ledger accounts and borrower files, which were all shared by the micro-finance bank. The number of active agents fluctuated from 2 to 27 over the period from September 2011 till January 2016 as shown in Figure 4. The number of agents on mixed contract started from 1 in June 2013 and reached above 20 in 2015. However, the number of agents based on commission started from 2 in September 2011 and kept increasing to 10 until March 2013. Then the number decreased to 6 by January 2015. The increase in the number of agents based on mixed contract and the decrease in the number of agents based on commission confirms the policy change by the bank since 2013. Moreover, Figure 5 shows that the number of new loans issued by agents based on pure commission tend to decrease over the period and the same figure for agents based on mixed contract increased significantly. This difference could be partly explained by both an increase in the number of mixed contract agents over time as well as the initial assignment of new areas to the mixed agents.

The characteristics of agents are summarized in the Table 2 for categorical variables and Table 3 for the the continuous variables. Among the 39 agents, 11 agents are on the pure commission-based contract whereas the remaining 28 agents are on the mixed contract. No agent changed their contract type during the study period. There are 800 observations at the agent-month level over a period of 51 months (November 2011 to January 2016). Out of which, 383 observations are for agents based on the pure commission contract and 417 observations are for agents based on the mixed contract. Furthermore, within the sample period the agents have issued a total of 17,167 loans. Out of which,

[3]Employment and Unemployment Situation in India, NSS 68th Round, NSS Report No.554 (681101), 2014 http://mospi.nic.in

8,315 loans are issued by agents on a commission contract and the remaining 8,852 loans are issued by agents on a mixed contract.

An agent's effort and performance can be affected by the following three factors – agent's risk appetite, skills and administrative setting. We attempt to assess risk appetite of an agent by the information on gender, marriage, caste, house roof, number of rooms, education, household location, land holdings, number of family members, number of earners, proportion of earners in a household, share of income contribution in the household and age (see Guiso and Paiella (2008) who show that risk aversion decreases with wealth). We assume skills of agents would be captured by education, earlier finance experience and experience in the bank itself. Information on the location type (rural or urban) of areas served by the agent, repayment frequency, region (block) and whether a new area is being served will inform us about the administrative setting.

Table 2 describes the categorical variables. The gender of the agents may play a role in their performance since only women can be borrowers of this bank. Predominantly agents are male with only 4 females who are equally divided into the two remuneration schemes. Marital status of the agent might influence their risk preferences leading to greater (or less) motivation to work. The number of agents who are married (20) and who are unmarried (19) are practically same. However, the proportion of unmarried agents are significantly larger in the mixed contract. Among married agents, 9 are under the pure commission contract while 11 are under the mixed contract.

The agent living in an urban area might have a higher opportunity cost to work for the bank. Out of the total 39, 14 agents are residents in an urban area among whom 3 are under the pure commission contract. The distribution of agents among the four types of house roof is RCC (17), sheets (14), Tiles (6) and Other (1). The fact that most of agents have RCC and sheets house roof suggests relatively better economic conditions relative to the conditions in the area. The number of agents who have prior experience in finance is 12 whereas the remaining 27 agents do not have any experience in a finance related field. Among those 12 experienced agents, only 2 are under the pure commission contract.

It is worthy to note that agents based on the pure commission contracts do not have monthly repayment collection. This is because the monthly recollection loans are offered in large urban areas where the bank has expanded in later years only. The areas agents cover are almost equally distributed with 19 in the rural areas and 20 in the urban areas. The distribution between the two remuneration types seems roughly similar.

Table 3 reports descriptive statistics on the time-invariant continuous variables which measure agent characteristics such as education level (measured by number of school years), number of household members, proportion of earners in a household, income contribution ratio, number of rooms and land holdings. We discuss only the statistics of the whole group of agents here, since the mean differences between the two agent types is statistically insignificant using a t-test.

Most agents are in their late 20s with an average age of 27 years and that within the mixed contract it is 26 years. The average number of school years of an agent is 13, which is in the range of 10 to 15. High school offers 10 years of education in this part of India, followed by college for 5 years (first 2 in Junior college). Hence, in terms of education this does not seem a very diverse group. The opportunity cost of getting education will also be similar for all the agents. The average time an agent has been working in the bank is 1.15 years with a range of 0 to 4.33 years.

The household composition of an agent may influence her risk preference and motivation to work harder. We have collected information on the size of the family, the number of members of the family that earn as well as the total income of the family along with the agent's income. We have further constructed variables measuring the proportion of the earning members within the family and the proportion of the agent's income in the family income. The average number of household members in an agent's family is 5. Among the family members, 1 to 3 are working and contribute to family income. The average of earners ratio is 0.42 with a range of 0.17 to 1. The income contribution averages at 75%.

The assets owned by an agent may influence the risk appetite of the agent. The number of rooms normalised by the number of family members has an average of 0.69 with a range of 0.2 to 1.3. Some agents own land, while others do not. The average area of land owned by agents is 2.54 acre. Increased land ownership may lead to efforts towards managing the land and can possibly lead to a lack of motivation.

The agents consist of 15 caste groups, in which, Maratha (11), Dhangar (6) and Mang (6) are the most common castes among the agents. The cast composition of agents roughly correlates with the proportion of population of caste in the area. For our empirical analysis discussed in the next section, we grouped these castes into three categories: General castes, Scheduled castes/tribes, and Other backward classes.

3.1 A simulation exercise

We simulate a simple example to better understand how the two contract types compare with each other. We assume that the agents acquire borrowers every month over an 1.5 year period with a loan amount of Rupees 20,000 per borrower on an 18-month duration, which is the most popular choice in our sample. Two scenarios are simulated: (1) low risk with only 5% borrowers delaying by more than a month, and (2) high risk with 20% borrowers delaying repayments by more than a month. At the end of the 1.5 year period, the simulated agent has roughly 500 borrowers, which is the maximum limit the bank has placed on the number of borrowers an agent can have.[4]

The pure commission wage is calculated simply by calculating 3% of the repayments in each month. The mixed contract wage has a flat part of Rs. 8000 plus three bonus components. First, if the portfolio reaches Rs. 3,000,000, then a bonus of Rs. 1000 is added permanently to the salary. In our example, this happens in month 6. Second, if the portfolio reaches Rs. 4,500,000 another bonus of Rs. 1000 is added permanently - this happens in month 9 in our example. Third, if a mixed contract agent acquires more than 25 borrowers in a month, for each additional borrower Rs. 25 are earned. In a quarter of the simulated months, agents acquire more than 25 borrowers which is inline with our original data. Also, a penalty has to be applied if a specific number of borrowers are overdue (delay installment by more than 60 days). We do not see this being applied in our data and even if apply this, its effect will be very marginal since the magnitude of the third bonus component is not very high (See Table 1 for details).

Figure 10 shows a plot of monthly wages for the two contract types. We note two things in this graph. First, the majority of payout to a mixed contract agent is driven by the fixed part. Although, there are step jumps in month 6 and 9 due to the first two bonus components, but it remains mostly flat everywhere else. The effect of the third bonus component seems not too high. Second, the wages of the pure commission agent in the low risk (red) and high risk (green) scenario is almost identical. This happens because even if some borrowers delay their repayments in a month, they repay it in the next month in our simulation.

It is interesting to note that in month 9 both contract types have similar wages with the simulated agent having 238 borrowers with Rs. 4,760,000 in the portfolio. At this point, only the pure commission agent has strong incentives to grow further as her payout increases almost linearly, whereas the mixed contract agent has only weak incentives (from third bonus) to grow further.

[4]For the simulated agent, the mean number of borrowers acquired each month is 27 with a standard deviation of 8.

Overall, this simulation exercise suggests that the pure commission contract has high-powered incentives with very little downside if borrowers delay their repayments. This can create incentives for agents to acquire risky borrowers. On the other hand, the mixed contract agents have a greater certainty of income every month which may be more optimal for low-income risk-averse agents.

In the next section, we will explain our estimation method and results.

4 Empirical model and results

The bank operates with an objective of lending money to low-income women entrepreneurs. We want to study the effect of different incentives on the performance of bank agents, who are employed by the bank to achieve the stated objective. Specifically, we study two primary tasks assigned to an agent at different points in a borrower's loan cycle. First, to increase the number of new borrowers to sign up for the the JLG lending product. Second, to collect repayments from the existing borrowers. While the banks does not observe the actual effort being made by the agents, the bank has records of the number of new borrowers and the current borrowers and how much each borrowers owes and has repaid. So the outcome of the tasks the agents perform are both observable and verifiable. Therefore, the banks can potentially design payments based on these observable and verifiable signals.

In the pure commission contracts, the bank writes incentive contracts based on the repayment of collections alone. Since the tasks are complementary, an incentive on repayments collected will have positive effect on both effort on getting new borrowers and effort on recollecting. More new clients will lead to greater opportunity for more collection of repayments later. Our main hypothesis for the analysis is that changing the contract type from pure commission contract on one outcome to a mixed contract where incentives are provided on two outcomes and there is a large fixed component will improve the two outcomes, signing of new clients and recollection amount collected. As pointed out earlier, we assume that the effort levels of both getting new agents as well as collecting repayments contribute towards the banks objective.

We measure performance for the efforts put in by the agent at two stages. At the beginning, the agent has to put efforts to get new clients. Here, considering that there is no collateral, to avoid adverse selection, the screening is crucial. The agents are able to get new clients only after this thorough screening process. It is the objective of the bank to reach out to as many potential borrowers as possible – so an agent's performance is measured in terms of the number of new borrowers acquired

in a given month. Low supply of credit is also identified as an issue for microfinance clients, so the objective of the bank is to provide bigger amount of loans. Hence, the amount disbursed to the new clients is also considered as a performance indicator of the agent.

The second stage of the loan is recollection at monthly or weekly frequencies. The regularity with which the clients are facilitated to repay the loans is also checked as the performance of an agent. To avoid moral hazard, agent has to put in efforts towards monitoring her borrowers. Ceteris paribus, more effort the agent makes to monitor, fewer delays in repayment would be observed. It is important to note that the the delay in repayments is also impacted by the effort from first stage as better screening would lead to an increase in less risky borrowers, hence fewer delays.

Non-enforceability of the credit contracts without collateral is another issue faced by the credit market. The efforts by the agent can't be observed considering all loans were indeed repaid. However, the zero default in this product is caused probably by the high standards of monitoring where delayed repayments are taken very seriously by the lender. Hence, it makes sense to carefully observe the delays in repayment.

4.1 New borrowers and amount disbursed

We estimate the following regression model to understand the effect of the contract type on an agent's performance,

$$L_{it} = \beta_0 + \beta_1 S_i + \boldsymbol{\beta_2 X_{it}} + \theta_b + \xi_t + \epsilon_{it}, \tag{1}$$

where L_{it} is a performance indicator of agent i in a time period t such as the number or amount of loans disbursed. S_i identifies an agent's contract type, which holds a value 1 for the pure commission contract and 0 for the mixed contract. $\boldsymbol{X}$ is a vector of variables measuring the agent characteristics. The block fixed effects (θ_b) intend to capture the time invariant differences between the six bank branch areas where the loan product is offered. These differences can arise due to both demand side factors (such as borrower demographics) as well as due to the variation in competition and market structure the bank may face from other lenders. The block fixed effects also control for differences in administration within the bank since most blocks have only a single bank branch in them.[5] Time fixed effects (ξ_t) are measured by including the year-month dummy variables to capture the seasonality in the demand for loan services. We can observe an annual cyclical pattern in number of loans issued in

[5]Out of the 5 blocks, only 1 blocks have more than 1 bank branch in them.

Figure 2, with a trough in March and peak in September-October. ϵ_{it} is the unobserved component of the performance measure.

4.1.1 Estimation results

We estimate the regression model in equation (1) using a monthly panel data from Jan-2014 to Dec-2015. We estimate the regression model with both number of new loans and amount of new loans disbursed in a month as the dependent variable. We estimate the parameters using a pooled OLS model. The reported standard errors are bootstrapped and clustered at the agent level. There are only 36 agents (clusters) in our chosen sample, hence bootstrapping becomes important for inference.

Table 4 shows the results of the pooled OLS model. Column (1) and (2) does not include any control variables and find that pure commission agents disburse 13 and 15 loans fewer than the mixed contract agents. Column (3) includes the control variables and the magnitude of the effect decreases showing the relevance of some of the control variables, such as prior finance experience and number of earners in the family. Our most preferred specification in column (4) reports that pure commission agents are associated with roughly 10 fewer loans every month than the mixed type agents.[6] Table 5 report the results with amount of new loans disbursed in a month (in Rupees) as the dependent variable and the findings are qualitatively similar.

The control variables in the regression shed light on various aspects such as social network and skills of an agent. We observe that the proportion of earners in a family is positively associated to the performance of agents. This can happen if an agent is risk averse and surety of income reduces her financial stress leading to an increased effort. This can also be due to more well-off families having a better social network and economic status, which can possibly lead to an increased trust among borrowers. Prior experience in the financial domain being related to an improved performance seems intuitive. Also, a newer area, where Mann Deshi hasn't operated before, leads to more borrowers seems natural as there might be untapped opportunities.[7] Other control variables which can measure wealth of an agent such as portfolio size, land holdings, and number of rooms in a house seem to have no explanatory power. Experience in the bank showed high multi-colinearity with contract type and portfolio size, hence was dropped from the final specification (VIF = 30.84).

[6]Both contract type agents are given a target by the bank to acquire 50 new borrowers every month until they reach a portfolio of 500 borrowers.

[7]The new area dummy variable is defined to be 1 for the first three months, 0 otherwise.

4.1.2 Alternative specifications

Table 6 and 7 report estimation results with an additional interaction term between contract type and other agent characteristics. We want to find out whether the effect of contract type on agent performance depends on other factors. Results show that the effect of the contract type does not depend on the proportion of earners in a family and land holdings. However, the performance of commission based contract agents increases more than the mixed contract agents as the size of the portfolio increases. Although, both contract types have incentives to increase the portfolio size, the pure commission contract agents have high powered incentives which can lead them to putting more effort, once they have enough learning about acquiring new borrowers. It is also possible that the agents are risk averse and an increased portfolio leads to some certainty of income making the contract more optimal. Also, pure commission agents receive income from collections on the full portfolio, however the mixed type agents only receive a fixed raise once the portfolio reaches a certain size. Hence, mixed type agents may slack after their portfolio reaches certain size. Moreover, the pure commission based contract does not have a direct penalty if any account becomes overdue, which can make the commission agents to increase portfolio quicker than the mixed type agents by putting less effort in ascertaining borrower quality.

Table 8 reports results from estimating the regression equation (1) for the time period June-2013 to June-2014 instead of the 24 month panel in the main specification. The results look qualitatively similar for both the number and amount of new loans. However, the magnitude of the effect is much larger compared to the main specification since the mixed contract agents acquired more borrowers when assigned to newer areas initially - the effect slowly tapers off as time passes and we see a smaller effect when averaged over a longer time horizon in the main specification. Table 9 reports estimation results with the dependent variable as the loans disbursed to new as well as existing customers (repeat loans). The results look qualitatively similar to the previous section, however the parameter on the contract type has a slightly larger magnitude than the prior specification. This seems intuitive as the commission based agents will put in lesser effort to disburse loans if they already have existing borrowers and collection from whom can provide them income. However, these monetary incentives are weaker for the mixed type agents.

4.1.3 Selection bias

A natural concern with our analysis is that the characteristics of the applicants for an agent's job may have changed in response to the change in the contract type. This self-selection can potentially cause a bias in our parameter of interest. The selection can occur at two points in time. First, due to a change in the pool of job applicants in response to the job advertisement. Second, the offer holders who accept the job may be different. We consider both these possibilities.

First, the job advertisements placed were generic in nature and did not explicitly specify the compensation structure. Figure 6 is a job advertisement in Marathi which appeared in a local newspaper after the policy change and is translated into English in Figure 7. The job advertisement only specifies that the remuneration will be based upon prior experience and abilities. Moreover, rural labour markets in India have large under and unemployment resulting in buyers markets, so that the structure of compensation may have minimal affect on participation decisions of potential employees beyond a threshold. In 2013, the state of Maharashtra had only 14 percent of rural households with wage earning members. Most households have self-employed or entrepreneurs members. Another measure is how many households depend on employment generation schemes: In Satara District, 42 out of 1000 households used state funded employment generation schemes, while the same number was 52 for all of Maharashtra (Singh, Ministry of Labour and Employment, Government of India, 2013-14).[8]

Second, it could be that once a mixed contract was offered, the characteristics of the applicants who accepted the job offer changed. To address this issue, we estimate a simple OLS regression at the agent level data with contract type as the dependent variable and other agent characteristics as the independent variables. This model had no overall explanatory power (F-stat = 1.1 and p-value = 0.41) with most variable coefficients insignificant. This suggest that there is no difference among the agents who accepted the job offer in terms of their observable characteristics. Next, to quantify the importance of unobserved factors such ability or effort impacting an agent's performance we run a regression with portfolio size (running sum of count/amount for all loans in a period) as the dependent variable and other observed agent characteristics including contract type as the control variables. The R^2 is 0.89 for the number of loans and 0.83 for the amount of loans regression. Hence, a majority of the variation in portfolio size can be explained by the observable characteristics, which suggests

[8]Report on District Level Estimates for the State of Maharashtra, 2013-2014 (https://labour.gov.in/sites/default/files/MH District Level Report.pdf)

that the role of unobservables is not substantial.[9] We further discuss the differences in ability and/or motivation between the two agent types in the next subsection.

4.2 Mechanism

In this section, we explore possible mechanisms behind mixed contract agents performing better than the pure commission agents.

In the agent-level survey conducted to acquire their demographic information, we also asked four descriptive questions asking agents to comment on:(Q1) negative experiences when dealing with borrowers; (Q2) strengths of the JLG product; (Q3) weaknesses of the JLG product; (Q4) suggestions to improve the JLG product. Table 10 reports statistics on the average number of words used by agents for the above questions as well as the aggregated number of words across all four questions. The number of words can be considered a proxy measure for the motivation or ability of an agent, as the agent is providing insight into the workings of the loan product. We find no significant difference in the mean number of of words used between the two contract types by employing a t-test. To mitigate any concerns due to the low power (n=37), we conduct a Mann-Whitney test which could not reject the null hypothesis that both samples are drawn from populations with the same distribution. Next, we run five OLS regressions with the number of words as the dependent variables and previously used control variables alongside contract type of an agent. Table 11 reports the findings. Overall, the contract type seems uncorrelated with the number of words. This suggests that agents of both contract types may have similar levels of motivation and/or ability.

Next, we explore borrower-level data from the loan applications used by the Mann Deshi bank. These application are filled by the agents after interviewing, and verifying assets and information of the borrowers. Each loan application has four open ended questions regarding: (1) strengths of the sector/activity for the business loan; (2) weakness of the sector/activity; (3) strengths of the loan proposal; and (4) weakness of the loan proposal. We believe that the number of non-blank answers and words used to answer each of these question can be considered a measure of effort employed by the agent to assess the loan application. This is important because verifying the information of a potential borrower by inquiring her neighbours and visiting the house is the most labor intensive part of an agent's job. Table 12 reports results from a t-test comparing means of the non-blank

[9]In our discussions with the CEO of Mann Deshi, JLG product head and branch managers who are responsible for interviewing and managing agents, we were told that no explicit difference was noticed in the profile of the agents after the policy change.

answers and number of words across contract types. We find that mixed type agents not only use more words for each of the four questions, but also answer more questions (fewer blank answers), on average. Table 13 reports the estimation results from an OLS regression with the number of words and non-blank answers as a dependent variable with agent and borrower characteristics as the control variables. The main finding suggests that the pure commission type agents exerted less effort than the mixed contract agents in ascertaining borrower quality.

Extra effort in ascertaining borrower quality should translate to improved loan performance. We explore that in the next subsection.

4.3 Delinquency

Alongside acquiring new borrowers, another responsibility of the agents is to collect repayments. This is a key part of managing the credit contract and monitoring the borrower. It is also important for the bank to have timely recollections, as delayed repayments can have significant opportunity costs. Obviously, the quality of borrowers acquired will have a major role to play in the delay of repayments.

We construct a delinquency metric using borrowers' deviation (delay) from the original repayment schedule as a measure of the quality of a borrower. We assign the delay in repayments entirely to borrower quality as an agent cannot directly affect the repayment schedule. We define delinquency rate as the number of times the installments were delayed by two or more days normalized by the total number of installments in a loan.[10] A margin of two days allows us to account for any potential holidays and a possible delay in data input. Figure 9 shows the frequency distribution of this delinquency rate. It shows a bi-modal distribution with one cluster roughly centered around 0.5 (i.e. 50% of the installments delayed by two or more days), while other group of loans are clustered around zero.

Table 14 reports estimation results with the delinquency rate as the dependent variable. Column (1) does not control for any variables and finds that borrowers acquired by pure commission agents delay roughly 21% more than the mixed contract agents. Column (2) and (3) control for borrower and agent characteristics respectively and the results show that the commission agents' borrowers delay 13% and 17% more respectively, on an average. Column (4) reports results from our most preferred specification which controls for both agent and borrower characteristics. Overall, borrowers acquired

[10]Typical loan amounts offered are of Rs. 15,000 (52 weekly installments), Rs. 20,000 (78 weekly installments) and Rs. 30,000 (104 weekly installments).

by commission agents are associated with having more delays in repayments.

Preceding analysis made a simplifying assumption that the data generating process is coming from a single peaked distribution. However, Figure 9 shows that borrowers can be classified in two types: low risk (l) and high risk (h). Low risk borrowers have number of delays clustered close to zero, whereas high risk borrowers have approximately half of their installments delayed, on average. Hence, we estimate a finite mixture model with two classes of borrowers having π_l and π_h proportions in the data. The density of the two component mixture model can be written as,

$$f(d) = \pi_l f(d|x'\beta_l) + \pi_h f(d|x'\beta_h), \tag{2}$$

where d is the delinquency rate and x consists of the control variables (borrower and agent characteristics). β_l and β_h measure the role of agent and borrower characteristics separately for low risk and high risk borrowers, respectively. The probability of an observation coming from one of the latent classes is assumed to follow a logistic distribution. Model parameters are estimated by maximizing the likelihood function constructed by summing over the probability weighted conditional likelihoods from both classes.

Table 15 reports the estimation results of a mixture of two linear regression models. The estimated mean delay rate in the low risk class is 1.4% and 46.9% in the high risk class. The estimated values of π_l and π_h are 0.37 and 0.63 respectively. These statistics are inline with our raw data. The results show that the pure commission agents are associated with more delays for the high risk borrowers, and the agent type has no correlation with delays of the low risk borrowers. This suggests the possibility that high risk borrowers were acquired more by the pure commission agents.

5 Cost

Mann Deshi changed the contract structure for its agents in order to reduce its operating costs.[11] The intention was that with lower operating costs, Mann Deshi could increase the short-run liquidity and this can potentially lead to providing credit to more borrowers. Using bank's data, we find that the wage bill cost to the bank has gone down by changing the contract from a commission based to a mixed one. The monthly average payment to a mixed contract agent is Rs. 10,059 which is Rs. 644

[11] Chetna Sinha, who is the chairpesron of Mann Deshi informed us about the reason for the change in our discussions with her.

less than that for the pure commission agents. In other words, the pure commission agent got paid 7% more than the salaried ones, on average. We find here that while the wage bill reduced, but Mann Deshi improved the performance of the agents too by including a significant fixed wage component in the contract. The pure incentive contract seems to have motivated the agents to screen and monitor the borrowers less and drove up the delinquency of the borrowers.

There is also an opportunity cost of delayed repayments, which turns out to be quite significant and surprisingly does not get enough attention in the literature. A median borrower in our data delays 45.8% of the total installments by two days or more. Given the bank charges a 24% interest rate per annum, we estimate that the bank is forgoing an interest cost of 3.1% on the median borrower, at the minimum.

6 Conclusion

In this paper we address the question, to what extent incentives to agents/employees can help the firm/organization achieve its objectives. We believe that the main contribution is twofold. One, our analysis helps identify a key transaction cost faced by microfinance banks, namely delayed payments and analyses the contractual structure which can reduce this transaction cost. Credit markets in developing countries suffer from various transaction costs and thus the outcome in terms of credit provided to the poor is far below what it should be. An important mechanism in credit provision to the poor is contract or the governance structure the microfinance bank uses for the agents who disburse the loans. An effectively designed contract structure can reduce the transactions costs and lead to an increased provision of credit. This aspect of transaction cost, i.e., delayed repayments or delinquency, in credit delivery to the poor is often not studied, but can still form an important part of an intervention in credit delivery to the poor. The second contribution is that we use a rich data set which allows us to carry out this study and analyse the effectiveness of incentive contracts. Often empirical study of agency problems or incentive design is limited to CEO compensation of public companies mainly due to data constraints. But here availability of the data on the employees and their clients and that of the microfinance bank allows us to analyse that incentive contracts can help align the performance of the agent with that of the firm/organization's objectives.

Our underlying set up is such that the field agent has to perform two tasks, to get borrowers and to collect repayment for the bank. For the former, the agent has to travel to villages, distribute

flyers, meet potential borrowers and complete the screening and for the latter task the agent has to arrange for collection and travel. The effort exerted in these tasks are unobserved by the bank but the bank does observe the number of borrowers including who are being added, and the amount being recollected. We assume that greater the effort in these tasks there is a higher likelihood the number of borrowers and repayment collected respectively will be higher.

From this we expect that if the two tasks the agent has to perform are complements, it may be better for the bank to offer incentives on both tasks rather than on one. If the tasks are strong complements then incentives on both can be provided and agent will respond positively (greater effort) to such incentives and the outcomes will improve. If they are weak complements or tasks are unrelated then the performance of the agent can be worse in case of incentives offered to two tasks. We find from our data that with the contract structure where the a significant part of compensation is a flat wage and the incentives are weak, agents acquire more new borrowers. In addition we find that pure incentive contract also results in higher delinquency in the repayments. It is likely that either the agents who are paid under pure incentive contracts are selecting borrowers who are more risky, not monitoring borrowers and they are putting in less effort to collect repayments from the borrower. The agents who are relatively poor, put in more effort in case they have other sources of household income. Though we do not measure the risk preference of agents, this result supports that incentives are more effective for agents who face less risk in their household income and put in more effort under incentive contracts. We believe that it is probably either agents selecting more risky borrowers or spending less effort in repayment collection under pure incentive contracts which drives the results. Similar results of incentives leading to riskier portfolios have been documented in the literature (see Efing, Hau, Kampkötter and Steinbrecherare, 2015). The agent may find it easier to get new borrowers, given the lack of credit in the market, than managing the borrowers at the later stage of the contract. Also the agent who is under a flat wage and weak incentives responds to it with higher effort as there is more surety about his household income.

Finally, while incentive provision can be effective, the observable signal on which the incentive is provided has to be in line with the objective of the organisation/firm and if there is an element of multi-tasking then the incentive has to be on the task which is most beneficial to the organisation and clearly measurable and if the efforts are complementary then incentives should be provided on both outcomes or signals. To this end, we find that with incentives on two outcomes, performance improves.

Our results, we believe justify our perspective and assumption that two tasks are complements. As more effort is put on screening and acquiring borrowers, there will be reduced effort in collecting repayments. This is particularly important as the delay in repayment rate is 50% and in the end overall default rate is 98%.

References

[1] Ulf Axelson and Philip Bond. Wall street occupations. *The Journal of Finance*, 70(5):1949–1996, 2015.

[2] Abhijit V Banerjee and Esther Duflo. The economic lives of the poor. *Journal of economic perspectives*, 21(1):141–168, 2007.

[3] Timothy Besley and Maitreesh Ghatak. Competition and incentives with motivated agents. *American economic review*, 95(3):616–636, 2005.

[4] Timothy Besley and Maitreesh Ghatak. Profit with purpose? a theory of social enterprise. *American Economic Journal: Economic Policy*, 9(3):19–58, 2017.

[5] Hans P Binswanger, Shahidur R Khandker, and Mark R Rosenzweig. How infrastructure and financial institutions affect agricultural output and investment in india. *Journal of development Economics*, 41(2):337–366, 1993.

[6] Yenn-Ru Chen, Jenn-Shyong Kuo, and Chun-Hung Lin. Employee bonus, corporate governance and productivity: The evidence of taiwan. 7(2):41–61, 2006.

[7] Jonathan Conning and Christopher Udry. Rural financial markets in developing countries. *Handbook of agricultural economics*, 3:2857–2908, 2007.

[8] Pascaline Dupas, Sarah Green, Anthony Keats, and Jonathan Robinson. Challenges in banking the rural poor: Evidence from kenya's western province. Technical report, National Bureau of Economic Research, 2012.

[9] Pascaline Dupas, Dean Karlan, Jonathan Robinson, and Diego Ubfal. Banking the unbanked? evidence from three countries. *American Economic Journal: Applied Economics*.

[10] Pascaline Dupas, Dean Karlan, Jonathan Robinson, and Diego Ubfal. Banking the unbanked? evidence from three countries. Technical report, National Bureau of Economic Research, 2016.

[11] Matthias Efing, Harald Hau, Patrick Kampkötter, and Johannes Steinbrecher. Incentive pay and bank risk-taking: Evidence from austrian, german, and swiss banks. *Journal of International Economics*, 96:S123–S140, 2015.

[12] Robin Greenwood and David Scharfstein. The growth of finance. *Journal of Economic Perspectives*, 27(2):3–28, 2013.

[13] Luigi Guiso and Monica Paiella. Risk aversion, wealth, and background risk. *Journal of the European Economic association*, 6(6):1109–1150, 2008.

[14] Dean Karlan and Jonathan Morduch. Access to finance. In *Handbook of development economics*, volume 5, pages 4703–4784. Elsevier, 2010.

[15] Dean Karlan and Jonathan Zinman. Expanding credit access: Using randomized supply decisions to estimate the impacts. *The Review of Financial Studies*, 23(1):433–464, 2009.

[16] Edward P Lazear. Performance pay and productivity. *American Economic Review*, 90(5):1346–1361, 2000.

[17] Linlin Ma, Yuehua Tang, and Juan-Pedro Gómez. Portfolio manager compensation in the us mutual fund industry. *Journal of Finance, forthcoming*, 2017.

[18] Kevin J Murphy. Executive compensation. *Handbook of labor economics*, 3:2485–2563, 1999.

[19] Galit Ben Naim and Stanislav Sokolinski. What does compensation of portfolio managers tell us about mutual fund industry? evidence from israeli tax records. *Working Paper*, 2016.

7 Appendix

7.1 Data collection

7.1.1 Information of agents

A questionnaire (in Marathi) was developed to collect demographic information and was distributed to those who have worked as JLG agents.[12] For those who did not respond, phone calls were made to collect information. The questionnaire starts with the demographic questions regarding the agent herself. For example, name, age, gender, marital status, caste, education, religion, address, contact information and so on. To get a sense of the risk appetite of agents, the information on income and wealth belonging to the household was to be collected. For the agent to understand the questions easily, the same format was used as which the bank uses in the clients' application form. So the agent would be very familiar with these questions. Questions including house (number of rooms, roof, wall and owner), bulls, buffaloes, cows, goats, phones, fridges, TVs, gas cylinders, bikes, motorbikes, farmland and total value of assets are checked. The information of family members such as name, age, gender, education, relationship, income, current job and village of birth is also included. Furthermore, the information on an agent's household monthly income and expenditure is checked. Moreover, areas covered and remuneration type in the current job are asked and then are cross-checked from the head of JLG product in the bank as well as the branch managers and loan officers at the respective branches. These are to confirm the shift from commission to the mix of a base salary and other incentives remuneration package and the replacement of agents when there is someone leaving. The previous work experience (job, location, period, salary) is collected to find out if an agent had any previous experience which might have positive impact on her performance such as working in the finance industry. The names of the competitors in the areas are also asked to find out the outside option in the area she works. Among 42 agents, information on 39 agents was collected.

Regarding the remuneration paid to agents, the main source is tax deducted at source (TDS) files which are stored at the head office of the bank. This records the pay to all the agents of the bank every month which is used for tax purposes. We were able to collect 37 agents' information from these files. All these 37 agents also filled in the questionnaires. To ensure the accuracy of the pay data, the saving ledger accounts of agents, where the remuneration is paid, is also collected. This is used to cross check the remuneration paid data from TDS files and record information for the remaining

[12] Refer to Figure 9 in the appendix for details.

two agents out of the 39 who filled in the questionnaires.

7.1.2 Information of clients/borrowers

The JLG clients' loan accounts are stored in the bank's internal system which records loan information such as customer id, loan amount, account open date, account status and so on. It started from September 2009 and records data till May 2016. To link with agents who manage the account, this client (borrower) file is merged with the consultant file which has account-level information together with the agents who serve the accounts and group numbers. Lastly, to identify the delinquencies client ledger accounts were collected which record the loan repayment information and merged with the agent data.

8 Tables and Figures

Pure commission contract	**Mixed contract**
3% of collections in the previous month.	Rs. 8000 fixed + incentives: (a) Rs. 1,000 if portfolio > Rs. 3,000,000 (b) Rs. 1,000 if loan portfolio > Rs. 4,500,000 (c) Rs. 25 per account acquired above target (d) 25/40/50/75/100 % shading of incentive (c) if 1/2/3/4/5 accounts are in overdue.

Table 1: Description of the two contract types.

		Agents			Agent-Months			Loans disbursed		
		C	M	Total	C	M	Total	C	M	Total
Gender	Male	9	26	35	310	391	701	6,598	8,339	14,937
	Female	2	2	4	73	26	99	1,717	513	2,230
Marriage	Unmarried	2	17	19	97	254	351	1,836	5,635	7,471
	Married	9	11	20	286	163	449	6,479	3,217	9,696
Residential area	Rural	8	17	25	325	234	559	7,137	4,784	11,921
	Urban	3	11	14	58	183	241	1,178	4,068	5,246
House roof	RCC	3	14	17	109	228	337	2,487	5,143	7,630
	Sheets	6	8	14	192	122	314	4,061	2,279	6,340
	Tiles	1	5	6	31	58	89	733	1,242	1,975
	Other	1	0	1	51	0	51	1,034	0	1,034
Previous Experience in Finance	No	9	18	27	299	300	599	6,411	6,021	12,432
	Yes	2	10	12	84	117	201	1,904	2,831	4,735
Repayment frequency	Weekly	11	7	18	383	117	500	8,351	2,057	10,372
	Monthly	0	21	21	0	300	300	0	6,795	6,795
Areas served	Rural	8	11	19	322	182	504	7,103	3,506	10,609
	Urban resident	3	17	20	61	235	296	1,212	5,346	6,558
Total		11	28	39	383	417	800	8,315	8,852	17,167

Table 2: Frequency distribution of categorical variables for pure commission (C) and mixed contract (M) agents. The observations are aggregated at the agent, agent-month and agent-month-loan levels.

		Mean	Std. Dev.	Min	Max
Age	C	30	4.79	19	41
	M	26	5.12	19	37
Education	C	14	1.6	12	15
	M	13	1.7	10	15
Experience	C	1.56	1.07	0	4.33
	M	0.78	0.6	0	2.5
Number of family members	C	5	1.64	2	6
	M	4	1.38	1	6
Number of earners	C	1.5	0.76	1	3
	M	1.7	0.75	1	3
Proportion of earners	C	0.35	0.29	0.17	1
	M	0.44	0.26	0.17	1
Proportion of own income	C	0.85	0.29	0.24	1
	M	0.71	0.26	0.33	1
Number of rooms	C	0.65	0.21	0.2	1
	M	0.71	0.24	0.2	1.3
Land holdings	C	2.53	3.94	0	12
	M	1.42	3.31	0	15

Table 3: Summary statistics of continuous variables for pure commission (C) and mixed contract (M) agents.

	(1)	(2)	(3)	(4)
Commission	-13.48***	-15.44***	-11.13***	-9.597**
	(1.833)	(3.104)	(2.989)	(3.571)
Portfolio Size	0.00906*	0.0131**	0.0119	0.00878
	(0.00524)	(0.00484)	(0.00807)	(0.00924)
Urban Resident			1.552	1.111
			(2.157)	(2.204)
Female			5.161*	0.833
			(2.945)	(2.674)
Married			-1.812	-1.437
			(1.746)	(1.433)
Education			0.513	0.460
			(0.657)	(0.552)
Proportion of earners			7.481**	8.555**
			(3.430)	(3.621)
Prior finance experience			3.318**	5.339***
			(1.623)	(1.619)
New area			7.201**	6.586**
			(3.177)	(3.195)
No. of rooms			0.786	1.820
			(2.933)	(3.585)
Land holdings			0.476*	0.102
			(0.235)	(0.335)
Constant	30.52***	31.03***	16.44*	17.47*
	(6.650)	(7.291)	(9.116)	(9.243)
Area FE	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
House roof FE	No	No	Yes	Yes
Caste FE	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	557	557	548	548
R-squared	0.257	0.296	0.388	0.399

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression result: number of loans is the dependent variable.

VARIABLES	(1)	(2)	(3)	(4)
Commission	-251,938***	-278,389***	-195,764***	-169,983***
	(37,481)	(56,439)	(47,036)	(56,255)
Portfolio size	0.0113**	0.0150***	0.0130	0.00892
	(0.00533)	(0.00483)	(0.00784)	(0.00921)
Urban resident			33,076	24,586
			(42,357)	(43,632)
Female			78,266	-629.4
			(59,631)	(55,748)
Married			-29,347	-24,031
			(34,628)	(29,937)
Education			9,086	8,745
			(13,277)	(11,696)
Proportion of earners			168,201**	191,377**
			(70,785)	(73,057)
Prior finance experience			80,629**	118,470***
			(32,760)	(32,976)
New area			143,026**	128,731**
			(62,392)	(62,988)
No. of rooms			9,099	31,243
			(56,621)	(70,499)
Land holding			9,530**	2,564
			(4,431)	(6,546)
Constant	581,786***	579,939***	290,125	299,736
	(137,977)	(151,399)	(181,700)	(189,937)
Area FE	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
House roof FE	No	No	Yes	Yes
Caste FE	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	557	557	548	548
R-squared	0.262	0.303	0.395	0.405

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Regression result: amount of loans is the dependent variable.

Variables	(1) Commission × Portfolio size	(2) Commission × Proportion of earners	(3) Commission × Married	(4) Commission × Land holdings
Commission	-51.11***	-7.003*	-3.531	-9.328**
	(9.815)	(3.881)	(3.709)	(4.282)
Interaction Term	0.0999***	-6.310	-7.488**	-0.0909
	(0.0211)	(5.208)	(3.525)	(0.637)
Area FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
House roof FE	Yes	Yes	Yes	Yes
Caste FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	548	548	548	548
R-squared	0.442	0.400	0.403	0.399

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Regression result: Number of loans is the dependent variable. Various interactions with the contract type are considered.

Variables	(1) Commission × Portfolio size	(2) Commission × Proportion of earners	(3) Commission × Married	(4) Commission × Land holdings
Commission	-655,786***	-97,656	-39,177	-159,866**
	(133,762)	(63,215)	(71,843)	(69,576)
Interaction Term	0.0874***	-183,293*	-152,133**	-3,711
	(0.0203)	(104,944)	(69,479)	(12,901)
Area FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
House roof FE	Yes	Yes	Yes	Yes
Caste FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	548	548	548	548
R-squared	0.440	0.407	0.409	0.405

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Regression result: Amount of loans is the dependent variable. Various interactions with the contract type are considered.

	(1) No. of loans	(2) Amount of loans
Commission	-31.49***	-443,918***
	(6.408)	(67,229)
Area FE	Yes	Yes
Controls	Yes	Yes
House roof FE	Yes	Yes
Caste FE	Yes	Yes
Time FE	Yes	Yes
Observations	203	203
R-squared	0.680	0.647

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Regression result: robustness to the chosen time period.

	(1) No. of loans	(2) Amount of loans
Commission	-15.79***	-263,198***
	(3.718)	(65,937)
Area FE	Yes	Yes
Controls	Yes	Yes
House roof FE	Yes	Yes
Caste FE	Yes	Yes
Time FE	Yes	Yes
Observations	548	548
R-squared	0.252	0.243

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Regression result: dependent variable includes loans to both new and existing borrowers.

	Commission (N=27)	Mix (N=10)	p-value	Mann-Whitney Test p-value
Q1	4.60	7.89	0.13	0.23
Q2	9.00	6.85	0.33	0.49
Q3	6.00	8.63	0.36	0.24
Q4	7.70	9.74	0.63	0.57
Total words	27.30	33.11	0.52	0.41

Table 10: Average number of words for the descriptive questions in the agent survey. The p-value corresponds to the t-test comparing mean number of words between the pure commission and mixed agents. The Mann-Whitney p-value corresponds to the null hypothesis that both samples are drawn from the population with the same distribution.

	Q1	Q2	Q3	Q4	Total
Commission	-5.116*	3.177	-3.087	6.115	1.089
	(2.682)	(2.678)	(4.154)	(6.162)	(12.95)
Area FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
House roof FE	Yes	Yes	Yes	Yes	Yes
Caste FE	Yes	Yes	Yes	Yes	Yes
Observations	36	36	36	36	36
R-squared	0.781	0.788	0.695	0.682	0.698

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Regression result: dependent variable is the number of words used in the agents' survey.

	Commission (N=1,941)	Mix (N=771)	p-value
Q1	1.29	2.18	<0.01
Q2	0.93	1.99	<0.01
Q3	1.23	2.37	<0.01
Q4	1.54	2.32	<0.01
Total words	4.99	8.85	<0.01
Non-blank answers	2.03	3.31	<0.01

Table 12: Average number of words across agents using loan level data. The p-value corresponds to the t-test comparing mean between the pure commission and mixed agents.

Variables	Q1	Q2	Q3	Q4	Total words	Non-blanks
Commission	-0.560***	-0.698***	-0.778***	-0.384***	-2.419***	-0.947***
	(0.0554)	(0.0480)	(0.0551)	(0.0638)	(0.175)	(0.0563)
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes
Agent controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,657	3,657	3,657	3,657	3,657	3,657
R-squared	0.309	0.442	0.518	0.245	0.472	0.482

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Regression result: dependent variable is the number of words and count of non-blank answers in various questions in the borrower applications.

Variables	(1)	(2)	(3)	(4)
Commission	0.207***	0.135***	0.166***	0.105***
	(0.00829)	(0.00825)	(0.00953)	(0.00861)
Borrower variables:				
No. of rooms		0.00621**		0.00338
		(0.00297)		(0.00287)
Age		-3.40e-05		-3.35e-06
		(0.000343)		(0.000329)
No. of phones		-0.00268		0.00280
		(0.00344)		(0.00310)
Cattle		-0.00193		0.000686
		(0.00138)		(0.00137)
Electrical appliances		-0.00125		-0.00280*
		(0.00207)		(0.00164)
Two wheelers		-0.00220		-0.00324
		(0.00596)		(0.00577)
Farm land		0.00450		0.00914
		(0.00692)		(0.00679)
Other loans		0.0206***		0.0297***
		(0.00713)		(0.00697)
Work experience		0.0417***		0.00204
		(0.00666)		(0.00728)
Loan amount		-0.0269***		-0.0259***
		(0.000476)		(0.000494)
Agent variables:				
Education			0.00414	-0.00333
			(0.00366)	(0.00321)
Household size			0.0315***	0.0231***
			(0.00606)	(0.00540)
No. of earners			0.0145***	0.0255***
			(0.00545)	(0.00508)
Land holdings			-0.00852***	-0.00481***
			(0.00106)	(0.00101)
Prior finance experience			-0.155***	-0.128***
			(0.00908)	(0.00825)
Constant	0.143***	0.738***	0.0383	0.703***
	(0.00726)	(0.0216)	(0.0587)	(0.0571)
Observations	3,649	3,649	3,649	3,649
R-squared	0.142	0.347	0.212	0.393

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Regression result: dependent variable is the delinquency metric.

Variables	(1) High risk class	(2) Low risk class
Commission	0.0146***	-4.83e-05
	(0.00396)	(0.000177)
Borrower variables:		
No of rooms	0.00104	0.000224***
	(0.00107)	(6.13e-05)
Age	0.000182	-1.05e-05
	(0.000126)	(6.67e-06)
Phones	-0.000922	-0.000338***
	(0.00149)	(8.52e-05)
Cattle	-0.000713	-4.58e-05*
	(0.000926)	(2.71e-05)
Electric appliances	-0.00316***	-3.17e-05
	(0.000832)	(3.43e-05)
Two wheelers	-0.00130	6.97e-05
	(0.00228)	(0.000112)
Farm land	0.00597**	-2.82e-05
	(0.00254)	(0.000135)
Other loans	0.00478*	0.000317**
	(0.00285)	(0.000150)
Work experience	-0.00397	0.000207
	(0.00299)	(0.000190)
Loan amount	-0.00403***	-0.000473***
	(0.000903)	(1.21e-05)
Agent variables:		
Education	0.00244**	0.000349***
	(0.00117)	(8.18e-05
Household size	0.00727***	-0.000752***
	(0.00190)	(0.000136)
No. of earners	0.00401*	-0.00176***
	(0.00215)	(0.000156)
Land holdings	-0.00190***	5.20e-05**
	(0.000561)	(2.50e-05)
Prior finance exp.	0.00519*	0.00251***
	(0.00313)	(0.000206)
Constant	0.472***	0.0250***
	(0.0263)	(0.00128)
Latent class:		
Mean delinquency rate	0.4688***	0.0141***
	(0.0022)	(0.00008)
Class proportions	0.6251***	0.3749***
	(0.0080)	(0.0080)
Observations	3,649	3,649

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15: Regression result from the finite mixture model.

Figure 1: Number of loans issued per month

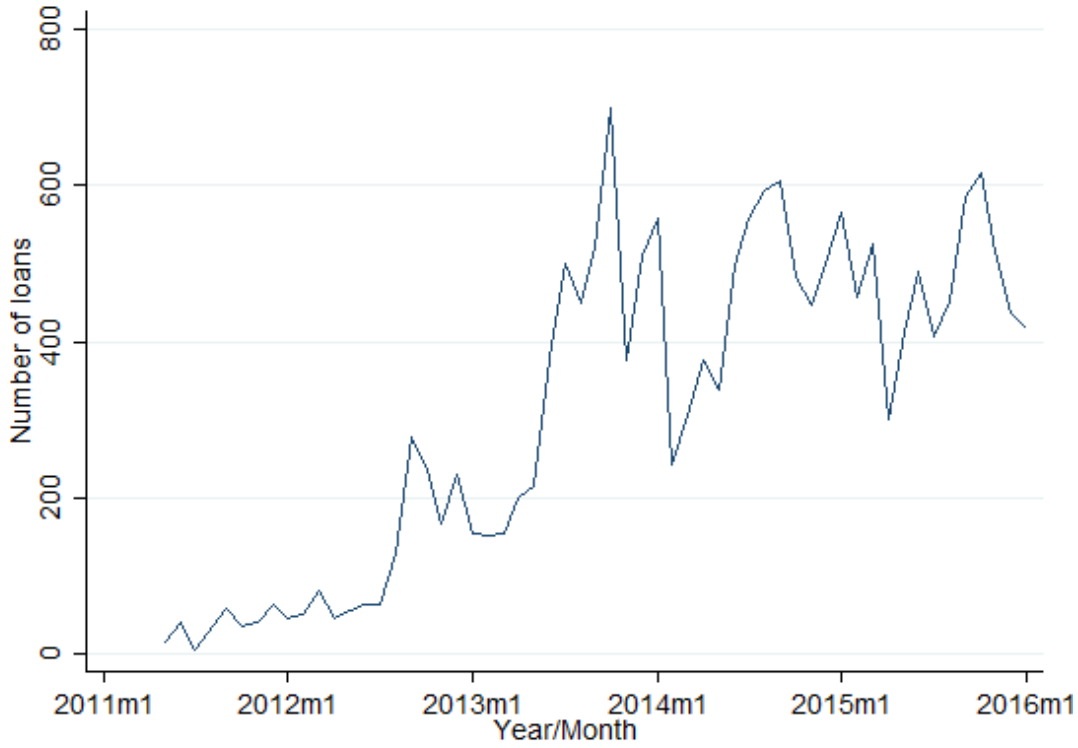

Figure 2: Number of loans issued per month (by year)

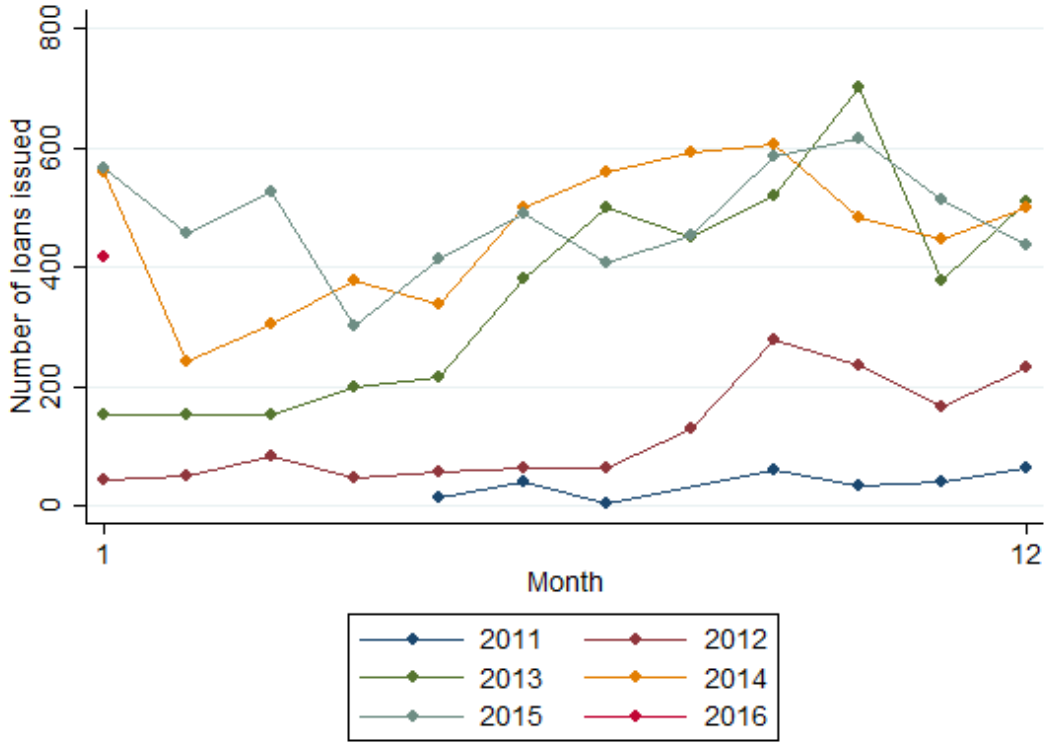

Figure 3: Growth rate of number of loans issued

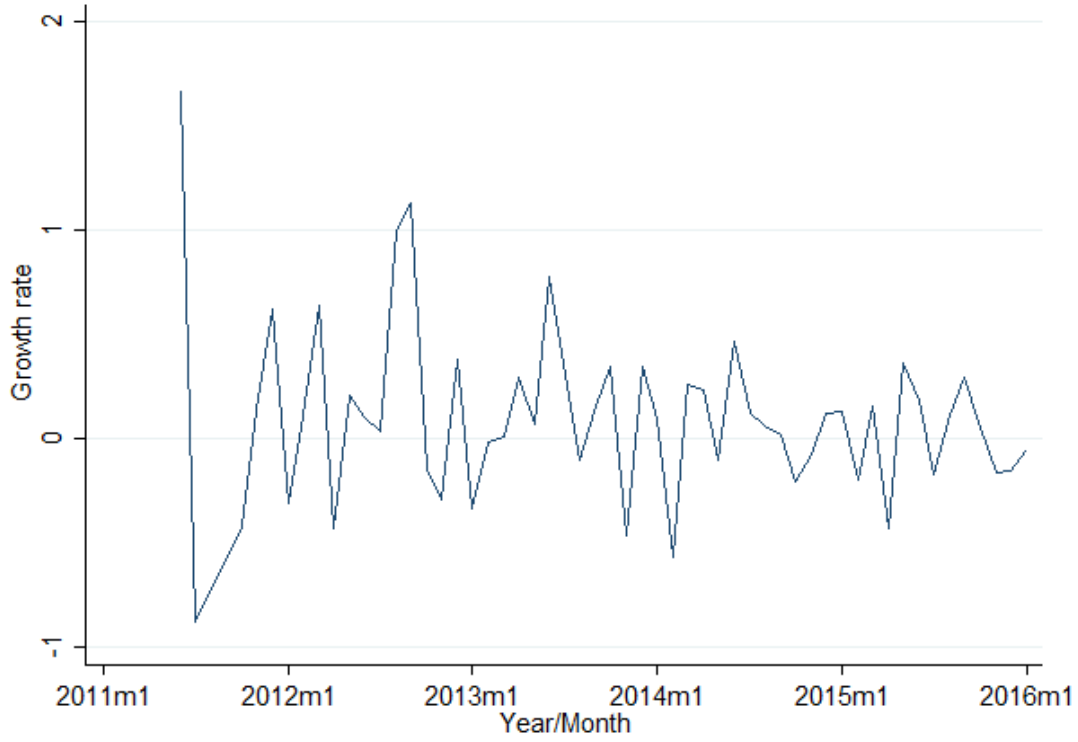

Figure 4: Number of active agents by month

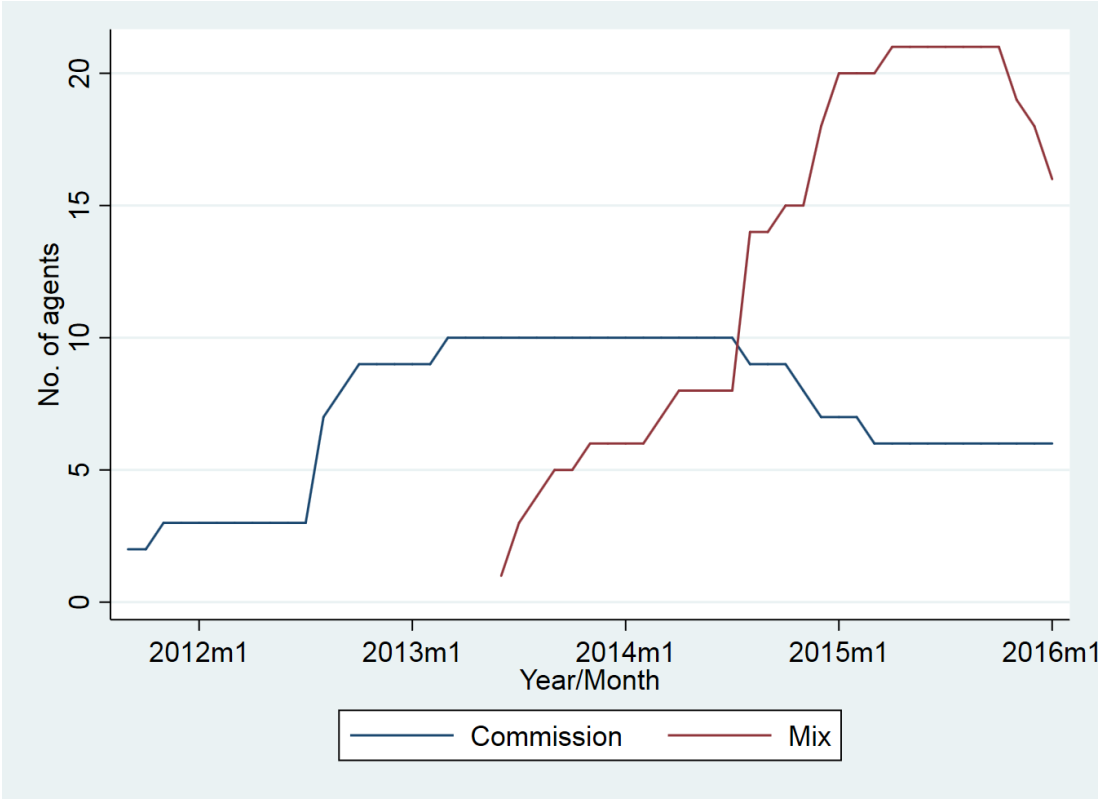

Figure 5: Number of loans issued to new borrowers by agent

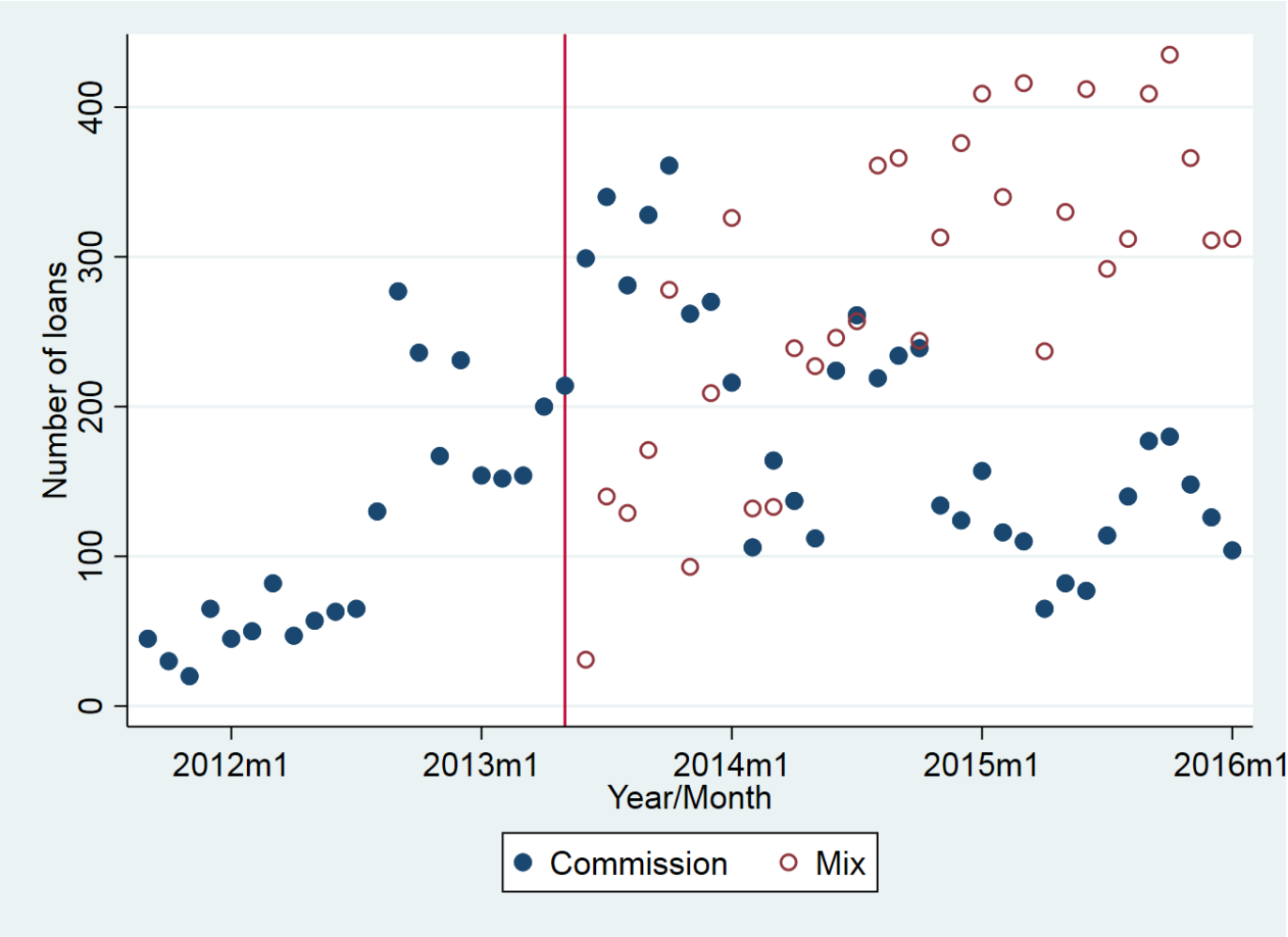

Figure 6: Job advertisement placed by the bank after the policy change (Marathi)

एका नामांकीत सहकारी बँकेत नोकरी करण्याची संधी

आंतरराष्ट्रीय पातळीवर नामांकित असलेल्या बँकेत पिंपरी चिंचवड ☐पुणे☐व कामोठा ☐नवी मुंबई☐येथे खालील पात्रतेप्रमाणे खालील पदांची भरती करायची आहे .

अ .क	पद	वयोमर्यादा	काम	पात्रता	मानधन (कमीत कमी ☐
1	फायनान्शीयल सर्व्हीस ॲडवायजर्स	21 ते 35 वर्ष	कर्ज प्रकरणांची माहिती सांगून कर्ज वाटप करणे	पदवीधर☐संगणक कॉम्प्युटर चे ज्ञान ☐अनुभवास प्राधान्य	अनुभव व पात्रतेनूसार योग्य मानधन दिले जाईल
2	क्रेडीट ऑफिसर	21 ते ३५	कर्ज प्रकरणांची माहिती सांगून कर्ज वाटप करणे व रिपोर्टींग करणे	कोणत्याही शाखेचा पदवीधर कॉम्प्युटर चे ज्ञान☐अनुभवास प्राधान्य	अनुभव व पात्रतेनूसार योग्य मानधन दिले जाईल

तरी पात्र उमेदवारांनी आपल्या मूळ कागदपत्रांसोबत खालील ठिकाणी मुलाखतीला हजर राहावे .

मुलाखतीचे ठिकाण : उज्वल हाउस कैलास जीवन फक्टरी समोर धायरी ता .हवेली जि पुणे ४११०४१
इंपेरियल हाईट्स बिल्डींग फ्लॅट नं . २३१ शॉप नं . ८☐१०☐ सेक्टर☐१ ☐कामोठे ☐नवी मुंबई
☐SBI स्वस्तीक पार्क शाखेजवळ☐

मुलाखातीची दिनांक व वेळ :

फोन नं . :Dhayri - 7558609300 , Kamothe - 9920026147

टिप : मुलाखतीस येणारा जाणारा प्रवास खर्च दिला जाणार नाही याची नोंद घ्यावी .

Figure 7: Job advertisement placed by the bank after the policy change (English)

Job opportunity in a renowned cooperative Bank

As per the mentioned qualifications, following posts are to be filled by a bank renowned at an international level in Pimpari-Chinchwad, 'Pune' and Kamotha, 'New Mumbai'

Serial No	Post	Age	Job(details)	Qualifications	Remuneration (minimum)
1	Financial Service Advisers	21 to 35 years	To pass on information about loans and disbursement of loans	Degree holders, Basic knowledge of operating computers, experience preferred	Fair remuneration as per the experience and qualification will be offered
2	Credit Officer	21 to 35 years	To pass on information about loans, disbursement of loans and reporting	Degree holders, Basic knowledge of operating computers, experience preferred	Fair remuneration as per the experience and qualification will be offered

Qualified candidates should be present for the interview at the following address along with original documents

Places for interviews:
Ujjval House, Opposite to Kailas Jeevan Factory, Dhayari, Block Haveli, District Pune 411041
Imperial Heights Building, Flat No. 231 Shop No. 8, Sector 21, Kamothe, New Mumbai- 'Next to SBI, Swastik Park branch

Phone No. Dhayari- 7558609300, Kamothe- 9920026147

Note- Please note that the candidates will not be reimbursed their travel expenses for attending the interview

Figure 8: The survey questionnaire given to agents requested the following information: name, age, gender, marital status, caste, education, religion, address, demographic information on other household members, household expenditure and income, areas served, remuneration type, previous work experience (job type, location, tenure, salary), assets (house (# rooms, roof and wall type), bulls, buffaloes, cows, goats, phones, fridges, TVs, gas cylinders, bikes, motorbikes, farmland), total value of banks, subjective comments on: competitors, weakness/strengths of JLG products, bad experience with borrowers, suggestions to improve the JLG product.

मानदेशी महिला बँक प्रश्नावली

(Questionnaire Mann Deshi Mahila Banks FSA on JLG)

नांव..... जन्म तारीख..... स्त्री/पु..... विवाहित/अविवाहित

जात..... धर्म..... शिक्षण.....

पत्ता.....

संपर्क क्र.....

राहण्याचे ठिकाण:- भाडयाचे ० स्वत:चे ० घराचा मालकी हक्क.....

भिंतींचा प्रकार	घराचे छत	घरातील खोल्यांची संख्या
वीट/दगड/माती/इतर	आर.सी.सी./कवेलू/टीनाचे/ गवताचे/ इतर	

चल अचल संपत्ती: बैलजोडी....म्हैस....गाय...शेळी....मोबाईल....फ्रिज...टी.व्ही...गॅस...सायकल....दुचाकी.....

शेतजमीन(एकर)..... इतर (विस्तृत).....

कुटुंबातील सदस्य						
क्र.	नांव	नाते	वय	व्यवसाय	शिक्षण	मासिक उत्पन्न
१		स्वत:				
२						
३						
४						
५						
६						
७						

पती/पत्नीचे मूळ गाव:.....

आईचे मूळ गाव.....

वडिलांचे मूळ गाव.....

उत्पन्न	एकूण संपत्ती
३ ते ६ हजार, ६ ते हजार, ९ ते १२ हजार किंवा १२ हजार पेक्षा जास्त	२० हजार, २० ते ३५ हजार, ३५ ते ५० हजार, ५० हजाराच्या वर

मासिक मिळकत			मासिक खर्च	
स्वत:			घर खर्च	
जोडीदार			कर्ज परत फेड	
इतर			बचत	
एकूण १			एकूण २	

Figure 9: Delinquency rate : Frequency plot

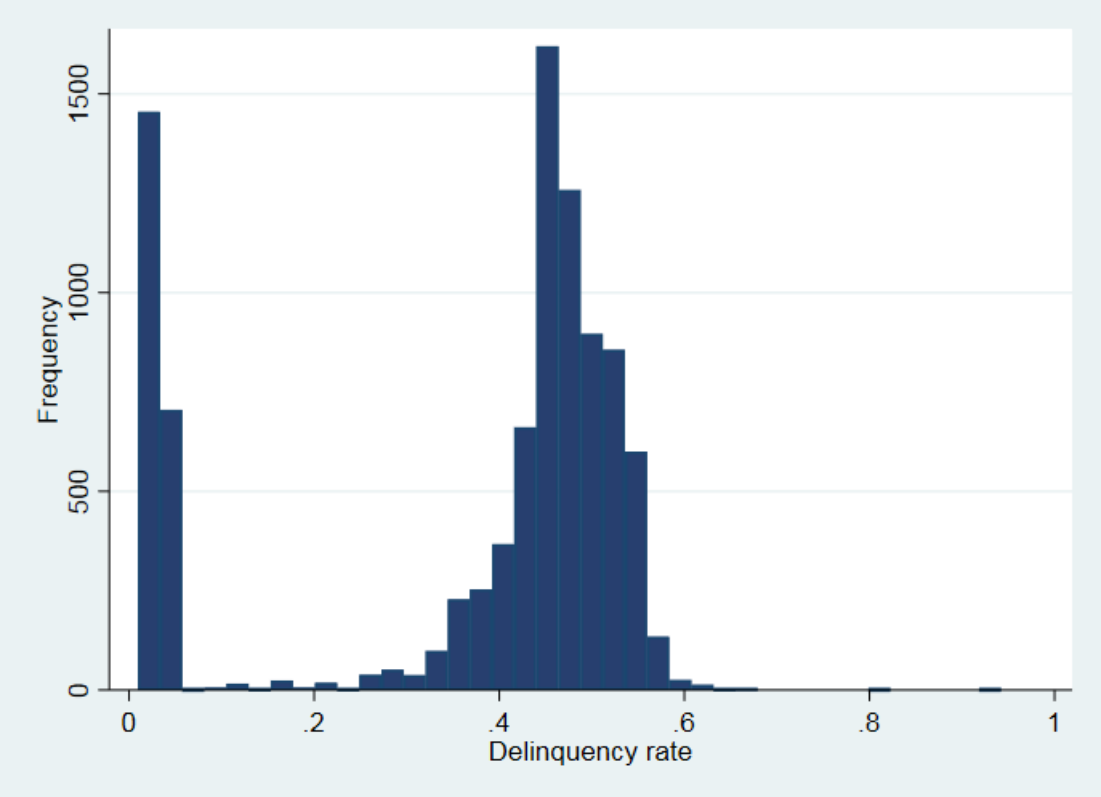

Figure 10: Simulation example: comparison of the payouts to the two contract types.