Debt Relief And Credit Market Efficiency: Evidence from a Policy Experiment*

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Abstract

Using loan accounts data for a large sample of borrowers before and after a nation-wide debt relief program in India, we investigate the ex-ante and ex post implications of the program for the performance of the credit market in the post-program period. Employing regression discontinuity tests to exploit a discontinuity in relief granted under the program, we find that unconditional debt relief leads to significant rationing of new credit to the beneficiaries of the program and no significant improvement in the loan repayment behavior as measured by loan default rate.

Key Words: : bank credit; debt relief; credit market interventions.

JEL Classification: G21, O2, Q14.

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I Introduction

Government interventions in credit markets in the form of large-scale debt relief programs for delinquent borrowers are increasingly common. Some recent examples include Home Affordable Modification Program in the USA (Agarwal, Amromin, Ben-David, Chomsisengphet, Piskorski, and Seru (2013)), and a large loan bailout in Thailand and a USD 10 billion household debt restructuring program in Brazil. However, the current state of knowledge about the implications of a large debt relief program for the efficiency of the credit markets is limited. Important efficiency issues, such as the creditors' ex ante response to new loan requests from relief beneficiaries as well as ex post efficiency issues including repayment behavior of the beneficiaries on new loans are under-researched. The discussions in the existing literature, such as there are, have mostly taken place either in the context of personal bankruptcy (Group et al, 1997; Chen-Cole et al 2013; Hn and Li 2011; Han et al, 2013; and Jagitani and Li, 2014) where the eligibility for relief is not exogenously determined, or debt relief granted in response to a specific crisis (see, for example, Mayer, Morrison, Piskorski, and Gupta (2011); Agarwal, Amromin, Ben-David, Chomsisengphet, Piskorski, and Seru (2013)). However, the issues arising from a nationwide debt-relief program, particularly if the program inclusion is not conditional on an adverse economic shock, largely remain unaddressed.

In this paper we empirically examine both ex ante and ex post implications of a large government-funded debt waiver program for the credit market in the period following the program. Both hidden information in ex ante selection based on unobserved but anticipated efforts (as opposed to classic adverse selection based on types) and hidden action in ex post incentive effects are hard to identify in practice and pose serious challenges to empirical investigations. Hidden information is particularly hard to observe in practice ((Karlan and Zinman (2009)). It is not surprising that existing empirical evidence on specific information frictions in credit markets is thin (Chiappori and Salanie (2000)). Also, reliable data about individual borrowers' accounts before as well as after a debt relief program, necessary to investigate both ex ante and ex post implications of a relief program, are usually not available. In the present paper we use special data that meet the challenges.

Our primary dataset consists of panel data of complete audited transaction records for about ten thousand agricultural borrower accounts with a public sector bank in India over the period October 2005 - May 2012. This period includes the implementation of Agricultural Debt Waiver and Debt Relief Scheme (ADWDRS) for Small and Marginal Farmers program in India, one of the largest debt relief programs in history. The program ultimately covered an estimated 36 million farmers and cost the exchequer equivalent of USD 14.4 billion amounting to 1.3% of India's GDP in 2008-09. The program was an-

nounced on February 29th, 2008. We discuss the main features of the ADWDRS program in section III of this paper. We note here briefly that the program covered overdue farm loans owed to commercial banks at the end of 2007. The farmers who were in default as of 31st December 2007, two months prior to the program announcement, were eligible for the waiver. "Small and marginal farmers" defined for the purpose of the program as farmers with landholdings of 2 hectares or less, were eligible for a full (100%) waiver of overdue debt (henceforth referred to as "full-waiver" farmers), whereas the "the other farmers" defined as those with more than 2 hectares (henceforth referred to as "partial-waiver" farmers), qualified for partial (25%) loan relief provided they paid off the remaining 75% within one year. The banks that wrote off the loans were reimbursed in full by the government. Two aspects of the program are particularly important for our purpose. The program was implemented in a normal year of rainfall and farm production. There are also other reasons, discussed in section III, that indicate that a government program of full or partial debt relief was unanticipated at the time. The official release announcing the program states that the program would make it easier for the poor indebted farmers to meet their future debt obligations and tap the credit market. Those are the two objectives of the program we examine in this study.

Our data also include information about the tenure of loan officers in the branches of the bank where the accounts were maintained. Public sector banks in India have a mandatory rotation policy (Bhowal, Subramanian, and Tantri (2013)) whereby a loan officer is transferred from a branch after a three-year tenure. We exploit this information in our investigations of ex ante selection of borrowers by bank loan officers.

In terms of choice of an appropriate empirical strategy for our tests, the nature of the program, the qualification criterion based on a specific government-mandated landholding cut-off, and the granularity of our data make for an ideal setting for application of regression discontinuity (RD) designs, with the two-hectare cut-off as the discontinuity threshold and individual landholdings as the running variable. In our tests we compare *defaulting* borrowers just below the cut-off of 2 hectares with *defaulting* borrowers just above the cut-off. Consequently, the number of observations used in our tests decline to about three thousand from ten thousand in our primary dataset. The two primary conditions for a RD design to work effectively are that the values of the running variable around the discontinuity threshold should be quasi-random, and therefore not be contaminated by self-selection. Further, the observed results should not be driven by discontinuity at the same threshold in any of the other covariates in the regression model (Lee and Lemieux (2010)). We verify that the first condition is satisfied in our setting (see section III below). The empirical methodologies that we use in this paper discussed in section V below fully satisfy the second condition.

For our tests, we use polynomial regression models that include all covariates. For robustness, we allow the differential slopes of the trend lines to take different powers, including 1, 2. and 3, resulting in tests with polynomial models of three different orders. We also conduct multiple other robustness tests and consider three post-program sample periods of different length: two years, three years, and four years. Our basic results hold up in all nine cases. For a final robustness check, we also conduct our RD tests with an alternative methodology and use robust RD designs proposed by Calonico, Cattaneo, and Titiunik (2014). Our results are robust under their methodology also.

In the first part of the paper, we investigate ex ante selection of borrowers in loan decisions in both extensive and intensive margins following the program. We start with the extensive margin. We do not find significant difference in loan outcomes for full waiver beneficiaries just below the cut-off of two hectares (treated group) and partial waiver beneficiaries just above the cut-off (control group) in our sample when the sample periods are not divided into before-rotation and after-rotation of loan officers, though in majority of the nine regression tests the sign of the regression coefficients indicates negative outcome for the treated group. We also do not find consistent evidence of difference between the two groups when the new loan decisions are made by loan officers who continue from the time of the waiver, though in a few cases there is weak evidence that full waiver beneficiaries are preferred. However, the evidence is consistent and significant in all cases that, when faced with a new loan officer in the post-program period, the borrowers in the treated group are less likely to have a loan in the post waiver period than the borrowers in the control group. The difference in probability of a new loan varies from 4% to 12% depending on the test model specification and length of the post-program sample period. The evidence consistently indicates that new loan officers target the treated group borrowers for ex ante selection while the continuing loan officer does not. The test results using the robust RD test developed by Calonico, Cattaneo, and Titiunik (2014) also indicate that the probability of a new loan for the treated group is lower by 7%. This result is significant at 1% level. We explain below the rationale for this finding and our identification strategy.

Landholdings are the primary determinant of farm production in India's rural economy which still uses very basic technology. They also serve as the standard collateral for farm loans. Given the similarity of their credit history as well as landholdings by design in our tests, the only systematic major difference between the full-waiver beneficiaries and the partial-waiver beneficiaries in our research design is their treatment under the program. Therefore, any observed asymmetric pattern in post-waiver loan outcomes between the two groups can be causally attributed to the difference in relief received under the program. However, by itself evidence relating to loan outcomes is not sufficient to infer credit rationing by loan officers. Loan outcomes are equilibrium values. Ex ante

selection of borrowers by bankers leading to credit rationing is a supply side effect. It is, therefore, important to consider whether possible demand side developments may explain our result noted above.

In the present case full waiver beneficiaries' demand for new credit may change significantly after the waiver since their existing debt repayment obligations are wiped out. However, as discussed in Section II below, agricultural loans in India are available up to a point at a steep discount even to the risk free rate. The discount is as high as 450 basis points, creating a strong incentive to borrow at the subsidized rate even when there is no immediate production-related need for new loans and substitute it for far more expensive non-bank debt (Banerjee and Duflo (2014)). Further, though it has been observed that existing clients of a bank tend to curtail their loan demand under a new loan officer Drexler and Schoar (2014), the fall in demand in such cases should not be systematically different between the two groups of borrowers in very comparable economic conditions. We also examine the possibility that full waiver beneficiaries, with their collateral freed up and their "land-passbook" [1] retrieved, are in principle free to seek new credit from another bank in the post-waiver period. This opportunity is not available to partial waiver beneficiaries who still have 75% of their overdue debt outstanding under the waiver program. However, this possibility is actually remote. The borrowers will face a new loan officer at the new bank too. More importantly, the institutional features of the rural credit market in India and many other emerging countries seriously impede migration of the current clients of a bank to different banks. It has been frequently documented that non-pecuniary transactions costs, including especially physical distance from a bank branch, hinder bank usage in rural economies (see, for example, Karlan et al, 2014). The borrowers in our sample are very likely to have chosen their current bank based on its proximity compared to others. Any possible marginal gains in moving to another bank at a further distance where also they will face a new loan officer may very well be offset by additional transactions costs.

However, to address any residual concern that the observed results may reflect decline in demand from full waiver beneficiaries who migrate to other banks, we investigate the issue empirically. We exclude the only bank in our sample in an urban area which also accounts for the largest number of observations and conduct our tests with observations from branches in more rural areas with low banking penetration. Migration opportunities to other banks for the remaining borrowers in the reduced sample should be scarce and, hence, observed credit declines for the this sample should more realistically reflect true supply effects. Our evidence indicates that the decline in credit probability for full waiver beneficiaries for this sample of borrowers is actually sharper. The finding suggests that the observed declines for our full sample in our original tests understate the true supply

[1] A document handed over by the borrowers to the bank when they get a loan

effect.

The arguments above cast doubt on demand-based explanations. Finally, even if we accept that the demand for new credit may well be different for the two groups of beneficiaries in the post-program period, that difference is unlikely to be correlated with the continuation or transfer of bank loan officers dictated by an exogenously mandated job rotation policy. In other words, we use the mandatory loan officers rotation policy of public sector commercial banks in India as a tool in our identification strategy. We also investigate, but do not find, adverse selection in the intensive margin or the loan size, conditional on a loan being granted in the post-program period, except in one out of the nine tests where the result is statistically negative for the full waiver beneficiaries but economically insignificant. This result makes sense. The size of an agricultural loan in rural India is closely tied to the size of the landholding of the borrower, which is two hectares by design for all borrowers in our sample. In other words, banks can ration agricultural loans in the extensive margin, but not in the intensive margin.

With demand-based explanations ruled out, our test results noted above are considered to indicate that full waiver beneficiaries of the debt relief program face adverse selection and rationing in new credit decisions in the post-program period compared to partial waiver beneficiaries in similar economic conditions under a new loan officer following the rotation of the officer incumbent at the time of the waiver who does not appear to differentiate between the two groups. We investigate the possible reasons for the finding. We note that relative size of the two groups is not a plausible reason. By design our sample includes only those farmers who have landholdings very close to 2 hectares, though technically full waiver farmers are below the two-hectare boundary and partial waiver farmers are above it. However, we must note that though the full-waiver and partial waiver beneficiaries in our sample have very similar economic characteristics, they are quite dissimilar in the post-waiver period in one important qualifying criterion for new bank credit. The first group has no bank debt on their balance sheets, while the second group still has 75% of their overdue bank debt outstanding. This fact should actually favor the first group. Nevertheless, we investigate how the full waiver beneficiaries fare in terms of new loan generation in comparison to another group of borrowers with similar creditworthiness. The group of borrowers who paid off their loans before the cut-off date for inclusion into the ADRDWS program (December 31, 2007) and, accordingly, did not benefit at all from the program, is one such group. Our tests find that full waiver beneficiaries fare significantly worse than this group too, in fact by a higher margin (15%), even if the borrowers in this group had defaulted on loans in the past (and therefore have comparable credit history as the full waiver beneficiaries) though not on the last loan before the waiver program.

Finally, we consider the possibility that a massive nation-wide government-funded farm debt relief scheme like the ADWDRS program not only makes sweeping changes in the current balance sheets of the affected parties but also changes expectations of all parties in the rural debt market about the direction of government policies in the debt market going forward. As we have noted before, the program classified the farmers with landholdings below 2 hectares as small and marginal farmers and those above the cut-off as other farmers. The levels of relief for the two groups were very different under the ADRDWS program. The bank loan officer may well reason that the next debt relief program of the government will again be more favorable to the small and marginal farmers, and the borrowers in this group, influenced by similar beliefs, will experience moral hazard and default on new loans in anticipation of debt relief going forward. This line of reasoning would acquire some urgency from the fact that the ADWRDS program was implemented in a normal state of the rural economy, creating expectations in creditors and borrowers alike that the next round of government debt relief could happen any time, and motivating the loan officer to preemptively engage in ex ante selection of borrowers in this group to minimize the probability of extensive moral hazard - induced defaults on new loans. We test this hypothesis indirectly, and find supporting evidence. We consider three sample periods of different length before the ADWDRS program. By design, the three periods include no debt relief program. The results for each period indicate that, in the absence of a waiver program, the loan officers, whether new or continuing, do not differentiate between borrowers around the two hectare cutoff. The results provide support for our hypothesis that the preferential treatment of full waiver beneficiaries under the waiver program paradoxically leads to their unfavorable treatment in new loan decisions following the program.

What explains the second part of our finding that a new loan officer in the post-waiver period makes credit supply decisions that are very different from the decisions of a continuing officer? The latter is likely to depend on hard information such as landholdings and credit records as well as client-specific soft information acquired over time (Petersen (2004)) for loan decisions. Importantly, the loan officers in our sample are also managers of their respective branches, with the result that there is no distance between the producer of soft information and the ultimate decision maker. The situation permits extensive use of soft information in loan dcisions. Further, a continuing loan officer is also likely to have had time to develop access to informal networks (Fisman, Paravisini, and Vig (2012), especially in rural economies, which may help the loan officer enforce loan contracts even in the presence of increased moral hazard. There may also be relationship banking between the continuing officer and some of her existing clients. The new loan officer, on the other hand, typically does not have her own soft information and, consequently, would depend only on hard information and her own anticipation of loan repayment behavior

of her clients which, as we have discussed above, may be unfavorable to the prospective borrowers in the small and marginal farmers group. Even if her predecessor has the time as well as the incentive to transfer her soft information (Drexler and Schoar, 2014), the new loan officer may not be inclined to use it, seeing that it has resulted in bad loan decisions in the recent past.

In the second part of this paper, we test the impact of the program on loan repayment behavior of the program beneficiaries around the cut-off in the post-program period. This is of course conditional on a loan being granted in this period. Default probability of a new loan in the post-program period is the dependent variable in our tests in this part of the paper, though in other respects the tests our identical to the tests for the probability of a new loan we have discussed above. The test results document worse loan performance for the borrowers in the treated group compared to the control group in two of the nine tests, and no significant difference between the two groups in any of the other seven specifications though the regression coefficients are consistently negative for the first group. The results indicate that even full debt relief does not elicit more responsible debt repayment behavior from full waiver beneficiaries, suggesting moral hazard in their case and vindicating credit rationing by loan officers.

The findings of this paper contribute to several distinct literatures. It is the first paper within our knowledge to present systematic empirical evidence of credit rationing in an actual setting. In this context, note that our work provides empirical evidence on both types of information asymmetries in credit markets in an actual setting: hidden information (ex ante selection based on unobserved but anticipated effort) as well as hidden action (ex post incentive effects). In the case of an unconditional debt waiver program, we find that both types of evidence are negative. As Karlan and Zinman (2009) point out, while both types of information asymmetries are difficult to observe, hidden information is especially hard to identify in practice. Accordingly, our evidence on ex ante selection by the bankers is of necessity indirect. However, given that empirical evidence on the existence and magnitude of specific information frictions in credit markets is thin (Chiappori and Salanie (2000)), our indirect evidence makes a noteworthy contribution to the existing literature.

In the existing literature, two other papers also examine different aspects of the ADWRDS program. In a paper that looks at ex ante and ex post credit market implications of the ADWDRS program, Giné and Kanz (2013) use district-level bank credit disbursement data and find that credit allocation by banks in districts with greater exposure to the program (where exposure is defined as a share of waived overdue loans in total credit disbursed) appears to decline in the post-waiver period. However, this finding does not establish credit rationing. As we have argued above, observed credit allocation is an equi-

librium outcome, while credit rationing by bankers is a supply side effect. Giné and Kanz (2013) also do not address the related issue whether the observed decline in credit allocation was in the intensive or the extensive margin. Kamz (2016) uses experimental data to analyze the implications of the ADWDRS program for the affected farmer's productivity and investments, but recognizes that "banks' credit supply response to the bailouts is beyond the scope of this study" (p. 70). A related literature finds that post-bankruptcy access to credit declines for households that receive bankruptcy protection (Group et al, 1997; Cohen-Cole et al 2013; Hn and Li 2011; Han et al, 2013; and Jagitani and Li, 2014). However, endogeneity concerns about the findings of the studies are unavoidable when the program eligibility of the borrowers is not exogenously established. By contrast, in the setting of the present study both program eligibility, based on landholding and default status, and amount of relief were exogenously determined.

Our paper contributes to the existing literature on the efficiency implications of political interventions in credit markets. In a well-known paper, Bolton and Rosenthal (2002) consider the possibility that anticipated political interventions in private debt contracts may induce lenders to ration credit. In fact, rationing may be extensive in such situations (Alston, 1084) It follows that in our setting, where the debt relief program was implemented in a normal year of farm production and rainfall, credit rationing is likely to occur following the porgram. However, if the political system only permits interventions conditional on adverse shocks to the economy, efficiency implications are benign. Ex ante efficiency may even improve by completing debt contracts which are typically incomplete with respect to outcomes in bad states. However, though bankers resort to credit rationing to forestall contract violations ex post, some violations still happen. The result is a decline in the effectiveness of credit contracts and, to that extent, loss in credit market efficiency. In this sense, our paper may be viewed as complimentary to Bolton and Rosenthal (2002) as we focus on consequences of debt relief programs that are not state-contingent.

Our findings have implications also for the literature on 'poverty trap' (Banerjee and Newman 1993, Banerjee 2000, Mookherjee and Ray 2003). The central thesis of this literature is that household incomes of the the heavily indebted poor net of debt service charges may not be sufficient to undertake investments in human or physical capital, forcing indebted households to remain in a low-productivity equilibrium. Large-scale debt relief may lift poor households out of their traps and improve their investments and productivity. As a rule, the poverty trap models do not consider moral hazard issues arising from expectations of more bailouts and strategic indebtedness. In the present case, full-waiver beneficiaries of the ADWRDS program exhibited poorer loan repayment behavior than other beneficiaries in a comparable economic situation who received much less debt relief.

Finally, the findings of this paper have special implications for the realm of policy-making. Our findings question two key officially stated premises of the program, namely that access to credit as well as repayment behavior on new credit of the program beneficiaries would improve following the program. The findings amply demonstrate that debt relief not conditional on adverse economic shocks may lead to unintended and negative consequences for credit markets. Ironically, the burden of the negative effects falls harder on the small and marginal borrowers such programs are intended to help by cutting off their access to future credit. The consequences are also likely to undercut other government initiatives to advance financial inclusion of the poor. Such initiatives are quite common in emerging economies, including India. With government debt relief programs increasing around the world, especially in emerging economies, the implications of our findings have special relevance for policy-making on debt relief and related issues.

II Institutional Background

In this section we briefly describe some key features of the institutional context for our study, particularly as they relate to government-controlled public sector banks in India. As mentioned above, the bank from which we obtained our data is a public sector bank.

II.A Public sector banks in India

Indian banking system comprises principally four types of banks; (1) public sector banks; (2) old private sector banks; (3) new private sector banks; and (4) foreign banks. All public sector banks except State Bank of India[2] were created by nationalising the then existing large private sector banks in two phases: 1969 and 1980 (Cole (2009)). The official rationale for nationalization was that public banks could better serve rural and underbanked regions; they would promote an equitable allocation of credit, and would better serve sensitive sectors of the economy, primarily agriculture. All public sector banks are listed and have significant minority stakes owned by non-government entities and investors. Government stakes in public sector banks varies between 55% and 85%.[3] Public sector banks account for more than 73% of total banking credit. credit.[4] The banks that existed at the time of nationalisation but were not nationalised, mostly smaller banks, are known as old private sector banks. Two years after India adopted a policy of economic and financial liberalisation in 1991, the legal framework was suitably

[2]State Bank of India is the largest bank in India. It was created out of Imperial Bank of India that existed prior to Indian independence from the British in 1947. Source: Reserve Bank of India

[3]Table for government stakes in public sector banks, http://financialservices.gov.in/banking/Shareholding

[4]Source:http://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/BCF090514FR.pdf

amended to permit new private sector banks. Banks that are subsidiaries of large foreign multinational banks are known as foreign banks. All banks in India are regulated by the Reserve Bank of India (RBI), India's central bank.

II.B Loan officer rotation policy in public sector banks

The public sector banks are required to follow a mandatory rotation policy of loan officers in order to avoid collusion. A loan officer is transferred after she spends 3 years in a branch. Such transfers have no relationship to business performance of the branch or job performance of the officer concerned. It has been observed that due to administrative exigencies it is not always possible to carry out rotation after exactly 36 months of tenure. Bhowal, Subramanian, and Tantri (2013) find that a loan officer of a public sector bank is most likely to be transferred out of a branch between 33rd and 36th month of her tenure. We use the mandatory rotation policy of loan officers in our identification strategy in this paper.

II.C Agricultural credit in India

Agricultural credit given by commercial banks in India are mostly short term loans, with a typical maturity period of one year (365 days). The contracts for the loans in our sample clearly state that the loan repayment is due after a year. The loans fall under priority sector guidelines issued by the RBI and carry a subsidized interest rate. The loans are usually fully collateralized, with land and standing crops being the standard collateral assets. The loan officer takes the land passbook of the farmer when a loan is given and holds it in custody until the loan ie repaid. A state level bankers committee, comprising the state government representatives and senior bankers in the state, issues guidelines regarding collateral requirements and the amount of loan to be given per hectare of land for different crops. These guidelines, although not mandatory, are generally adhered to by banks.

Every year the farmers who have bank accounts seek bank credit during the crop planting season and is expected to pay back with proceeds from the harvest. This rural credit cycle is repeated each year. Many farmers do not have access to formal banking and seek credit from informal sources, including private moneylenders, at much higher interest rates. Various estimates put the proportion of total agricultural credit used in a year coming from formal banking at no higher than 23%.

II.D Subsidised Agricultural Lending

Since 1985, all commercial banks have been required to lend a fraction of their total credit to the priority sectors of the economy defined by the government.[5] Currently, the figure is 40% for domestic banks and 32% for foreign banks3. Of the priority sector lending targets for domestic banks, almost half (18% of total bank credit) is required to be extended to agriculture. Foreign banks do not have specific targets for agricultural lending owning to their minimal presence in rural areas. Agricultural loans below INR 300,000 carry a fixed rate of 7% per anum.[6] The farmers who repay their loans in time get a concession of 3% per anum.[7] Thus the effective rate of interest on agricultural loans is 4%. According to data compiled by the RBI, the average lending rate charged by public sector banks in India is 12.75%.[8] The risk free rate in India at the time of the ADWRDS program annoincement was 8.5%. Thus, subsidized agricultural loans are offered at substantial discounts to even the risk free rate.

III Agricultural Debt Waiver and Debt Relief Program for Small and Marginal Farmers (2008) In India

Farmer indebtedness in India is an old problem, almost as old as Indian agriculture itself, though the problem was increasing in magnitude over time. Unpredictable rainfall, small landholdings, and high interest rates on loans from private money lenders have been cited as some of the reasons that had pushed rural farmers into unsustainable levels of debt (Mukherjee, Subramanian, and Tantri (2014)). While the rest of the Indian economy grew at an average annual rate of 8% in the early years of the present century, agricultural sector, by far the largest employer of the working age population in the country, grew at an anemic 2.3% rate. To limit the magnitude of the farm debt problem, from time to time the Indian government had attempted various measures, including provision of credit through public sector banks and highly subsidized priority sector agricultural loans, and also set up committees to suggest measures. The last such committee before the ADWDRS program of 2008, the Expert Committee on Rural Indebtedness, was given a sweeping mandate: "to look into the problems of agricultural indebtedness in its totality and to suggest measures to provide relief to farmers across the country"Ṫhe committee

[5]Master Circular-Lending to Priority Sector, Reserve Bank of India, July 1, 2011
[6] This is a Government mandate. Source: http://farmer.gov.in/shortloan.html
[7]Government of India bears this subsidy. Source: http://farmer.gov.in/shortloan.html
[8]Source: Reserve Bank of India, http://rbi.org.in/rbi-sourcefiles/lendingrate/LendingRates.aspx

submitted its report in July 2007. Two important recommendations of the committee were a government fund specifically set up to provide long-term bank loans to farmers in an effort to limit high-interest loans from private moneylenders, and special relief packages for 100 districts, out of a total of 640 in India, that were identified as low land productivity areas. Notably, the committee did not recommend a waiver, unconditional or otherwise, of overdue commercial bank loans.

The ADWRDS program covered formal agricultural debt issued by commercial and cooperative banks. The types of debt included crop loans, investment loans for direct agricultural purposes or purposes allied to agriculture, and agricultural debt restructured under prior debt restructuring programs. Over a period of time the government compensated the banks in full for the loans written off under the program. Loans from moneylenders and other informal sources, and loans taken for non-agricultural purposes, were not included in the program.

We have noted before that to qualify for debt relief under the program, a loan had to be overdue or restructured as of December 31, 2007, two months prior to the program announcement on February 29, 2008. It is important to note that the status of the last loan before the program was the determining factor for waiver. Small and marginal farmers, defined for the purpose of the program as farmers with landholdings of 2 hectares or less, were eligible for a full (100%) waiver, while the other farmers, defined as those with more than 2 hectares, qualified for partial (25%) loan relief conditional on repayment of the remaining 75%.

All evidence indicates that the ADWSRS program of 2008 was unanticipated. We have noted above that the Expert Committee on Rural Indebtedness did not recommend debt waiver. There are additional reasons. First, it was launched in a normal state of the rural economy. The years immediately preceding the program experienced normal rainfall and, in fact, increasing agricultural productivity and increasing food grains production. In particular, 2007 was a better than normal year in terms of those indicators (Mukherjee, Subramanian, and Tantri (2014)). Second, although the waiver program was announced just one year before national elections scheduled in 2009, that fact should not have caused it was the first nation-wide agricultural debt relief program in India after 1990.[9] The program in 1990 did not precede an election. Five national elections were held in the intervening period 1990 - 2008. No large scale debt waiver preceded any of those elections either. Therefore, announcing national level debt relief just before elections was not a norm in India. Finally, our search of the press reports from the time also did not find evidence of anticipation of debt waiver in the press.

[9]Source:http://timesofindia.indiatimes.com/city/chandigarh/INLD-says-Devi-Lal-had-initiated-reforms-for-aam-aadmi-long-ago/articleshow/28408304.cms

IV Data

IV.A Transactions records

The original dataset includes account level data for 9,759 farmers who are customers of the bank and had received crop loans during the period October 2005 - May 2012. However, information on landholding, which is critical in all our tests, is available only for those farmers who qualified for relief under the ADWDRS program.[10] There are 6,601 such borrowers in our sample who received a total of 17,893 loans during our sample period October 2005 - May 2012. The summary statistics relating to the data are presented in Tables 2 and 3. The farmers in our sample belong to 4 districts of the state of Andhra Pradesh[11] in India: Karimnagar, Khammam, Mehboobnagar, and Medak. Only two of the 4 districts share a common border with each other. All the four districts share a common border with at least one other state.

The public sector bank that we obtained our data from has a total of 9 branches in those districts. We personally visited each branch and collected the necessary data from the MIS of the branch, ensuring total authenticity of the data collected.[12] The data relate to *all* full and partial waiver beneficiaries among the clients at the branches. Andhra Pradesh is known as the rice bowl of India. In most cases, the crop under consideration is rice. As is typical of agricultural credit, the loans are short term loans, payable in a year according to the sample loan contracts obtained from the bank. The loans fall under priority sector guidelines issued by the RBI and carry a subsidized interest rate. The loans are mostly fully collateralized, with land and standing crops being the standard collateral assets.

The transactions records of the farmers in the sample include the date of each transaction, a description of the transaction, type of the transaction (debit or credit), transaction amount, account balance before the transaction and after. The description of the transaction is sufficiently detailed for us to understand the exact nature of the transaction. With the help of the description and other variables, we are able to determine when a particular loan was taken, the amount of the loan, interest and other charges on the loan, when the loan was repaid and how long was the payment period.

[10] The loan waiver scheme required the banks to publish detailed information about the beneficiaries of the program on their notice boards and websites. The information included size of their landholdings.

[11] Currently the erstwhile state of Andhra Pradesh is divided into two states: Telangana and Andhra Pradesh

[12] The computerized MIS of the branches did not go farther back than October 2005, while we did our data collection in th esummer and fall of 2012. This explains our sample period October 2005 - May 2012.

IV.B Loan Officer data

We also collected data on the tenure of each loan officer in all 9 branches of the bank in our sample during our sample period. The data includes the exact date when a loan officer takes charge in a particular branch as well as the date on which he demits office pursuant to job rotation. In total, we have information about 27 loan officers. However, 11 officers were rotated before the completion of their full tenure of 3 years required under government regulations for public sector banks. [13] The remaining 16 officers were transferred on schedule. Given the possibility of early rotations being endogenously determined by performance at the branch level, we perform our tests by limiting our data to loans granted by those 16 officers; 13,818 loans in total.

Though government regulations for public sector banks require a loan officer to be transferred from a bank branch on completion of 3 years of tenure, Bhowal, Subramanian, and Tantri (2013), who use the same loan officer data, find that slight deviations from the three-year rule due to administrative exigencies are not uncommon. We follow their definition of a regular rotation and consider all job rotations effected to in the 12th quarter and beyond of an officer's tenure in a branch as regular job rotation.

Importantly, all branches but one we collected data from are small branches located in rural areas. The branches consist of a branch manager and other supporting staff. The branch manager is authorised to take decision on loans upto INR 0.65 million, which is nearly 15 times larger than a typical loan in our sample. In other words, there is no hierarchial distance between the producer of information and the decision maker in our setting. The situation facilitates increased use of soft information (Liberti and Mian (2009); Stein (2002)). For the purpose of this study, each branch manager is the loan officer at the branch.

IV.C Summary Statistics

Table 2 presents the summary statistics of the data on borrower accounts with loan and land information in our sample. We classify the 6,601 farmers in our final sample with landholding information into two categories based on the benefits they received from the debt waiver scheme. 4,508 farmers in our sample fall under the full waiver category, and 2,093 farmers under the partial waiver category. The full-waiver group in the sample has a total of 12,404 loans during the sample period, comprising 4,963 in the pre-program period (October 2005 - December 2007) and the remaining 7,411 loans

[13] Our discussions with the management indicate that 6 of them requested transfers due to personal reasons and the other 5 were transferred due to other reasons including administrative exigencies such as opening of a new bank branch.

in the post-program period (January 2008 - May 2012). The partial waiver group in the sample has a total of 5,489 loans during the sample period, 2,258 of them in the pre-program period and the remaining 3,131 loans in the post-program period. For both groups the number of loans in the post-program period exceeds the number in the pre-program period. This is explained by the fact that the post-program period in our sample is much longer.

We provide summary data pertaining to land and loans in Table 3. The average (median) landholding for the entire sample 1.32 (2.29) hectares. This table shows that the farmers in our sample are indeed small. As expected, the average (median) land holding of the full waiver farmers is much smaller (1.01 (1.00) hectare) than that of the partial waiver farmers- (5.19 (3.11) hectares).

From the table, the average(median) loan amount for the entire sample during the pre waiver period is INR 32,585(23,644.). The number increases to INR 40,064.5(30,000.00) in the post waive period. Note that they are nominal numbers, and the increase could be partly due to inflation. The average (median) loan amount for the full waiver beneficiaries increases from is INR 24,008 (16,822) in the pre-waiver period to INR 31,074(25,000) in the post waiver period. Similarly, for partial waiver beneficiaries, the average (median) loan amount increases from INR 51,533(41,822) to INR 61,424 (51,250). It is clear from the table that partial-waiver farmers are systematically larger than the full-waiver group in terms of landholdings, and other critical parameters such as loan amount and loan outstanding. This observation influences our empirical strategy.

V Empirical Strategy

V.A Test model

We use a key feature of the debt waiver program in our identification strategy. Since the quantum of debt relief under the ADWDRS program depends on the size of the landholdings of the defaulting farmers, with 2 hectares or less qualifying for full waiver of overdue debt and landholdings above this cutoff qualifying for only a partial (25%) relief, this feature of the program provides us with two groups with different levels of treatment. Although both full-waiver and partial-waiver farmers are defaulters and have similar credit history, we cannot straight away compare the two groups as they differ substantially in terms of critical parameters such as the size of the landholding, loan amount tied to landholding and outstanding balance. However, defaulting farmers very close to the two hectare mark on either side of the cutoff are likely to be similar to

each other not only in terms of credit history but also in terms of other observable and unobservable characteristics related to farming where land remains the most important factor of farm production in India. Therefore, we employ regression discontinuity (RD) designs using the two hectare mark as the discontinuity threshold and land as the running variable in order to assess the causal impact of a large scale debt relief program on credit availability and loan repayment behaviour of the beneficiaries of the program.

We estimate the following regression equation:

The data is organized at a borrower level. D_i is an indicator variable that takes the value 1 if the landholding of the borrower i under consideration is more than 2 hectares and zero otherwise. In other words, it represents the treatment status of borrower i under the program. Accordingly, it is the main independent variable of interest in the model. Xi represents the distance of the landholding from the cut-off of 2 hectares. The cut-off is normalized to zero. The interaction terms indicate the assumptions regarding the slopes on either side of the cut-off. We start with a local linear model and then consider higher order polynomials. We include Branch X Month fixed effects.

V.A.1 Other covariates

The other covariates in the regression model used to control for possible dissimilarities between the two groups on two sides of the discontinuity threshold in relevant observable characteristics, including individual-level characteristics, such as loan amount and credit history, and district-level characteristics including rainfall, agricultural production, and credit flow into the district. We also employ Branch*Month fixed effect to control for unobservable time invariant as well as time varying factors. The first part takes care of the idiosyncracies at the loan officer level across branches, since each branch in our sample has only one loan officer. Further, the jurisdiction of a branch in our sample is limited to a district, there being no branch in our sample that operates in two districts. Hence, using branch effects also controls for district level factors such as rainfall, overall economic growth, credit growth etc. The second part controls for the influence of seasonal factors, as there are strong seasonal in farm production.

V.B RD approach validity

The two primary conditions for the validity of a RD design are that the values of the running variable around the discontinuity threshold should be quasi-random, and that the observed results should not be driven by discontinuity at the same threshold in any of the other covariates in the regression model. As Lee and Lemieux (2010) demonstrate,

if the agents cannot manipulate the running variable around the discontinuity threshold with a view to self-selection into the preferred side of the threshold, then the variation in the treatment around the threshold is "as good as randomized" in a RD design. We verify that self selection around the cut-off is unlikely in our setting. As described above, the qualification into the program depended on the size of the land possessed by a farmer. Though the waiver program was announced on February 29, 2008, the waiver was granted only to defaulters as of December 31, 2007. Given that crop loans in India typically have a tenure of one year, the eligible loans were obtained, and landholdings pledged as collateral, a minimum of fourteen months before the waiver announcement. Correct anticipation of the program including the precise eligibility cut-off leading to self selection that far back would be inconceivable. To confirm this intuition, we conduct McCrary (2008) tests to check for evidence of bunching of the borrowers below the threshold of 2 hectares. We find no such evidence (please see figure 1 at the end of this paper). Further, since eligibility for waiver depended on the status of a loan two months before the waiver, there is also no possibility of a borrower defaulting after learning about the waiver (Mayer, Morrison, Piskorski, and Gupta (2011)). There are a number of other reasons to rule out self-selection in our setting. The qualification into the program depended on the size of the land possessed by a farmer. Land, by its very nature, is not an easily divisible asset. Farmland is typically organized into plots of various sizes for use in production, making it difficult to cut out a piece in order to slip into the preferred group. Finally, we have noted a number of reasons in a previous section describing the major features of the ADWDRS program that the program was unanticipated. This would also rule out self selection in anticipation of the program.

As indicated above, the RD design methodology that we use in this paper permits inclusion of all covariates in one single regression equation. Hence the second condition is satisfied transparently. The observed effect of the independent variable of interest in our tests is net of the effects of all other covariates in the regression model.

V.C An alternative RD design

For robustness, we also conduct our basic tests with the method developed by Calonico, Cattaneo, and Titiunik (2014). The test results are reported in an appendix. Their method recognises the fact that the routinely employed polynomial estimators are extremely sensitive to the specific bandwidths employed. The authors show that both conventional RD designs as well as recently developed nonparametric local polynomial estimators make bandwidth choices that lead to "bias in the distributional approximation of the estimator"Ṫhey first bias-correct the RD estimator by re-centering the t-statistics. This leads to their bias-corrected estimators. They also recognise that conventional meth-

ods may lead to "low quality distributional approximation"Ṫhey devise a novel method to calculate standard errors which accounts for the additional variability introduced as a result. They label them robust standard errors. Following them, we eport both bias corrected and robust RD estimates. We also report conventional RD coefficients.

In order to control for the impact of other covariates on the dependent variable while using their method, following Lee and Lemieux (2010) we first estimate a regression of the dependent variable on the other covariates excluding the running variable. Using the residuals from the above regression as the dependent variable, we estimate RD coefficients which are then likely to reflect the impact of only the running variable on default. In discussion of our findings, we focus on estimates from "residualized" RD designs.

V.D Using job rotation of loan officers in identification

The event we study in this paper lends itself nicely to regression discontinuity designs. Given the similarity of their credit history as well as landholdings by design in our tests, the only systematic difference between the two groups of beneficiaries in our research design is their treatment under the program. Therefore, any observed asymmetric pattern in post-waiver loan outcomes between the two groups can be causally attributed to the difference in their treatment under the program. However, by itself evidence relating to loan outcomes is not sufficient to make inferences regarding access to credit. Loan outcomes are equilibrium values. Ex ante selection of borrowers by bankers leading to credit curtailment is a supply side effect. It is, therefore, important to consider whether possible demand side developments may explain our equilibrium results.

In order to disentangle the role of demand and supply in loan outcomes, we use the policy of time dependent mandatory rotation of loan officers in public sector banks in India. At the branch level, we divide the post waiver period into two parts; before and after loan officer rotation. To avoid endogeneity concerns, we ensure that in each case in our test sample the previous loan officer completes her full term mandated for government-owned banks before her successor takes over, and exclude all cases of transfers for other reasons. For example; in one of the branches, the loan officer who was in charge at the time of the waiver announcement was mandatorily transferred from the branch on 10th May 2008. In that branch, the time period between 29th February 2008 and 10th May 2008 represents the continuing loan officer period. The time period after 10th May 2008 represents new loan officer period. We make the reasonable identifying assumption that the difference in loan demand between full waiver and partial waiver farmers at the margin (near the cut-off of 2 hectares) is unlikely to be correlated with the continuation or rotation of the loan officers who served at the time of the waiver announcement.

Therefore any observed difference in loan outcomes between the new and continuing loan officer should be viewed as a supply effect. Further, given that the borrowers near the arbitrary cut-off are likely to be similar in all observable characteristics other than their treatment under the program, any such supply effect is attributable to the difference in treatment under the program. This is of course a proposition and, as such, needs to be investigated.

VI Evidence on Ex Ante Selection and Credit Rationing

VI.A Results: extensive margin

Our first set of tests, conducted at the borrower level, are designed to compare the probability of a new loan for the average pre-program borrower in the two groups in sample periods of different length following the program: two years (ending on February 28, 2010). three years (ending on February 28, 20110), and three years (December 29, 2012). For the purpose of some tests, each sample period is partitioned into the sub-period before the rotation of the branch loan officer in charge at the time of the waiver announcement and the sub-period after rotation with a new loan officer in charge. Following the methodology discussed in the previous section, we design robust RD tests between full waiver and partial waiver beneficiaries around the two-hectare cut-off with land as the running variable.

It is important to note that in all tables in this paper reporting results of RD tests, the coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are under the cutoff (the LHS of the discontinuity threshold over the LHS). Also, in our discussion of the results in any table, we focus exclusively on the results for the independent variable of interest,D_i, which represents the treatment status of borrower i, and none of the other covariates in the underlying regression model.

We report the results for the after-rotation sub-periods in Table 4 below. The dependent variable is a dummy which takes the value 1 if the borrower under consideration does not have a loan in the test period, and 0 otherwise. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each

set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications.

Table 4 here

The results in columns 1 - 3 of table 4 indicate that full waiver beneficiaries with a land holding of just below two hectares are 4% - 11% less likely to get a new loan than comparable partial waiver beneficiaries with a land holding of just above two hectares under a new loan officer when the sample period is two years following the waiver program. The corresponding results in columns 4 - 6 when the sample period is three years, and in columns 7 - 9 when the sample period is four years, are very similar, 4% - 12% for both sample periods. The results are statistically significant in all tests. The results uniformly indicate that in the period following the waiver program full waiver beneficiaries of the program fare significantly worse in loan outcomes under a new loan officer than comparable partial waiver beneficiaries with similar landholdings and similar credit history.

Table 5 below report results for tests that investigate the comparative loan outcomes for the two groups of borrowers before the rotation of the loan officer concerned. In all other respects the tests are identical to those in table 4 above. The test results appear to be mixed. The results are favorable for the full waiver beneficiaries by 6% in the three sample periods when the underlying polynomial test model is of order 3. However, the statistical significance of the results is weak (10%). In the other six tests the difference between the two groups is insignificant.

Table 5 here

In table 6 below we report results for the full sample periods, without bifurcating them into sub-periods based on the rotation of the loan officers. In all nine tests the difference between the two groups is insignificant.

Table 6 here

In an appendix at the end of this paper we report the results of similar tests using the RD designs proposed by Calonico, Cattaneo, and Titiunik (2014) and a two-year sample period The results indicate that full waiver beneficiaries fare worse than comparable partial waiver beneficiaries by 6.7% over the entire sample period as well as in the time period after the rotation of the loan officer. However, the two groups perform evenly in the time period before the rotation. Hence, the observed negative outcome for the full waiver beneficiaries over the full sample period is driven entirely by their poorer outcomes in the post-rotation period. The RD plots from the tests are presented in Figure 2 below.

VI.B Demand or supply effects?

Taken together, the results in tables 4 - 6 above indicate that fewer full waiver beneficiaries receive fresh credit in the post-program period than comparable partial waiver beneficiaries with similar economic characteristics under a new loan officer, but not if the loan officer from the time of the waiver continues. In fact, the loan outcomes are mildly favorable for the full waiver beneficiaries under the continuing loan officer. Their unfavorable treatment is also not observed in full sample periods. However, we must note that evidence relating to loan outcomes is by itself not sufficient to infer adverse selection of full waiver beneficiaries by bank loan officers. Loan outcomes are observed in equilibrium. Are the outcomes in table 4 above driven by a fall in demand for fresh credit among full waiver beneficiaries, with all their past debt obligations liquidated? As we have argued before, since agricultural loans in India are available up to a point at a steep discount even to the risk free rate, creating a strong incentive to borrow even when there is no production-related need for new loan and substitute far more expensive non-bank debt with cheaper subsidized bank credit (Banerjee and Duflo (2014)). This argument casts doubt on demand-based explanations. Further, though it has been observed that existing clients of a bank tend to curtail their loan demand under a new loan officer (Drexler and Schoar (2014)), the fall in demand in such cases should not be systematically different between the two groups of borrowers in very comparable economic circumstances. Finally, even if we accept that the demand for new credit may well be different for the two groups in the post-program period, that difference is unlikely to be correlated with the continuation or transfer of bank loan officers enforced by an exogenously mandated job rotation policy.

There still remains the possibility that full waiver beneficiaries, with their collateral freed up and their "land-passbook" retrieved, have an opportunity to seek new credit from another bank in the post-waiver period. This opportunity is not available to partial waiver beneficiaries who have 75% of their bank debt still outstanding. However, this possibility is actually remote. The borrowers will face a new loan officer at the new bank too. It has been frequently documented that non-pecuniary transactions costs. including especially physical distance from a bank branch, hinder bank usage in rural economies (see, for example, Karlan et al, 2014). The borrowers in our sample are very likely to have chosen their current bank based on its proximity compared to others. However, to address any residual concern that the observed results in table 4 may reflect decline in demand from full waiver beneficiaries who move to other banks, we investigate the issue empirically. Lacking direct data, our test is indirect. Our evidence, presented in table 7 below, indicates that the decline in credit supply for full waiver beneficiaries is actually somewhat deeper than it appears in table 4.

Table 7 here

In this group of tests we exclude the only branch in our sample in an urban area which also accounts for more observations than the other branches in our sample. The number of observations declines by about 325 from the original sample to 2461 - 2475 depending on the specification. The reduced sample includes observations from branches in more rural areas with low banking penetration. Migration opportunities to other banks for the remaining borrowers in the reduced sample should be scarce and, hence, observed credit decline for this sample should reflect true supply effects more reliably. We conduct the same tests as in table 4 before with the reduced sample. Our evidence indicates that the decline in credit probability for full waiver beneficiaries for this reduced sample is actually deeper, 5% - 13%, using the same test specifications and sample periods in the original tests. The finding suggests that the observed decline of 4% - 12% in our full sample understates the true supply effect. Note that the coefficient for D_i, our main variable of interest, is negative and significant in each test in the table, similar to the results reported in table 4 before. however, note that the observed results for D_i in each test in this table is stronger than the results for the corresponding test in table 4.

VI.C Credit rationing?

We now conclude that our test results in tables 4 - 7 above indicate that full waiver beneficiaries of the debt relief program face adverse selection and rationing in new credit decisions in the post waiver period compared to partial waiver beneficiaries in similar economic conditions. Further, this finding is driven by the unfavorable treatment of the former group by a new loan officer following the rotation of the incumbent officer at the time of the waiver who either does not appear to discriminate between the two groups or mildly favors the first group. We now investigate the possible reasons for the findings. We start with the first finding.

We start by noting that relative size of the two groups is not a plausible reason for the unfavorable treatment of full waiver beneficiaries of the program compared to partial waiver beneficiaries. By design, our sample includes only those farmers who have landholdings very close to 2 hectares, though technically full waiver farmers are below the two-hectare boundary and partial waiver farmers are above it.

However, the two groups are very dissimilar in the post-waiver period in one important qualifying criterion for new bank credit. The first group has no bank debt in their balance sheets, while the second group still has 75% of their overdue bank debt outstanding. Though this fact should actually favor the first group, we still investigate how the full waiver beneficiaries fare in terms of new loan generation in comparison to another group

of borrowers with similar creditworthiness. The group of borrowers who paid off their loans before the cut-off date for inclusion into the ADRDWS program (December 31, 2007), and therefore did not benefit from the waiver program, is one such group. In table 8 below, we present the results of our tests comparing the performance of the two groups.

Table 8 here

The results reported in table 8 are based on standard OLS regressions. In all columns, the dependent variable is a dummy that takes a value of 1 if there is no loan for the borrower under consideration in the post-program period and 0 otherwise, and loan size is a control variable. The control groups in columns 1 - 4 of table 8 include borrowers in our sample who repaid their bank loans between January and December 2007, and accordingly missed the waiver. We consider a one-year loan repayment window in view of the typical maturity period of one year for agricultural loans in our sample. In columns 2 and 4, the control groups includes only those borrowers who are non-defaulters at the end of 2007 but had defaulted on their previous loans. Therefore their credit history is closer to the beneficiaries of the ADWDRS program. In columns 1 and 3 the treated groups include all waiver beneficiaries, while in columns 2 and 4 they include only full waiver beneficiaries. In terms of probability of obtaining a new loan, the treated group of all waiver beneficiaries in column 3 appears to fare worse than the corresponding control group by 17%, while in column 4 the treated group of full waiver beneficiaries does so by 15%. Both coefficients are significant at 1% level, and there is no statistical difference between the two coefficients. The results indicate that defaulters on the last loan before the waiver program fare worse than non-defaulters, including those those who had defaulted in the past, in terms of obtaining a new loan in the post-waiver period though both groups are currently debt-free.

But we must consider the possibility that that a massive nation-wide government-funded farm debt relief scheme like the ADWDRS program not only makes sweeping changes in the current balance sheets of the affected parties but also changes expectations of all parties in the rural debt market about the direction of government policies in the debt market going forward. As we have noted before, the program classified the farmers with landholdings below 2 hectares as small and marginal farmers and those above the cut-off as other farmers. The levels of relief for the two groups were very different under the ADRDWS program. The bank loan officer may well reason that the next debt relief program of the government will again be more favorable to the small and marginal farmers, and the borrowers in this group, influenced by similar beliefs, will experience moral hazard and default on new loans in anticipation of debt relief going forward. This line of reasoning would acquire some urgency from the fact that the ADWRDS program was implemented in a normal state of the rural economy, creating expectations in creditors

and borrowers alike that the next round of government debt relief could happen any time and motivating the loan officer to preemptively engage in ex ante selection of borrowers in this group to minimize the probability of extensive moral hazard-induced defaults on new loans. We test this hypothesis indirectly, and find supporting evidence.

For the purpose of this test too, we consider three sample periods before the ADWDRS program: (1) February 2005 - February 2006, (2) February 2006 - February 2007, and (3) February 2007 - February 2008. We verify that the sample periods do not include any debt relief program. Otherwise, the design of the tests is identical to those in table 4 before. The dependent variable is a dummy that takes the value 1 if the borrower under consideration has a loan in the sample period after the loan officer is transferred from the branch under the government-mandated job rotation policy, and 0 otherwise. The test results are reported in table 9 below.

Table 9 here

As before, the coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the borrowers above the two hectare cutoff over the borrowers under the cutoff (the RHS of the discontinuity threshold over the LHS in the RD design). The estimates are insignificant in all 9 tests. The results indicate that, in the absence of a waiver program, the new loan officer does not differentiate between borrowers around the two hectare cutoff. The results support our hypothesis that the very different benefits under the ADRDWS program for the defaulters under the two hectare cutoff and the defaulters above it leads to unfavorable new loan outcomes for the first group compared to the second in the post-program period that we have observed before. Even when they have very similar economic characteristics, government policy makes the borrowers in the two groups different credit prospects.

The test results reported in table 9 indicate that the preferential treatment of the full waiver beneficiaries under the ADRDWS program paradoxically results in their unfavorable treatment in new loan decisions in the subsequent period. Our test results in the next section of this paper validate the loan officer's apprehension that full waiver beneficiaries of the program are more likely to default on their new loans than partial waiver beneficiaries.

What explains our second major finding that a new loan officer in the post-waiver period makes credit supply decisions that are very different from the decisions of a continuing officer? The latter is likely to depend on hard information such as landholdings and credit records as well as client-specific soft information acquired over time (Petersen (2004)) for loan decisions. Further, a continuing loan officer is also likely to have had time to develop access to informal networks (Fisman, Paravisini, and Vig (2012), especially

in rural economies, which may help the loan officer enforce loan contracts even in the presence of increased moral hazard. There may also be relationship banking between the continuing officer and some of her existing clients. The new loan officer, on the other hand, typically does not have her own soft information and, consequently, would depend only on hard information and her own anticipation of loan repayment behavior of her clients which, as we have discussed above, may be unfavorable to the prospective borrowers among the small and marginal farmers. Even if she has access to the soft information of her predecessor, she may well be inclined not to use it in view of its role in recent bad loan decisions, and feel more confident with using only the objective and verifiable hard information available to her. In reality, she may also not have access to the soft information. Though the turnovers in our sample are mandatory and known well in advance, in our experience banks often do not provide for sufficient time or make other arrangements for loan officer turnovers in rural branches to take place smoothly. Occasionally, a rural bank branch is left without a loan officer for a few days during the transition process.

VI.D Results: intensive margin

Our results so far focus on the the extensive margin, the probability of a proportion of the borrowers in our sample not getting a loan. We now examine the intensive margin impact of the loan waiver scheme. Note that the issue of the loan amount is conditional on a loan being granted in the first place, and hence represents a supplementary constraint in terms of access to credit. As in the case of extensive margin results, we use loan officer rotations in order to disentangle demand and supply effects, and limit our sample to mandatory rotations following completion of full tenures. Here, again we have no reason to believe that the difference in the loan amount demanded by borrowers just below and above the two hectare threshold is correlated with time-dependent mandatory loan officer rotations.

The dependent variable in the intensive margin tests is a dummy variable that takes the value 1 if the loan amount (in INR)for the average borrower i in the treated group is higher than that for the average borrower in the control group, and 0 otherwise. Since the borrowers in both groups have landholding close to 2 hectares, and also have similar credit history, they should all qualify for the same loan size. Given the wide variability in loan amount data, we winzorize the data at 5%. We use logged loan values in the tests. In all other respects, the design of our tests is identical to those in table 4 before. The RD coefficients reported in table 10 below in all columns are insignificant except for column 4 where the size of the coefficient is very close to 0. Our evidence indicates that there is no differential intensive margin impact of the loan waiver program between the borrowers just below the two-hectare cutoff and just above it.

Table 10 here

Taken together, our test results in this section indicate that, though a higher proportion of borrowers just under the two-hectare cutoff fail to obtain a new loan in the post-waiver period than the borrowers just above the cutoff, the loan amount, conditional on a loan being granted, is not significantly different between the two groups. The results make sense. The size of an agricultural loan in rural India is closely tied to the size of the landholding of the borrower, which is two hectares by design for all borrowers in our sample. In other words, banks can ration agricultural loans in the extensive margin, but not in the intensive margin.

VII Evidence on Ex-post Adverse Incentive Effects for Borrowers

In this section we examine the overall impact of the debt waiver program on loan repayment behavior of the borrowers in our sample in the post waiver period conditional on a loan being granted. If the waiver program lifts the borrowers out of their poverty traps (Banerjee and Newman 1993, Banerjee 2000, Mookherjee and Ray 2003) and allows them to access new loans for productive investments using some of their freed-up collateral, the default rate in the post-waiver period should be lower for the full-waiver group than the partial-waiver group at the margin. On the other hand, if the benefits are offset by adverse incentives arising from expectations of future loan waivers, then we will not observe any difference in the loan repayment behavior between the two groups.

In the tests in this part the dependent variable is a dummy variable that takes the value 1 if the loan of borrower i in the post-program period defaults (not repaid in the typical maturity period of 365 days for a farm loan) and 0 otherwise. In all other respects, the empirical design of our tests remains the same same as before. The test results are reported in table 11 below.

Table 11 here

The results are consistently negative in all columns but significant (at 5% level) in two cases where the probability of loan default appears to be 6% higher for the average full waiver beneficiary than for the corresponding partial waiver beneficiary of the program. The results suggest moral hazard on the part the first group, validating the concerns of the new loan officers discussed in the previous section of this paper.

VIII Concluding remarks

In this paper we have investigated the effects of a large-scale debt relief program on the credit decisions by the lenders and on the debt repayment behavior of borrowers following the program. The mandatory time-dependent loan officer rotation policy followed by the bank who provided the data used in our tests and the arbitrary nature of the cut-off-in terms of landholding for eligibility into the program facilitates identification. The scope of our investigations has been comprehensive and has included all classes of program beneficiaries, including those who receive full debt relief and those who receive partial debt relief. Our empirical tests show that an unconditional debt relief program has strong ex ante and ex post implications for the credit market. It results in large scale credit rationing. Credit rationing manifests itself in the extensive margin in the form of lower probability of new loan availability. Moreover, debt relief does not lead to any improvement in the loan repayment behaviour. Expectations of similar debt relief in future generates moral hazard and strategic loan default. Rationally anticipating adverse behavior, the lending institutions ration credit in the case of waiver beneficiaries, generating ex ante inefficiency as well. In sum, our work provides empirical evidence on both hidden information (ex ante selection based on unobserved but anticipated effort) and hidden action (ex post incentive effects) implications of a large government-initiated debt relief program. In the case of an unconditional debt waiver program, both types of evidence are negative.

For our empirical investigations we have used loan accounts data for a large sample of rural borrowers before and after a massive nation-wide debt relief program undertaken by the Indian government in 2008. The ADWDRS program remains one of the largest such programs in history, ultimately covering 36 million farmers and costing about 1.3% of the Indian GDP at the time. However, apart from its direct monetary costs and adverse efficiency implications, the program involved other substantial costs for the economy. It represented a massive transfer to the agricultural sector at the expense of other activities and services of the government when the government ran a sizable budget deficit even before the program. It is beyond the scope of the present paper to attempt to estimate the cost implications for the other sectors in a general equilibrium framework. However, those costs too must have been substantial. We do not find records suggesting that those other costs, and their implications, were extensively discussed in policy circles. The policy makers who undertake a massive policy initiative of this kind should recognize, and worry about, both direct and indirect costs of the initiative.

Our findings in this paper have other serious implications for policy making. The findings not only demonstrate that debt relief not conditional on adverse economic shocks may generate unintended and negative consequences for credit markets, but also that,

ironically, the burden of the negative effects falls harder on the small and marginal borrowers such programs are intended to help by cutting off their access to future credit. The consequences are also likely to undercut other government initiatives to advance financial inclusion of the poor. Such initiatives are quite common in emerging economies. With government debt relief programs increasing around the world, especially in emerging economies, the implications of our findings have special relevance for policy-making on debt relief and related issues.

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Figure 1: Regression discontinuity (RD) for depicting the impact of the waiver on access to credit-Extensive Margin

The figure depicts the discontinuity in the probability of not having a loan at the two hectares cut-off following a waiver. Here we consider a time period after a branch experiences its first job rotation in the post waiver period. We use the technique developed by (Calonico, Cattaneo, and Titiunik (2014)) for drawing RD plots. The horizontal axis denotes the running variable—land—. The vertical axis represents a dummy that takes the value of 1 if the borrower concerned does not have a loan in the period after job rotation after waiver.

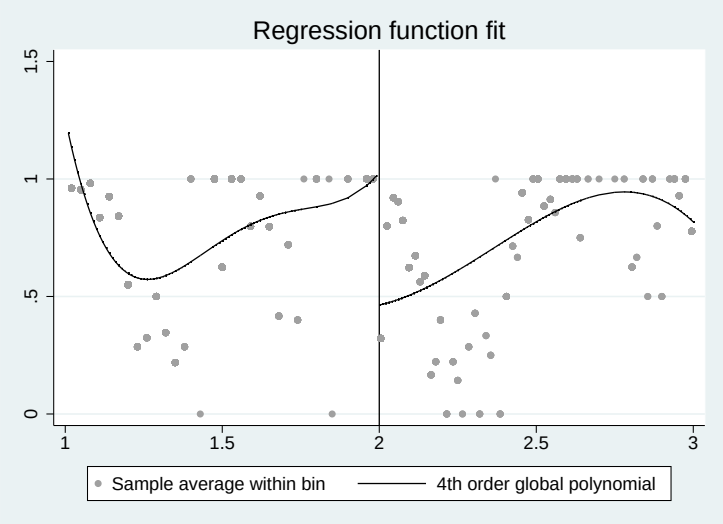

Figure 2: McCrary test for discontinuity at cutoff point

The figure below depicts the McCrary test results for the borrowers in our sample. We use the default values of bandwidth and bin size for our estimation. Land is the running variable here with a cut-off of 2 hectares. We report the coefficient and standard error estimates below. However, owing to the non-parametric nature of the test, we do not report a t-statistic.

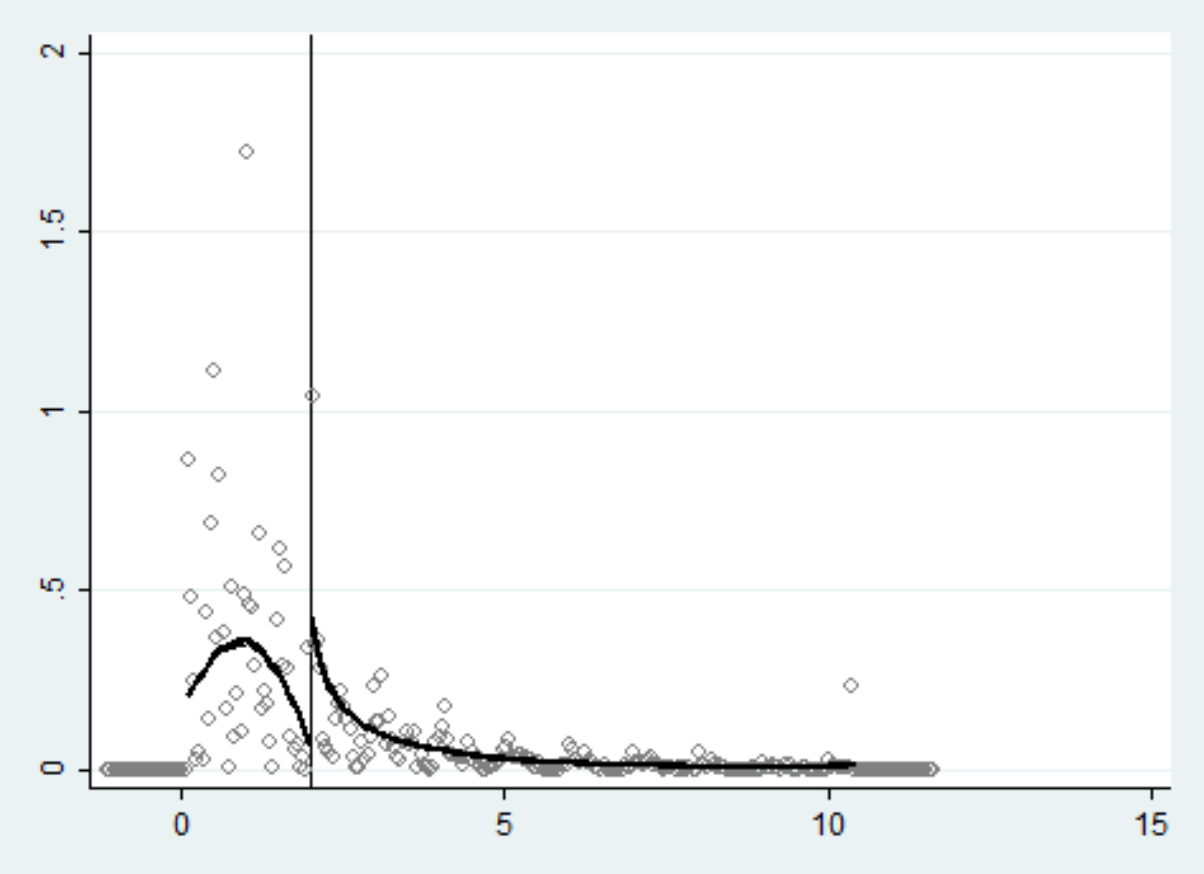

Figure 2: Discontinuity estimate at 2 hectares

Summary Statistics	
Log diff in height at 2 hectares	1.57
Std. Error	0.07
Default Bandwidth	1.04
Default Bin Size	0.02

Table 1: Variable Definition

A description of important variables used in regression models is provided in the table below.

Variable	Description
Waiver_Dummy	Takes the value of 1 if a farmer defaults on last loan prior to Feb, 29th 2008 and 0 otherwise
Fullwaiver_Dummy	Takes the value of 1 if a farmer with a landholding of not more than 2 hectares qualifies for the waiver and 0 otherwise
Partialwaiver_Dummy	Takes the value of 1 if a farmer with a landholding of more than 2 hectares qualifies for the waiver and 0 otherwise
Default_Dummy	Takes the value of 1 for loans outstanding (not overdue) beyond 365 days.
Loan	Loan amount in Indian Rupees
District	Equivalent of a County in the United States
Loan Officer	A branch manager who has ultimate loan sanctioning authority
Rationed_Dummy	Takes the value of 1 if a borrower does not have a loan in the post waiver period and 0 otherwise

Table 2: Summary Statistics: Loan Accounts

The table reports key summary statistics for the loan accounts of the borrowers in our sample. In the first row, we report numbers pertaining to all borrowers with loan account information in our database. In the second row, we restrict the sample to borrowers with both loan and landholding information. The third and fourth rows report the information separately for borrowers who received 100% waiver and those that received only 25%. In the first column, we report the number of farmers in the sample. In the second column, we report the number of loans availed by such farmers. In columns 3 and 4, we separate the loans into pre-waiver and post-waiver loans. The data used is loan account level information obtained from a public sector bank. The data covers the period from 2005-2006 to 2011-2012.

Particulars	No.of borrowers	No. of loans	Pre Waiver	Post-waiver
Accounts with loan information	9759	26,241	10,215	16,026
Accounts with information on loan as well as land	6601	17,893	7,321	10,572
Accounts with less than or equal to 2 hectares of land	4,508	12,404	4,963	7,411
Accounts with more than 2 hectares of land	2,093	5,489	2,358	3,131

Table 3: Summary Statistics

The table reports key summary statistics of the loan accounts. We report details pertaining to land pledged, Loan Amount and Outstanding Loan Amount. We classify the data into pre and post waiver. Further, we sub-classify the data into that of full waiver and partial waiver beneficiaries. We report mean, median and standard deviation for all variables. The data is from loan account level information obtained from a public sector bank. The data covers the period from 2005-2006 to 2010-2011.

Average loan characteristics before and after waiver			
	Mean	Median	Standard Deviation
Land Pledged Data for the entire sample	1.32	2.29	17.99
Land Pledged Data for Full Waiver Beneficiaries	1.01	1.00	0.53
Land Pledged Data for Partial Waiver Beneficiaries	5.19	3.11	32.29
Loan Amount in the pre waiver period -full sample	32,854.76	23,644.00	44,840.94
Loan amount in the post waiver period -full sample	40,064.51	30,000.00	42,882.00
Loan Amount in the pre waiver period for full waiver beneficiaries	24,001.71	16,822.00	29,947.37
Loan Amount in the post waiver period for full waiver beneficiaries	31,074.19	25000.00	31120.00
Loan Amount in the pre waiver period for partial waiver beneficiaries	51,532.87	41822.00	62036.29
Loan Amount in the post waiver period for partial beneficiaries	61,424.36	51,250.00	53,690.76

Table 4: Probability of Obtaining a Loan After Waiver Program And After Rotation of Loan Officer

This table reports the regression discontinuity (RD) results for the impact of the ADWDRS program on the probability of no loan for the pre-program borrowers in our sample in the post-program period following the rotation of the loan officer. We consider three overlapping post-program periods: ending in February 2010, February 2011, and February 2012. The data is organized at the borrower level. We use the regression discontinuity methodology, and use non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares (as specified by the ADWDRS program) as the sharp cut-off. In each specification, the dependent variable takes the value 1 if a pre-program borrower i does not have a loan during the period under consideration and zero otherwise. The independent variable of interest, Di, is the treatment status of the borrower under the program. The coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample ends on 28th Feb 2010			Sample ends on 28th Feb 2011			Sample ends on 28th Feb 2012		
Dependent Variable	Dummy for no loan								
Di	-0.039*	-0.083***	-0.114***	-0.039*	-0.082***	-0.116***	-0.042*	-0.083***	-0.115***
	[-2.068]	[-3.725]	[-4.583]	[-2.036]	[-3.588]	[-4.259]	[-2.060]	[-3.578]	[-4.107]
Land	-0.004	0.139	0.183	-0.004	0.145	0.171	-0.003	0.143	0.161
	[-0.179]	[1.814]	[0.957]	[-0.180]	[1.874]	[0.886]	[-0.114]	[1.853]	[0.824]
Land-Square		0.145*	0.274		0.151**	0.227		0.147**	0.201
		[2.354]	[0.546]		[2.442]	[0.449]		[2.371]	[0.394]
Land-Cube			0.091			0.054			0.038
			[0.265]			[0.155]			[0.109]
Land X Di	0.135**	0.181*	0.591*	0.127**	0.143	0.633*	0.127**	0.138	0.602
	[2.640]	[2.005]	[2.251]	[2.389]	[1.773]	[2.025]	[2.397]	[1.731]	[1.760]
Land -SquareX Di		-0.353***	-1.694		-0.334**	-1.785		-0.320**	-1.659
		[-4.311]	[-1.416]		[-3.300]	[-1.496]		[-3.045]	[-1.298]
Land -CubeX Di			0.724			0.871			0.826
			[1.212]			[1.325]			[1.182]
Previous Loan Size	-0.024***	-0.024***	-0.025***	-0.023**	-0.024**	-0.024**	-0.024***	-0.024***	-0.024***
	[-3.677]	[-3.711]	[-3.667]	[-3.354]	[-3.383]	[-3.364]	[-3.526]	[-3.560]	[-3.539]
Branch X Month Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order For Polynomial	1	2	3	1	2	3	1	2	3
Observations	2,784	2,784	2,784	2,797	2,797	2,797	2,800	2,800	2,800
R-squared	0.319	0.319	0.320	0.315	0.316	0.316	0.314	0.315	0.315

Table 5: Probability of Obtaining a Loan After Waiver Program But Before Rotation of Loan Officer

This table reports the regression discontinuity (RD) results for the impact of the ADWDRS program on the probability of having no loan for the pre-program borrowers in our sample in the post-program period before the rotation of the loan officer. We consider three overlapping post-program periods: ending in February 2010, February 2011, and February 2012. The data is organized at the borrower level. We use regression discontinuity methodology and use non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares (as specified by the ADWDRS program) as the sharp cut-off. In each specification, the dependent variable takes the value 1 if a pre-program borrower i does not have a loan during the period under consideration and zero otherwise. The independent variable of interest, Di, is the treatment status of the borrower under the program. The coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample ends on 28th Feb 2010			Sample ends on 28th Feb 2011			Sample ends on 28th Feb 2012		
Dependent Variable	Dummy for no loan								
Di	-0.022	-0.010	0.056*	-0.022	-0.008	0.057*	-0.019	-0.006	0.055*
	[-1.389]	[-0.816]	[2.168]	[-1.366]	[-0.626]	[2.269]	[-1.310]	[-0.553]	[2.355]
Land	0.006	-0.048	-0.271	0.005	-0.047	-0.262	0.003	-0.045	-0.251
	[0.590]	[-1.788]	[-1.797]	[0.494]	[-1.821]	[-1.816]	[0.282]	[-1.734]	[-1.803]
Land-Square		-0.054**	-0.701		-0.053**	-0.675		-0.049**	-0.644
		[-2.919]	[-1.647]		[-2.866]	[-1.667]		[-2.627]	[-1.645]
Land-Cube			-0.454			-0.437			-0.419
			[-1.540]			[-1.561]			[-1.540]
Land X Di	0.021	0.041	-0.651	0.021	0.021	-0.652	0.021	0.026	-0.616
	[0.933]	[0.972]	[-1.339]	[1.149]	[0.496]	[-1.399]	[1.129]	[0.638]	[-1.441]
Land -SquareX Di		0.091	3.178		0.111	3.101		0.097	2.952*
		[1.376]	[1.850]		[1.851]	[1.867]		[1.715]	[1.914]
Land -CubeX Di			-1.185			-1.153			-1.099
			[-1.619]			[-1.658]			[-1.732]
Previous Loan Size	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.017
	[1.240]	[1.249]	[1.272]	[1.298]	[1.309]	[1.328]	[1.310]	[1.319]	[1.335]
Branch X Month Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order For Polynomial	1	2	3	1	2	3	1	2	3
Observations	2,784	2,784	2,784	2,797	2,797	2,797	2,800	2,800	2,800
R-squared	0.516	0.516	0.517	0.515	0.515	0.516	0.513	0.513	0.514

Table 6: Probability of Obtaining a Loan After Waiver Program

This table reports the regression discontinuity (RD) results for the impact of the ADWDRS program on the probability of having no loan for the pre-program borrowers in our sample in the post-program period. We consider three overlapping post-program periods: ending in February 2010, February 2011, and February 2012. The data is organized at the borrower level. We use the regression discontinuity methodology and use non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares (as specified by the ADWDRS program) as the sharp cut-off. In each specification, the dependent variable takes the value 1 if a pre-program borrower i does not have a loan during the period under consideration and zero otherwise. The independent variable of interest, Di, is the treatment status of the borrower under the program. The coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample ends on 28th Feb 2010			Sample ends on 28th Feb 2011			Sample ends on 28th Feb 2012		
Dependent Variable	Dummy for no loan								
Di	-0.014	-0.026	0.003	-0.015	-0.024	0.002	-0.016	-0.025	0.003
	[-1.241]	[-1.704]	[0.048]	[-1.234]	[-1.501]	[0.034]	[-1.262]	[-1.541]	[0.042]
Land	0.014	0.009	-0.167	0.014	0.010	-0.171	0.014	0.009	-0.174
	[0.772]	[0.104]	[-0.477]	[0.740]	[0.119]	[-0.489]	[0.771]	[0.113]	[-0.496]
Land-Square		-0.006	-0.515		-0.004	-0.526		-0.005	-0.535
		[-0.091]	[-0.585]		[-0.064]	[-0.603]		[-0.078]	[-0.610]
Land-Cube			-0.358			-0.367			-0.372
			[-0.620]			[-0.641]			[-0.648]
Land X Di	0.007	0.117	-0.076	0.003	0.090	-0.053	0.004	0.088	-0.065
	[0.167]	[1.863]	[-0.129]	[0.072]	[1.294]	[-0.087]	[0.078]	[1.261]	[-0.106]
Land -SquareX Di		-0.108	1.387		-0.087	1.298		-0.083	1.345
		[-0.603]	[0.503]		[-0.454]	[0.473]		[-0.427]	[0.484]
Land -CubeX Di			-0.304			-0.212			-0.230
			[-0.322]			[-0.224]			[-0.238]
Previous Loan Size	-0.009	-0.009	-0.009	-0.008	-0.008	-0.008	-0.008	-0.009	-0.008
	[-0.535]	[-0.555]	[-0.540]	[-0.463]	[-0.477]	[-0.463]	[-0.475]	[-0.489]	[-0.474]
Branch X Month Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order For Polynomial	1	2	3	1	2	3	1	2	3
Observations	2,784	2,784	2,784	2,797	2,797	2,797	2,800	2,800	2,800
R-squared	0.112	0.112	0.112	0.111	0.111	0.112	0.111	0.111	0.112

Table 7: Probability of Obtaining a Loan After Waiver Program for Borrowers in Branches Located In Low Banking Penetration Areas

This table reports the regression discontinuity (RD) results for the impact of the ADWDRS program on the probability of having no loan for the pre-program borrowers in areas with low banking penetration in our sample in the post-program period following the rotation of the loan officer. We consider three overlapping post-program periods: ending in February 2010, February 2011, and February 2012. The data is organized at the borrower level. We use the regression discontinuity methodology and use non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares (as specified by the ADWDRS program) as the sharp cut-off. In each specification, the dependent variable takes the value 1 if a pre-program borrower i does not have a loan during the period under consideration and zero otherwise. The independent variable of interest, Di, is the treatment status of the borrower under the program. The coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample Ending 28th Feb, 2010			Sample Ending 28th Feb, 2011			Sample Ending 28th Feb, 2011		
VARIABLES	Dummy For No Loan								
Di	-0.048**	-0.097***	-0.124***	-0.049**	-0.095***	-0.125***	-0.052**	-0.097***	-0.123**
	[-2.515]	[-4.996]	[-4.244]	[-2.507]	[-4.721]	[-3.806]	[-2.548]	[-4.773]	[-3.581]
Land	-0.002	0.166	0.245	-0.002	0.172*	0.232	-0.000	0.170	0.225
	[-0.068]	[1.899]	[1.437]	[-0.073]	[1.958]	[1.333]	[-0.006]	[1.940]	[1.296]
Land Squarred		0.167*	0.397		0.174*	0.347		0.171*	0.331
		[2.359]	[0.833]		[2.447]	[0.709]		[2.381]	[0.679]
Land Cubed			0.162			0.122			0.113
			[0.479]			[0.351]			[0.327]
Di X Land	0.135*	0.153	0.469	0.127*	0.113	0.512	0.128*	0.108	0.459
	[2.315]	[1.511]	[1.098]	[2.098]	[1.300]	[1.044]	[2.111]	[1.264]	[0.869]
Di X Land Squarred		-0.371***	-1.642		-0.350**	-1.732		-0.336**	-1.567
		[-3.810]	[-1.103]		[-2.940]	[-1.150]		[-2.726]	[-0.970]
Di X Land Cubed			0.530			0.682			0.599
			[0.580]			[0.683]			[0.568]
Previous Loan Size	-0.027***	-0.027***	-0.027***	-0.026***	-0.026***	-0.027***	-0.027***	-0.027***	-0.027***
	[-5.445]	[-5.464]	[-5.258]	[-4.840]	[-4.863]	[-4.740]	[-5.209]	[-5.242]	[-5.098]
Observations	2,461	2,461	2,461	2,472	2,472	2,472	2,475	2,475	2,475
R-squared	0.260	0.261	0.261	0.256	0.257	0.257	0.255	0.256	0.256

Table 8: Probability of Obtaining a Loan For Borrowers Who Repay In The Normal Course

This table reports the results of OLS regressions. Here we compare waiver program beneficiaries with non-beneficiaries who repaid their loans during the normal course before the waiver program in terms of their chances of having a loan in the post-program . The control group, in all four columns, consists of borrowers who missed the waiver and repaid their loans between January and December 2007. In columns 3 and 4, we limit the control group to borrowers who repaid their last loans before the waiver but had defaulted on previous loans. The dependent variable is a dummy variable that takes the value of 1 if the borrowers do not have a loan in the post waiver period and zero otherwise. We use the loan amount, branch fixed effects and year fixed effects as controls. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)
Dependent Variable	Dummy For No Loan			
Waiver Beneficiaries	0.213***	0.174***	0.180***	0.150***
	[4.852]	[44.479]	[4.379]	[26.644]
Loan Size	-0.000	-0.000	-0.000	-0.000
	[-0.216]	[-1.172]	[-0.154]	[-1.131]
Constant	0.394***	0.434***	0.426***	0.455***
	[8.625]	[38.287]	[9.962]	[36.190]
Branch Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	10,024	4,937	9,882	4,797
R-squared	0.137	0.105	0.138	0.106

Table 9: Placebo Tests: Probability of Obtaining a Loan Before waiver Program But After Rotation

This table reports the regression discontinuity (RD) results for the probability of having no loan for the borrowers in our sample in the post-program period following the rotation of the loan officer. We consider three overlapping pre-program periods: ending in February 2006, February 2007, and February 2008. The data is organized at the borrower level. We use the regression discontinuity design and employ non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares (as specified by the ADWDRS program) as the sharp cut-off. In each specification, the dependent variable takes the value 1 if a borrower i does not have a loan during the period under consideration and zero otherwise. The independent variable of interest, Di, takes the value 1 if the running variable exceeds two hectares and 0 otherwise. The coefficients corresponding to a specific RD design reported in the table represent the differential between those borrowers in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the first sample period ending in February 2006. Similarly, columns 4 - 6 and 7 - 9, report results for the second and third sample periods respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample ends in February 2006			Sample ends in Februry 2007			Sample ends in February 2008		
Dependent Variable	Dummy for no loan								
Di	-0.006	0.012	0.012	-0.003	0.015	0.016	-0.003	0.015	0.016
	[-0.269]	[0.490]	[0.324]	[-0.143]	[0.525]	[0.370]	[-0.134]	[0.531]	[0.365]
Land	-0.015	-0.047	0.078	-0.015	-0.047	0.073	-0.015	-0.047	0.073
	[-0.402]	[-1.403]	[0.274]	[-0.407]	[-1.410]	[0.251]	[-0.409]	[-1.406]	[0.253]
Land-Square		-0.032	0.328		-0.033	0.313		-0.032	0.315
		[-1.764]	[0.444]		[-1.761]	[0.418]		[-1.756]	[0.421]
Land-Cube			0.253			0.243			0.244
			[0.489]			[0.463]			[0.465]
Land X Di	0.026	-0.051	-0.236	0.024	-0.052	-0.242	0.024	-0.051	-0.238
	[0.861]	[-0.657]	[-1.464]	[0.882]	[-0.654]	[-1.695]	[0.876]	[-0.646]	[-1.715]
Land -SquareX Di		0.152	-0.048		0.153	-0.008		0.151	-0.021
		[1.300]	[-0.046]		[1.268]	[-0.007]		[1.257]	[-0.019]
Land -CubeX Di			-0.363			-0.369			-0.364
			[-0.867]			[-0.910]			[-0.910]
Previous Loan Size	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Branch X Month Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order For Polynomial	1	2	3	1	2	3	1	2	3
Observations	2,784	2,784	2,784	2,797	2,797	2,797	2,800	2,800	2,800
R-squared	0.754	0.755	0.755	0.754	0.754	0.754	0.754	0.754	0.754

Table 10: Intensive Margin: Loan Amount

This table reports the regression discontinuity (RD) results for the impact of the ADWDRS program on the loan amount for the pre-program borrowers in our sample in the post-program period following the rotation of the loan officer. We consider three overlapping post-program periods: ending in February 2010, February 2011, and February 2012. The data is organized at the loan level. We use the regression discontinuity methodology and employ non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares as the sharp cut-off, as specified by the ADWDRS program. In each specification, the dependent variable is the size of the loan under consideration. The independent variable of interest, *Di*, is the treatment status of the borrower under the program. The coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample ends on 28th Feb 2010			Sample ends on 28th Feb 2011			Sample ends on 28th Feb 2012		
Dependent Variable	Loan amount								
Di	0.012	-0.156	-0.295	-0.000***	-0.000	-0.000	0.020	-0.139	-0.299
	[0.224]	[-0.820]	[-1.217]	[-199.404]	[-1.653]	[-1.490]	[0.377]	[-0.722]	[-1.245]
Land	0.517***	0.351	0.398	0.000***	0.000	0.000*	0.520***	0.360	0.382
	[10.358]	[1.389]	[0.749]	[1,901.667]	[1.043]	[2.027]	[10.460]	[1.431]	[0.723]
Land-Square		-0.169	-0.027		0.000	0.000*		-0.162	-0.091
		[-0.799]	[-0.024]		[0.922]	[2.009]		[-0.774]	[-0.082]
Land-Cube			0.100			0.000*			0.050
			[0.145]			[1.965]			[0.074]
Land X Di	-0.241	1.460	3.533	-0.000***	-0.000	0.000	-0.274	1.334	3.767
	[-1.096]	[1.023]	[1.280]	[-515.252]	[-0.473]	[0.617]	[-1.230]	[0.918]	[1.385]
Land -SquareX Di		-1.528	-7.327		-0.000**	-0.000		-1.442	-8.054*
		[-1.279]	[-1.883]		[-2.487]	[-1.605]		[-1.182]	[-2.116]
Land -CubeX Di			3.708			0.000			4.352
			[1.172]			[0.695]			[1.395]
Previous Loan Size	-1.270***	-1.276***	-1.279***	0.000	0.000	0.000	-1.270***	-1.275***	-1.278***
Branch X Month Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order For Polynomial	1	2	3	1	2	3	1	2	3
Observations	2,784	2,784	2,784	2,797	2,797	2,797	2,800	2,800	2,800
R-squared	0.381	0.385	0.385	1.000	1.000	1.000	0.378	0.381	0.382

Table 11: Loan Performance After Waiver Program

This table reports the regression discontinuity (RD) results for the impact of the ADWDRS program on loan performance of the borrowers after the waiver program. Each unit of observation represents a loan borrowed in the post-program period. We consider three overlapping post-program periods: ending in February 2010, February 2011, and February 2012. We use the regression discontinuity methodology and employ non-linear polynomial regression models of order 1, 2, and 3 (see the Empirical Methodology section). In all nine specifications in the table, land is the running variable with 2 hectares (as specified by the ADWDRS program) as the sharp cut-off. In each specification, the dependent variable takes the value 1 if a loan defaults during the period under consideration and zero otherwise. The independent variable of interest, *Di*, is the treatment status of the borrower under the program. The coefficients corresponding to a specific RD design reported in the table represent the differential impact of the waiver program on the partial waiver beneficiaries in the control group who are just above the two hectare cutoff (the RHS of the discontinuity threshold in the RD design) over the full waiver beneficiaries in the treated group who are just under the cutoff (the LHS of the discontinuity threshold over the LHS). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. In columns 1 - 3 of the table, we present results for the two-year sample period. In columns 4 - 6 and 7 - 9, the sample periods are three years and 4 years respectively. The different columns within each set indicate different orders of the underlying polynomial test model. The number of observations used in the tests varies from 2784 to 2800 depending on the specifications. T-statistics are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sample ends on 28th Feb 2010			Sample ends on 28th Feb 2011			Sample ends on 28th Feb 2012		
Dependent Variable	Dummy for default								
Di	-0.019	-0.055**	-0.062	-0.016	-0.048	-0.046	-0.018	-0.057**	-0.061
	[-1.370]	[-2.468]	[-1.649]	[-1.036]	[-1.890]	[-1.410]	[-1.229]	[-2.543]	[-1.607]
Land	-0.008	-0.004	-0.001	-0.039	-0.023	-0.018	-0.007	-0.004	-0.007
	[-0.337]	[-0.042]	[-0.006]	[-1.403]	[-0.194]	[-0.091]	[-0.286]	[-0.037]	[-0.042]
Land-Square		0.003	0.014		0.016	0.029		0.003	-0.006
		[0.039]	[0.031]		[0.174]	[0.058]		[0.032]	[-0.013]
Land-Cube			0.007			0.009			-0.006
			[0.023]			[0.027]			[-0.019]
Land X Di	0.074***	0.354	0.445	0.088**	0.302*	0.266	0.072***	0.373	0.444
	[4.243]	[1.589]	[0.903]	[3.482]	[2.076]	[0.598]	[3.946]	[1.735]	[0.873]
Land -SquareX Di		-0.317*	-0.580		-0.271*	-0.199		-0.339*	-0.512
		[-1.912]	[-0.371]		[-2.283]	[-0.133]		[-2.111]	[-0.308]
Land -CubeX Di			0.163			-0.067			0.129
			[0.265]			[-0.100]			[0.201]
Previous Loan Size	0.078***	0.077***	0.077***	0.152***	0.151***	0.151***	0.078***	0.077***	0.077***
	[44.521]	[22.578]	[19.637]	[10.542]	[11.456]	[11.893]	[43.642]	[22.338]	[19.083]
Branch X Month Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order For Polynomial	1	2	3	1	2	3	1	2	3
Observations	2,784	2,784	2,784	2,797	2,797	2,797	2,800	2,800	2,800
R-squared	0.135	0.136	0.136	0.149	0.149	0.149	0.132	0.133	0.133

Table Appendix: Probability of Obtaining a Loan After Waiver

This table reports the regression discontinuity (RD) results for the impact of debt relief on chances of having a new loan in the post waiver period. The data is organized at the borrower level. The post waiver period considered extends up to December 31st, 2009. We use the robust regression discontinuity methodology suggested by Calonico, Cattaneo, and Titiunik (2014). The RD specification estimates the significance of $E[Y_i(1) - Y_i(0)|X_i = \bar{x}]$. We use procedure developed by Calonico, Cattaneo, and Titiunik (2014) to estimate robust and bias corrected standard errors. Our inferences are based on robust standard errors. In all six specifications, land is the running variable with 2 hectares (as specified by the ADWDRS in 2008) as the sharp cut-off. In columns 1 and 2, the dependent variable takes the value of 1 if a borrower under consideration does not have a loan during the entire post waiver period and zero otherwise. In columns 3 and 4 (5 and 6), the dependent variable takes the value of 1 if a borrower under consideration does not have a loan during the period after (before) the loan officer who was in charge during waiver announcement is transferred out of the branch because of job rotation and zero otherwise. In columns 1, 3 and 5, we use the dependent variable as is. In columns 2,4 and 6, the dependent variable, corresponds to the residuals obtained from the regressions where loan amount, loan officer's tenure, branch fixed effects and year fixed effects are independent variables. Standard errors are reported in parentheses. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	(1)	(2)	(3)
Dependent Variable	Dummy For Not Having a Loan		
Robust	**-0.067***	**-0.060*****	**-0.031**
	[-1.704]	**[-3.333]**	**[-0.814]**
Bias-corrected	-0.067**	-0.060***	-0.031
	[-2.538]	[-3.488]	[-1.538]
Conventional	-0.057*	-0.056***	-0.040**
	[-1.801]	[-3.221]	[-1.975]
Observations	3,653	1,999	5,812