

# Efficacy of Loan Waiver Programs

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## Abstract

Debt, formal or informal, plays an essential role in the lives of rural households. Past evidence shows high rates of non-repayment in the formal banking sector. Non-repayment of loans could be due to income shocks, beyond the control of the households, which justifies policy intervention to ease temporary resource constraints. However, default could also be a reflection of moral hazard - inability to pay due unproductive expenditures incurred by the households. In this paper we combine theoretical and empirical insights to understand the nature and extent of indebtedness of rural Indian households. Particularly, the theoretical framework focuses on the role played by penalty, associated with borrowing contracts, in determining consumption and investment incentives of households. Using secondary data we estimate the utilisation and subsequent repayment of loans taken from formal lending agencies vis-a-vis informal ones. Finally, we study in detail a policy intervention in Uttar Pradesh, India, where by outstanding loans of farmers were waived under the UP Rin Maafi Yojna. Using primary data collected from various treated and non-treated districts of UP, we estimate the efficacy and sustainability of the popular loan waiver programs in achieving their announced targets.

Keywords:    Loan Repayment, moral hazard, debt relief

JEL Codes:    O17,

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# 1 Introduction

Intervention in the credit market through household debt relief has been a fiscal policy adopted by many governments both at central and state level since many years. Economists like Keynes were very much in favour of government intervention through fiscal channels during exceptionally harsh economic circumstances. But not all are in favour of these interventions. On one hand economic argument in favour of stimulus programs operating through credit markets rests on the premise that in situations where households are unable to ensure themselves against macroeconomic shocks, such policies will prevent excessive dead weight losses from foreclosure. Bolton and Rosenthal (2002). They also help reduce high level of debt which distorts consumption and investment decisions of households Mian et al. (2012). On the other hand these economic stimulus programs may distort borrower incentives and give rise to moral hazard. Giné and Kanz (2014). They can create negative externalities and are likely to raise the cost of credit in the long run. Despite this being a controversial argument since many years loan waivers have been an important tool used by governments. The debate on loan waivers is not whether it should be given or not but to see whether loan waivers lead to sustainable development.

On July 14th 2014, the governments of both states of Telengana and Andhra Pradesh announced a 43000 crores loan waiver scheme. The scheme was opposed by the RBI and as well as several economists as the government took this decision in spite of being in severe financial crisis, having a budget deficit of 16000 crores and no funds for regular schemes. Frequent loan waivers, often announced with a political motivation have hastened the process of the erosion of the rural credit delivery system (Pandey, 2005).

## 1.1 History of Loan Waivers in India

Since independence India has been an agricultural economy with a majority of its citizens being farmers. Due to this reason a number of politicians have tried to favour farmers by promising schemes which would help them in order to gain their votes. Loan waiver schemes have been one such political tool used by a number of politicians of different states for decades for vote bank politics. In 1990, then prime minister, V P Singh announced an agricultural debt relief scheme totalling to 10,000 crores for agricultural borrowers. In the same year, a similar scheme was announced by Devi Lal, then Chief Minister of Haryana, waiving Rs. 227.5 crores of farm loans by banks and cooperatives out of which Rs 162 crores was due to commercial banks. Over the next decade in spite of RBI warning that defaults and problems in recovery of dues would effect the

credit system a number of state and central governments came up with debt relief schemes.

In 2008, the Indian government announced one of the largest debt waiver schemes in history. The Agricultural Debt Waiver and Debt Relief Scheme waived Rs 600 billion spread across 237 districts and reaching 30 million farmers (Kanz, 2012). A complete waiver was given to small and marginal farmers (holding land between 1 and 2.5 hectares). Other farmers with land holding above 2.5 hectares were given 25% waiver. The scheme was introduced to address the increasing suicides amongst the farmers by alleviating their miseries. Another goal of the program was to help public and private banks refinance themselves by cancelling their non performing assets which had accumulated due to directed lending to rural communities over the years (Giné and Kanz, 2014).

Over the next few years the program received widespread criticism from economists. However this did not stop governments at state level from announcing further waiver programs with Uttar Pradesh being the foremost player. With a history of repeated waivers given out to farmers it is very important to study debt relief schemes in India. It is necessary to understand the purpose and objectives behind these schemes and to find out whether these objectives were met. In addition it is important to analyse how household's make consumption and investment decisions in anticipation of such waivers.

## 1.2 Theoretical Model

Rural credit markets in under developed countries like India have primarily three ways of ensuring repayment of loans; screening, monitoring and enforcement. Formal and informal institutions differ in their screening, monitoring and enforcement capabilities. We explore how these characteristics shape repayment patterns of borrowers. In particular, it explores the role played by strong and weak enforcement by a lending agency on the repayment patterns of borrowers. Formal institutions have always faced problems with rural credit. Due to asymmetric information problem formal lenders discriminate against small borrowers because of the high cost involved in acquiring information (Wenner, 1995).

On the other hand, informal lenders usually live in the same village as the borrowers and are usually part of the same social network. The better flow of information within these networks make it possible to have a better screening mechanism that does not involve as high a cost as that of formal institutions. Formal institutions also find it difficult to monitor the households who have taken a loan to ascertain how they use the loan and what mechanisms do they adopt to implement the project. On the other hand, informal lenders due to

their social proximity and relationship with the borrowers have better access to monitor and influence how the borrower uses the loan (Wenner, 1995).

There are a number of studies which have looked at various mechanisms which could help solve the screening and monitoring problem for formal institutions (Stiglitz, 1990), (Gine and Karlan, 2008), (Rajan and Winton, 1995). Group credit for instance, solves the monitoring problem by inducing people who are part of the credit group to monitor their peers (Stiglitz, 1990). The problem of screening can be solved using joint liability as it induces endogenous peer selection in the formation of groups in a way that is beneficial for increasing repayment rates (Ghatak, 2000).

Finally we come to the third characteristic of rural credit which is credible contract enforcement. Many formal institutions find forgiving or refinancing a debt easier than strictly enforcing the contract and foreclosing on a defaulting borrower (Wenner, 1995). The formal institutions in India, especially the state owned regional banks are often faced with the problem of a weak legal system. In addition, pervasive views that the bank loans are political patronage make it difficult for the formal institutions to enforce their credit contracts especially for the rural masses which form majority of the vote bank in most states. On the other hand, informal moneylenders can rely on social ostracism, interlinked contracts and blatant coercion as effective methods of enforcement (Bakshi, 2008). In this section we focus on this third mechanism of contract enforcement and argue that weaker enforcement of contracts by formal institutions, make it easier for borrowers to get away with non-repayment of formal loans.

### 1.2.1 Model Setup

Let us consider a utility maximising household with a 2 period Utility function,  $U(C_1, C_2)$ . For simplicity we assume that the household does not have any initial monetary endowment and borrows a loan to finance consumption and investment. However, the household owns Land, which it is able to provide as collateral to borrow.

In Period 1 the household decides to divide the borrowed resources between consumption and investment. Suppose the household consumes  $x$  resources in period 1, and uses  $y$  resources for investment, such that

$$x + y = 1$$

we assume that the household will have a positive consumption in period 1 and thus under no circumstances can  $x = 0$ . Moreover success,  $p$ , is a function of the amount of resources the household invests in period 1 i.e.  $y$ . For simplicity let us assume that success is a linear function of  $y$ ; specifically  $p = y$ .

If the project is a success, the household gets net return,  $\pi$ , and if it fails a penalty amount  $D$  is confiscated by the lender. Hence the expected consumption in period 2 is:

$$E(C_2) = (1 - x)\pi + x(-D)$$

I.e the expected consumption of the household in period 2 is equal to the net return the household earns, incase of success that occurs with a probability  $(1 - x)$  plus the amount it has to payback incase of failure that occurs with a probability of  $x$ .

### 1.2.2 Probability of Enforcement

The expected value of  $D$ , which is the penalty amount confiscated by the lender incase of default is a function of the return on investment (produce) and land. This means that incase of default, the creditor confiscates the entire produce of the household and if the produce is not enough to meet the amount due, then the collateral (Land) is confiscated. The probability of confiscating the land depends on the probability of enforcement of contract,  $\theta$ .

$$E[D] = Produce + \theta.Land$$

where  $\theta$  is the probability of enforcement.

Thus the second period utility function is:

$$U = \alpha(C_1) + \beta E(C_2)$$

where  $\beta$  is the household's discount factor for consumption in period 2.

#### a. Optimal choice of consumption:

To find an analytical solution to the problem we assume a Constant Returns to Scale Utility function of the form:

$$U = [x^\sigma + (\beta[(1 - x)\pi - x(Produce + \theta.Land)]^\sigma)]^{\frac{1}{\sigma}} \quad (1)$$

The farmer chooses  $x$  consumption in period 1, and effectively invests  $y$  in period 1, to maximise lifetime utility. Hence the first order condition for optimisation yields:

$$\frac{dU}{dx} = 0 \quad (2)$$

This implies

$$\frac{1}{\sigma} [x^\sigma + (\beta[(1 - x)\pi - x(P + \theta.L)]^\sigma)]^{\frac{1-\sigma}{\sigma}} [\sigma x^{\sigma-1} + \beta\sigma([(1-x)\pi - x(P + \theta.L)]^{\sigma-1})] [-\pi - P - \theta L] = 0 \quad (3)$$

$$\Rightarrow \sigma x^{\sigma-1} + \beta \sigma [(1 - x\pi - x(P + \theta L)]^{\sigma-1} [-(\pi + P + \theta L)] = 0 \quad (4)$$

$$\Rightarrow \sigma x^{\sigma-1} = \beta \sigma [(1 - x)\pi - x(P + \theta L)]^{\sigma-1} [\pi + P + \theta L] \quad (5)$$

$$\Rightarrow \frac{x^{\sigma-1}}{[(1 - x)\pi - x(P + \theta L)]^{\sigma-1}} = \beta [\pi + P + \theta L] \quad (6)$$

$$\Rightarrow \frac{x}{(1 - x)\pi - x(P + \theta L)} = \beta [\pi + P + \theta L]^{\frac{1}{\sigma-1}} \quad (7)$$

$$\Rightarrow x = \mu(1 - x)\pi - \mu x(P + \theta L) \quad (8)$$

where

$$\mu = \beta [\pi + P + \theta L]^{\frac{1}{\sigma-1}} \quad (9)$$

$$\Rightarrow x = \frac{\pi \mu}{1 + \pi \mu + \mu(P + \theta L)} \quad (10)$$

$$\Rightarrow x = \frac{\pi}{\frac{1}{\mu} + (\pi + P + \theta L)} \quad (11)$$

### 1.2.3 b. Comparative Statics

We are interested in looking at the change consumption in the first period when the probability of enforcement changes. In other words, We are interested in  $\frac{\partial x}{\partial \theta}$ . Taking the partial derivative of  $x$  in respect to  $\theta$  we obtain,

$$\frac{\partial x}{\partial \theta} = - \frac{(\pi(L + \frac{[L\beta(\theta L + P + \pi)]^{\frac{1}{\sigma-1}-1} \beta'(\theta L + P + \pi)}{1-\sigma})}{(\theta L + \beta(\theta L + P + \pi)^{\frac{-1}{\sigma-1}} + P + \pi)^2} \quad (12)$$

Since the denominator is a square term it is positive. Now consider the numerator.

$$-(\pi(L + \frac{[L\beta(\theta L + P + \pi)]^{\frac{1}{\sigma-1}-1} \beta'(\theta L + P + \pi)}{1-\sigma}))$$

Decreasing marginal rate of substitution implies that  $\sigma < 1$  or  $\sigma = 1$ . In our theoretical set up we have assumed that the household has some positive consumption in period 1, which implies that  $x \neq 0$ . Because of this we can

safely assume that in our setup  $\sigma \neq 1$ , because  $\sigma = 1$  implies perfect substitutability, which results in corner solutions, with one of the solutions being  $x = 0$ . Since  $\sigma < 1$

$$\rightarrow 1 - \sigma > 0$$

Moreover, each term in the numerator is positive, hence the whole term is positive. Thus

$$\frac{\partial x}{\partial \theta} < 0$$

This implies that as  $\theta$  increases,  $x$  decreases, i.e. with the increase in the probability of enforcement the consumption in period 1 decreases.  $\theta$  determines the level of expected penalty imposed on the borrowers in case of default. Thus the above result suggests that higher the expected penalty lower is the consumption in the first period and thus higher will be the investment.

#### 1.2.4 High versus Low Penalty

In the above model we study the consumption and investment decisions of borrowing households when they are faced with different types of penalty in the event of a default. Consider two specific cases. In the first case, the lender only confiscates the produce of the household in case of a default. Even if the lending contract uses land as a collateral, the lender writes off the remaining debt and only confiscates the produce. We define this to be the case of a Low Penalty. Thus a household that is unable to repay its debt in the second period only fears confiscation of produce. In such a situation, the household knows that if it defaults in period 2, then the creditor will confiscate all the produce. Thus the household will not have an incentive to produce more in period 2. Instead, it will consume more in period 1 and invest just enough to finance second period consumption.

In the second case, the lender confiscates not only the second period production but also the collateral as per the lending contract, in the event of a default by the household. We define this to be the case of a High Penalty. The households are now faced with a higher penalty and fear confiscation of both produce and land. Loss of land, does not only affect second period utility but is likely to affect utility for all future periods, since the household will not be able to produce for future consumption. Since land is an illiquid asset, the household will invest more in period 1 to be able to return the debt in the fear of losing the land.

### 1.2.5 The Case of Loan Waivers

Loan waivers typically create expectations of low penalty amongst households. Under a loan waiver scheme, households who have been unable to repay their debt and have a collateral attached to the debt have their loans waived and collateral freed. In other words, Loan waivers prevent contract enforcement. With a precedence of loan waivers in agricultural markets, households expect formal institutions to intervene in credit contract enforcements and not seize collaterals in case of default. On the other hand there are no such expectations from informal institutions since they do not come under the purview of government programs.

If households believe that the probability of enforcement  $\theta$  is less when the contract is written with formal sources then they will have a higher tendency to default on the loan by indulging in unproductive consumption. On the other hand if households believe that the probability of contract enforcement and hence of losing their collateral is high in case of loans taken from informal source, then they are likely to invest and produce enough to repay their loans. To the extent that repeated loan waiver programs affect people's belief about the probability of enforcement, they are likely to generate different behavioural responses from people in their treatment of formal versus informal loans.

## 2 Efficacy of Loan Waivers: Analysing UP Rin Maafi Yojana

In the previous section we argued theoretically how expectations about weak enforcements, which might arise as a result of repeated waivers, could alter people's consumption and investment decisions. Households may consume more, invest less and not utilise their loans productively expecting to be bailed out by the government. The main arguments in favour of potential loan waivers are that they reduce debt overhang problems and provides incentives to borrowers who have high incidence of debt (Jensen and Meckling, 1976). Debt overhang refers to the threshold level of debt, where an organisation, or in my case a household's debt is so large that it is unable to borrow fresh loans even though new borrowing can have higher returns (Krugman, 1988).

Agricultural households that have already pledged their assets as collateral and have a high incidence of indebtedness are unable to attract new credit and get stuck in a vicious debt trap . By giving a waiver the creditor (in this case the government on behalf of the banks) frees up the household's collateral so that it can access new credit and use it for productive purposes. Along similar lines, debt moratoria, which means a delay in payment of debt, may result in ex



ante as well as ex post efficiency gains when imposed on creditors in an adverse state of the economy (Bolton and Rosenthal, 2002). Overall supporters of loan waivers argue that they can lift borrowers out of their 'poverty traps' and low productivity equilibria (Banerjee (2000), Mookherjee and Ray (2003)).

Much of the research on the effect of financial markets on households in India, focus on access to credit, (Rajeev and Bhattacharjee, 2001),(Basu, 2006) and the effect of bank expansion in India(Burgess et al., 2005). A second strand of literature looks at the viability and effectiveness of micro credit programs. For instanceField and Pande (2008) study the effect of different types of repayment schedules on default. They find that for micro-finance clients who are willing to borrow at either weekly or monthly repayment schedules, a more flexible schedule can significantly lower transaction costs without increasing client default. Similarly Gine and Karlan (2008) study whether group monitoring alleviates risk and reduces default. They study data from a Philippine bank and find that banks do just as well as peers at monitoring and enforcing loans and generating high repayment rates.

In addition to this, there is a strand of literature that studies government interventions in the financial markets through loan waiver programs. While large-scale loan waivers have become an overly popular policy, very few have tried to understand its impact at the household level. Although these policies are widely believed to be driven more by political economy motive of vote maximisation (Cole, 2009), nevertheless they are important economic interventions putting a significant strain on budget deficit of the country. Hence, it is imperative to understand the efficacy and sustainability of these interventions. One of the largest debt relief programs in India was the Agricultural Debt Waiver and Debt Relief Scheme (ADWDRS).

The ADWDRS was announced by the Union government on 29 February 2008, by Mr. P. Chidambaram, the then Finance Minister of India. It was a relief package for farmers across India, which included the complete and partial waiver of loans given to small and marginal farmers. Specifically the ADWDRS was announced as a Rs. 600 billion program and waived the loans for 30 million small and marginal farmers and included a one time settlement scheme for another 10 million farmers (Jain and Raju, 2011). In the end, the program was to cost the government Rs 716.8 billion which was approximately 1.3% of the country's GDP (De and Tantri, 2014). It took the government four years to disburse the loan amount. A detailed year wise disbursement can be seen in Table 1. Because of the sheer size of the program and its proximity to the general elections of 2009, it invited attention from researchers and political analysts.

Kanz (2012) evaluated the program using data based on a survey of the households that received full, partial and/or no waiver. He found that the 2008

debt relief program failed to improve upon the policy targets of investment and productivity of households. De and Tantri (2014) also used extensive empirical tests using data of 16000 agricultural loan accounts from the year 2005-2012, spread over 4 districts in the state of Andhra Pradesh, to study the effect of the ADWDRS program on the post-waiver debt repayment behaviour of borrowers and creditors in rural credit markets. They found that the number of days taken to repay a loan after the loan waiver was announced increased for all classes of borrowers, those that received full waiver, those that received partial waiver and even for those who received no waiver at all. This interprets their findings as existence of moral hazard in the behaviour of people in anticipation of a further loan waiver. They also found that access to formal finance for low-income households declined after the unconditional debt relief.

To my knowledge, Kanz (2012), Giné and Kanz (2014) and De and Tantri (2014) are the only detailed papers to study the economic impact of the loan waiver schemes in India. All three papers use the ADWDRS, a nationwide intervention that started in 2008 and ended in 2012. We add to this literature by studying in details one of the state level waiver programs and its impact on productivity, consumption and repayment behaviour of households. Specifically, we study the Uttar Pradesh 'Rin Maafi Yojana' announced by the Samajwadi Party in November 2011. Even after a large-scale program like the ADWDRS was announced and a number of questions were raised about its effectiveness, a few states continued to announce their own state level debt relief programs. Uttar Pradesh was the foremost player.

With its election coming in 2012, UP announced its loan waiver policy a few months before the elections. This waiver policy being announced immediately after the completion of the nation wide ADWDRS policy makes it ideal to analyse household behaviour as a result of exposure to repeated generalised loan waiver policies that transform people's expectations of future waivers. In this chapter, we first provide a detailed summary of the program. Then, using primary data collected from 6 districts of Uttar Pradesh we analyse the impact of the program on household behaviour. For identification we use the staggered implementation of the policy, whereby not all districts received the waiver at the time of my data collection.

The results suggest that loan waiver programs have an important implication on household spending and investment behaviour. The UP loan waiver points towards a presence of moral hazard in the behaviour of people when they expect waivers. In what follows, we provide a detailed description of the UP Loan Waiver Program in section 2.1. Section 2.1.1 describes the trends and statistics of the loan disbursement and loan outstanding details for the state of Uttar Pradesh over the last five years. Section 2.2 describes the primary data collection methodology and data description. In section 2.4, we empirically

setup the research questions followed by Section 2.7 which describes the results.

## 2.1 Uttar Pradesh Rin Maafi Yojana

The UP “Rin Maafi Yojana” was one of the first agricultural borrower bailout program announced in the state of Uttar Pradesh. The program was first announced by the current Chief Minister, Mr Akhilesh Yadav, as part of his electoral campaign in November 2011. Even though the waiver amount was not as huge as the 2008 ADWDRS program, the fact that it was announced immediately after the completion of the ADWDRS makes it particularly relevant to study. Repeated waivers alter people’s expectations about enforcement of loan contract and hence are likely to affect the way these loans are used by the households.

The primary goal of the program was to free the collateral of farmers who had borrowed from the state’s Regional Rural Bank and the Land Mortgage Banks. As emphasised by the UP government, by freeing the collateral the household would be able to access fresh line of credit, which would enable them to make more investments and in turn increase the household’s productivity. The waiver was announced four months before the UP elections and was expected to act as a significant vote winning strategy for the Samajwadi Party.

The rules for the program eligibility were kept simple and measures were taken to allow quick processing of claims and reduce corruption at branch level of the districts. Each branch was given a performa, which they had to fill with the details of the eligible borrowers following the eligibility criteria laid down in the official manifesto. The eligibility criteria was based on a number of parameters. Firstly, only those loans will be eligible for waiver which have been taken by giving the household’s agricultural land as collateral. Second, the total value of the loan taken should not excess Rs. 50,000. Third, the borrower should have repaid at least 10% of the borrowed amount. The borrower should have met all of these conditions before 31st March 2012. The program promised that if the borrower meets the mentioned eligibility then his principal amount as well as the entire interest due would be waived.

In order to ensure that a fair process has been adopted and no discrepancies occur in the selection of eligible borrowers the government instructed all the district level branches to set up a committee consisting of the manager of the branch, the assistant manager, and other senior bank members. This committee was to make a list of eligible borrowers based on the above-mentioned criteria which later verified by the District Magistrate. The information had to be submitted by 31st December 2012. In this way the government managed to set up procedures, which would not leave any beneficiary out of the list and

Table 1: Outline of UP Loan Waiver Scheme

ALL DISTRICTS					DISTRICTS WITH HIGHEST LOAN WAIVER	
Year	No. of farmers	No. of districts	Total Loan Waived	Avg waiver received	Districts	Loan Waived
2012-13	419835	43	902.51 cr	20.98 cr	Sitapur	108.20 cr
2013-14	286617	28	747.42 cr	26.68 cr	Shahajahanpur	83.56 cr
2014-15	25715	4	70.42 cr	17.61 cr	Unnao	241.50 cr
TOTAL	732167		1720.4 crores			

Table 2: \*

*Notes.* This table provides the year wise waiver distribution details UP Loan waiver program. It provides the number of farmers that received the waiver along with the districts that received the highest waiver each year. (Source:) Primary Data Collection, Own Calculation

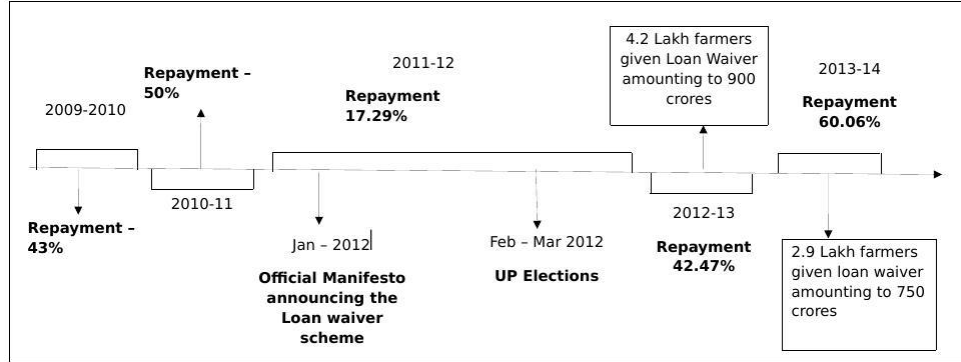
also avoid borrowers who are not eligible to get on the list.

Even though the state government implemented the program as soon as it won the elections in March 2012, the actual roll out happened in a phased manner over a period of 3 years starting in April 2012. Hence, different districts received the waiver in different years. The initial budget allocated for the loan waiver program was 1650 crores. However, the actual implementation cost the government much more. By the end of financial year 2014-15, a total amount of 1720.42 crores was disbursed as debt relief covering approximately 7.3 lakh farmers from 74 districts. The delay in implementation of the program for all districts happened primarily due to the lack of funds. As a result of the allotted funds getting exhausted by the end of 2015, the district of Lakhimpur still did not receive the waiver amount. A summary of the phased roll out of the program is given in the Table 1.

In the first year of the program 2012-13, 43 districts received the waiver. A total of Rs. 902.51 crores of outstanding amount from these districts was waived off for roughly 42,000 farmers. The district with the highest amount of debt waived off was Sitapur. Rs. 151.64 crores of loan amount was due for the district in the year 2012-13, out of which Rs. 108.198 was waived off under the debt relief scheme in 2012-13. The average loan amount waived for all the districts in the year 2012-13 was approximately Rs. 21 crores.

Similarly in 2013-14, Rs. 750 crores of loan was waived off, for 28 districts, out of which Shahjahanpur district received the highest amount of approximately Rs. 83 crores. In 2014-15, only 4 districts received a massive amount of Rs. 70.4 crores out of which Unnao district had Rs. 24.15 crores of their

Figure 1: Time Line for the Uttar Pradesh Loan Waiver Program



loan waived off. A detailed timeline of the program roll out is shown in the Figure 1. The official manifesto was released in January 2012, and the implementation began soon after the UP elections held between February and March 2012. Different groups of district received the waiver in the different years.

### 2.1.1 Loan Disbursement & Loan Outstanding

To understand the credit situation in UP at the time of the program announcement and implementation we use district level administrative records collected from the headquarters of the Gramin Vikas Bank of Uttar Pradesh in Lucknow. The data collected had loan disbursement and loan outstanding details of all the districts of UP from the year 2009-10 till the year 2013-14. In addition to this the data includes the year each district received the loan waiver and the amount of loan waived.

Table 3 gives a summary of the loans disbursed for the state of Uttar Pradesh by the Rural Development Bank of the state. Issue of fresh credit drastically declined from 728 crores before the waiver was announced in 2010-11 to Rs. 55 crores in 2012-13, that is after the waiver was announced. Loan amount outstanding for the year 2011-12, which is the year the waiver announcement was made, was approximately 3700 crores. This amount is significantly higher than the previous two years or the next two years, showing a possibility of households not repaying their loan possibly as a result of the waiver announcement. Table 3 also shows the loan disbursed for the districts of UP from 2009-14. The amount of credit given out by the rural development bank significantly dropped by almost 90% to Rs. 55.81 crores in 2012-13 from Rs. 568.15 crores the previous year.

The decline in the disbursement of credit can be attributed to the bankers rationing credit in anticipation of adverse borrower behaviour. De and Tantri (2014) finds similar results on analysing the 2008 ADWDRS loan waiver scheme. According to them this generates ex ante inefficiency and access to finance for poor households declines following unconditional debt relief.

Table 3: Phases of Waiver Distribution and Repayment Rates: 2009-2014

	Loan Disbursed	Outstanding Loan	Loan Due	Repayment	Loan Waived	Repayment including waiver	Repayment without waiver
2009-10	702.89	3204.96	1719.62	746.85		43.43%	43.43%
2010-11	728.22	3502.68	1545.08	774.05		50.10%	50.10%
2011-12	568.15	3691.85	2289.82	395.93		17.29%	17.29%
2012-13	55.81	3057.1	3049.54	1295.27	900	42.47%	12.96%
2013-14	406.53	2814.93	2200.03	1321.44	750	60.06%	25.97%

Table 4: \*

*Notes.* This table provides the summary of the UP Loan waiver program. It gives the details of the loan disbursement and loan outstanding details for UP for the years 2009-14. (Source:) Primary Data Collection, Own Calculation

Figure 4.2 maps the repayment rates for different districts in the state of UP. Panel A shows the repayment rates before the loan waiver was announced in 2010-11. Panel B shows the repayment rates after the loan waiver policy was announced in 2011-12. Darker shades reflect higher repayment rate. As one can see in the figure, in the year 2010-11 most of the districts belonged to the repayment range of 25%-50%. A few districts even had repayment rates above 60%. In contrast, the year 2011-12 sees a drastic fall in the repayment rates and majority of the districts have repayment rates in the range of 10%-25%, as reflected by the lighter shade of the overall map. This suggests the presence of moral hazard in the behaviour of borrowers. As soon as the announcement was made, majority of the households stopped repaying their loans. Since the eligibility status was a complicated calculation, it is unlikely that the fall in repayment rates was driven by knowledge of their actual eligibility status. In fact as we find in my survey data, 34.55% of the households interviewed had no knowledge about the loan waiver program and 15% out of these households that had no knowledge actually qualified for the waiver and had received the waiver.

To further understand whether repayment rates were affected by the loan waiver program, Figure 3 shows the repayment rates for groups of districts segregated according to the year the districts received their waiver. Group 1 includes districts that received the waiver in 2012-13, Group 2 are the ones

Figure 2: Comparison of Repayment Rates Pre & Post Waiver Announcement

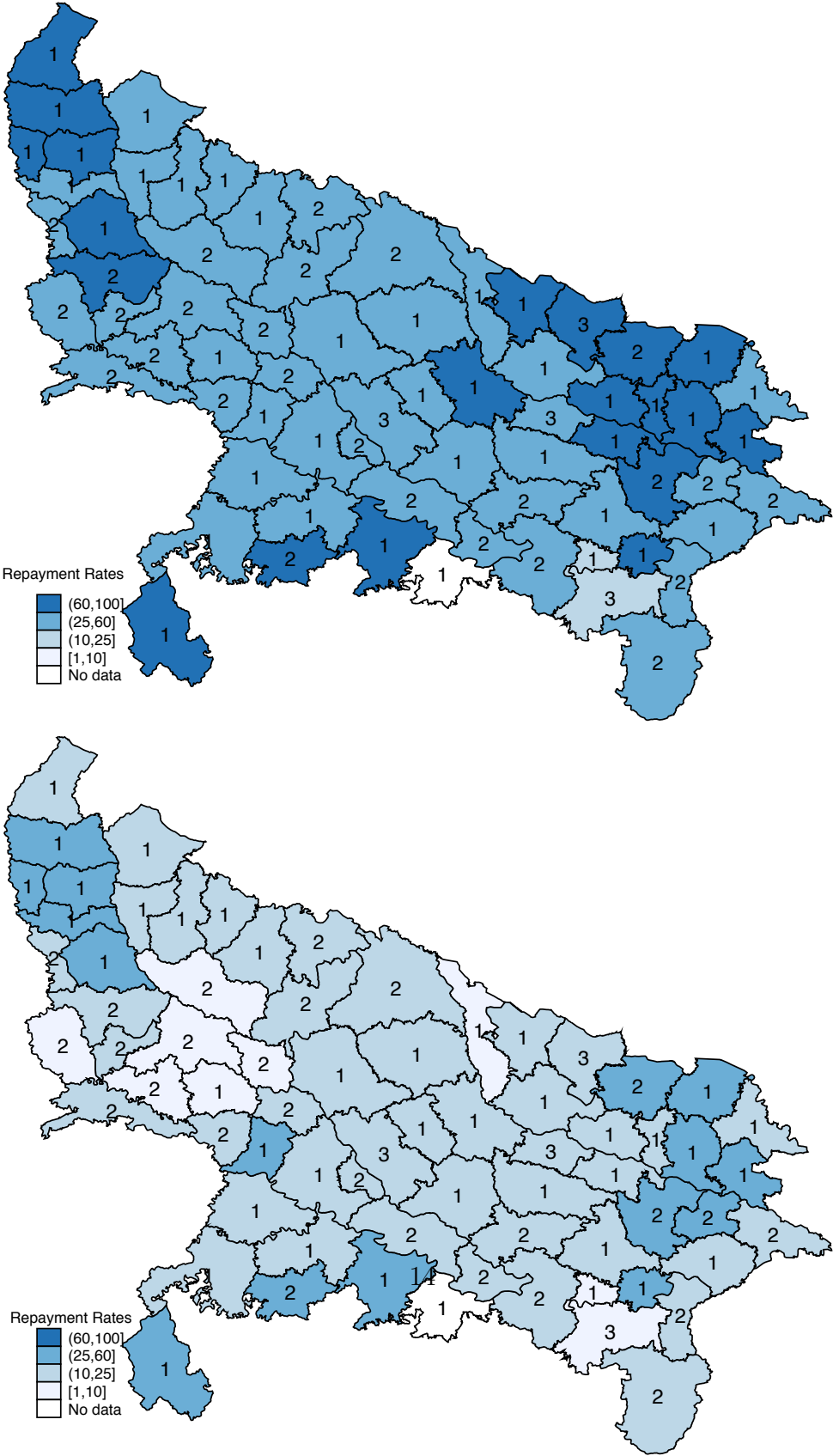
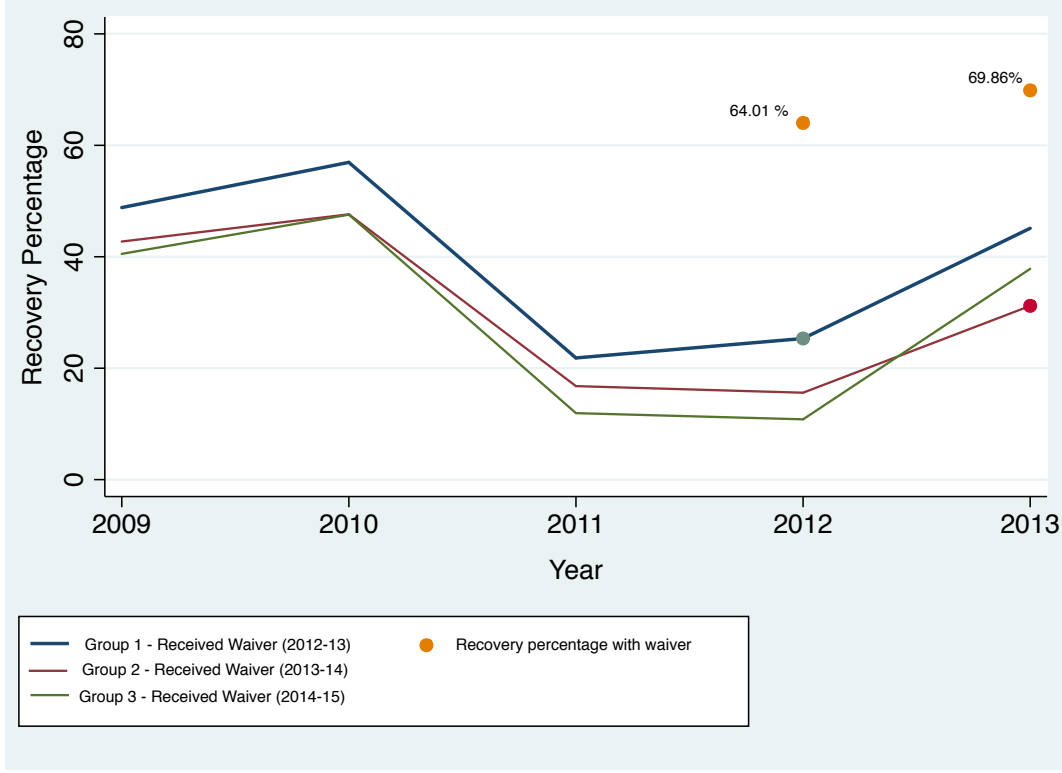


Figure 3: Group wise Repayment percentages of from 2009-14



that received the waiver in 2013-14 and Group 3 comprises of those districts that received waiver in the year 2014-15. The graph maps the repayment rates from 2009, much before the waiver announcement was made. There are two interesting inferences that can be made from the graph.

First, we notice a drastic fall in the repayment rates in the year 2011, which was when the announcement was made for the first time in UP. Secondly, as Group 1 receives the waiver in the year 2012, repayment rates in those districts start increasing. As the borrowers have received the waiver and are probably no longer expecting any more waiver in the immediate future, they repay their outstanding debts. On the other hand, Group 2 and 3 which have not received the waiver, continue to have low repayment rates in the year 2012-13. Unfortunately, we do not have administrative records beyond 2013-14 to observe the complete trend for Group 2 and Group 3.



## 2.2 Primary Data Collection

### 2.2.1 Methodology

This study was carried out in the state of Uttar Pradesh (UP), India. UP is one of the 29 states in India and is located in the northern part of the country. It has 75 districts and 312 sub-districts with a population of 212 million people. It is one of the most densely populated states of the country. Agriculture is the primary occupation of the state and it employs around 136 million people in the sector according to the 2001 Census.

The primary data was collected from 6 districts out of the 75 districts of UP. The selection of the districts was done keeping in mind the following criteria. First, to utilise the staggered implementation process we needed to include districts from each of the three phases of waiver disbursement. Districts of Auraiya, Kanpur Dehat, Agra and Firozabad fulfilled these criteria. Secondly, we selected a pure control district, i.e a district where loan waiver had been announced but had not been disbursed at the time of the survey. The district of Lakhimpur fell in this category. Thirdly, we included a treatment district, i.e a district where loan waiver was disbursed, which is geographically close to the control district so that geographical variations, traditions and other unobserved factors are controlled for. The district of Sitapur, located adjacent to Lakhimpur fulfilled this criteria.

Majority of the data was collected from a cross section of rural households that were randomly selected from a list of loan waiver beneficiaries released by the UP Government. The sampling pool consisted of two types of households; the treated and the control. The treated group comprises of households that received any loan waiver in one of the years between 2012-2014. Out of the total sample size 770 households interviewed, 502 households (65.19%) belong to the treated group. For the purpose of this study randomisation was carried out at the village level. In other words, we randomly selected  $x$  villages in each district from the census listing of villages. We then, selected  $y$  households randomly from each village available from the beneficiary list.

In addition to these households, data was collected from a control group that comprises of a random set of households in the same districts that did not receive any waiver. Out of the total sample size 770 households, 267 households (34.81%) belong to the control group. A detailed list of the the number of households and the districts can be seen in the Table 5. Among the list of 6 districts provided in Table 5, Auraiya, Kanpur Dehat and Sitapur households received their loan waiver in the year 2012-13. Agra and Firozabad received the waiver in 2013-14. Eligible households in Lakhimpur district still did not receive the loan waiver at the time of the survey. Information obtained include

age of respondents in years, farm size, household size, household income, loan outstanding, loan returned, knowledge of the UP loan waiver, a detailed consumption and investment history, along with a range of other socio-economic and demographic variables. A complete list of all the variables along with their summary statistics can be found in the Appendix.

Keeping in mind the area of research, low literacy rate, the sensitivity of the information and the accuracy required the data collection strategy adopted for the purpose of this study was the Interview Method. A detailed questionnaire was prepared which was divided into different sections which included demographic details, occupation and income, expenditure and consumption and most importantly borrowing, repayment and debt relief. A complete copy of the questionnaire is in the Appendix. The interviewers asked the questions to the head of the household and in case the head was not present, to an available adult who was aware of the borrowing details. While the main questionnaire was in English, it was translated to Hindi before the data collection process began. A copy of the questionnaire was provided both in English and Hindi to avoid any confusion in translation.

The data collected was both at the household level and individual level. The sample consists of 5270 individuals from 770 households across 6 districts of Uttar Pradesh. While we have demographics and certain income information at an individual level, my focus of the analysis which studies borrowing and repayment behaviour, is at the household level. This is primarily due to two reasons. First, eligibility of loan waiver generally applies to a single member of the household. Second, my main outcome variables of interest, consumption and investment are defined at the household level.

Table 5: District Wise Distribution of Loan Waiver in Sample

District	Frequency	Received Waiver	Did Not Receive Waiver	Received Waiver (Year)
Auraiya	83	67	16	2012-13
KanpurDehat	148	105	43	2012-13
Sitapur	150	146	4	2012-13
Agra	104	93	11	2013-14
Firozabad	102	91	11	2013-14
Lakhimpur	183	0	183	No Waiver
<b>Total</b>	<b>770</b>	<b>502</b>	<b>263</b>	

*Source:* Primary Data Collection

*Notes:* This table gives a breakup of the households from the six districts the primary data was collected. They have also been grouped according to the year the district received the loan waiver. The district of Lakhimpur did not receive the loan waiver till the time data was collected and is thus treated as a control group for the analysis.

## 2.3 Descriptive Statistics

Before delving deeper into studying the repayment patterns of households it is important to understand their borrowing behaviour. Source of borrowing, amount of loan borrowed, rate of interest, preferred source of borrowing, ease of borrowing and other terms and conditions of borrowing are all important inputs in determining repayment. Among the 770 households we surveyed, 97.66% people borrowed money in the last 10 years. 94.25% of the loans were taken in the name of the head of the household. 84.39% of the households borrowed for the purpose of agriculture. As seen in Figure 4, majority of the people borrowed from formal sources. The formal sources constitutes of all institutional credit agencies like co-operative banks, nationalised banks, private banks, rural development banks, land mortgage banks, kisan credit and loans taken from life insurance corporation of India (LIC). On the other hand the informal sector comprises of the non-institutional credit agencies like landlords, agricultural moneylenders, professional money lenders, traders and commission agents, relatives and friends.

Figure 4 shows that 46.96% borrowed from land mortgage Banks, followed by 25.03% from kisan Credit banks and 11.40% from rural development banks. The high intensity of formal source borrowing, compared to the general situation, is once again driven by the fact that beneficiaries of loan waivers by definition borrowed the waived loans from formal sources. However an interesting observation is that even though majority of the households borrowed from formal sources, when questioned about their preferred source of borrowing, these same households reported informal sources to be more preferred. Almost 34% of the households preferred to borrow from money lenders. This is vis-a-vis only 24% who preferred to borrow from the kisan credit banks, a formal source.

In this thesis, we use three types of waiver status to analyse the effect of the loan waiver program on household decisions. First we use the actual waiver status. This is a binary variable equal to 1 when the household actually received the loan waiver according to the data released by the UP government. It takes the value of 0, if the individual did not receive the waiver. I.e the individual either had not yet been given the waiver at the time of this survey or the individual was not eligible for the loan waiver. Since none of the households received the waiver in Lakhimpur district at the time of the survey, these households are assigned a value of 0.

Figure 4: Source of Borrowing

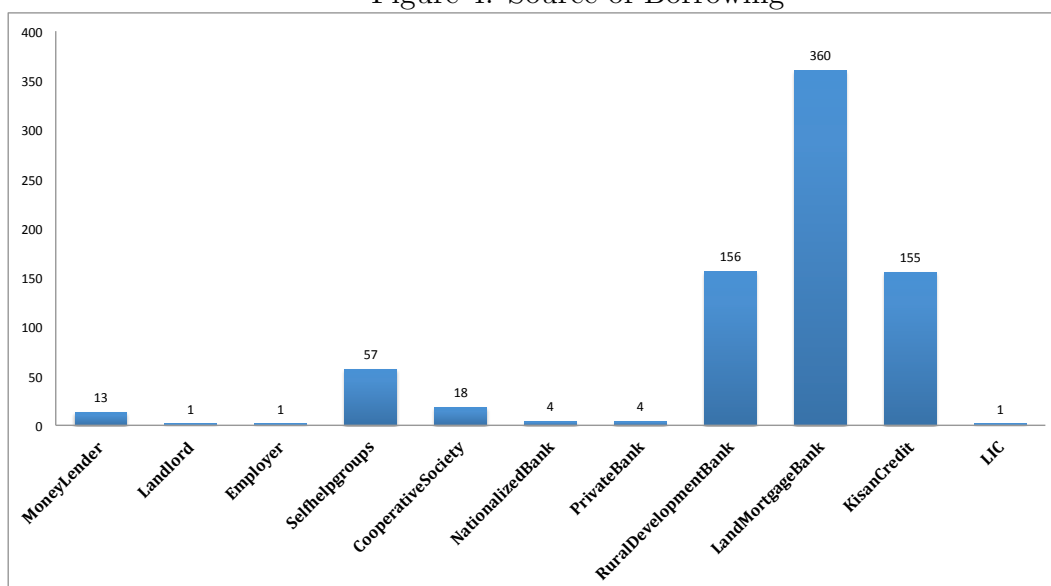


Figure 5: \*

*Notes.* This figure looks at the distribution of loan source. It shows the number of loans taken from various sources of borrowing both formal and informal. (Source:) Primary Data Collection.

$$\text{Loan Waived} = \left\{ \begin{array}{ll} 1, & \text{if household received the waiver} \\ 0, & \text{if not received waiver at the time of survey or} \\ & \text{does not qualify to receive the waiver} \end{array} \right\}.$$

My second measure of waiver status is defined by the eligibility status of an individual as per the conditions laid down by the government to be eligible for receiving loan waiver. This implies that Eligibility is a binary variable that takes a value 1 if the principal amount of the loan borrowed by an individual from a formal source is less than or equal to Rs. 50,000 and at least 10% of the amount due was repaid at the time of the survey. Eligibility takes on the value 0 if anyone of these conditions is not met.

$$\text{Eligibility} = \left\{ \begin{array}{ll} 1, & \text{if } Loan_i \leq 50000 \text{ \&} \\ & \text{if } Repayment \geq 0.1(Loan_i) \text{ \&} \\ & \text{if } LoanSource = Formal \\ 0, & otherwise \end{array} \right\}.$$

The third measure of waiver status that we use for my analysis is 'Knowledge of Waiver'. It is also a binary variable taking the value 1 if the head of the household has any knowledge about the UP loan waiver program announced in the state and 0, if the head of the household is not aware of the program.

$$\text{Knowledge of Waiver} = \left\{ \begin{array}{ll} 1, & \text{if household is aware of the UP loan waiver program} \\ 0, & otherwise \end{array} \right\}.$$

Table 6: Outcome Variables by Waiver Status

Variable	Full Sample		Received LW	Not-Received LW	Knowledge	No-Knowledge
	Obs	Mean	Mean	Mean	Mean	Mean
Consumption	770	38433	41479	37531	42502	30725
Productivity	462	32876	29397	40131	29491	38691
Total Production	519	47046	38769	75317	39129	58511
Income	770	54860	52623	63956	52864	58642
HH Loan	770	34605	24268	69621	25808	51273
HH Size	770	1.01	1.01	5.32	1.01	1.00
Wedding	139	0.24	0.22	0.10	0.06	0.27
Bulk Purchases	762	0.13	0.14	0.16	0.09	0.14
Frequency	770		502	199	504	266

Source: Primary Data Collection

Notes: This table gives the mean values of the main variables used for my analysis. The different samples used for the analysis are, Full Sample, Households that received loan waiver, Households that did not receive loan waiver, households that are eligible for loan waiver, households that are not eligible for loan waiver, households that have knowledge about the loan waiver program and households that do not have knowledge about the loan waiver program. The variables used for the analysis of these different samples are Consumption, which is a yearly consumption in rupee terms each household; Income, which is the annual income of all the members of the household; Total Production which is the total rupee value of the produce by the household; Productivity refers to the value of total production over farm size. Household loan refers to the amount of largest loan taken by the household. Household size refers to the number of members in each household. The variable wedding is a dummy variable that captures if there was a wedding in the family in the last one year and the variable bulk purchase is a dummy variable that captures if the household has made a bulk purchase in the last one year.

Table 6 provides a summary of the main variables used in my analysis for the full sample as well as by different definitions of the waiver status. The average consumption of the full sample is Rs 38433 per year. This is lower than the average consumption of households that received the waiver, households that are eligible for waiver and households with knowledge about the waiver. Productivity, calculated as the rate of total production over land cultivated, is lowest for households that received the waiver. Households that are not eligible for loan waiver have the highest mean income amongst all samples. They also have the highest average loan amount borrowed.

Another important observation from the table is the behaviour of people who have knowledge of loan waiver as opposed to those who do not have any knowledge of the waiver. Since loan waivers come in the form of repeated interventions in India and have often been used by political parties as an election winning strategy, it is likely that people start expecting governments to offer loan waivers during election years. We notice that yearly consumption of households with knowledge of waiver is almost 28% higher compared to that of households with no knowledge of the program.

One could argue that this is simply an income effect driven by the possibility that households that have higher consumption are also those households with higher income. People with higher income are usually more educated and have access to news that in turn would make them more aware about such programs. However, when we notice the yearly income of both these groups we find that the mean yearly income of households with no knowledge of loan waiver is actually higher than that of households with knowledge of loan waiver. In addition, we find that households with knowledge of loan waiver are 33% more likely to have made a bulk purchase within a year of hearing about the loan waiver.

Table 6 indicates that households that either received loan waiver or had knowledge of the program, or were eligible for the program, have lower income, higher consumption and lower productivity as compared to their respective counterparts. This is indicative of existence of unproductive utilisation of loan borrowed by the households. To investigate these possibilities we first explore whether waiver status has an impact on the consumption and productivity decisions of households.

## 2.4 Empirical Analysis

### 2.4.1 Loan Waiver Status & Household Consumption

In this thesis we study whether loan waivers have an effect on the consumption patterns of households. As mentioned before previous studies have shown that

loan waivers can induce moral hazard amongst households. The moral hazard is induced to the extent that households may alter their consumption patterns based on just the knowledge of loan waivers being announced. we start by investigating whether two households with the same amount of outstanding loan and with the same overall income differ in their consumption behaviour depending on their waiver status. To do this we estimate the following model using a liner probability framework.

$$Consumption_i = \alpha_1 + \alpha_2 LW_i + \alpha_3 Inc_i + \sum_{i=4}^k \alpha_i X_i + \epsilon_i$$

where Consumption is yearly consumption of household i. It is the total rupee amount a household spends on consumable goods and services like food, fuel, medicines, social functions etc. In the primary data we asked a series of 12 questions about household's monthly and yearly consumption of various goods designed to estimate total household consumption expenditures. Consumption is calculated as a sum total of the expenditures on these 12 consumption items.  $LW$  is an indicator reflecting whether household i received a loan waiver or not..  $Inc$  is total household income.  $X_i$  is an additional set of covariates such as amount of loan borrowed, interest rate charged on the loan, sex of the head of the household, employment and religion. My primary parameter of interest is  $\alpha_2$  which captures the effect of the loan waiver program on consumption behaviour of households. As mentioned above we also run the above regression with Waiver Eligible and Knowledge as proxy for program exposure in place of actual loan waiver status.

$$Consumption_i = \alpha_1 + \alpha_2 Eligible_i + \alpha_3 Inc_i + \sum_{i=4}^k \alpha_i X_i + \epsilon_i$$

$$Consumption_i = \alpha_1 + \alpha_2 Knowledge_i + \alpha_3 Inc_i + \sum_{i=4}^k \alpha_i X_i + \epsilon_i$$

In my next section, we analyse the relationship between a household's level of social spending, which is the amount of money a household spends on social functions like festivals, birth and death ceremonies etc and the household's waiver status.

## 2.5 Loan waiver Status & Social Spending

A possible effect of a loan waiver scheme could be that otherwise constrained households are able to satisfy their need for the consumption of necessary goods

like education, food or health. This could be beneficial for the household and can be seen as a positive impact of the loan waiver scheme as it leads to an overall increase in the well being of the household by relaxing their resource constraints temporarily.

However, from a policy perspective it is worrisome if there is an increase in the unproductive expenditure of the household as a result of the loan waiver. While the former type of consumption might lead to human capital accumulation and foster future productivity, an increase in unproductive expenditure defies the whole purpose of the policy intervention and the household continues to be in a debt trap. To test this possibility we check the effect of a household's waiver status on its social spending. Hence, we investigate whether two households with the same amount of outstanding loan and with the same overall income differ in their social spending behaviour depending on their potential waiver status. To do this we estimate the following model in a liner probability framework.

$$\text{Social Spending}_i = \alpha_1 + \alpha_2 \text{LW}_i + \alpha_3 \text{Inc}_i + \sum_{i=4}^k \alpha_i X_i + \epsilon_i$$

where Social Spending is the amount of money household  $i$  spends per month on social functions like festivals, marriages and death ceremonies.  $\text{LW}$  is an indicator reflecting whether household  $i$  received a loan waiver or not..  $\text{Inc}$  is total household income.  $X_i$  is an additional set of covariates such as amount of loan borrowed, interest rate charged on the loan, sex of the head of the household, employment and religion. My primary parameter of interest is  $\alpha_2$  which captures the effect of loan waiver programs on the social spending behaviour of households. Once again, we run the above regression with Eligible and Knowledge as proxy for program exposure in place of actual loan waiver status.

$$\text{Social Spending}_i = \alpha_1 + \alpha_2 \text{Eligible}_i + \alpha_3 \text{Inc}_i + \sum_{i=4}^k \alpha_i X_i + \epsilon_i$$

$$\text{Social Spending}_i = \alpha_1 + \alpha_2 \text{Knowledge}_i + \alpha_3 \text{Inc}_i + \sum_{i=4}^k \alpha_i X_i + \epsilon_i$$

## 2.6 Loan Waiver Status & Productivity

The underlying purpose of the UP Rin Maafi Yojana was to free collateral so that a household could have access to new credit and thus increase productivity.



To analyse the efficacy of the program we check if the households that received the waiver experienced higher productivity. To test this we regress agricultural productivity that is calculated as total production/land cultivated, on the loan waiver status of a household. Total production of a household is calculated by multiplying quantity of crops grown by farm level prices for each crop. we use the state level price data for calculating the nominal values for the state of UP.

$$\text{Productivity}_i = \alpha_1 + \alpha_2 \text{ LW}_i + \alpha_3 \text{ Inc}_i + \sum_{i=4}^k \alpha_i \text{ X}_i + \epsilon_i$$

Similar to the previous regressions, we run the above regression with Eligible and Knowledge as proxy for program exposure in place of actual loan waiver status. My parameter of interest is  $\alpha_2$  which captures any difference in the productivity of the households as an effect of their loan waiver status.

$$\text{Productivity}_i = \alpha_1 + \alpha_2 \text{ Eligible}_i + \alpha_3 \text{ Inc}_i + \sum_{i=4}^k \alpha_i \text{ X}_i + \epsilon_i$$

$$\text{Productivity}_i = \alpha_1 + \alpha_2 \text{ Knowledge}_i + \alpha_3 \text{ Inc}_i + \sum_{i=4}^k \alpha_i \text{ X}_i + \epsilon_i$$

The next section provides a detailed summary of my findings.

## 2.7 Results

### 2.7.1 Consumption

If the debt overhang argument proposed by proponents of loan waiver schemes hold, then households receiving the waiver should rationally use their resources to make higher investments than before to ensure greater productivity. However as seen in Table 6, this is not true. In fact the households that received the waiver have lower productivity. To understand this, we check whether households that received the waiver engaged themselves in excessive consumption. Column [1] in Table 7 estimates the impact of the loan waiver program on yearly consumption of the household.

The results show that the program has a incremental impact on the yearly consumption of a household, following equation 2.4.1. Controlling for other covariates, the coefficient on waiver is 6838 (significant at 1% confidence level). This implies that between two households with same level of income, employment status, and loan size, the one which received the loan waiver has

approximately Rs 6838 higher consumption compared to the other. Looking at the other covariates, the variable income has a positive sign, as expected. Similarly loan amount, also has a positive sign, indicating that households that borrow larger loan amounts have higher consumption. Both these variables are significant at 1% confidence level. Hindus have a lower consumption as compared to other religions. Sex and employment status of the head of the household have no significant effect on the consumption of the household.

Column [2] and Column [3], which have 'eligibility' and 'knowledge of waiver' as proxies for waiver received also suggest similar results. This finding hints towards a possible moral hazard amongst households that either have the information of the waiver or have actually received the waiver. With the reduction in their liabilities and freeing of the collateral due to the waiver, the results indicate that these households chose to use their resources for extra consumption, rather than higher investment which could led to higher productivity eventually. A possible alternative interpretation of the result could be that people who borrow from formal sources have higher income, are more education and aware of their surroundings. Thus they tend to have more exposure which can result in them having a higher consumption. we have controlled for a rich set of variables at the household level like income, employment status, religion etc to rule out the alternate interpretations.

### 2.7.2 Social Spending

To identify the nature of increase in consumption following loan waiver programs, we separately consider social spending. we study how having the loans waived off has an effect on the social spending of a household. Table 9 below shows us the results of the regression analysis from the estimation of equation 2.5. Column [1] estimates the impact of the actual waiver status on monthly social spending of the household. The coefficient indicates that the program has a positive impact on the monthly social spending of a household. Controlling for other covariates, the coefficient on waiver, 243 implies that between two households with same level of income, employment status and loan size, the one which received the loan waiver approximately spent Rs 243 more per month on social functions compared to those households that did not receive the loan waiver.

Column [2] and Column [3], which have 'eligibility' and 'knowledge of waiver' instead of actual waiver status, also suggest a positive and significant effect on social spending of a household.

Table 7: Effect of Loan Waiver on Consumption of Households			
Dependent Variable: Consumption (Yearly)			
	Loan Waived	Eligibility	Knowledge of Waiver
	1	2	3
Waiver Status	6,838*** (1,991)	5,809*** (2,196)	9,544*** (1,950)
Income (Yearly)	0.159*** (0.021)	0.161*** (0.021)	0.157*** (0.020)
Loan Amount (Rs)	0.111*** (0.019)	0.113*** (0.020)	0.116*** (0.019)
Interest Rate (Yearly)	37.42 (113.4)	-32.10 (110.9)	67.74 (111.9)
Hindu	-9,889*** (2,276)	-9,561*** (2,281)	-9,768*** (2,252)
Sex	-2,730 (7,172)	-4,496 (7,203)	-1,945 (7,108)
Unemployed	10,518 (6,540)	12,271* (6,546)	8,643 (6,501)
Employed	-1,484 (2,683)	-25.75 (2,655)	-2,035 (2,655)
Constant	27,302*** (8,532)	28,074*** (8,588)	24,819*** (8,468)
Observations	634	634	634
R-squared	0.171	0.165	0.187
Standard errors in parentheses			

Table 8: \*

*Notes.* This table explores the impact of loan waiver status on consumption. The dependent variable is consumption which is an aggregate of all the money a household spends on consumables in a year. Consumption is measured in Rupees. Three types of waiver statuses that have been analysed are Actual Loan waived, Eligible for Loan waiver and Knowledge of Loan waiver. The dummy variable 'Sex' refers to the gender of the head of the household. It takes the value 1, if the head of the household is a Male. Similarly the dummy variables 'Unemployed' & 'Employed' refer to the employment status of the head of the household, with the general category being self-employed. Asterisks denote significance: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ . Standard errors are in brackets. (Source:) Primary Data Collection, Own Calculation

Table 9: Effect of Loan Waiver on Social Spending of Households			
Dependent Variable: Social Spending (Monthly)			
	Loan Waived	Eligibility	Knowledge of Waiver
	1	2	3
Waiver Status	243.1*** (56.26)	175.9*** (62.36)	205.3*** (55.83)
Income (Yearly)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Loan Amount (Rs)	0.001*** (0.001)	0.001** (0.001)	0.001** (0.001)
Interest Rate (Yearly)	-4.080 (3.204)	-6.670** (3.148)	-4.719 (3.206)
Hindu	-504.3*** (64.30)	-492.0*** (64.74)	-495.3*** (64.48)
Sex	-237.6 (202.6)	-295.5 (204.4)	-232.5 (203.5)
Unemployed	226.6 (184.7)	288.7 (185.7)	210.2 (186.1)
Employed	-33.22 (75.81)	19.14 (75.36)	-23.24 (76.03)
Constant	912.2*** (241.0)	961.7*** (243.7)	928.4*** (242.4)
Observations	634	634	634
R-squared	0.223	0.210	0.217

Table 10: \*

*Notes.* This table explores the impact of waiver on social spending. The dependent variable is social spending which is a rupee amount a household spends on social functions in a month. Three types of waiver statuses that have been analysed are Actual Loan waived, Eligible for Loan waiver and Knowledge of Loan waiver. The dummy variable 'Sex' refers to the gender of the head of the household. It takes the value 1, if the head of the household is a Male. Similarly the dummy variables 'Unemployed' & 'Employed' refer to the employment status of the head of the household, with the general category being self-employed. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets. (Source:) Primary Data Collection, Own Calculation

### 2.7.3 Productivity

Next we explore the effect of waiver on agricultural productivity. Proponents of the loan waiver programs argue that the waiver initiative would free households from a debt trap and create incentives for productive investment. The underlying purpose of the UP Rin Maafi Yojana was to free collateral so that a household could have access to new credit. This would enable the household to invest for future production enhancement. To test this hypothesis we could either study investments or effective productivity. Actual investment is difficult to observe. Large farmers are likely to own capital intensive equipment that require less yearly investments than smaller farmers who might rent these equipment that show up in their last year's investment figures. Hence we restrict my analysis to productivity that is easier to measure.

Table 11 reports the results of the regression analysis following equation 2.6. Column [1], estimates the impact of the loan waiver program on the agricultural productivity. The results show that the program has a negative impact on productivity of the household. Estimates in Column [1] indicate that households, which received a waiver had approximately Rs 9741 lower production value per acre as compared to households that did not receive the waiver. This could be because the waiver program did not incentivise households to use the waived amount for investments that could generate greater productivity. Column [2] and Column [3], which have 'eligibility' and 'knowledge of waiver' as proxies for waiver received also suggest that loan waiver status caused a negative impact on the productivity of the households.

## 2.8 Difference In Differences Analysis

The above regressions show us the effect of loan waiver status on consumption, productivity and social spending after controlling for observable differences between households eligible and not eligible for waiver. However, there might still be unobservable differences between households by eligibility status, waiver status or knowledge of waiver which are not entirely, captured by the observed variables. For instance, some households might influence their entry into the actual waiver list by using their political affiliation. Hence, actual waiver status variable is likely to be endogenous with respect to household behaviour. Similarly knowledge of waiver status might also be endogenous w.r.t household behaviour. For instance households that have stronger connections to village networks might have a better knowledge of various government programs and at the same time might indulge in higher social spending to maintain strong

Table 11: Effect of Loan Waiver on Productivity of Households			
Dependent Variable: Productivity (Yearly)			
	Loan Waived	Eligibility	Knowledge of Waiver
	1	2	3
Waiver Status	-9,741*** (3,101)	-9,715*** (3,315)	-9,680*** (3,095)
Income (Yearly)	0.029 (0.033)	0.022 (0.033)	0.029 (0.033)
Loan Amount (Rs)	0.031 (0.031)	0.026 (0.032)	0.031 (0.031)
Interest Rate (Yearly)	66.8 (193.2)	177.5 (188.8)	67.7 (193.2)
Hindu	-479.6 (6,468.4)	-1,357.6 (6,444.6)	-897.8 (6,448.7)
Sex	4,191.6 (14,441.9)	6,305.5 (14,486.7)	4,119.0 (14,443.1)
Unemployed	-4,055.5 (12,934)	-7,759.1 (12,889)	-4,267.7 (12,929)
Employed	7,758* (4,637)	6,650 (4,604)	7,593 (4,630)
Constant	24,175 (17,124)	24,273 (17,155)	24,794 (17,137)
Observations	420	420	420
R-squared	0.047	0.044	0.046

Table 12: \*

*Notes.* This table explores the impact of waiver on productivity. The dependent variable is productivity that is calculated by dividing total production (amount a household earns in a year by selling its produce) by total land cultivated by the household. Three types of waiver statuses that have been analysed are Actual Loan waived, Eligible for Loan waiver and Knowledge of Loan waiver. The dummy variable 'Sex' refers to the gender of the head of the household. It takes the value 1, if the head of the household is a Male. Similarly the dummy variables 'Unemployed' & 'Employed' refer to the employment status of the head of the household, with the general category being self-employed. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets. (Source:) Primary Data Collection, Own Calculation

connection with the network. The potential eligibility status variable is less likely to suffer from endogeneity problems once the underlying variables that determine eligibility is controlled for.

Hence, we conduct a difference in differences analysis using as treatment and control group the potentially Eligible and potentially Not-Eligible households respectively. In addition to this there could be some inherent differences between the districts that received the waiver and Lakhimpur. By controlling for district fixed effects we eliminate these inherent differences

### 2.8.1 Identification Strategy

In general difference in differences setup is where the outcome is observed for two groups over two time periods. In this setup in time period 1 both groups are not exposed to the treatment. In time period 2, one group is exposed to the treatment and is called the 'Treatment Group' and the other group that is not exposed to the treatment in both time periods is called the 'Control Group'. In such a case considering that the same units are observed in both the time periods, the average gain in the control group is subtracted from the average gain in the treatment group. This removes biases in second period comparisons between the treatment and control group that could be the result from permanent differences between those groups, as well as biases from comparisons over time in the treatment group that could be the result of trends (Wooldridge, 2007). This kind of strategy is possible when we have the same observations observed over two or more time periods. However, a similar strategy can be adopted with independent cross sections (Lee and Kang, 2006).

In such a scenario we have two groups of people from two different districts. Both have potential treatment and control groups. In district 1 the treatment group has received the treatment while in district 2 the treatment group has not received the treatment, thus making them similar to the treatment group in state 1 before receiving the treatment.

I restrict to eligibility over actual waiver status and knowledge of waiver status for two reasons. First, knowledge of waiver is more likely to be endogenous. For example people with better networks are usually more likely to have access to information regarding government policies. At the same time network pressure might push them towards high social spending. Second, it is not feasible to use actual waiver status for the control district of Lakhimpur as the program was not rolled out in Lakhimpur. Eligibility reflects an expectation of households to receive the waiver.

Table 13 reports the mean differences in productivity between the potential Treatment and Control groups. The difference in differences estimate captures the following effect:

$$(E - NE)^{WD} - (E - NE)^{NWD}$$

where  $(E - NE)^{WD}$  represents difference between households that belong to the Eligible and Not-Eligible groups in districts that received the loan waiver (WD = Waiver Districts). It is possible that this difference is a result of some innate differences.  $(E - NE)^{NWD}$  represents difference between households that belong to the Eligible and Not-Eligible groups in districts that did not receive the loan waiver (NWD = No Waiver Districts). This is analogous to my regression estimates in column [2] of Tables 2.4.1, 2.5, 2.6 between Eligible and Not-Eligible groups which would exit even if the program was not rolled out.

If so, the first difference results are likely to be confounded by the unobserved differences between these two groups. Hence we look at the potential Eligible and Not-Eligible groups in regions which did not receive the loan waiver, namely Lakhimpur district, and eliminate it from the difference between Eligible and Not-Eligible groups in the districts that received loan waiver. This leaves us with a difference in differences estimator which estimates the effect of eligibility into the loan waiver programs on productivity under the assumption that the difference between the Eligible and Not-Eligible households in Lakhimpur is identical to the difference between the same two groups in other districts in the absence of the program.

Table 13 shows this difference to be equal to -42.35. This implies that eligible households in districts that received loan waiver had a lower productivity by approximately Rs 42 as compared to households not eligible for loan waivers.



Table 13: Difference in Differences analysis of Eligibility on Productivity of Households

	Eligible	Not Eligible	
Waiver District	32687.48	33133.28	-445.8
No Waiver District	32573.28	32976.73	-403.45
	114.2	156.55	-42.35

*Source:* Primary Data Collection, Own Calculation

*Notes:* The table above shows the mean differences in productivity between Eligible and Not-Eligible groups. Eligibility is a self-calculated binary variable that takes the value 1, if a household has met the following three criteria. First, the household should have taken a loan from a formal source. Second the loan amount should not exceed Rs 50,000 and finally the household should have repaid at least 10% of the loan amount due. In addition to this we use two categories of districts. Waiver Districts and No Waiver Districts. In No Waiver Districts we have the district of Lakhimpur where the loan waiver program was not rolled out till the survey and the Waiver districts include the remaining five districts of Auraiya, Sitapur, Kanpur Dehat, Firozabad and Agra.

Formally the difference in differences analysis is captured by the following regressions:

$$Y_{id} = \alpha_1 + \alpha_2 \text{Eligible} * \text{WaiverDistrict}_{id} + D_d + D_{\text{Eligible}} + \sum_{i=3}^k \alpha_i X_{id} + \epsilon_{id}$$

where  $Y_{id}$  is the outcome variable, which can either be Consumption, Productivity or Social Spending.  $D_d$  are the district specific fixed effects which capture the difference between the districts. These account for unobserved factors that might have driven the program implementation timings for various districts.  $D_{\text{Eligible}}$ , is a dummy for Eligibility of the household. A household is Eligible, if it meets the following three criteria. First, it borrows a loan from a formal source. Secondly, the loan amount should not exceed Rs 50,000 and finally the household should have repaid at least 10% of the loan amount due. My coefficient of interest is  $\alpha_2$  which captures the difference in differences effect.  $\sum_{i=3}^k X_{id}$  includes other controlling variables like household income, loan size, monthly rate of interest, religion and employment.

Table 14 reports the estimates from equation 2.8.1. Column [1] shows that eligible households in districts that received loan waiver had a higher consumption expenditure, approximately by Rs 8000, as compared to households not-eligible for loan waivers, after controlling for pre-existing differences between the two groups and other household level control variables like income, loan size, etc.

Column [2] shows that eligible households in districts that received loan waiver had a Rs 208 higher social spending per month as compared to households that are not eligible for loan waivers. The coefficient in Column [3] suggests that the households that were eligible for the loan waiver had a lower productivity than households not-eligible for the loan waiver. However, the coefficient in Column [2] is insignificant, indicating that at best the eligible households had no productivity difference from not-eligible households in districts that received the loan waiver. Given that the households in the same districts are faced by similar shocks the insignificant difference between the eligible and not-eligible groups suggests a failure of the loan waiver program in UP to achieve its desired goals

Table 14: Difference in Differences Analysis

Dependent Variable:	Consumption	Social Spending	Productivity
	1	2	3
DID (WaiverDistrict * Eligible)	7,890*	208*	-9,378
	(4,445)	(118)	(7,280)
Eligibility	-940	1.874	-576.0
	(3,381)	(90.06)	(5,067)
Income (Yearly)	0.153***	0.005***	0.020
	(0.020)	(0.001)	(0.033)
Loan Amount (Rs)	0.099***	0.001	0.013
	(0.020)	(0.001)	(0.035)
Interest Rate (Yearly)	128.64	-0.241	48.62
	(116.6)	(3.106)	(199.4)
Hindu	2,259	85.06	490.5
	(4,165)	(110.9)	(6,441)
Sex	-1,512	-183.0	5,366
	(7,031)	(187.3)	(14,422)
Unemployed	-9,757	-192.9	-5,261
	(6,416)	(170.9)	(12,972)
Self-employed	-11,340*	-211.9	8,121*
	(5,968)	(158.9)	(4,635)
Constant	26,057**	584.9*	23,070
	(11,199)	(298.2)	(17,390)
Observations	634	634	420
R-squared	0.223	0.353	0.067

Source: Primary Data Collection, Own Calculation

Notes: The table above reports the difference in differences estimates for equation 2.8.1. Consumption refers to the yearly consumption, which is a rupee amount that the household spends on consumable goods in a year. Social Spending refers to the amount of money a household spends in a month on social functions like marriages and death ceremony. Productivity is calculated by dividing total production (amount a household earns in a year by selling its produce) by total land cultivated by the household. It is also measured in Rupees.

the Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets.

## 2.9 Difference in Differences with Restricted Sample

In the above analysis we focus on overall consumption, social spending and productivity differences between eligible and not-eligible households. It is pos-

sible that even though productivity increases are not experienced in the long run, the short run effect of the waiver status for districts that received the waiver in 2012-13 was worn off. To investigate this we run the Difference in Differences analysis with only those districts that received waiver in 2013-14, namely Agra and Firozabad along with my control district, Lakhimpur. This will help us identify the short run effect as these districts received the waiver in the year right before the primary data was collected.

Table 15 reports the results from the estimation of the equation 2.8.1, but for the restricted sample size. Column [1] shows a positive but insignificant difference between eligible and not-eligible groups in districts that received loan waiver. The loss of significance at 10% level could be driven by the small sample size. However, even for a small sample size, Column [2] shows that eligible households in districts that received loan waiver had approximate Rs 24,000 lower value of production per acre as compared to households not-eligible for loan waivers. Column [3] shows that eligible households in districts that received loan waiver had a Rs 226 higher social spending per month as compared to households that are not eligible for loan waivers.

## 2.10 Propensity Score Matching

To further alleviate my concerns about unobserved differences between Eligible and Not-Eligible groups we match households on the basis of a rich set of observed characteristics and then perform the difference in differences analysis on a matched sample. Specifically we compute propensity scores to match the households. A propensity score is the probability of a unit being assigned to a particular treatment given a set of observed covariates. Based on the similarity of their predicted probabilities of potential program eligibility, i.e. the propensity score, Propensity Score Matching (PSM) balances the distribution of observed covariates between the control and the treatment group.

In my case, we consider those who are eligible for loan waivers as treatment group (denoted  $D_i=1$  for household  $i$ ) and those that are not, belonging to the control group ( $D_i=0$ ). Households that are eligible (the “treated” group) are matched to households that are not (‘control’ group) on the basis of the propensity score:

$$P(x_i) = Prob(D_i = 1|x_i) \text{ where } (0 < P(X_I) < 1)$$

where  $x_i$ , is a vector of control variables. For estimating the propensity score we follow the usual practice in the literature of using the predicted values from a standard logit model. Then the estimated propensity scores are used

Table 15: Difference in Differences Analysis with Restricted Data

Dependent Variable:	Consumption	Social Spending	Productivity
	1	2	3
DID (WaiverDistrict * Eligible)	2622 (5,094)	226* -130.92	-24226*** -9,148
Eligibility	-1,723 (2,975)	-7.63 (76.45)	337 (4342)
Income (Yearly)	0.068*** (0.025)	0.005*** (0.001)	0.024 (0.041)
Loan Amount (Rs)	0.064*** (0.021)	0.001 (0.001)	0.008 (0.032)
Interest Rate (Yearly)	-68.587 (111)	-1.25 (2.86)	-222 (183)
Hindu	4344 (4178)	135.55 (107.39)	-2271 (6845)
Sex	-4046 (7678)	-55.89 (197.34)	3696 (16975)
Unemployed	5,905 (8,193)	281.67 (210.57)	21537 (18366)
Self-employed	-2244 (2730)	-89.06 (70.17)	30,408* (17895)
Constant	28,796*** (9753)	269.96 (250.64)	12714 (25528)
Observations	354	354	238
R-squared	0.204	0.371	0.136

Table 16: \*

*Notes.* The table above reports the difference in differences estimates for equation 2.8.1 but with a restricted sample size. The data used for this estimation is restricted to only those districts that received the loan waiver in the year 2013-14, namely Agra and Firozabad, and the control district of Lakhimpur. Consumption refers to the yearly consumption, which is a rupee amount that the household spends on consumable goods in a year. Social Spending refers to the amount of money a household spends in a month on social functions like marriages and death ceremony. Productivity is calculated by dividing total production (amount a household earns in a year by selling its produce) by total land cultivated by the household. It is also measured in Rupees. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets. (Source:) Primary Data Collection, Own Calculation

to create matched-pairs based on how close the scores are across the treatment and control groups. we then perform a Difference in Differences analysis on the matched sample. One way in which the PSM differs from regular regression method is that in PSM the regression analysis is confined to the households that lie on the common support. The unmatched households are dropped from the analysis. On the other hand in commonly-used regression methods the full sample is used. The impact estimates based on full samples are less robust to miss-specification of the regression function and are usually more biased as compared to those based on matched sample (Rubin and Thomas, 2000).

Table 17 reports the estimates from the difference in differences analysis on the matched sample. As can be seen, we lose my sample significantly by restricting to households on the common support. we look at the effect of eligibility on consumption, productivity and social spending. Even in the restricted sample my original results continue to hold. Consumption and Social Spending are higher between the treatment group as opposed to the control group. Additionally, there is no significant difference in productivity between the treated and the control groups as before.

## 2.11 Robustness Checks

### 2.11.1 Drought:

Usually debt relief is announced as a policy intervention to combat a natural calamity, especially drought in the case of agricultural loans. Table ?? in the Appendix, gives a list of states which were declared suffering from drought from the year 2010-2016. It also includes the number of districts in each state that were suffering from drought. Uttar Pradesh, had no districts with less than adequate rainfall from 2010-2014. Only in the year 2014, 44 out of 75 districts in Uttar Pradesh were declared to be drought struck districts. Similarly in 2015-16, 50 districts were declared to have received less than adequate rainfall. Because the primary data was collected in the year 2015, as a robustness check we control for drought using the data on the districts declared as drought struck in the year 2015. In the sample data collected for the purpose of this study, the districts of Agra, Auraiya and Kanpur Dehat were declared as drought districts, while those of Firozabad, Sitapur and Lakhimpur were not declared as drought districts.

Poorly distributed rainfall has a negative effect on crop production which could drive down productivity. To test whether the effect of loan waiver status

Table 17: Difference in Differences Analysis with Matched Data

Dependent Variable:	Consumption	Productivity	Social Spending
	1	2	3
DID (WaiverDistrict * Eligible)	16,632*** (6,013)	6,045 (6,645)	352** (156)
Eligibility	-3,324 (3,438)	1,067 (3,799)	24.6 (89)
Income (Yearly)	0.148*** (0.030)	-0.003 (0.033)	0.005*** (0.001)
Loan Amount (Rs)	0.151 (0.118)	0.037 (0.131)	0.000 (0.003)
Interest Rate (Yearly)	-155.9 (159.501)	151.4 (176.263)	-3.449 (4.159)
Hindu	-1,789 (5,079)	-657.2 (5,613)	150.9 (132.4)
Sex	-4,891 (17,217)	2,693 (19,027)	-72.22 (448.9)
Unemployed	15,058 (17,924)	3,531 (19,808)	-138.5 (467.3)
Self-employed	15,960.9 (17,408)	10,787 (19,237)	-24.92 (115.5)
Constant	6,076 (26,091)	17,877 (28,833)	152.4 (504.1)
PSU Fixed Effects			
Observations	151	151	151
R-squared	0.362	0.144	0.506

Table 18: \*

*Notes.* This table estimates the difference in differences on a matched sample using propensity score matching. The dependent variables are consumption, productivity and social spending. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets.(Source:) Primary Data Collection, Own Calculation

Table 19: Propensity score Matching Table

Outcome Variable	Unmatched			Matched		
	Eligible	Not Eligible	T-stat	Eligible	Not Eligible	T-stat
Income	54976	69524	-3.09	57463	72263	-1.4
HH Size	5.8028	5.449	1.33	5.9241	5.369	1.75
Loan Amount (Rs)	22157	67054	-9.43	28854	28818	0.02
Interest Rate (Yearly)	10.126	10.673	-0.69	13.468	12.197	0.84
Sex	1.0138	1.00	1.33	1.013	1.00	1
Land cultivated	1.417	2.103	-4.86	1.533	1.404	0.82
Hindu	0.965	0.921	1.94	0.873	0.939	-1.4
Self Employed	0.903	0.835	2	0.835	0.8354	0
Regional Rural Banks	0.007	0.04	-2.38	0.03	0.01	0.73

Table 20: \*

*Notes.* This table is a sensitivity analysis done to show the propensity score balance. It checks for the differences in average covariates between the eligible and non eligible households to see if there remain any significant differences between the two groups after propensity score matching. (Source:) Primary Data Collection, Own Calculation



on consumption, productivity and social spending of a household is confounded by drought, we control for drought. Column [1] in Table 21 estimates the impact of the loan waiver program on yearly consumption of the household. The results show that the program has a incremental impact on the yearly consumption of a household, even after controlling for drought in my original equation 2.4.1. Controlling for other covariates, the coefficient on waiver is 4855. (significant at 5% confidence level). Even though this number is slightly lower than in Table 7, it is still incremental and significant. This implies that after controlling for drought and other covariates, if a household received a loan waiver, or was eligible or had the knowledge of loan waiver, then it had a higher consumption than those households that did not. On similar lines Table 25 shows that receiving a waiver had a incremental effect on social spending after controlling for drought. Table 23 shows the receiving a waiver had a negative impact on productivity after controlling for drought.

## 2.12 Reducing Lakhimpur Sample Size

After collecting the Primary Data, it was brought to my notice through some government officials that there was a possibility that certain blocks in Lakhimpur did get the Loan waiver. From my data collected, six blocks were part of the possible list of blocks which received the waiver. The SIX blocks were, Ambarpur, Dilawar, Padhua, Roshan Nagar, Sansarpur and Tirkolia. While there was no official list released of the beneficiaries we decided that as a robustness check we would remove households from these blocks from my control district Lakhimpur and test Lakhimpur as a pure control district. Even as we write this thesis, Lakhimpur remains out of the purview of the program. My informal interviews government officials and banks revealed that a few blocks in Lakhimpur might have received loan waiver in 2015, the year we conducted the survey.

However unlike other districts of UP that received the waiver, there does not exist a clear official document of households that received a waiver in Lakhimpur. The only information we could obtain are the names of blocks that could have received a program roll out. Given the fuzziness of the information, we excluded these blocks from my analysis as a Robustness Check. This reduced my sample size of Lakhimpur from 179 households to 111 households. Table 27 reports the estimates from the difference in differences analysis

Table 21: Effect on Consumption			
Dependent Variable: Consumption (Yearly)			
	Loan Waived	Eligibility	Knowledge of Waiver
	1	2	3
Received Waiver	4,854.250**	5,673.786***	7,830.683***
	-2,019.67	-2,157.17	-1,974.16
Income (Yearly)	0.149***	0.150***	0.148***
	-0.02	-0.02	-0.02
Loan Amount (Rs)	0.097***	0.104***	0.104***
	-0.019	-0.02	-0.019
Interest Rate (Yearly)	73.861	38.241	104.512
	-112.215	-109.882	-111.044
Hindu	-4,166.79	-3,281.03	-4,507.313*
	-2,618.24	-2,579.71	-2,585.10
Sex	-1,066.36	-2,332.85	-462.552
	-7,087.09	-7,087.90	-7,034.35
Unemployed	8,172.40	9,081.00	6,643.23
	-6,476.52	-6,461.31	-6,444.29
Employed	-1,619.61	-681.773	-2,202.42
	-2,647.99	-2,611.15	-2,624.44
Drought	9,665.607***	10,853.975***	8,993.103***
	-2,273.33	-2,209.98	-2,248.09
Constant	19,975.086**	18,329.411**	17,999.904**
	-8,593.12	-8,664.23	-8,540.19
Observations	634	634	634
R-squared	0.195	0.196	0.207

Table 22: \*

*Notes.* The variable drought is a dummy variable taking the value 1, if a district was declared a drought district in the year 2015, and 0 a district was not declared drought in the year 2015. All other variables are similar to the ones described as in the tables above. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets.(Source:) Primary Data Collection, Own Calculation

Table 23: Effect on Productivity			
Dependent Variable: Productivity (Yearly)			
	Loan Waived	Eligibility	Knowledge of Waiver
	1	2	3
Received Waiver	-9,794*** (3,093)	-9,399*** (3,316)	-9,909*** (3,088)
Income (Yearly)	0.022 (0.033)	0.016 (0.033)	0.022 (0.033)
Loan Amount (Rs)	0.026 (0.031)	0.024 (0.032)	0.026 (0.031)
Interest Rate (Yearly)	110.356 (194.2)	217.502 (190.3)	111.27 (194.1)
Hindu	-155.568 (6,454)	-1,169.12 (6,434)	-505.24 (6,432)
Sex	5,117.26 (14,413)	7,045.77 (14,469)	5,098.31 (14,409)
Unemployed	-4,736.04 (12,906)	-8,393.76 (12,873)	-4,917.20 (12,895)
Employed	7,890* (4,625)	6,719 (4,596)	7,769* (4,617)
Drought	8,660* (4,880)	7,665 (4,900)	9,130* (4,882)
Constant	22,164 (17,117)	22,391 (17,167)	22,736 (17,120)
Observations	420	420	420
R-squared	0.054	0.049	0.054

Table 24: \*

*Notes.* The variable drought is a dummy variable taking the value 1, if a district was declared a drought district in the year 2015, and 0 a district was not declared drought in the year 2015. All other variables are similar to the ones described as in the tables above. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets.(Source:) Primary Data Collection, Own Calculation

Table 25: Effect on Social Spending

Dependent Variable: Social Spending (Monthly)			
	Loan Waived	Eligibility	Knowledge of Waiver
	1	2	3
Received Waiver	138.8** (54.981)	169.2*** (58.687)	106.7** (54.273)
Income (Yearly)	0.005*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
Loan Amount (Rs)	0.001 (0.001)	0.001* (0.001)	0.001 (0.001)
Interest Rate (Yearly)	-2.165 (3.055)	-3.158 (2.989)	-2.601 (3.053)
Hindu	-203.552*** (71.28)	-178.428** (70.18)	-192.404*** (71.07)
Sex	-150.15 (192.93)	-187.49 (192.83)	-147.10 (193.39)
Unemployed	103.32 (176.31)	129.39 (175.78)	95.06 (177.16)
Employed	-40.32 (72.09)	-13.61 (71.04)	-32.88 (72.15)
Drought	508.1*** (61.89)	542*** (60.12)	517.8*** (61.80)
Constant	527** (233.93)	475.1** (235.71)	535.7** (234.78)
Observations	634	634	634
R-squared	0.299	0.301	0.296

Table 26: \*

*Notes.* The variable drought is a dummy variable taking the value 1, if a district was declared a drought district in the year 2015, and 0 a district was not declared drought in the year 2015. All other variables are similar to the ones described as in the tables above. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets.(Source:) Primary Data Collection, Own Calculation

on the restricted sample from the district of Lakhimpur. Even in the restricted sample the coefficient of the variable Consumption is positive and significant. Social Spending is also positive but insignificant at the 10% level. Additionally, there is no significant difference in productivity between the treated and the control groups as before. A possible reason for this could be the loss of my sample size of the control district due to the restriction in the Lakhimpur district.

Table 27: Difference in Differences Analysis with Pure Control for Lakhimpur

Dependent Variable:	Consumption	Productivity	Social Spending
	1	2	3
DID (WaiverDistrict * Eligible)	10,244*	-10,554	203.1
	(5,400)	(9,195)	(144.6)
Eligibility	-2,885	905.3	17.67
	(4,511)	(7,447)	(120.8)
Income (Yearly)	0.159***	0.025	0.006***
	(0.022)	(0.035)	(0.001)
Loan Amount (Rs)	0.104***	0.018	0.001
	(0.022)	(0.038)	(0.001)
Interest Rate (Yearly)	116.4	75.71	-0.990
	(142.3)	(277.9)	(3.814)
Hindu	1,811	3,379	71.60
	(5,646)	(9,246)	(151.2)
Sex	-1,132	5,249	-179.1
	(7,414)	(15,319)	(198.6)
Unemployed	-10,324	-4,920	-206.5
	(6,809)	(13,981)	(182.3)
Self-employed	-11,205*	8,434	-209.2
	(6,250)	(5,624.448)	(167.4)
Constant	26,169**	18,944	600.5*
	(12,104)	(19,765)	(324.2)
Observations	562	356	562
R-squared	0.218	0.063	0.342

*Source:* Primary Data Collection, Own Calculation

*Notes:* Data on all variables is taken from the primary data collected. Data on all variables is taken from the primary data collected. Asterisks denote significance: \*  $p < :10$ , \*\*  $p < :05$ , \*\*\*  $p < :01$ . Standard errors are in brackets.

### 3 Conclusion

In this chapter we study the UP Rin Maafi Yojana using both primary and secondary data. Using administrative loan repayment data we find a sharp fall in repayment rates immediately following the announcement of the waiver scheme, across all districts of UP. Moreover, the timing of this fall in repayment rate in each district corresponds to the year in which the program was rolled

out in that district. To understand whether these macro level patterns are indeed indicators of moral hazard we look further in to my primary data.

First, we analyse the effectiveness of loan waiver programs on productivity. we also investigate whether expectations about loan waivers lead to moral hazard by potentially eligible households. My findings from primary data suggest that in expectation of loan waiver households make unproductive expenditures. households that have actually received the waiver, those that are eligible and those with knowledge of waiver, exhibit an increased consumption and social spending. we interpret these findings as indicators of moral hazard in the behaviour of households when they expect waivers. Further my results show no significant productivity enhancement in response to the loan waiver program. My findings are robust to different empirical specification and a series of sensitivity tests.

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