Essays in Development Economics in Reference to the Indian Credit Sector

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Thesis submitted in fulfilment for the degree of Doctor of Philosophy in Economics

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October 2018

Abstract

This dissertation comprises four empirical essays with the objective of understanding how to improve the delivery of credit to the poor in India by studying caste discrimination in credit, women's empowerment, and impact of business training and repayment cycle on loan volumes, investment and incomes. The study uses primary data collected by myself from a village in the Indian state of Haryana from the clients of three microfinance institutions (MFIs), cooperative credit society and professional money lenders between 2015 and 2017 over three field visits; and from the India Human Development Survey (IHDS) data of 2005 and 2011-12.

In the first chapter, from the IHDS data, I examine whether the borrowers' caste differences explain their differences in credit volumes. Using the Blinder–Oaxaca decomposition method, along with the Heckman procedure and the instrumental variable (IV) procedure to correct for selection and simultaneity bias, I find large credit differentials between upper castes and lower castes. I also show the evidence of caste discrimination (against the lower castes) and its increase between 2005 and 2012. I corroborate discrimination from the qualitative information collected in my field surveys.

Using the village survey data, my second chapter examines the impact of women's empowerment on their creditworthiness, measured in terms of total amount of loans (taken over time). An empowerment index is constructed from the borrowers' responses to questions regarding economic, social, interpersonal and political consciousness. I find that more empowered women secure greater loans. However, empowerment is likely to suffer from endogeneity, which is address by adopting the Instrumental Variable (IV) approach and using the sex of the borrower's first child as an instrument for empowerment. The IV estimates show a positive impact of empowerment on the volume of loans. My explanation is that empowered women may have a higher ability to utilise loans for their businesses due to greater mobility, purchasing capacity, and economic independence. I study the robustness of this finding using the IHDS data.

In the third chapter, I evaluate the impact of a business training programme on women microfinance clients using the same village survey data and interviews. The treatment group is the borrowers from one MFI that received business training (by an exogenous rule), while the control group had no training. Using difference-in-difference, I find that training did increase

their incomes albeit with a reduction in their investment. The ‘treated’ women realised that expanding business without necessary knowledge and skills was risky, and hence cut back on investment.

In the fourth chapter, I explore if flexibility in repayment would be beneficial for clients as opposed to traditional weekly repayments using the same primary data and in-depth interviews. I find that the flexible and monthly repayment increased the level of investment as compared to the weekly schedule, but it did not raise income. The monthly repaying clients also had a higher loan amount and greater savings compared to the weekly paying clients.

In sum, the study covers some key issues of the poor borrowers, and it highlights the need for removing caste barriers, eliminating son preferences, training women entrepreneurs, and flexible and infrequent loan repayment cycles.

Acknowledgement

I thank my supervisors' Dr Bibhas Saha and Dr Xiangong Che for their help and guidance throughout the course of my PhD. My research is greatly benefited by the feedback of Dr Muhamad Asali whose work also inspired me and served as a base for one of the chapters in this thesis; and Joe Durham, who proofread and challenged me on every single word of this research. I am also very grateful to staff at the three Microfinance Institutions who helped me during the data collection process.

This work has benefited from the comments in various seminars and conferences, including DSA conference 2018 at University of Manchester. I would also like to thank Luis Artiva, Sarah Donachie, Dr. Rashmi Arora, and Matthew Gibson for useful comments and kind support. I am also greatly indebted to Dr. Owen Wilson for his physical love and academic support.

Last but not least, I would like to thank my parents and my partner, Alex Durham, for their love and encouragement during this process.

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Chapter 1

3000 Years of Discrimination and Counting: How Caste Still Matters in the Indian credit sector.

Abstract

The caste system has dominated the social, political and economic lives of Indian people for over three thousand years. Since independence, the Indian government has introduced a flood of quotas, schemes and affirmative action to tackle caste discrimination. Can seventy years of government policy reverse three thousand years of oppression? Taking a close look at the country's credit system reveals that a new, more subtle, and less overt form of discrimination appears to be emerging, and becoming more widespread. This paper examines whether caste-based differences influence the amount of credit sanctioned to borrowers in India utilising data from the India Human Development Survey collected in 2005 and 2011-12. Using the Blinder–Oaxaca decomposition method, along with the Heckman procedure and the instrumental variable approach to correct for selection and simultaneity bias, I find substantial credit differentials between the general caste and other lower castes. I also show the evidence of caste discrimination against the lower castes. The results of this research have been complemented by qualitative data gathered from interviewing lower caste borrowers in North India to understand the nature of discrimination and obstacles faced by them in the credit sector.

1. Introduction

Discrimination based on caste is a well-established phenomenon in India. Not that long ago, lower caste people were treated as untouchable, were consistently denied access to public services, and were subject to exploitation, abuse, mistreatment and prejudice. Nowadays, the scale and visibility have changed, but discrimination can still be seen in the form of relatively subtle constraints and restrictions in different areas: education, housing, finance, and employment. Although caste equality has been enshrined in the Indian constitution since 1950, caste-based divisions have continued to dominate - in the economy (Deshpande, 2000; Kijima, 2006), in marriage (Ahuja and Ostermann, 2016), in employment (Agrawal, 2014; Thorat and Attewell, 2007), in access to energy (Saxena and Bhattacharya, 2018), in education (Desai and Kulkarni, 2008) and in general social interaction. These caste divisions are sometimes reinforced through economic boycotts and physical violence (Narula, 1999; Thorat, 2005). Despite various efforts by the government such as reservation policies in educational institutions, and employment in the government and public sector, caste still remains an important indicator of socioeconomic disadvantage (Kumar, 2016). Given the pervasive presence of discrimination, it would be surprising if it did not have a significant influence on credit outcomes.

Credit is one of the most critical constraints in economic development for the lower castes (Thorat, 2009). Variations in access to credit constitute a major source of income inequality (Demirgüç-Kunt and Levine, 2009). Previous research has shown that a lack of access to credit constraints entrepreneurship (Banerjee, Breza, Duflo and Kinnan, 2012), poverty reduction (Chowdhury, Ghosh and Wright, 2005), agricultural investment, and income growth (Kaboski and Townsend, 2012), farm production (Kochar, 1997), and spending on education (Doan, Gibson, and Holmes, 2004). These constraints are even higher for lower caste groups who remain socially excluded from the mainstream and lack access to assets, public facilities and opportunities to improve their plight (Thorat and Neuman, 2012).

I use the definition of discrimination proposed by Becker (1971) which states that discrimination occurs when some individuals complete a market transaction at a higher cost or under more stringent terms than others who share the same characteristics. In credit markets, this translates into differences in loan outcome (approvals, amount, and interest rate) which are based on differences in caste, race, or nationality between groups with otherwise similar human

and physical capital. Becker introduced the first model of discrimination which explains discrimination by 'taste for discrimination'. When applied to credit markets, this model implies that lenders may discriminate against minority borrowers to avoid interacting with them, regardless of the borrower's ability to repay, and that they are willing to suffer a financial penalty to do so. Another theory of discrimination, known as 'statistical discrimination' was pioneered by Arrow (1973) and Phelps (1972). The premise of this model - when applied to lending - is that the lenders have limited information about the circumstances of some borrowers - particularly their ability to repay. This gives lenders an incentive to use easily observable characteristics such as caste to assume the expected creditworthiness of borrowers provided that these characteristics are correlated with creditworthiness.

The reasons for credit differentials between castes may originate on both the supply and demand sides of the credit market. On the supply side, some lenders may treat a loan application differently based on whether it comes from a higher caste or a lower caste, notwithstanding similar economic, household, and personal characteristics of the borrower - simply because of preferences or cultural beliefs about castes. Other lenders may discriminate against lower caste borrowers due to an expectation that lower caste clients lack the business acumen to use a loan investment wisely. On the demand side, lower caste borrowers may demonstrate traits such as a cultural reluctance to display entrepreneurship or initiative; a lack of background in negotiation, or a cautious attitude to risk-taking - all of which could affect a loan application. It could also be that a self-fulfilling prophecy was at work: the borrowers themselves anticipated prejudice, felt that the lender would be unfair to them (high-interest rates and unfair collateral requirements), and hence, did not seek large loans.

The qualitative interviews with lower caste borrowers in Northern India demonstrate that modern-day discrimination is rarely in the overt form of denying all loans to the lower castes. More subtle means are used: for example, giving a smaller loan amount, demanding higher collateral, granting inadequate extensions on late repayment, imposing higher interest rates, or denying marginal applications. The qualitative enquiries find evidence of petty discrimination to discourage borrowers: long waiting times for opening bank accounts, lack of help with the completion of paperwork, and intimidating inter-personal contact between higher caste lenders and lower-caste borrowers.

One lower caste entrepreneur expressed his views on business lending from banks:

"....bank lending is not for the poor lower caste businesses. The banks never give us an adequate loan. And it takes many weeks just to start the loan process - they give priority to the higher castes."

Another lower caste borrowers added about his experience in the informal credit market:
"....the loan terms are unfair to us. We get less loan for the same amount and quality of land for collateral compared to upper caste. Lenders always treat it like they are doing us a favour even though we pay such a high-interest rate"

The issue of caste discrimination in credit has largely been ignored in social science research in India. We, therefore, have limited insight on the extent and nature of caste discrimination in credit associated with group identity. This is one of the first studies to analyse the discrimination against lower castes in India in the credit framework using qualitative and decomposition methods.

Using nationally representative data from the India Human Development Survey (IHDS) collected in 2005 and 2011-12 and qualitative interviews with lower caste borrowers, this paper examines and compares loan amount differentials between castes in the Indian credit sector over two periods. Using Blinder–Oaxaca decomposition, I demonstrate to what extent these differences can be 'explained' due to the differences in observable characteristics of the individuals and how much is 'unexplained' - which represents an indication of discrimination. I further decompose the 'explained' component to identify the contribution of each specific characteristic in generating the credit differences. In addition, I use the quantile decomposition technique to analyse the caste gap across the entire credit distribution. Furthermore, I compare the credit outcomes – loan application, approval rate and credit amount sanctioned – in lending from banks, money lenders and social network.

It is important to acknowledge at the outset that there are genuine statistical differences between castes which affect loan outcomes, regardless of discrimination. There are particular differences in observable characteristics between the general caste (GC) and lower castes - Other Backward Castes (OBC); Schedule Castes (SC); and Schedule Tribes (ST). The former is more urban, better educated, more likely to be self-employed or in regular salaried jobs, have higher income and consumption levels. These disparities inevitably get reflected in the amount of credit sanctioned - such that lower castes on average perform significantly poorly compared

to general castes. The differences, however, in the credit amount between the general caste and other lower castes in India are not only because of lower quality attributes of lower caste (in terms of education, income, assets etc) but also because these groups may be facing discrimination in the credit sector.

The findings show three main results. First, there are significant differences in loan amount between the general caste and other lower castes; second, the credit differentials have increased between 2005 and 2011-12; and third, the unexplained component of the total difference (an indication of discrimination) has also increased over the period in question. In other words, the situation of lower castes in the credit market is getting worse.

Another contribution of this paper is highlighting the sticky floor[1] phenomenon in the credit gaps between the general caste and other lower castes in India. Using the quantile regression-based decomposition method, I find that the credit gap between the general caste and other lower castes, and the share of unexplained component of the gap, is higher at lower and middle deciles suggesting a sticky floor effect. There are large credit differentials between castes in lending from the bank, money lenders and social networks and the differences are higher in rural areas than urban areas.

This paper is structured as follows: Section 2 draws on literature to give the background of the Indian caste system. Section 3 presents data and uses descriptive evidence to highlight caste differences in India. Section 4 sets out the methodology for the paper. Section 5 presents the results from the selection equation, loan amount equation, decomposition of credit differentials. Section 6 discusses and concludes the paper.

2. Background of the caste system in India

The Indian Constitution identifies three main categories of people for preferential policies that reserve seats in legislatures, public sector enterprises, government jobs, and educational institutions. These are OBC; SC also known as *Dalits*; and ST also known as

[1]Sticky floor refers to the scenario where the gap is higher at the bottom of the distribution and the lower caste at the bottom are at a great disadvantage. In this particular case, it refers to the phenomenon of social rigidity in which a certain group of lower castes fail to or are unable to take advantage of readily available options for improving their social and economic status.

Adivasis. GC (also known as forward class) is a term used in India to classify communities who do not qualify for any affirmative action schemes operated by the Indian government. By default, 'general caste' equates to the higher caste in more traditional categorisations.

In India, caste is associated with socio-economic status with a close relationship with occupation and employment (Thorat and Attewell, 2007), income and expenditure (Deshpande, 2000), and capital (Kijima, 2006) - all which are of course helpful in accessing new lines of credit. General caste groups have usually better economic outcomes than lower castes. There is a great hierarchy among the OBC and generally, many OBC groups are closer to GC than to SC or ST in terms of standard of living, income, education and other characteristics. The SC, ST and OBC comprise about 19.5 percent, 8.6 percent, and 41 percent, respectively, of India's population (National Sample Survey Office, 2011). But seven decades after Independence, 33.6 percent of SC, 44.8 percent of ST and 20.7 percent of OBC live below poverty line.

Table 1: Caste distribution according to population, poverty, expenditure and literacy

Caste	% of population	% below poverty line	Average Monthly Expenditure Rural (Rs)	Average Monthly Expenditure Urban (Rs)	Literacy Rate
General Castes	25	12.5	1281	2467	79%
Scheduled Castes	19.5	33.6	929	1444	58%
Scheduled Tribes	8.6	44.8	873	1797	50%
Other Backward Classes	41.1	20.7	1036	1679	69%

Source: National Sample Survey Office, 2011. 1 Dollar = Rs 70 in May 2019

Dalits are the most oppressed and marginalised group in India. While Dalits make up around 20% of the total population of India, their control over resources of the country is less than 5% (National Campaign on Dalit Human Rights (NCDHR) report, 2009). Approximately three-quarters of the Dalit workforce are landless or nearly landless agricultural labourers (Census of India, 2011). According to an NCHDR report, the social conditions of Dalits are so deplorable that more than half of the Dalit children are malnourished and less than 10% of Dalit households can afford electricity, safe drinking water, and toilets.

The condition of ST households is no better than their SC counterparts. Even though ST did not face exclusion in the form of untouchability, unlike SC, they have even poorer outcomes in terms of health, education, jobs, and employment. Despite the reservation system, the share of SC and ST in government job is 16.99% and 8.55 % respectively (Census, 2011). On the whole, lower castes especially SC and ST perform badly in every development metric - including credit.

3. Data and sample characteristics

The data used in the paper comes from two rounds of the India Human Development Survey (IHDS) - a nationally representative survey of 42,152 households in 2011-12 and 41,554 households in 2005 collected from 1,503 villages and 971 urban neighbourhoods across India. The survey covers a range of questions relating to economic activity, income and consumption expenditure, assets, social capital, education, health, marriage, and fertility. Realising that quantitative secondary data is insufficient to capture most of the social reality of discrimination, this study also makes use of qualitative data using semi-structured interviews and informal discussions with several borrowers in three villages[2] in North India to understand the way caste discrimination exists in the credit sector. 16 men (3 from OBC, 12 from SC, and 1 from ST) and 8 (6 from SC and 2 from ST) women from lower caste communities were randomly selected for the interviews[3]. The interviews followed a semi-structured approach, giving participants the flexibility to discuss issues important to them. Informal discussions were held with political activists and representative of Dalit communities, four junior employees of two rural commercial banks[4] (3 GC and 1 OBC) and six local money lenders (belonging to general caste) operating in the region.

Table 2 presents the descriptive of the variables of the four caste groups used in the analysis. The proportion of caste groups used in IHDS 2011-12 is similar to National Sample Survey Office (2006) where GC are 30 percent, OBC are 41.1, ST are 8.6 percent, SC are 19.5

[2] The qualitative work was done in the months of January and February in 2018. The villages demographic are representative of the states in the North India, however, it's difficult to say that it represents nationwide trends since India is such a diverse country. However, qualitative analysis are very much in line with the quantitative analysis.

[3] All the clients approached agreed to be interviewed for this study. The interviews were done with women at their houses in the presence of a local social worker who helped with translation and conversations. Consent was taken in verbal form.

[4] Punjab National Bank and State Bank of India.

percent. The primary dependent variable is the log of loan amount[5]. GC has the highest amount of loan undertaken, followed by OBC, SC and ST. However, only 46 percent of the GC participated in the credit market compared to 60 percent of the OBC, 44 percent of the ST and 56 percent of the SC in 2011-12. Similar trends can be seen in 2005.

The general caste has better outcomes in terms of loan amount, income, consumption, and education compared to the other castes. Income, consumption and loan amount increased by more than double for all the castes between 2005 and 2012. Caste-based stratification translates into low human capital for lower caste individuals. In 2005, the average number of education years completed by ST (head of the households) in the sample were 3.63 years, 3.99 years for SC, 5.22 years for OBC, followed by 7.30 years for the GC. Generally, the differences at lower levels of education (primary) are less pronounced across social groups but start to diverge widely by middle school and higher. For instance, only 3.5 percent of the SC heads of household have achieved a graduate or post-graduate education compared to 14 percent of GC individuals.

Although the GC are less likely to live in rural areas, they are more likely to own land for agricultural purposes. In 2011-12, 56 percent of GC lived in the rural area, and 46 percent owns land for agricultural purposes. Whereas 65 percent of OBC, 86 percent of ST and 70 percent of SC population live in the rural area, however, 46 of OBC, 59 percent of ST, and 35 percent of SC own land for agricultural purposes. The amount of land owned by SC/ST has increased, while decreased for OBC and GC over this time. The general castes are more likely to live in dwellings that are designed to be solid and include cemented flooring and strong roof (also known as *pukka* houses).

[5] Government policies have invariably seek to tackle the discrimination problem in the credit market by focusing on the access to credit. The assumption is that - having gained access to credit market - the processes and controls within that system will work to ensure equal treatment. This study does not focus on access, instead, it measures how equitably the credit system treats different groups after they have gained access.. The key measure is therefore the amount of credit - the size of the loan actually granted - to those who make applications.

Table 2: Summary Statistics

	2011-12								2005							
	GC		OBC		ST		SC		GC		OBC		ST		SC	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Loan amount (Rs)	64435	718730	52949	184840	24611	117216	28483	79241	24356	214400	18751	92206	7390	36548	10971	46609
Log of Loan	10.72	1.49	10.39	1.41	9.6	1.66	9.94	1.34	10.03	1.48	9.56	1.4	8.67	1.6	9.14	1.38
Dummy if loan taken	0.46	0.5	0.6	0.49	0.44	0.5	0.56	0.5	0.33	0.47	0.47	0.5	0.34	0.47	0.44	0.5
Number of loans taken	1.23	2.42	1.87	2.89	1.57	3.05	1.66	2.74	0.97	2.29	1.45	2.72	1	2.39	1.42	2.76
Yearly income (Rs)	178140	292287	114354	181464	92999	135742	99492	167256	75374	113964	47282	63617	39268	79403	38676	42127
Yearly consumption (Rs)	148807	149001	114919	114844	83398	85722	94903	84609	68797	61416	49866	46009	32724	33295	43027	40272
Proportion have female head	0.14	0.35	0.14	0.34	0.15	0.36	0.15	0.35	1.1	0.29	1.1	0.29	1.1	0.3	1.1	0.3
Age of the head	51.88	13.61	49.53	13.53	47.92	13.17	47.83	13.43	48.51	13.68	47.08	13.38	45.53	13.02	45.46	13.18
Education years of the head	7.46	5.07	5.46	4.71	3.91	4.54	4.39	4.55	7.3	5.06	5.22	4.68	3.63	4.45	3.99	4.46
Size of the Household	4.82	2.33	4.92	2.44	4.77	2.16	4.83	2.17	5.12	2.46	5.28	2.6	5.06	2.4	5.19	2.33
Amount of land in acres	11.99	59.93	11.6	48.16	16.52	65.04	4.78	27.81	22.31	322.91	12.97	218.14	15.54	77.84	3.42	22.07
Dummy if own land	0.46	0.5	0.46	0.5	0.59	0.49	0.35	0.48	0.4	0.49	0.45	0.5	0.55	0.5	0.33	0.47
Live in urban area	0.44	0.5	0.35	0.48	0.14	0.35	0.3	0.46	0.47	0.5	0.34	0.47	0.15	0.35	0.29	0.45
House Quality[6]	0.76	0.43	0.67	0.47	0.35	0.48	0.56	0.5	0.71	0.45	0.58	0.49	0.29	0.45	0.47	0.5
Have a ration card[7]	0.87	0.33	0.86	0.35	0.81	0.39	0.87	0.34	0.85	0.36	0.8	0.4	0.78	0.41	0.86	0.35
Proportion in the sample	28.57		41.10		8.78		21.74		32.48		39.19		8.28		20.05	

[6] A binary variable distinguishing between dwellings that are designed to be solid and include cemented flooring and strong roof compare to houses without a strong floor or roof. (Good = 1, Bad = 0)

[7] Ration card is an identification document issued by state governments in India. It categorises household according to their poverty level and allow the holder of below and extreme poverty households to obtain food and other commodities at a subsidised price.

The proportion of those taking a loan has also increased for all the groups. GC has taken the lowest number of loans in the last five years; however, their loan amount is twice as big as SC. However, SC/ST have significantly improved their credit outcomes between 2005 and 2011-12. Figure 1 below plots the kernel density distribution of log loan for all the castes. The distribution of log loan of GC lies to the right of all the other lower castes.

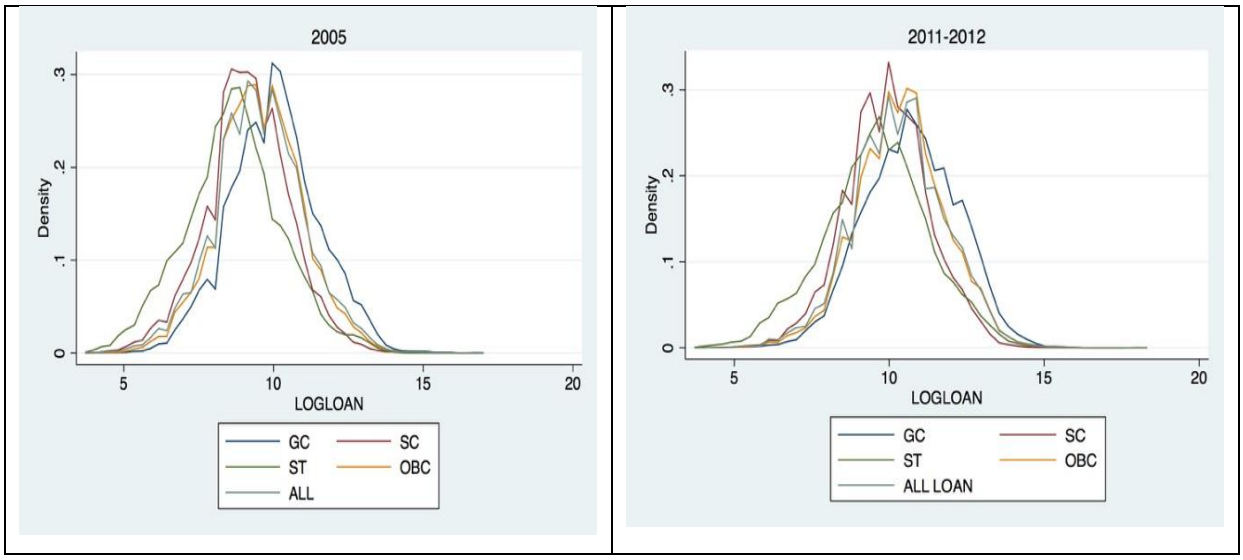


Figure 1: The kernel density distribution of log of amount of loan by various caste groups in 2011-2012 and 2005.

There is a clear distinction in the occupational structure of various castes (see Table 11 in the Appendix). The major source of income for GC and OBC continued to be cultivation, non-agricultural wage labour and salaried employment. Since a large proportion of ST own land, a very significant portion of this caste group derives their income from agricultural activities. The hierarchical nature of the caste system combined with low endowments of human and physical capital implies that major portion of SC's income continues to come from selling their labour and a very small portion derives from cultivation.

The purpose of loans taken varies according to the caste group (see Table 12 in the Appendix). In 2011, around 36.5 percent of the general caste loans are for productive purposes such as buying land, agricultural, business, and education and the rest for non-productive purposes such as marriage, consumption, educational, medical expenses etc. Around a third of the loans by ST and OBC are for productive purposes which are in line with GC. SC mostly comprising of wage labour has only 21 percent of loans for productive purposes and mostly take loans for non-productive purposes.

Compared to 2005, the patterns within the group are more or less the same. Loan for the non-productive purposes has increased for all the caste groups. Since consumption loans do not generate any financial return and are deemed risky, increase in such loans for GCs and OBC shows that lenders favour these castes over SC and ST. Loans for productive purposes such as agriculture and business decreased for all lower castes but the decline in the SC was the sharpest where it reduced to half.

Different castes tend to get their loans from different sources (see Table 13 in the Appendix). The major source of finance for general castes comes from formal lenders such as banks, while social networks and money lenders also play a significant role. OBC have increased their share of lending from banks while reducing their reliance on money lenders between 2005 and 2011-12. SC and ST are majorly dependent on informal sources for their finance, however, these groups have greatly reduced their dependence on money lenders between 2005 and 2011-12.

With the development of formal finance in India in the last decade, all the caste groups have increased their reliance on formal sources such as banks, NGOs and credit groups in 2011-12. With further development in financial services in India specially in microfinance and rural banking, we may see a current trend of a diminishing role for money lenders in Indian society. The data also show an increase in the share of loans from relatives and friends for all the caste groups. Overall, we see a significant convergence of education, income, consumption, loan amount of SC/STs toward non-SC/ST levels (also noted by Hnatkovska, Lahiri and Paul, 2012).

The survey done in 2011-2012 also has information on the breakdown of loan approval and rejection of households from banks, money lenders, and social network (see Table 14 in the Appendix). There is no clear pattern, however, general castes are more likely to borrow from banks, whereas other castes are more likely to borrow from informal sources such as money lenders and friends.

4. Methodology

This paper presents estimates of the mean caste loan amount gap in the Indian credit sector and the extent to which this differential can be explained by differences in observable

characteristics or 'endowments' of clients across caste groups. The amount of credit the borrower has arises from the following equation:

$$ln\, Y_{ij} = X_{ij}\beta_j + u_{ij} \qquad (1)$$

Where lnY is the natural logarithm of loan amount of i_{th} individual in j_{th} social group ranging from GC, SC, ST and OBC. X_{ij} is a vector of observed characters, and β_j is a coefficient vector to be estimated for each caste type, and u_{ij} is assumed to be a normally distributed error term with mean zero and positive variance.

The Blinder–Oaxaca decomposition is employed to decompose the credit amount gap in outcomes between various castes[8]. Oaxaca (1973) and Blinder (1973) developed a regression-based decomposition to divide the gap in an outcome of interest between two groups into an 'explained' and an 'unexplained' portion. The 'explained' portion of the gap is the actual difference between the mean values of two castes which could be explained by differences in endowments and personal attributes. The 'unexplained' portion of the gap arises from group differences in the effects of the independent variables (Sen, 2014). This is also known as discrimination function or unexplained residual – a part that cannot be accounted for by differences in characteristics. While the unexplained component is often used as a measure for discrimination, it is very likely that the residual also includes the effects of unobservable or unmeasurable characteristics (Deshpande and Sharma, 2014). All decomposition analyses are subject to this caveat given that it is generally very difficult to control for all the borrower's characteristics that may affect creditworthiness[9].

The difference in the credit amount arise from following equation:

$$\overline{lnY_g} - \overline{lnY_l} = \underline{[(\overline{X_g} - \bar{X}_l)\hat{\beta}^*]} + \underline{[(\hat{\beta}_g - \hat{\beta}^*)\bar{X}_g + (\hat{\beta}^* - \hat{\beta}_l)\bar{X}_l]} \qquad (2)$$

EXPLAINED UNEXPLAINED

[8] Blinder–Oaxaca decomposition has been used to measure differences between castes in health outcomes (Maity, 2018), labour market (Hnatkovska, Lahiri and Paul, 2012), poverty (Borooah, 2005), school enrolment (Borooah and Iyer, 2005), access to energy (Saxena and Bhattacharya, 2018) in Indian context.

[9] It is also possible that pre-market discrimination affects the development of characteristics, and thus, the explained component could also constitute the effects of past discrimination. Considering this, the estimates of the unexplained components should not be taken as precise measurement of discrimination but as rough estimates of its scale (Deshpande and Sharma, 2014).

Where lnY is the natural logarithm of loan amount, g and l subscripts stand for general caste and lower castes (SC, ST and OBC) respectively. X_g is a vector of observed characters for general caste, X_l is a vector of observed characters for various lower castes, and β_g is a coefficient vector to be estimated for general caste, β_l is a coefficient vector to be estimated for lower caste and $\hat{\beta}^*$ is the estimate of the non-discriminatory credit coefficient and can be written as:

$$\hat{\beta}^* = D\hat{\beta}_g + (1 - D)\hat{\beta}_l$$

The non-discriminatory credit coefficient $\hat{\beta}^*$, can be estimated using the coefficients from the higher caste where (D=1) or the lower caste as the reference coefficients (D=0). However, there is no particular reason to assume that the coefficients of any of the groups are non-discriminating (Jann, 2008). It has been claimed that the undervaluation of one group comes along with an overvaluation of the other (Cotton, 1988). Considering this, I use the method proposed by Neumark (1988) using the coefficients from a pooled regression over both groups as an estimate for $\hat{\beta}^*$.

Selectivity and simultaneity bias

Another methodological problem faced in analysing the caste gap is the existence of endogeneity which can be caused by self-selection and simultaneity bias. Selection bias could occur when individuals with similar characteristics (education or consumption level) have different levels of entrepreneurship, perseverance and ability, which may lead to different probabilities of their participating in the credit market. The self-selection is corrected by using the Heckman two-step procedure in the analysis.

Using the Blinder-Oaxaca decomposition, the observed earnings differential can be further decomposed into:

$$\overline{lnY_g} - \overline{lnY_l} + [\gamma_j\bar{\lambda_j} - \gamma_i\bar{\lambda_j}] = \underline{[(\overline{X_g} - \bar{X_l})\hat{\beta}^*]} + \underline{[(\hat{\beta}_g - \hat{\beta}^*)\bar{X}_g + (\hat{\beta}^* - \hat{\beta}_l)\bar{X}_l]} \qquad (3)$$

EXPLAINED UNEXPLAINED

where γ is the coefficient of the inverse Mills ratio (λ).

Simultaneity bias could be caused by the presence of endogenous variable such as consumption expenditure which may cause reverse causality. To remove the simultaneity bias, we require an instrument for consumption expenditure – an exogenous variable that is

correlated with consumption expenditure but is not otherwise associated with the loan amount. In this case, the daily calorific requirement of the household satisfies the requirement for use as instrumental variables[10]**.** The instrument affects the loan amount through its effect on consumption expenditure only.

Specification checks

Identification can be achieved by including at least one independent variable that appears in the selection equation but not in the outcome equation - we need a variable that affects the selection, but not the outcome (Sartori, 2003). In the specification, there are a number of additional identifying restrictions that are described below.

A ration card is an important document for identification in India as well as a proxy for having other legal documents, is pre-requisite for being able to participate in the credit market, however, it does not affect the loan amount. No lender will start the loan application process without proper documentation. The information regarding the source of loan and purpose of the loan is only available for people who have taken loan, so it appears in the credit amount equation. The rest of the variables appears in both selection and loan amount model.

5. Results

Selection equation

I begin the analysis by estimating a model of the probability of participating in the credit market using a probit model[11]. The dependent variable is 1 if the client has taken a loan or 0 otherwise. The estimates of the probit regressions are used to construct the Inverse Mills ratio (IMR) for the purpose of correcting the credit amount equation for selection bias as reported in the later section.

[10] We also test for the relevance of the instrument in the first-stage regression. Staiger and Stock (1997) proposed a rule of thumb declaring the instruments weak when the first stage *F* statistic is less than 10. The F-statistic from the first-stage is sufficiently large in every instance, suggesting that the IV is powerful. Another approach, by Stock and Yogo (2005) is to reject the null hypothesis of weak instruments when the Cragg and Donald (1993) F-statistic exceeds a given threshold. In this case, we reject the null hypotheses of the weak instrument since Cragg-Donald F statistic exceeds the threshold of 16.38 at 10%. By these criteria, we have a good instrument in total daily calorific requirement of the household.

[11] I failed to reject the null hypothesis for Wald test of exogeneity using instrument variable, therefore, a regular probit regression may be appropriate.

To facilitate the understanding of the effects of coefficients, I present the marginal effects[12] of the regressors on the probability of participation in the credit market by each caste in Tables 3 and 4. The coefficients from the probit model are shown in Tables 15 and 16 in the Appendix.

Table 3: The marginal effect of participation in the credit market by various castes in 2005.

	(1)	(2)	(3)	(4)
VARIABLES	GC	OBC	ST	SC
CONSUMPTION	0.105***	0.144***	0.189***	0.160***
	(0.008)	(0.008)	(0.020)	(0.013)
AGE	0.005***	0.007***	0.007*	0.001
	(0.002)	(0.002)	(0.004)	(0.003)
AGESQ	-0.000***	-0.000***	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
EDUCATION	-0.007***	-0.008***	-0.008***	-0.007***
	(0.001)	(0.001)	(0.003)	(0.002)
LAND	0.001	0.009*	-0.004	0.038***
	(0.004)	(0.005)	(0.009)	(0.008)
SEX	-0.052***	-0.061***	0.001	-0.045**
	(0.015)	(0.015)	(0.033)	(0.021)
SIZE OF HH	0.002	-0.000	-0.006	-0.002
	(0.002)	(0.002)	(0.004)	(0.003)
URBAN RURAL	-0.097***	-0.101***	-0.154***	-0.048***
	(0.012)	(0.012)	(0.034)	(0.016)
HOUSE QUALITY	-0.038***	-0.045***	0.046*	-0.013
	(0.012)	(0.011)	(0.026)	(0.015)
RATIONCARD	0.013	0.025**	-0.017	0.027
	(0.013)	(0.011)	(0.023)	(0.018)

[12] Marginal effects are sensitive to two quantities: the variance of the dependent variable conditional on the independent variables and the scale parameter defined as the standard deviation of the underlying latent outcome conditional on the independent variables Controlling for confounding variables could change both these quantities in offsetting directions. Therefore, an additional care is needed while selecting the variables. *margins* command in STATA is used to measure the marginal effect of one unit increase in independent variable on the probability of taking a loan.

STATE DUMMIES	YES	YES	YES	YES
OCCUPATIONAL DUMMIES	YES	YES	YES	YES
Observations	13,332	16,213	3,270	8,304

Delta standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is 1 if the client has taken a loan or 0 otherwise. All predictors at their mean value. The independent variables are: log of consumption, age, sex of the head of the household, size of the household, number of education years completed by the head, log of amount of land, dummy whether the household has a ration card, dummy for quality of the house (good/bad), dummy whether household is in urban area, and various dummies for occupation and the state where the household is located.

Table 4: The marginal effect of participation in the credit market by various castes in 2011-12

	(1)	(2)	(3)	(4)
VARIABLES	GC	OBC	ST	SC
CONSUMPTION	0.114***	0.129***	0.097***	0.141***
	(0.009)	(0.008)	(0.020)	(0.012)
AGE	0.009***	0.012***	0.020***	0.012***
	(0.002)	(0.002)	(0.005)	(0.003)
AGESQ	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
EDUCATION	-0.009***	-0.008***	0.005*	-0.007***
	(0.001)	(0.001)	(0.003)	(0.002)
LAND	0.021***	0.013***	0.002	0.017***
	(0.005)	(0.004)	(0.007)	(0.007)
SEX	-0.049***	-0.057***	-0.104***	-0.035**
	(0.015)	(0.013)	(0.029)	(0.017)
SIZE OF HH	0.003	0.002	0.012**	0.001
	(0.002)	(0.002)	(0.005)	(0.003)
URBAN RURAL	-0.093***	-0.108***	-0.048	-0.067***
	(0.014)	(0.011)	(0.035)	(0.015)
HOUSE QUALITY	-0.037***	-0.034***	0.004	-0.037***
	(0.014)	(0.011)	(0.026)	(0.014)
RATIONCARD	0.038**	0.043***	0.046*	0.034*
	(0.016)	(0.012)	(0.026)	(0.018)
STATE DUMMIES	YES	YES	YES	YES

OCCUPATIONAL DUMMIES	YES	YES	YES	YES
Observations	11,680	16,763	3,590	8,807

Delta standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Same as Table 3

The results from both time periods show similar results. One percent increase in consumption increases the probability of taking a loan by 0.1 percent for GC, 0.14 percent for OBC, 0.18 percent for ST and 0.16 percent for SC in 2005 and 0.11 percent for GC, 0.13 percent for OBC, 0.10 percent for ST and 0.14 percent for SC in 2011-2012. The coefficients of age shows a positive relationship with the probability of taking a loan. The results show that gender exerts an influence on taking a loan. Being a female significantly decreases the probability of taking a loan. This is particularly strong in the ST in 2011-2012 where it reduces the probability of taking a loan by 10 percent. The number education years completed by the head of the households shows a negative relationship with the likelihood of participating in the credit market (except for SC in 2011-12). This implies that highly educated heads are more likely to work in salaried positions and may not require loans. The size of the household does not seem to matter which could be seen in the insignificant coefficient of the size of household for all castes, except for SC where it increases the probability of participation by merely 0.01 percent. The amount of land marginally increases the probability of participation in credit markets for GC, OBC and SC in 2011 and OBC and SC in 2005. Households living in strong and permanent dwelling are less likely to participate in the credit markets. Having a ration card which is an important document for identification and an indicator of having other legal document increases the probability of participation by 4 to 5 percent in 2011-12; however, it does not have any effect on 2005 except for OBC. Households living in rural areas are more likely to participate in the credit market reflecting the cyclical nature of an agricultural economy and the relatively long delay between investment and income. To account for the differences between the sources of income and location, I also controlled for occupation and states dummies.

Loan amount equation

I now proceed to estimate regressions for each caste type corrected for selection and endogeneity (see Tables 5 and 6 below).

Table 5: Selection corrected loan amount equation estimates for 2005

	(1)	(2)	(3)	(4)
VARIABLES	GC	OBC	ST	SC
CONSUMPTION	0.653***	0.702***	0.570**	0.679***
	(0.052)	(0.038)	(0.271)	(0.123)
AGE	0.026***	0.004	0.041***	0.041***
	(0.008)	(0.007)	(0.014)	(0.009)
AGESQ	-0.000***	0.000	-0.000**	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
EDUCATION	0.024***	0.025***	0.019	0.017***
	(0.004)	(0.003)	(0.014)	(0.006)
LAND UNIT	0.034**	0.041***	0.051	0.074**
	(0.017)	(0.015)	(0.035)	(0.033)
SEX	-0.064	0.181***	0.088	-0.015
	(0.072)	(0.053)	(0.127)	(0.070)
URBAN	0.056	0.092**	0.187	0.172***
	(0.051)	(0.036)	(0.194)	(0.056)
HOUSE QUALITY	0.152***	0.173***	0.332***	0.177***
	(0.042)	(0.032)	(0.087)	(0.045)
MILLS	0.415**	-0.281*	-0.108	0.252
	(0.207)	(0.160)	(0.428)	(0.413)
Constant	2.450***	1.888***	1.761	1.496
	(0.618)	(0.378)	(2.974)	(1.376)
LOAN PURPOSE	YES	YES	YES	YES
LOAN SOURCE	YES	YES	YES	YES
OCCUPATIONAL DUMMIES	YES	YES	YES	YES
STATE DUMMIES	YES	YES	YES	YES
Cragg-Donald Wald F statistic	3302.13	6502.25	478.31	228.523
Observations	4,444	7,633	1,156	3,661

R-squared	0.523	0.462	0.628	0.503

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of amount of loan. The independent variables are age, age square, number of education years completed, unit of land owned, predicted values of the first stage regression replacing the original value of log of consumption, and various dummies for loan source, its purpose and the state where the household is located. The test of equality rejects the equality of coefficients across equations.

Table 6: Selection corrected loan amount equation estimates for 2011-12

	(1)	(2)	(3)	(4)
VARIABLES	GC	OBC	ST	SC
CONSUMPTION	0.760***	0.715***	0.682***	0.700***
	(0.052)	(0.036)	(0.131)	(0.053)
AGE	0.017**	0.022***	0.023	0.037***
	(0.008)	(0.007)	(0.016)	(0.010)
AGESQ	-0.000*	-0.000***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
EDUCATION	0.019***	0.016***	0.023***	0.008**
	(0.004)	(0.003)	(0.008)	(0.004)
LAND UNIT	0.013	0.030***	-0.007	0.027
	(0.017)	(0.010)	(0.023)	(0.017)
SEX	0.060	0.087**	-0.006	0.045
	(0.055)	(0.040)	(0.096)	(0.053)
URBAN	0.058	0.044	0.204**	0.014
	(0.044)	(0.031)	(0.101)	(0.040)
HOUSE QUALITY	0.151***	0.193***	0.299***	0.165***
	(0.040)	(0.028)	(0.077)	(0.035)
MILLS	0.029	-0.033	0.183	0.190
	(0.176)	(0.125)	(0.189)	(0.205)
Constant	-0.085	1.698***	1.944	1.587***
	(0.493)	(0.354)	(1.190)	(0.502)
LOAN SOURCE DUMMIES	YES	YES	YES	YES
LOAN PURPOSE	YES	YES	YES	YES

DUMMIES				
OCCUPATIONAL DUMMIES	YES	YES	YES	YES
STATE DUMMIES	YES	YES	YES	YES
Cragg-Donald Wald F statistic	4106.26	7426.15	887.66	2366.63
Observations	5,316	10,012	1,571	4,952
R-squared	0.447	0.47	0.630	0.473

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Same as Table 6

As expected, consumption is a very significant predictor of the loan amount and a single percentage increase in consumption increases the loan amount by 0.76 percent for GC, 0.71 percent for OBC, 0.68 percent for ST and 0.71 percent for SC in 2011-12 and 0.65 for GC, 0.70 percent for OBC, 0.57 percent for ST and 0.69 percent for SC in 2005. Education has a positive relationship with the loan amount. An additional year of education significantly increases the amount of loan taken by all the castes except for SC in 2011-12. Loan amount has a quadratic relationship with age such that loan amount increases with age and start to decline thereafter. The amount of land owned increases the loan amount for all the caste except for ST in 2005. However, land does not seem to matter in 2011 except for the OBC where a percent increase in land increases the loan by only 3 percent. Land is an important asset, however, it has a limited effect on loan amount which could be due to the following reasons. First, in the absence of land titles, and poorly administered land records, small and marginal farmers, who account for more than half of the total land holding, may not be able to use it as collateral (Reserve Bank of India, 2015). Second, since average loan size is small, land may be worth more than the loan amount required. Third, it's a non-liquid and immovable asset so it's not very suitable for collateral. However, the quality of borrower's house is a better predictor of loan amount and significantly increases the loan amount. The sex of the head of the household does not seem to matter much in determining the loan amount except for the OBC households where it increases the loan amount by 17 percent in 2011-12 and 9 percent in 2005. The estimated models have fairly high explanatory power for all four social groups.

Decomposing the differences in participation in the credit market:

To disentangle the role of observable and unobservable factors on the participation level in the credit market among various castes, I extend the Oaxaca-Blinder decomposition to nonlinear methods using Fairlie's (2005) approach. Table 7 below decompose the probability of participation in the credit market into explained and unexplained part using the estimates from the selection equation

Table 7: Decomposition of probability of participation in the credit market in 2005 & 2011-12

	2005			2011-12		
VARIABLES	GC VS OBC	GC VS ST	GC VS SC	GC VS OBC	GC VS ST	GC VS SC
GC	0.331***	0.331***	0.331***	0.458***	0.458***	0.458***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Others	0.469***	0.337***	0.440***	0.600***	0.440***	0.565***
	(0.004)	(0.008)	(0.005)	(0.004)	(0.008)	(0.005)
Difference	-0.139***	-0.007	-0.109***	-0.142***	0.018*	-0.107***
	(0.006)	(0.009)	(0.007)	(0.006)	(0.009)	(0.007)
Explained	-0.132***	-0.040***	-0.066***	-0.109***	-0.031***	-0.052***
	(0.004)	(0.008)	(0.005)	(0.004)	(0.008)	(0.005)
Unexplained	-0.007	0.033***	-0.044***	-0.032***	0.048***	-0.055***
	(0.006)	(0.011)	(0.007)	(0.006)	(0.011)	(0.008)
Observations	29,714	16,877	21,765	28,444	15,270	20,491

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

For the data collected in 2005, I find that all the lower castes have a higher probability of participating in the credit market compared to the general caste. In 2011-12, I find that the SC and OBC have a higher probability of participation in the credit market compared to GC whereas GC has a small advantage over ST. A substantial proportion of the credit gap between GC and SC and GC and ST remains unexplained. On average, lower castes are more likely to participate in the credit market compared to general castes after controlling for the selection variables.

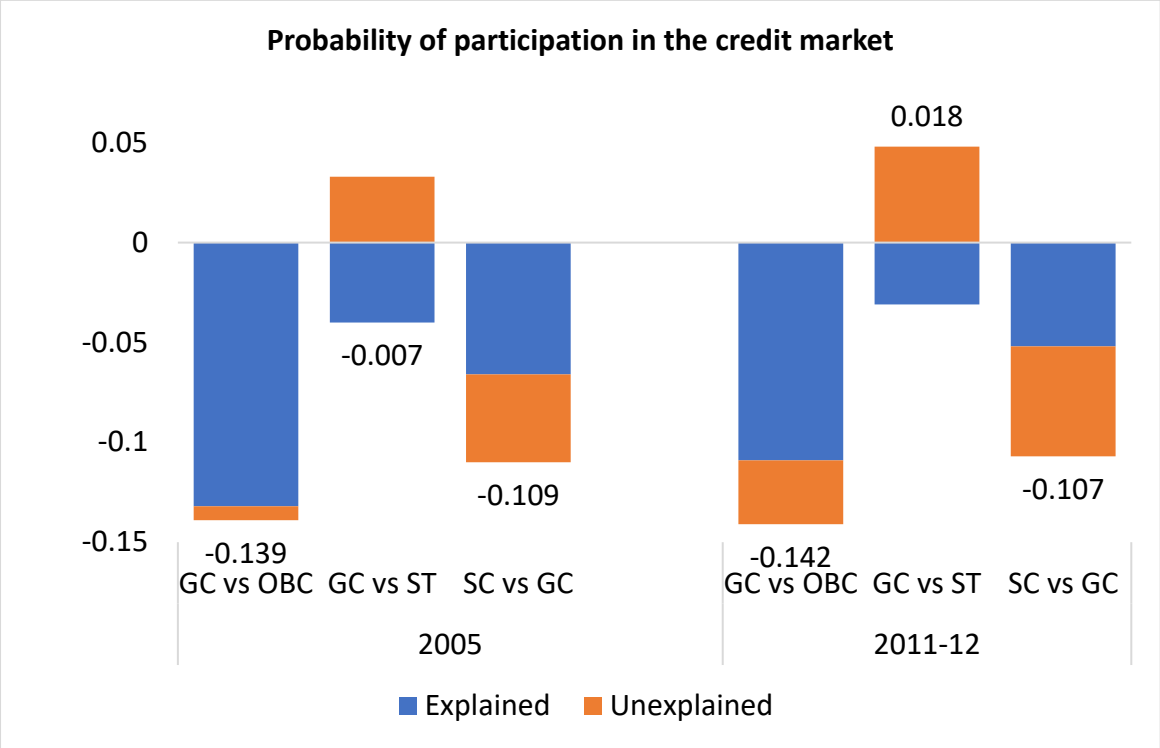


Figure 2: Decomposition of the probability of participation in the credit market. The figure is based on Table 7 comparing caste inequalities between various castes in 2005 and 2011-12.

Decomposing credit differential with the selection effect

Tables 8 and 9 present the decomposition of the log credit amount differentials between the general caste and all other castes into explained and unexplained component.

Table 8: Observed credit differentials and selection corrected credit differential in 2005

2005	Observed credit differential 1	Adjusted credit differential 2	Observed credit differential 3	Adjusted credit differential 4	Observed credit differential 5	Adjusted credit differential 6
VARIABLES	GC vs OBC	GC vs OBC	GC vs ST	GC vs ST	GC vs SC	SC vs GC
GC	10.025***	9.641***	10.025***	9.641***	10.025***	9.641***
	(0.022)	(0.199)	(0.022)	(0.199)	(0.022)	(0.199)
Others	9.555***	9.764***	8.667***	8.757***	9.140***	8.953***
	(0.016)	(0.125)	(0.047)	(0.395)	(0.023)	(0.326)
Difference	0.470***	-0.123	1.358***	0.885**	0.885***	0.688*

	(0.027)	(0.235)	(0.052)	(0.442)	(0.032)	(0.382)
Explained	0.436***	0.448***	1.065***	1.085***	0.712***	0.779***
	(0.021)	(0.032)	(0.047)	(0.049)	(0.026)	(0.030)
Unexplained	0.034	-0.571**	0.293***	-0.200	0.173***	-0.091
	(0.023)	(0.233)	(0.045)	(0.444)	(0.027)	(0.381)
Observations	12,076	12,076	5,600	5,600	8,105	8,105

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows decomposition of log of loan into explained and unexplained portion. Columns 1, 3 and 5 show results from equation 2. Columns 2, 4 and 6 show results from equation 3 and are corrected for selection and endogeneity.

Table 9: Observed credit differentials and selection corrected credit differential in 2011-12.

2011-12	Observed credit differential 1	Adjusted credit differential 2	Observed credit differential 3	Adjusted credit differential 4	Observed credit differential 5	Adjusted credit differential 6
VARIABLES	GC vs OBC	GC vs OBC	GC vs ST	GC vs ST	GC vs SC	SC vs GC
GC	10.724***	10.689***	10.724***	10.689***	10.724***	10.689***
	(0.014)	(0.144)	(0.020)	(0.144)	(0.020)	(0.144)
Others	10.386***	10.391***	9.592***	9.459***	9.945***	9.817***
	(0.009)	(0.079)	(0.042)	(0.147)	(0.019)	(0.137)
Difference	0.339***	0.298*	1.132***	1.230***	0.779***	0.872***
	(0.017)	(0.165)	(0.047)	(0.206)	(0.028)	(0.199)
Explained	0.260***	0.277***	0.895***	0.933***	0.526***	0.590***
	(0.016)	(0.025)	(0.046)	(0.045)	(0.023)	(0.025)
Unexplained	0.079***	0.021	0.237***	0.297	0.253***	0.282
	(0.002)	(0.164)	(0.045)	(0.203)	(0.025)	(0.198)
Observations	15,328	15,328	6,887	6,887	10,268	10,268

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition of log of loan into explained and unexplained portion. Columns 1, 3 and 5 show results from equation 2. Columns 2, 4 and 6 show results from equation 3 and are corrected for selection and endogeneity.

Consistent with earlier results, I find that GC is in a more favourable position in the Indian credit sector. The observed credit differentials show that the GC has 47 percent

advantage over OBC, 135.8 percent over ST, and 88.5 percent over SC in 2005 and 33.9 percent advantage over OBC, 113.2 percent over ST, and 77.9 percent over SC in 2011-12 (see observed credit differentials in Columns 1, 3 and 4 in Tables 8 and 9). Largely these differences can be explained by the endowments and personal characteristics, and a very small portion remains unexplained.

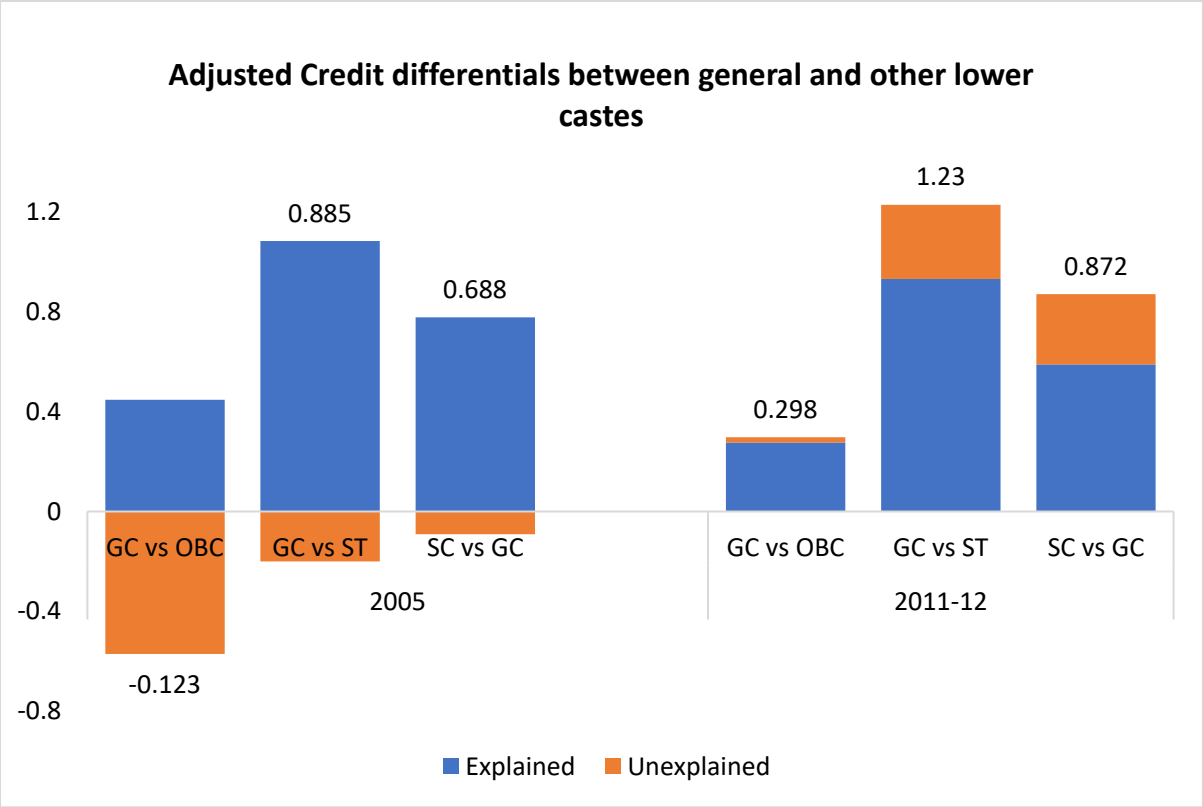


Figure 3: Credit differential between the general caste and other lower castes for 2005 and 2011-12. The figure is based on columns 2, 4 and 6 of Tables 8 and 9 comparing caste inequalities between various castes in 2005 and 2011-12

However, these results should be treated with caution due to self-selection in the credit market. The adjusted credit differentials in Tables 8 and 9 show that decomposition results are sensitive to the selection effect. The credit differentials are underestimated in 2011 (except for OBC) and overestimated in 2005 without the correction for selectivity. The adjusted credit differential decreases to -12.3 percent for OBC, 88.5 percent for ST, and 68.8 percent for SC in 2005 and marginally decreases to 29.8 percent for OBC, increases to 123.0 percent for ST, and 87.2 percent for SC in 2011-12. The credit differentials are largely explained by the differences in endowments and personal characteristics. The negative unexplained differences in 2005 suggest that there is negative discrimination for the lower castes implying that lower

caste borrowers got a better return for their personal characteristics. However, this effect is reversed in 2011-12. Compared to 2005, the credit differentials and the share of unexplained portion have increased between the general caste and other lower castes.

The credit differentials calculated without correcting for selection are underestimated in 2011-12. This increase after adjusting for selection is primarily due to a rise in the unexplained residual effect, which represents, for example, societal and cultural conditions such as discriminating structures and practices on the credit market affecting loan outcomes for lower caste individuals. This means that an individual from a lower caste with a similar probability of participation as an individual from a general caste is predicted to get less loan than the general caste borrower

Even though lower castes have a higher probability of participation in the credit markets compared to general caste, the credit amount differential between them is very high. Moreover, negative discrimination in 2005 was reversed in 2011-12. Now I will discuss the factors that will explain these sharp differences. Table 10 below shows the variable decomposition of credit differential.

Table 10: Decomposition of the log of credit amount differential for a selection corrected equation in 2005 and 2011-12

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	GC VS OBC	GC VS ST	GC VS SC	GC vs OBC	GC vs ST	GC vs SC
	2005			2011-12		
CONSUMPTION	0.214***	0.580***	0.351***	0.175***	0.524***	0.313***
	(0.012)	(0.031)	(0.019)	(0.010)	(0.028)	(0.016)
AGE	0.016**	0.070***	0.078***	0.043***	0.026	0.090***
	(0.007)	(0.025)	(0.021)	(0.012)	(0.024)	(0.025)
AGE SQ	-0.010	-0.052**	-0.063***	-0.037***	-0.022	-0.081***
	(0.007)	(0.024)	(0.020)	(0.012)	(0.024)	(0.025)
EDUCATION	0.049***	0.095***	0.069***	0.033***	0.064***	0.042***
	(0.005)	(0.016)	(0.010)	(0.004)	(0.012)	(0.008)
LAND UNIT	0.005***	-0.001	0.012*	0.003**	0.000	0.008
	(0.002)	(0.001)	(0.007)	(0.001)	(0.001)	(0.007)
URBANRURAL	0.007***	0.023**	0.015***	0.004**	0.022**	0.004

	(0.003)	(0.012)	(0.004)	(0.002)	(0.009)	(0.003)
SEX	-0.000	0.000	-0.000	0.000	0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
HOUSE QUALITY	0.020***	0.071***	0.032***	0.015***	0.066***	0.030***
	(0.003)	(0.016)	(0.007)	(0.002)	(0.013)	(0.005)
PURPOSE OF LOAN	0.034***	0.063***	0.047***	0.020***	0.032***	0.001
	(0.006)	(0.010)	(0.009)	(0.005)	(0.010)	(0.007)
SOURCE OF LOAN	0.072***	0.125***	0.111***	0.062***	0.128***	0.160***
	(0.007)	(0.014)	(0.011)	(0.007)	(0.014)	(0.010)
OCCUPATION	0.044***	0.075***	0.091***	0.033***	0.026**	0.095***
	(0.005)	(0.015)	(0.012)	(0.005)	(0.012)	(0.011)
STATES	-0.003	0.036	0.034**	-0.073***	0.065***	-0.071***
	(0.020)	(0.023)	(0.015)	(0.015)	(0.021)	(0.011)
Observations	12,076	5,600	8,105	15,507	6,949	10,379

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table decomposes the explained component from the equation 3 to identify the contribution of each specific characteristic in generating credit differences.

In 2005, consumption expenditure is responsible for around half of the explained share of the total difference between GC and OBC. The differences in source of the loan, purpose of the loan and occupations contribute to 33 percent; and differences in age and education years is responsible for the rest of the explained portion. Similarly, around half of the explained portion of the credit differences between GC and ST in 2005 arise from the differences in consumption expenditure; source of the loan, purpose of the loan and occupations explain 24 percent; and differences in years of education, age and quality of the house explain the rest. In the case of credit differences between GC and SC in 2005, differences in consumption explain around 45 percent; differences in the source of the loan, purpose of the loan and occupations explain 32 percent, and differences in years of education, age and house quality explain 23 percent.

In 2011, 58 percent of the explained portion of the total credit differences between GC and OBC is due to the differences in the level of consumption; differences in source of the loan, purpose of the loan and occupations contribute to 33 percent; and differences in age, house quality and education years explain the rest. Similarly, about half of the credit differentials between GC and ST in 2011 is due to differences in the level of consumption. The differences in the source of the loan, purpose of the loan and occupations contribute to 25

percent; and differences in age, house quality and education years are responsible for the rest of the explained portion. In the case of credit differences between GC and SC in 2011, differences in consumption explain around 53 percent; differences in source of the loan, purpose of the loan and occupations explain 40 percent, and differences in years of education, age and house quality explain the rest.

Differences in states explain a very negligible portion of the credit gap (see online Appendix). Further investigating the variations in states, I find that states with a higher population of ST (such as Orrisa, Chhattisgarh, Madhya Pradesh and Karnataka) increase the credit differences. While the states with higher population of OBC (such as Andhra Pradesh, Maharashtra, Tamil Nadu, and Rajasthan) and SC (Uttar Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu, Bihar, and Madhya Pradesh) decreases the credit differences between castes.

Overall, the characteristics disparity between the general castes and lower castes are largely due to differences in consumption, years of education, age, house quality, source of the loan, purpose of the loan, and occupations.

Quantile decomposition

In this section, I apply a quantile regression-based decomposition method proposed by Firpo, Fortin, and Lemieux (2009) to evaluate caste-based differences in the Indian credit sector[13]. Their methodology relies on an extension of the Oaxaca-Blinder decomposition which introduces a two-stage procedure; first, carry out the decomposition based on unconditional quantile regressions (UQR) techniques using a reweighting approach dividing the distributional changes into structure effect and a composition effect; second, the two components are further divided into the contribution of each explanatory variable using recentred influence function (RIF) regressions[14].

Figures 4 and 5 (based on Tables 24 and 25 in the Appendix) report the quantile regression decompositions obtained for five quantiles (10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th}). For 2011, the quantile decomposition suggests that credit gaps between GC and lower castes are higher

[13] I used the Stata program rifreg to estimate the unconditional quantiles. The programme can be downloaded from here: http://faculty.arts.ubc.ca/nfortin/datahead.html.
[14] The Firpo et al. method allows us to decompose the caste gap into the contribution of each individual variable. However due to the space constraint, I haven't shown this in the paper.

at lower (10^{th} and 25^{th}) and middle (50^{th}) deciles compared to upper deciles (75^{th} and 90^{th}). The share of the unexplained component of the gap is also higher at the lower and middle end of the credit distribution compared to higher deciles, demonstrating the evidence of a 'sticky floor'. This suggests that borrowers from the lower castes may be facing greater discrimination at the lower end of credit distribution. However, this effect reverses in the higher deciles where borrowers from lower castes experience negative discrimination – credit market favours lower castes.

The recent rise of Dalit millionaires, often known as the creamy layer, has sparked a debate regarding the reduction of quotas for lower castes. However, this does not appear representative of the broader swathes of the SC and ST population which live in poverty. The success of Dalit capitalism depends on the integration of lower castes in the credit market. The result suggests that the credit market only favours lower caste borrowers at the higher end of the distribution. After correcting for selection, we see the caste differences reduced at upper quantiles implying that lower caste borrowers at higher quantiles who self-selected in the credit market got a better return for their characteristics.

These lower caste borrowers at the upper end of the distribution are more likely to possess higher levels of entrepreneurial ability, perseverance and drive which improve their creditworthiness. They are also aware of their rights and might be in a better position to take action against perceived discrimination. Lenders aware of these possibilities may not be able to discriminate at the upper end of credit distribution. Moreover, the credit market at the higher end would be far more structured and rigidly defined, making it harder to discriminate across caste.

Similar trends can be seen in 2005. The gaps are generally higher at the lower end of the credit distribution. For ST, the unexplained portion is positive at the lower quantile and negative at the middle and upper quantiles. For SC, the unexplained portion is negative at the lowest quantile. For OBC, the unexplained portion is negative at all quantiles except the 25^{th}. The unexplained gaps are generally larger at the lower end of quantile suggesting that sticky floor effect prevails.

It is generally very difficult to disentangle taste-based discrimination and statistical discrimination. Both kinds of discrimination can easily coexist in the credit market. The

quantile decomposition shows significant variations in the unexplained component across the distribution – negative in the lower quantiles and positive in the upper quantiles. This suggests that a statistical discrimination effect prevails. If the discrimination was largely due to taste, it would have been constant across the entire credit distribution.

A possible reason for the sticky floor effect could be due to the statistical discrimination practised in the credit market. In India, division of labour according to the caste system has frequently prevented individuals from starting businesses (Iyer, Khanna, Varshney, 2013) and hence, the lack of business experience at the lower end of credit distribution hurts their credit prospects. Even when Dalits become entrepreneurs, their businesses could suffer due to discrimination present in most domestic markets and the lack of suitable social and business networks. Because of this, lower castes are perceived as less creditworthy and riskier to lend to than upper castes. As a lower caste borrower moves up the economic ladder, lenders are less like to discriminate against them and; even favour them.

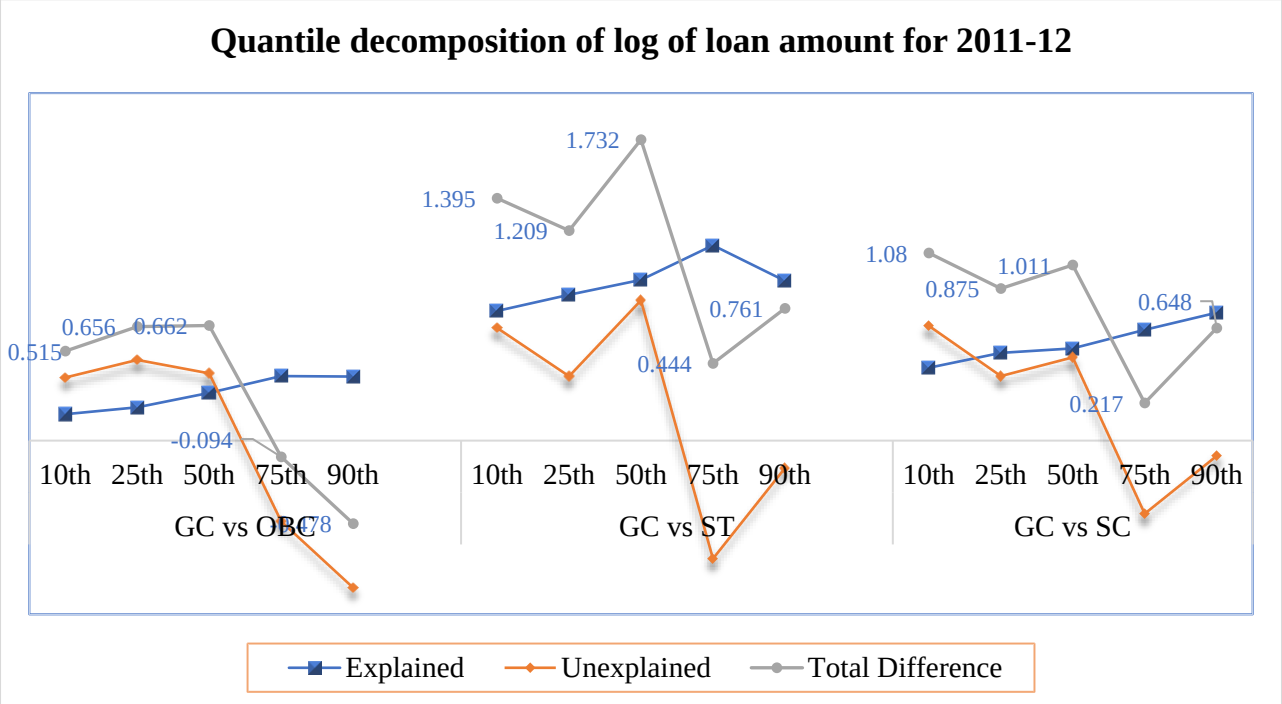


Figure 4: Quantile decomposition of log of loan amount for 2011-12. The figure plots the result from quantile regression decompositions obtained at 10th, 25th, 50th, 75th, and 90th percentile.

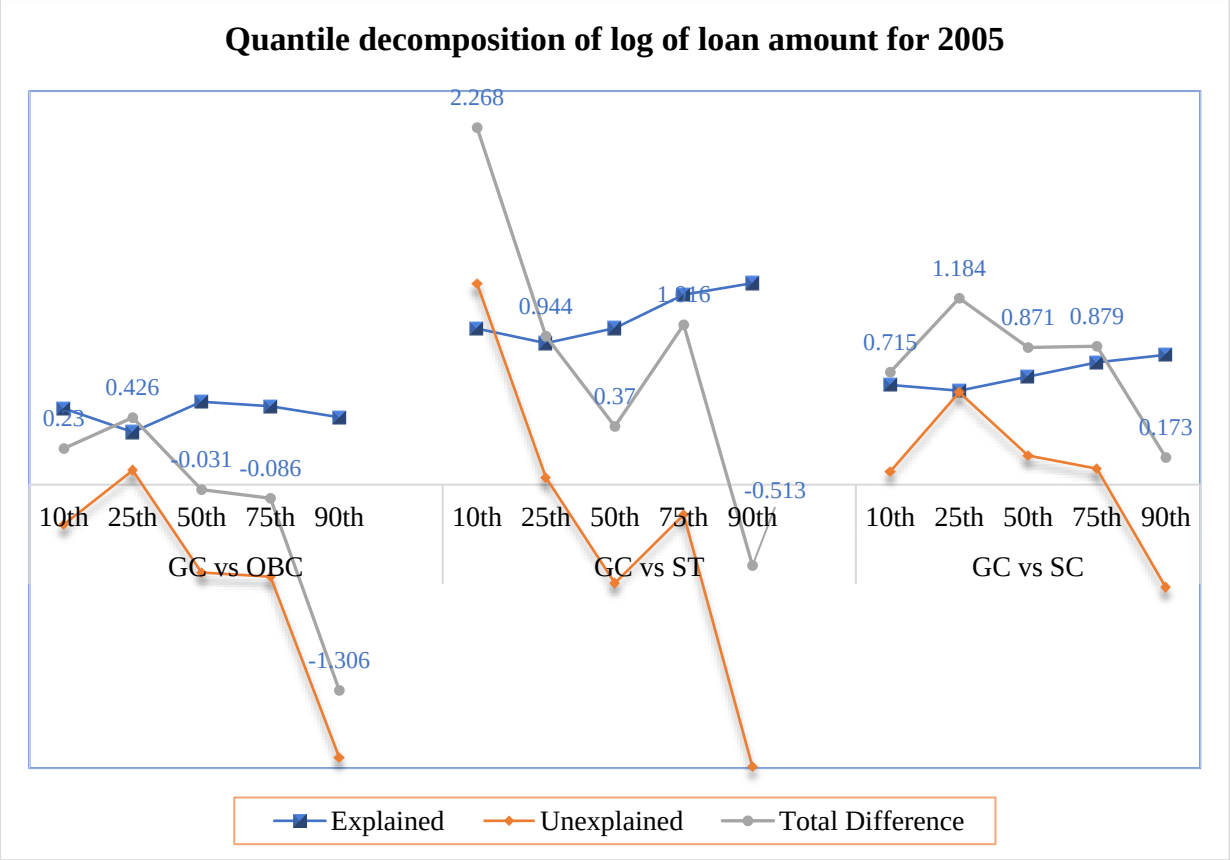


Figure 5: Quantile decomposition of log of loan amount 2005. The figure plots the result from quantile regression decompositions obtained at 10th, 25th, 50th, 75th, and 90th percentile.

Decomposing credit outcomes differences by lenders:

Since we have data regarding loan applications and approvals from various sources in the IHDS (II) 2011-12 survey data, we are able to decompose the caste differences in the probability of loan application and approval from banks, moneylenders, and social networks. The decomposition analysis reveals that GC has a lower probability to apply but a higher approval rate on their loan application in lending from banks compared to OBC (Panel A, Table 17 in the Appendix). However, GC has a higher probability of applying and approval rate in lending from the bank compared to SC and ST (Panel A, Table 17 in the Appendix). Contrary to that, all lower castes have a higher probability of applying and approval in lending from money lenders (Panel B, Table 17 in the Appendix). In lending from social networks, OBC and SC have a higher probability of applying but lower probability of approval compared to GC, whereas GC has a higher probability and approval compared to ST (Panel C, Table 17 in the Appendix).

In the following subsection, I will decompose the credit amount differences between castes in lending from banks, moneylenders and social networks.

Banks: Banks are one of the major sources of credit for Indian borrowers. 27 percent and 32 percent of all the borrowers in the sample in 2005 and 2011, respectively, took their loan from banks (see Table 13 in the Appendix). With the development of the banking system in India in the last decade, all the caste groups have increased their lending from banks. Figure 6 (based on Table 18 in the Appendix) shows that there are large credit differentials between the general caste and lower castes. However, the credit differentials between GC and OBC, and GC and ST have decreased over the period considered. Whereas the credit differentials between GC and SC and the share of the unexplained portion of the total differences have increased from 2005. Hence, Dalit community's financial performance in terms of formal credit from banks has deteriorated over the years.

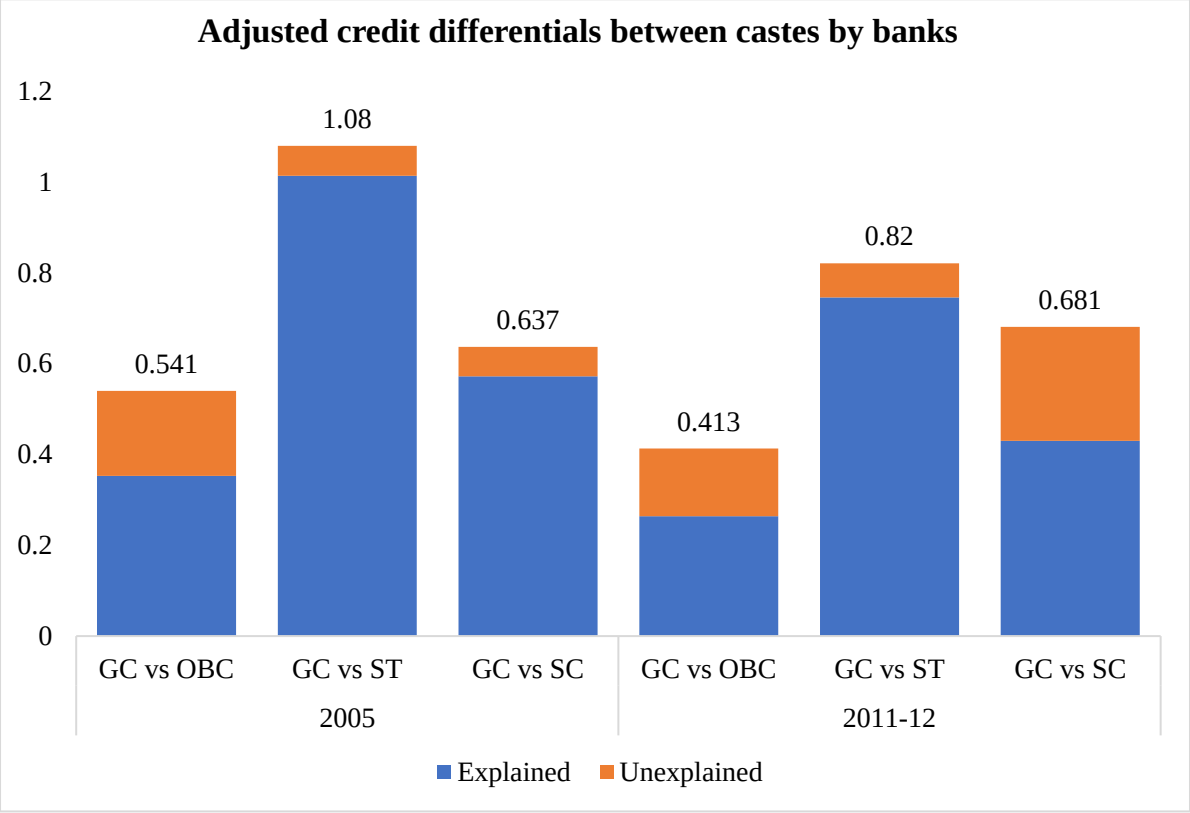


Figure 6: Adjusted credit differentials between castes in 2005 and 2011-12 in credit taken from banks.

One lower caste borrower described the process of bank lending as humiliating:

"…they (the bank) keep sending back our documents for the loan. While the loan officer collects the documents for the Jaats (upper caste) from their houses, we are not even allowed to sit on the chairs in the bank or offered any help to fill the complicated forms. While they photocopy the documents of upper castes in the bank, we are asked to get the photocopies from outside"

One female Dalit interviewee said:

"….even though my documents were complete, I was asked to sweep the bank floor in return for opening a bank account. This was despite the bank having a cleaning staff. This is degrading…"

Some of the credit differences between castes in banking lending could also arise from repayment enforceability of the financial contract (as shown by Rubin and Kuran, 2018). Successive Indian governments have passed reforms to ensure a substantial flow of credit to SC/ST for self-employment at concessional interest rates through priority lending and other special banking schemes. In some cases, loans to SC and ST entrepreneurs are given interest-free[15] and waiving the loan all together is in the process[16]. Reserve Bank of India (RBI) updated its guidelines on credit facilities to Scheduled Castes and Scheduled Tribes in 2016 giving extra support to these communities in the formal banking sector[17]. However, this may also have made the lower caste borrower riskier to lend to and less profitable. In this setting where lending is biased in favour of SC/ST, banks may resort to minimising the risk by giving less amount of loans to these communities, imposing an intended cost on them. Hence, these large credit differences may be echoing inherent conflict between allowing the banking system to be driven by market forces and expecting greater inclusion from the system.

[15] Under Chief Minister Scheduled Caste and Scheduled Tribes Entrepreneur Scheme, Bihar government will provide interest free loans to eligible entrepreneurs from scheduled caste and scheduled tribes category.

[16] In the state of Karnataka, the state president has requested to the state government to waive education loans of the SC/ST students.

[17] Under new recommendations, banks are responsible for increasing awareness about new credit facilities among SC/ST borrowers and helping the borrowers in filling out forms and completing other formalities. Loan proposals from these communities are encouraged to be considered with utmost sympathy and understanding. To ensure these policies are followed, a special department has been set up for monitoring the flow of credit to SC/ST beneficiaries. Under the same guidelines, the Ministry of Rural Development, Government of India has launched Deendayal Antyodaya Yojana-National Rural Livelihood Mission (DAY-NRLM), which would seek to ensure adequate coverage of vulnerable sections of the society such that 50% of these beneficiaries are SC/ST. Under Differential Rate of Interest Scheme, banks will provide finance up to Rs 15,000 at a concessionary rate of interest of 4 percent per annum to the lower castes for engaging in productive and gainful activities.

In the absence of credit history or information regarding borrowers' creditworthiness, the unexplained gap is more likely to be due to statistical discrimination[18]. In such cases, banks may be holding lower caste loan applications to higher standards of creditworthiness than upper castes. For example, lower caste borrowers are more likely to come from poor areas with a higher risk of default leading a bank loan officer to grade their loan application strictly. When a substantial part of statistical discrimination is influenced by profit maximising actors, market forces are less likely to eliminate it.

Our qualitative enquiries suggest that bank loan officers (largely belonging to general caste as observed by Fisman, Paravisini, and Rig, 2017) provide more assistance to higher caste borrowers in loan applications engaging in a subtle form of statistical discrimination, referred to as the "thick file" phenomenon[19]. This means that the loan application file of a marginal higher caste borrower us more likely to be thicker with extra documents than those of a marginal lower caste borrower. The idea here is that upper caste loan officers may have less cultural affinities with and less knowledge of lower caste applicants. They are more likely to be strict with lower caste applications, relying on the group characteristics rather than investing resources in gathering more information on the creditworthiness of lower caste borrowers. In such a situation, extra documentation providing mitigating information could positively affect the credit outcome of marginal upper caste applications. Although this phenomenon has some credibility, further investigation is needed to documents its relevance and occurrence.

Money lenders: Although the share of money lenders has reduced significantly over this time, they still play a major role in financing lower caste borrowers (see Table 13 in the Appendix). However, Figure 7 (based on Table 19 in the Appendix) shows that the credit differentials between the general caste and other lower castes have increased since 2005, and a large part of this gap is unexplained. Since money lenders provide credit to people in regions where formal finance has not reached; or to borrowers who are not creditworthy for banks and MFIs, the increase in the credit differentials and unexplained component is worrying .

[18] Bertrand and Mullainathan (2004) show that more information regarding minority applicants' skills does not always reduce discrimination in the labour market.
[19] As observed by Ladd (1988) from the investigation of Decatur Federal in Atlanta in 1992.

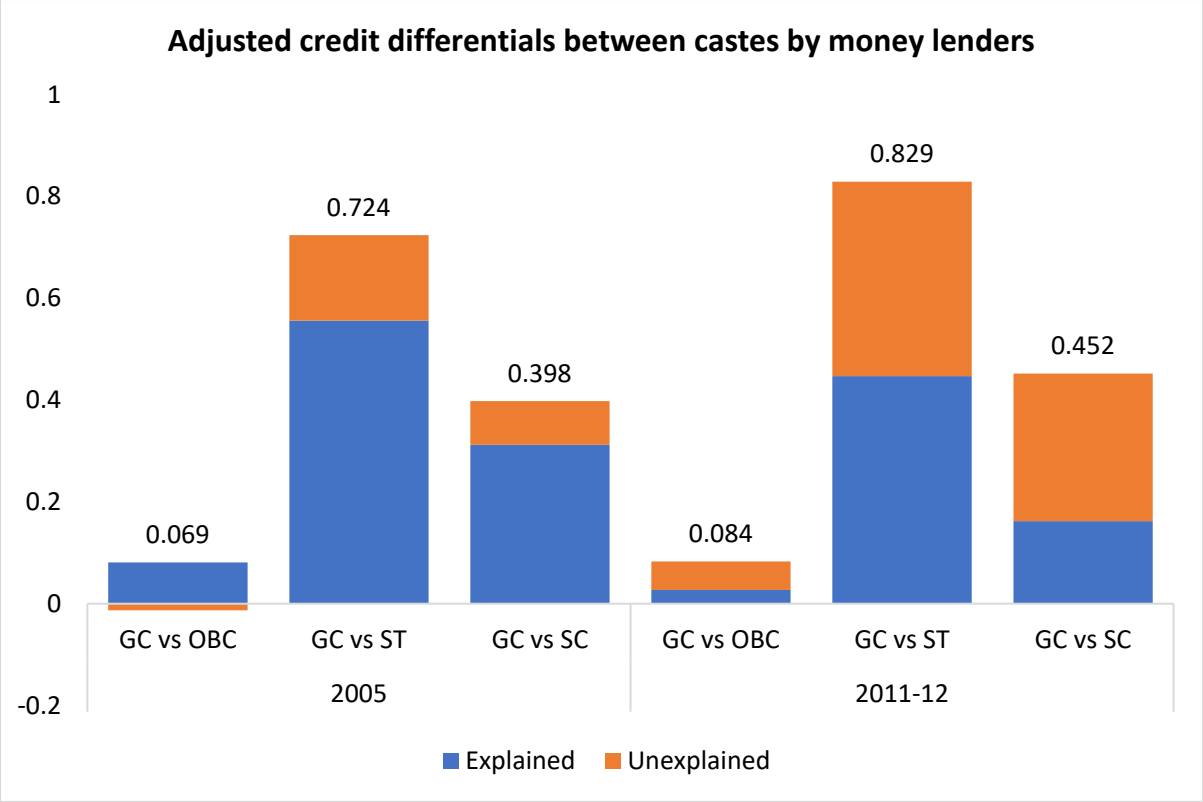


Figure 7: Adjusted credit differentials between castes in 2005 and 2011-12 in credit taken from money lenders

The qualitative interviews confirm the discriminatory attitude practiced by informal money lenders towards lower castes.

One respondent said:

"... my local money lender always says that people from my caste cannot be trusted, even though I have never defaulted on a loan in my life. The conditions they set are always discriminatory. Upper caste lenders think that if they give loans to lower castes, we might become rich and less dependent on them."

One Dalit entrepreneur said:

"The bayaj (interest rate) varies depending on your caste. Dalits are also expected to offer collateral (security) far in excess of the loan amount, and far in excess of other castes".

These informal money lenders, generally belonging to upper castes, have historically been the main source of financial credit for lower castes. In this sector of the credit market,

discrimination is frequently overt and extreme. The informal lender I interviewed didn't dispute the fact that they discriminate, and based their arguments on old-fashioned prejudice.

One money lender feared loss of face in dealing with lower castes:
"…….if a Dalit dared to default on my loan, people would laugh at me "

Another questioned the whole idea of Dalit entrepreneurs:
"…if they all have businesses, who will work in our fields or clean our toilets?"

In informal lending, money lenders can force repayments through *panchayats* (village councils usually consist of upper caste men whose verdicts are largely partial to the money lenders) or by keeping the collateral given as a security for the credit. Logically, the credit differentials between general and other lower castes and the unexplained portion of these differentials should be lower since lower castes are less risky, however, this is not the case here. Money lenders are sometimes the last resort of credit for poor and lower caste households. The qualitative enquiries suggest the informal lenders practice an extreme form of discrimination against lower caste and are reluctant to fund lower caste entrepreneurs. Hence, low risk of giving credit to lower caste reduces the credit differences, while discrimination practised by moneylenders increases it. The results suggest that the latter effect prevails.

The qualitative enquiries also suggest that taste-based discrimination is more likely to be present in lending from money lenders. In the case of better information regarding the borrower's creditworthiness, as usually in informal lending, the unexplained or discriminatory component in the total gap is more likely to be due to taste-based discrimination. Berkovec et al (1994) suggest that taste-based discrimination is likely to be higher when the lenders have higher market power.

Social networks such as friends and relatives: Credit in the informal sector is highly segmented, and is based around people of the same caste, religion and kinship (Gupta and Mitra 2002). Hence, poor and lower castes are significantly disadvantaged due to a lack of networks, income, land, and education in obtaining loans from friends and relatives. The proportion of those taking loans from friends and relatives has marginally changed over the years. Figure 8 (based on Table 20 in the Appendix) shows that the credit differentials in lending from social

networks such as friends and family have decreased significantly between GC and other lower castes.

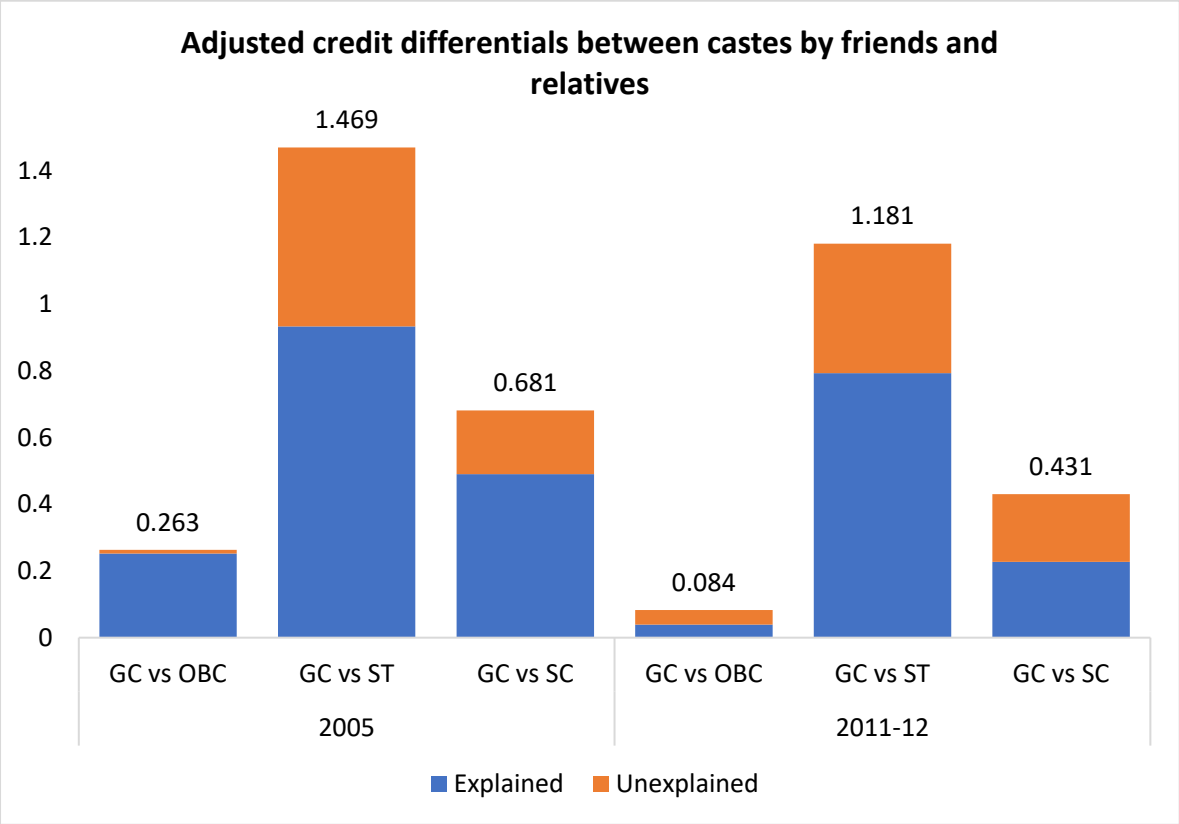


Figure 8: Adjusted credit differentials between castes by credit taken from friends and relatives

However, these changes in credit differentials above are not easy to explain without significant additional research. The individual results from each year are perhaps easier to interpret: if lower caste borrowers seek credit from lower caste friends, while general caste borrowers seek credit from general caste friends, then it is logical that there would be a wide differential in the availability and ease of credit – in this scenario, the general caste 'lenders' simply have more credit available to give. It is, though, difficult to explain why this differential has changed so dramatically over the time period unless the overall level of wealth within the pool of lower caste lenders has increased at a greater rate than that of their general caste equivalents – and there is little evidence to suggest that this is the case. This could also be due to the lower caste abandoning formal channels of finance because of the poor treatment and discouragement, thereby increasing their reliance on their own caste.

In terms of this study, however, the reasons for the change are not directly relevant. What is relevant is that this is the only category of lending in which both borrower and lender are likely

to share the same caste, and it is also the only category which shows improvement in the credit differentials between the general caste and all three lower castes. Clearly, this represents a positive development, but it also indicates that caste-based discrimination may be a significant factor in driving the credit differentials in other types of lending. In other words, caste-based differences may be decreasing, but only if lower caste borrowers are borrowing from lower caste lenders.

Decomposing credit differences by residence:

Figure 9 (based on Tables 21 and 22 in the Appendix) presents the caste differences in the credit amount by place of residence – urban and rural areas. There are stark differences between credit differentials in rural and urban areas. As caste phenomena are usually strong in rural areas, the credit differences between the general caste and other lower castes are larger than in urban areas. Compared to 2005, the caste difference between GC and OBC, and GC and ST has increased for urban area, while the caste differences between GC and ST and GC and SC has increased in rural area. The unexplained portion of the total difference has also increased in most cases.

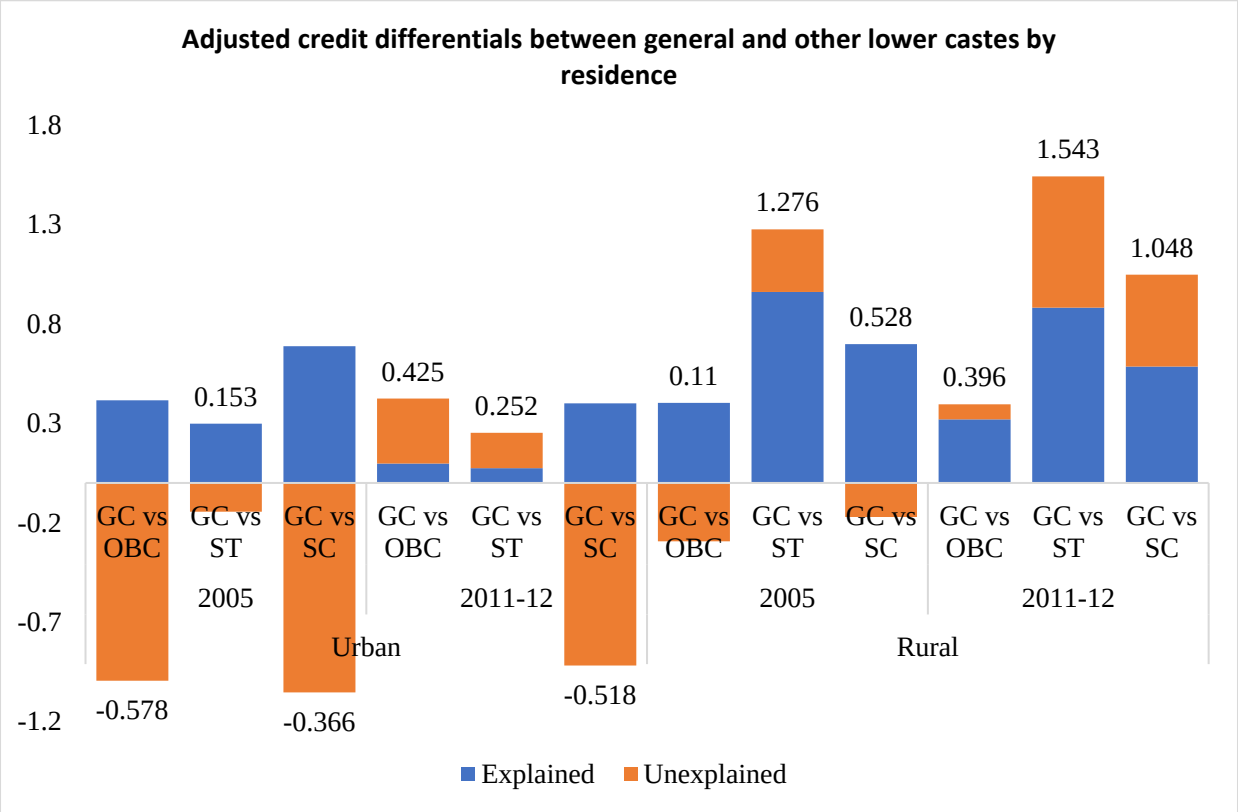


Figure 9: The figure compares credit inequalities between various caste in urban and rural areas in 2011-12 and 2005

A greater proportion of the lower castes live in rural areas, and hence, an increase in the credit differentials and the unexplained or discriminatory component over the years in rural areas is a matter of concern. Successive Indian governments have failed to improve the village banking infrastructure in India. Even though 70 percent of India's population lives in rural areas, they only have 37 percent of the total number of bank branches of the country (Reserve Bank of India, 2015). Thus, a significant proportion of rural households, especially lower castes, are still outside the formal fold of the banking system.

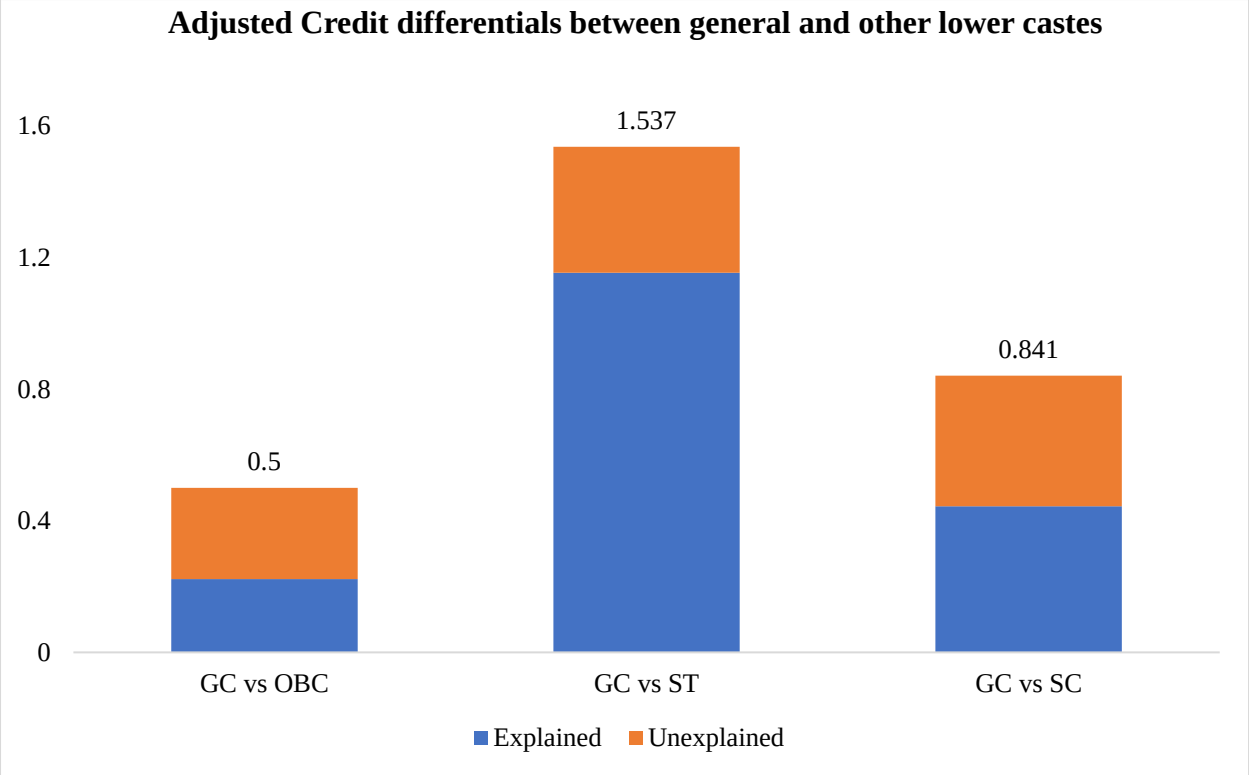
Gender and Religion

Column 1 of Table 23 in the Appendix shows the credit difference between the general caste and Muslims, the second biggest religious group in India. I find the GC has an advantage of 52.8 percent in 2005 and 58.3 percent in 2011-12 over Muslims. In both periods, the unexplained component is negative suggesting that Muslim borrowers, after self-selecting, got a better return for their characteristics in the credit market.

I also decomposed the credit differences between men and women (as head of the households) and find that women-led households have a small advantage over men (see Column 2 of Table 23 in the Appendix). There are variations in credit differences between men and women with respect to caste (Table 23 in the Appendix). The credit differences between men and women as a head from GC and SC are negative and, ST and OBC are positive. Hence, the women-led households from SC and GC groups have a higher advantage in the credit market compared to the men from the same community.

6. Robustness

In this section, I check the robustness of the results using a pooled model combining the data from IHDS 2005 and IHDS 2011-12 (see Table 26). The results are similar to the main analysis. GC has a 50 percent advantage over OBC and a higher portion of this difference remains unexplained. The difference of 153 percent between GC and ST and 84 percent between GC and SC can largely be explained by personal characteristics.



7. Discussion and conclusion

The study of discrimination in economics is motivated both by the moral case for equality and the consequent loss of efficiency in the market. Advances in research methods and designs have produced a significant interest in the field which has generated new insights into the nature of discrimination. Guryan and Charles (2013) argue that a deeper understanding of the sources and causes of discrimination is needed in order to formulate policies to reduce its incidence and effects; however, in order to do this, it is first necessary to identify the nature and scale of discrimination clearly. That is the focus of our study.

The empirical evidence in this paper suggests that – based on the credit amount sanctioned - caste is still a worryingly potent determinant of lending outcomes in India. There are substantial credit differences between the general caste and other lower castes. This credit gap has actually increased over the time period considered in this study. It is also alarming that the share of unexplained (or discriminatory) component of the credit gap between the castes has increased so significantly and so consistently. Hence, it can be argued that the disparities between the loans granted to general castes and other lower castes in India are not only because lower castes possess less human and physical capital than general castes, but also because these

groups may be facing extensive and persistent discrimination in the credit sector. I also find that the probability of participating in the credit market is generally higher for lower caste households. However, caste differences affecting the amount of credit granted is still a cause of apprehension, and in some cases, the situation appears to be growing worse, not better.

Using a quantile regression-based decomposition method, I find that the credit gap and share of the unexplained component of this gap is higher at the lower and middle end of the credit distribution compared to higher deciles, demonstrating the evidence of a 'sticky floor'. This suggests that borrowers from the lower castes may be facing greater discrimination at the lower end of credit distribution. However, this effect reverses in the higher deciles where borrowers from lower castes experience negative discrimination – the credit market favours lower castes.

It's also important to note that there are large credit differentials between the general caste and lower castes in almost every instance in question: this includes rural and urban areas, credit taken from banks, money lenders and social network. In many instances, the credit differentials have actually increased over the time period considered in this research. A substantial portion of the credit gaps between the general caste and lower castes remains unexplained.

In attempting to explain the results, I recognise that the unexplained portion may include unmeasurable or unobservable characteristics, for instance, drive, determination or other attitudes which are likely to affect the credit outcomes and thus, it does not necessarily mean explicit discrimination against lower castes. It is worth noting that the analysis seeks to measure the effects of a social variable named 'caste' which is itself composed of a number of ill-defined and unquantifiable elements. For instance, lower castes may possess higher levels of unmeasured characteristics like perseverance and determination which improve their creditworthiness but display more traits such as humility and lowered expectations which limit their credit requests. Hence, the issue of the unexplained components including the effects of unobservable or unmeasurable characteristics is a standard limitation in the decomposition analysis.

Altogether, the evidence is consistent that lower caste individuals are disadvantaged in the credit sector. Recognising this, the Indian government has launched various programmes

to improve the provision of financial services to the lower castes. However, the government can only play a direct role in the formal sector. Since banks and other government programmes have become the major source of finance for borrowers in India, a broader intervention from the government is much needed. Furthermore, the differences in credit amount sanctioned and loan approval rates between the general caste and other lower castes in lending from banks are high. Schemes to promote the economic empowerment of lower castes through finance have been implemented on a large scale since the 1990s, but if we take anything from the results in this research, they have not been very effective.

A large endowments difference between social groups indicates that there is a need to promote educational and training opportunities for the lower castes. The government should also ensure that the disadvantaged sections of society get full participation in schooling, employment, health programmes to reduce pre-market discrimination. Policy-makers need to adopt a broader range of strategies to tackle the deep-seated and multi-faceted challenge of systemic discrimination. Initiatives need to include the improvement of financial literacy across lower castes, encouragement of positive discrimination, improving the functioning and competitiveness of the financial sector, active monitoring of caste bias, and more focused social research into the causes and nature of caste discrimination.

8. Appendix: Tables

Table 11: Primary income generating occupational activities of various caste by percentage

	2011-12				2005			
Occupational activities	GC	OBC	ST	SC	GC	OBC	ST	SC
Cultivation	25.89	26.52	36.48	13.63	23.24	26.97	35	12.84
Allied agriculture	0.77	1.27	0.85	0.63	1.02	0.98	0.44	0.76
Agricultural wage labour	4.06	8.99	15.48	18.08	5.76	12.61	22	24.76
Non-agricultural wage labour	12.51	23.38	22.87	33.82	10.81	17.7	17	28.45
Artisan/Independent	1.58	1.91	0.8	1.35	5.26	8.01	2	4.9
Petty shop/Small business	13.72	12.87	4.39	6.87	5.68	5.03	2.44	2.54
Organized Trade/Business	2.4	1.32	0.41	0.4	9.02	5.58	2.06	2.92
Salaried employment	26.67	15.81	14.69	18.45	28.56	16.25	15	17.38
Other Professions	1.04	0.45	0.22	0.39	1.41	0.98	0.44	0.64
Pension/Rent/Dividend	8.23	4.28	2.72	3.7	6.05	3.25	2.27	2.51
Others	3.14	3.2	1.1	2.67	3.19	2.63	1.37	2.32

Table 12: Purpose of the loan in 2011-2012 and 2005

Purpose	GC	OBC	ST	SC	Purpose	GC	OBC	ST	SC
	2011-12					2005			
House	15.56	14.24	12.96	16.46	House	19	15.21	14.16	14.16
Land*	1.97	1.53	1.45	1.05	Land*	1.21	0.94	0.52	0.52
Marriage	13.92	17.07	18.68	19.76	Marriage	13.05	15.58	12.78	12.78
Agriculture*	18.38	18.21	23.14	9.8	Agri/business*	35.13	32.88	33.33	33.33
Business*	10.25	7.77	4.47	5.35	Consumption	8.38	12.29	18.05	18.05
Consumption	13.16	13.8	16.6	15.65	Car/appliance	2.76	1.1	0.78	0.78
Car/Jeep	3.34	1.22	1.01	0.95	Education*	2.88	2.44	1.81	1.81
Two-wheeler	1.23	1.02	0.44	0.97	Medical	10.89	13.83	12.09	12.09
Truck/Bus*	0.56	0.3	0.38	0.1	Other	6.69	5.73	6.48	6.48
Educational*	5.61	4.91	3.77	4.69					
Medical Exp	12.21	15.71	13.77	19.76					
Others	3.82	4.22	3.33	5.45					

* Loans for productive purposes

Table 13: Source of the loan in 2011-12 and 2005

Source	GC	OBC	ST	SC	GC	OBC	ST	SC
	2011-12				2005			
Employer	2.36	2.06	2.45	3.64	2.00	1.65	1.81	1.91
Money Lender	10.22	20.19	20.57	24.81	19.47	33.58	32.9	42.17
Friend	10.91	10.3	11.19	11.71	8.86	9.13	13.21	10.32
Relative	19.85	21.45	23.77	21.23	18.39	19.19	19.78	17.41
Bank*	43.81	32.31	26.42	22.9	37.36	26.28	21.07	19.62
NGO*	0.91	0.78	1.45	1.39	0.13	0.17	0.26	0.14
Credit Group*	3.28	2.29	2.39	3.12	2.61	2.06	3.97	1.83
Govt. Program*	1.02	0.48	0.38	0.64	1.44	0.8	1.64	1.12
Self-help group*	3.45	6.04	6.92	7.83	9.76	7.15	5.35	5.49
Kisan Credit*	2.06	2.53	2.58	0.85				
Prov Funds*	0.3	0.19	0.13	0.02				
Suppliers*	0.26	0.22	0.31	0.4				
Others	1.58	1.16	1.45	1.47				

* Loan from formal sources.

Table 14: Application for loans from various sources

		All	GC	OBC	SC	ST
Banks	Didn't apply	75	75	72	81	82
	Rejected	3	3	3	3	4
	Got it	22	22	25	16	15
Money Lenders	Didn't apply	81.5	89	77.5	78	84
	Rejected	3.5	3.5	4	3	3
	Got it	15	8	18.5	19	13
Relative and friends	Didn't apply	70.5	76.5	66.5	70	71.5
	Rejected	3.5	3.5	4	3.5	4
	Got it	26	20	29.5	26.5	24.5

Note: Numbers in percentages

Table 15: Probit model for 2005

	(1)	(2)	(3)	(4)
VARIABLES	GC	OBC	ST	SC
CONSUMPTION	0.302***	0.363***	0.536***	0.408***
	(0.024)	(0.021)	(0.058)	(0.032)
AGE	0.015***	0.018***	0.020*	0.001
	(0.006)	(0.005)	(0.012)	(0.007)
AGE SQ	-0.000***	-0.000***	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
EDUCATION	-0.020***	-0.021***	-0.023***	-0.018***
	(0.003)	(0.003)	(0.008)	(0.004)
LAND OWN	0.003	0.022*	-0.012	0.097***
	(0.013)	(0.011)	(0.025)	(0.021)
SEX HEAD	-0.150***	-0.154***	0.002	-0.115**
	(0.044)	(0.038)	(0.093)	(0.053)
SIZE OF HH	0.006	-0.001	-0.018	-0.004
	(0.006)	(0.005)	(0.012)	(0.008)
URBAN	-0.281***	-0.254***	-0.438***	-0.122***
	(0.035)	(0.029)	(0.096)	(0.042)
HOUSE QUALITY	-0.110***	-0.114***	0.130*	-0.033
	(0.034)	(0.028)	(0.073)	(0.038)
RATION CARD	0.038	0.064**	-0.050	0.070
	(0.036)	(0.028)	(0.065)	(0.046)
STATE DUMMIES	YES	YES	YES	YES
OCCUPATIONAL DUMMIES	YES	YES	YES	YES
Constant	-3.669***	-3.098***	-5.341***	-3.465***

	(0.523)	(0.289)	(0.679)	(0.517)
Observations	13,332	16,213	3,270	8,304

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is 1 if the client has taken a loan or 0 otherwise. The independent variables are: log of consumption, age, sex of the head of the household, size of the household, number of education years completed by the head, log of amount of land, dummy whether the household has a ration card, dummy for quality of the house (good/bad), dummy whether household is in urban area, and various dummies for occupation and the state where the household is located.

Table 16: Probit Model for 2011-12

VARIABLES	(1) GC	(2) OBC	(3) ST	(4) SC
CONSUMPTION	0.288***	0.338***	0.247***	0.358***
	(0.024)	(0.020)	(0.051)	(0.030)
AGE	0.023***	0.032***	0.051***	0.030***
	(0.006)	(0.005)	(0.013)	(0.007)
AGE SQ	-0.000***	-0.000***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
EDUCATION	-0.022***	-0.022***	0.012*	-0.017***
	(0.003)	(0.003)	(0.007)	(0.004)
LAND OWN	0.054***	0.033***	0.006	0.044***
	(0.013)	(0.010)	(0.019)	(0.017)
SEX HEAD	-0.124***	-0.149***	-0.266***	-0.089**
	(0.039)	(0.033)	(0.074)	(0.044)
SIZE OF HH	0.006	0.006	0.031**	0.003
	(0.006)	(0.005)	(0.013)	(0.008)
URBAN	-0.235***	-0.282***	-0.123	-0.170***
	(0.036)	(0.028)	(0.089)	(0.039)
HOUSE QUALITY	-0.095***	-0.089***	0.010	-0.095***
	(0.036)	(0.028)	(0.066)	(0.035)
RATION CARD	0.095**	0.112***	0.119*	0.087*
	(0.040)	(0.032)	(0.067)	(0.045)
STATE DUMMIES	YES	YES	YES	YES
OCCUPATIONAL DUMMIES	YES	YES	YES	YES
Constant	-3.748***	-3.342***	-2.935***	-4.134***
	(0.869)	(0.281)	(0.641)	(0.519)
Observations	11,680	16,763	3,590	8,807

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Same as Table 15.

Table 17: Decomposition of loan application and loan approval rates.

VARIABLES	(1) GC vs OBC	(2) GC vs ST	(3) GC vs SC	(4) GC vs OBC	(5) GC vs ST	(6) GC vs SC
	Loan application rate			Loan approval rate		
Panel A: Banks						
GC	0.257***	0.257***	0.257***	0.963***	0.963***	0.963***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Others	0.274***	0.187***	0.192***	0.937***	0.909***	0.898***
	(0.003)	(0.007)	(0.004)	(0.004)	(0.012)	(0.008)
Difference	-0.017***	0.070***	0.065***	0.026***	0.054***	0.065***
	(0.005)	(0.008)	(0.006)	(0.005)	(0.012)	(0.008)
Explained	-0.015***	0.044***	0.069***	0.020***	0.030***	0.050***
	(0.004)	(0.007)	(0.004)	(0.003)	(0.008)	(0.006)
Unexplained	-0.002	0.026**	-0.003	0.006	0.024*	0.015
	(0.006)	(0.010)	(0.007)	(0.005)	(0.013)	(0.009)
Observations	27,988	15,050	20,240	7,256	3,431	4,421
Panel B: Money Lenders						
GC	0.112***	0.112***	0.112***	0.806***	0.806***	0.806***
	(0.003)	(0.003)	(0.003)	(0.012)	(0.012)	(0.012)
Others	0.223***	0.164***	0.221***	0.878***	0.894***	0.900***
	(0.003)	(0.006)	(0.004)	(0.006)	(0.013)	(0.007)
Difference	-0.111***	-0.052***	-0.109***	-0.072***	-0.088***	-0.095***
	(0.004)	(0.007)	(0.005)	(0.013)	(0.018)	(0.014)
Explained	-0.088***	-0.036***	-0.063***	-0.048***	-0.107***	-0.066***
	(0.003)	(0.005)	(0.004)	(0.008)	(0.016)	(0.010)
Unexplained	-0.023***	-0.016*	-0.047***	-0.024*	0.019	-0.029*
	(0.005)	(0.009)	(0.006)	(0.013)	(0.020)	(0.015)
Observations	27,988	15,050	20,240	4,655	1,670	2,991
Panel B: Social Networks						
GC	0.233***	0.233***	0.233***	0.926***	0.926***	0.926***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Others	0.336***	0.287***	0.302***	0.922***	0.940***	0.925***
	(0.004)	(0.008)	(0.005)	(0.004)	(0.008)	(0.005)
Difference	-0.102***	-0.053***	-0.068***	0.004	-0.014	0.001
	(0.005)	(0.009)	(0.006)	(0.006)	(0.009)	(0.007)
Explained	-0.073***	-0.061***	-0.056***	0.002	-0.022***	-0.014***
	(0.003)	(0.007)	(0.004)	(0.004)	(0.008)	(0.005)
Unexplained	-0.029***	0.008	-0.012*	0.002	0.008	0.015**
	(0.006)	(0.011)	(0.007)	(0.007)	(0.011)	(0.007)
Observations	27,988	15,050	20,240	7,883	3,457	5,070

Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. The dependent variable is 1 if applied for a loan at a bank, from money lender or in social network, 0 otherwise (Columns 1-3). The independent variable is 1 if approved by bank, money lender or in social network (Columns 4-6). The dependent variables are same as used in selection model.

Table 18: Adjusted differences between castes by banks

	2005			2011		
VARIABLES	GC vs OBC	GC vs ST	GC vs SC	GC vs OBC	GC vs ST	GC vs SC
GC	10.996***	10.996***	10.996***	11.643***	11.643***	11.643***
	(0.142)	(0.142)	(0.142)	(0.091)	(0.091)	(0.091)
Others	10.455***	9.916***	10.359***	11.230***	10.823***	10.962***
	(0.257)	(0.326)	(0.196)	(0.091)	(0.238)	(0.670)
Difference	0.541*	1.080***	0.637***	0.413***	0.820***	0.681
	(0.294)	(0.356)	(0.242)	(0.129)	(0.254)	(0.676)
Explained	0.353***	1.014***	0.572***	0.264***	0.746***	0.430***
	(0.034)	(0.097)	(0.056)	(0.027)	(0.066)	(0.039)
Unexplained	0.187	0.066	0.065	0.149	0.075	0.251
	(0.293)	(0.356)	(0.247)	(0.128)	(0.254)	(0.677)
Observations	3,658	1,893	2,369	5,536	2,721	3,455

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition results corrected for selection and endogeneity for sample of borrowers from banks.

Table 19: Credit differences between castes by money lenders

	2005			2011		
VARIABLES	GC vs OBC	GC vs ST	GC vs SC	GC vs OBC	GC vs ST	GC vs SC
GC	9.319***	9.319***	9.319***	10.396***	10.396***	10.396***
	(0.044)	(0.044)	(0.044)	(0.056)	(0.056)	(0.056)
Others	9.250***	8.595***	8.921***	10.312***	9.567***	9.944***
	(0.025)	(0.068)	(0.032)	(0.029)	(0.080)	(0.036)
Difference	0.069	0.724***	0.398***	0.084	0.829***	0.452***
	(0.050)	(0.081)	(0.054)	(0.063)	(0.097)	(0.067)
Explained	0.081**	0.556***	0.312***	0.027	0.447***	0.162***
	(0.041)	(0.076)	(0.047)	(0.056)	(0.094)	(0.058)
Unexplained	-0.013	0.168**	0.086*	0.056	0.382***	0.290***
	(0.046)	(0.080)	(0.049)	(0.066)	(0.089)	(0.066)
Observations	3,428	1,244	2,405	2,574	870	1,773

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition results corrected for selection and endogeneity for sample of borrowers from money lenders.

Table 20: Credit differences in social networks

	2005			2011		
VARIABLES	GC vs OBC	GC vs ST	GC vs SC	GC vs OBC	GC vs ST	GC vs SC
GC	9.326***	9.326***	9.326***	9.920***	9.920***	9.920***
	(0.038)	(0.038)	(0.038)	(0.034)	(0.034)	(0.034)
Others	9.063***	7.856***	8.644***	9.836***	8.739***	9.489***
	(0.028)	(0.075)	(0.042)	(0.024)	(0.068)	(0.033)
Difference	0.263***	1.469***	0.681***	0.084**	1.181***	0.431***
	(0.047)	(0.084)	(0.056)	(0.042)	(0.076)	(0.047)
Explained	0.252***	0.933***	0.490***	0.039	0.793***	0.227***
	(0.038)	(0.082)	(0.054)	(0.032)	(0.078)	(0.037)
Unexplained	0.011	0.536***	0.191***	0.044	0.388***	0.203***
	(0.042)	(0.082)	(0.056)	(0.038)	(0.076)	(0.043)
Observations	3,374	1,594	2,225	4,835	2,182	3,269

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition results corrected for selection and endogeneity for sample of borrowers from social networks.

Table 21: Adjusted credit differential between castes in urban areas.

	2005			2011		
VARIABLES	GC vs OBC	GC vs ST	GC vs SC	GC vs OBC	GC vs ST	GC vs SC
GC	8.843***	8.843***	8.843***	10.763***	10.763***	10.763***
	(0.499)	(0.499)	(0.499)	(0.096)	(0.096)	(0.096)
Others	9.421***	8.690***	9.209***	10.338***	10.511***	11.280***
	(0.246)	(0.857)	(0.420)	(0.086)	(0.303)	(0.484)
Difference	-0.578	0.153	-0.366	0.425***	0.252	-0.518
	(0.557)	(0.992)	(0.653)	(0.129)	(0.318)	(0.494)
Explained	0.416***	0.298**	0.688***	0.098**	0.074	0.401***
	(0.057)	(0.135)	(0.054)	(0.038)	(0.110)	(0.045)
Unexplained	-0.995*	-0.145	-1.054	0.327***	0.178	-0.919*
	(0.554)	(0.986)	(0.650)	(0.126)	(0.306)	(0.494)
Observations	3,815	1,754	2,534	4,875	2,082	3,212

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition results corrected for selection and endogeneity for sample of borrowers from urban area only.

Table 22: Adjusted credit differential between castes in rural areas.

	2005			2011		
VARIABLES	GC vs OBC	GC vs ST	GC vs SC	GC vs OBC	GC vs ST	GC vs SC
GC	9.690***	9.690***	9.690***	10.760***	10.760***	10.760***
	(0.188)	(0.188)	(0.188)	(0.150)	(0.150)	(0.150)
Others	9.580***	8.414***	9.162***	10.364***	9.217***	9.711***
	(0.096)	(0.182)	(0.147)	(0.113)	(0.150)	(0.098)
Difference	0.110	1.276***	0.528**	0.396**	1.543***	1.048***
	(0.211)	(0.261)	(0.239)	(0.188)	(0.213)	(0.180)
Explained	0.403***	0.961***	0.699***	0.320***	0.882***	0.586***
	(0.030)	(0.050)	(0.033)	(0.025)	(0.045)	(0.027)
Unexplained	-0.294	0.315	-0.171	0.076	0.661***	0.462***
	(0.211)	(0.261)	(0.239)	(0.187)	(0.211)	(0.178)
Observations	8,262	3,845	5,571	10,466	4,803	7,064

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition results corrected for selection and endogeneity for sample of rural area only.

Table 23: Decomposition of credit differences by gender and religion

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	GC vs MUSLIM	MEN vs WOMEN	GC MEN vs WOMEN	OBC MEN vs WOMEN	ST MEN vs WOMEN	SC MEN vs WOMEN
Panel A: 2005						
GC	9.220***	9.140***	8.664***	9.844***	7.994***	8.525***
	(0.476)	(0.214)	(0.505)	(0.278)	(0.664)	(0.385)
Others	8.692***	9.204***	10.094***	8.109***	7.937***	10.083***
	(0.622)	(0.769)	(1.321)	(1.240)	(0.937)	(1.186)
Difference	0.528	-0.064	-1.431	1.735	0.058	-1.557
	(0.783)	(0.798)	(1.414)	(1.271)	(1.148)	(1.247)
Explained	0.651***	0.256***	0.218***	0.322***	0.138	0.153*
	(0.061)	(0.039)	(0.074)	(0.061)	(0.209)	(0.079)
Unexplained	-0.123	-0.320	-1.649	1.413	-0.080	-1.711
	(0.816)	(0.784)	(1.405)	(1.251)	(1.216)	(1.234)
Observations	5,289	16,896	4,444	7,633	1,158	3,661
Panel B: 2011						
GC	11.151***	10.442***	10.947***	10.649***	9.153***	10.048***
	(0.310)	(0.128)	(0.281)	(0.159)	(0.435)	(0.284)
Others	10.567***	10.489***	11.022***	10.048***	8.447***	10.900***

	(0.406)	(0.397)	(1.093)	(0.388)	(1.043)	(0.809)
Difference	0.583	-0.047	-0.075	0.601	0.706	-0.852
	(0.510)	(0.417)	(1.128)	(0.419)	(1.130)	(0.858)
Explained	0.610***	0.254***	0.281***	0.269***	0.243	0.147**
	(0.043)	(0.028)	(0.063)	(0.038)	(0.150)	(0.059)
Unexplained	-0.027	-0.302	-0.357	0.332	0.463	-0.999
	(0.510)	(0.409)	(1.103)	(0.417)	(1.094)	(0.846)
Observations	6,787	21,870	5,322	10,019	1,573	4,956

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

Table 24: Quantile decomposition of log of loan amount for 2011-12

VARIABLE	GC VS OBC					GC VS ST					GC VS SC				
Percentiles	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
GC	9.549***	10.107***	11.193***	11.202***	11.851***	9.549***	10.107***	11.193***	11.202***	11.851***	9.549***	10.107***	11.193***	11.202***	11.851***
	(0.016)	(0.017)	(0.015)	(0.017)	(0.014)	(0.238)	(0.229)	(0.193)	(0.298)	(0.326)	(0.238)	(0.229)	(0.193)	(0.297)	(0.326)
Others	9.035***	9.451***	10.531***	11.296***	12.329***	8.154***	8.897***	9.462***	10.758***	11.090***	8.469***	9.231***	10.183***	10.985***	11.203***
	(0.006)	(0.010)	(0.010)	(0.011)	(0.012)	(0.265)	(0.223)	(0.213)	(0.276)	(0.395)	(0.163)	(0.140)	(0.170)	(0.207)	(0.332)
Difference	0.515***	0.656***	0.662***	-0.094***	-0.478***	1.395***	1.209***	1.732***	0.444	0.761	1.080***	0.875***	1.011***	0.217	0.648
	(0.017)	(0.020)	(0.018)	(0.021)	(0.019)	(0.356)	(0.320)	(0.288)	(0.406)	(0.512)	(0.288)	(0.268)	(0.257)	(0.362)	(0.465)
Explained	0.152***	0.192***	0.275***	0.371***	0.369***	0.746***	0.839***	0.925***	1.124***	0.919***	0.419***	0.505***	0.531***	0.638***	0.736***
	(0.014)	(0.019)	(0.018)	(0.020)	(0.020)	(0.073)	(0.064)	(0.052)	(0.067)	(0.087)	(0.034)	(0.032)	(0.028)	(0.035)	(0.043)
Unexplained	0.363***	0.464***	0.387***	-0.465***	-0.847***	0.649*	0.370	0.807***	-0.680*	-0.158	0.661**	0.371	0.479*	-0.421	-0.088
	(0.005)	(0.003)	(0.003)	(0.004)	(0.006)	(0.358)	(0.320)	(0.288)	(0.402)	(0.521)	(0.285)	(0.264)	(0.256)	(0.356)	(0.464)
Observation	15,353	15,353	15,353	15,353	15,353	6,902	6,902	6,902	6,902	6,902	10,290	10,290	10,290	10,290	10,290

Robust standard errors in parentheses. p<0.01, ** p<0.05, * p<0.1. The table shows the result from quantile regression decompositions of log of loan amount obtained at 10%, 25%, 50%, 75%, and 90%

Table 25: Quantile decomposition of log of loan amount for 2005

VARIABLE	GC VS OBC					GC VS ST					GC VS SC				
Percentiles	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
GC	8.704***	9.567***	9.925***	10.498***	9.842***	8.704***	9.567***	9.925***	10.498***	9.842***	8.704***	9.567***	9.925***	10.498***	9.842***
	(0.015)	(0.013)	(0.014)	(0.015)	(0.019)	(0.290)	(0.209)	(0.243)	(0.331)	(0.549)	(0.290)	(0.209)	(0.243)	(0.331)	(0.549)
Others	8.474***	9.142***	9.956***	10.585***	11.147***	6.436***	8.623***	9.555***	9.482***	10.355***	7.988***	8.383***	9.053***	9.620***	9.669***
	(0.014)	(0.008)	(0.013)	(0.012)	(0.013)	(0.650)	(0.495)	(0.422)	(0.668)	(1.011)	(0.496)	(0.424)	(0.382)	(0.471)	(0.704)
Difference	0.230***	0.426***	-0.031	-0.086***	-1.306***	2.268***	0.944*	0.370	1.016	-0.513	0.715	1.184**	0.871*	0.879	0.173
	(0.020)	(0.016)	(0.019)	(0.019)	(0.023)	(0.712)	(0.538)	(0.487)	(0.746)	(1.150)	(0.574)	(0.473)	(0.452)	(0.576)	(0.893)
Explained	0.484***	0.334***	0.527***	0.498***	0.428***	0.991***	0.899***	0.994***	1.207***	1.280***	0.633***	0.597***	0.686***	0.777***	0.825***
	(0.021)	(0.014)	(0.021)	(0.020)	(0.022)	(0.081)	(0.056)	(0.050)	(0.064)	(0.096)	(0.040)	(0.030)	(0.030)	(0.035)	(0.052)
Unexplained	-0.253***	0.091***	-0.558***	-0.584***	-1.734***	1.277*	0.046	-0.625	-0.191	-1.793	0.083	0.587	0.185	0.102	-0.652
	(0.005)	(0.004)	(0.005)	(0.005)	(0.009)	(0.711)	(0.539)	(0.488)	(0.753)	(1.153)	(0.575)	(0.473)	(0.452)	(0.574)	(0.890)
Observation	12,081	12,081	12,081	12,081	12,081	5,602	5,602	5,602	5,602	5,602	8,108	8,108	8,108	8,108	8,108

Robust standard errors in parentheses. p<0.01, ** p<0.05, * p<0.1. The table shows the result from quantile regression decompositions of log of loan amount obtained at 10%, 25%, 50%, 75%, and 90%.

Table 26: Credit differences between general castes and other lower caste

	Observed credit differential	Adjusted credit differential	Observed credit differential	Adjusted credit differential	Observed credit differential	Adjusted credit differential
	1	2	3	4	5	6
VARIABLES	GC vs OBC	GC vs OBC	GC vs ST	GC vs ST	GC vs SC	SC vs GC
GC	10.877***	10.877***	10.877***	10.877***	10.877***	10.877***
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Others	10.510***	10.377***	9.465***	9.340***	10.036***	10.036***
	(0.018)	(0.132)	(0.048)	(0.089)	(0.027)	(0.027)
Difference	0.367***	0.500***	1.412***	1.537***	0.841***	0.841***
	(0.035)	(0.135)	(0.057)	(0.094)	(0.040)	(0.040)
Explained	0.248***	0.223***	1.126***	1.154***	0.505***	0.444***
	(0.024)	(0.031)	(0.050)	(0.057)	(0.033)	(0.041)
Unexplained	0.119***	0.277**	0.286***	0.383***	0.336***	0.397***
	(0.029)	(0.135)	(0.049)	(0.104)	(0.037)	(0.044)
Observations	27,604	27,604	12,341	12,341	18,210	18,210

Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. The table shows the decomposition of credit differences between general caste and other lower caste using a pooled data combining the data from two surveys.

Chapter 2

Credit Where Credit's Due: The Enabling Effects of Empowerment in Indian Microfinance

Abstract

We utilise primary data collected from a North Indian village in 2015 to 2016 and examine the impact of women's empowerment on their creditworthiness measured by the total annual loan amounts. Our key explanatory variable – an empowerment index – has been constructed using four individual-level factors -- economic, social, interpersonal and political. We find that more empowered women received greater cumulative loans. We have instrumented empowerment by the sex of the borrower's first child being male. It seems that in the male-dominated environment of North India, the 'luck' of giving birth to first child as a son helps a woman seize opportunities for empowerment. The village-level finding of empowerment is consistent with the result we obtain for the whole of North India using a separate and national dataset. We also show that for the rest of India education, but not empowerment, is an important determinant of loan volumes.

1. Introduction

Creditworthiness has been an integral part of the women's empowerment narrative of microfinance since the introduction of the *Grameen* Bank model in Bangladesh in 1983. Millions of poor women have benefitted from microfinance throughout the world and, in the process, have also been empowered (Hashemi, Schuler, and Riley, 1996; Kabeer, 2001; Pitt and Khandker, 1996), although in some cases disempowerment has also taken place from failures to repay, over-indebtedness and loss of control over the loan (Garikipati, 2008; Goetz and Gupta, 1996; Guérin, Kumar, and Agier, 2013) By and large, the microfinance literature has viewed empowerment more of an outcome (see for instance, Kabeer, 1999, 2005; Mayoux, 1998) than a determinant of creditworthiness.

But there is no denying that empowerment is a process. It takes place over time by gaining independence and taking control of personal, social and financial decisions (Hashemi, Schuler, and Riley, 1996). While borrowing leads to greater empowerment (Mayoux, 1998), empowerment could also lead to further loans. So, empowerment is both a *cause of* and an *effect on* loan behaviours. Here, we focus on the former. We aim to analyse how female empowerment affects their volume of loans, by studying a primary field survey data from a village in the state of Haryana, Northern India in combination with data from India Human Development Survey (IHDS)[20].

For the benefit of discussion, we define the volume and sustenance of loans as measures of creditworthiness, although in the literature it is the eligibility of getting loans that is commonly viewed as creditworthiness. The question of empowerment being a determinant of creditworthiness is likely to be of special importance for regions like rural North India where women have been historically disadvantaged. The region systematically lags in every gender development metric (Government of India, 2015). Even the microfinance institutions (MFIs), which have proliferated in the rest of India, have struggled to build a female clientele in Northern India.

[20] India Human Development Survey (IHDS) is a nationally representative survey produced by the National Council of Applied Economic Research (NCAER), New Delhi, and the University of Maryland.

In such an environment, a key consideration for lenders is likely to be woman's independence, mobility, and control over their own resources. Local money-lenders and village credit co-operatives (called co-operative societies) have the necessary background information on the borrowers - but MFIs do not. However, group lending (as in the *Grameen* model) ensures that the borrowers select their peers wisely considering their risk attitudes and financial independence.

We study female borrowers of three MFIs, a co-operative society and several local lenders in a randomly selected village of Haryana over two years (2015 and 2016). All loans were for production purposes. The village had no MFI before 2014. All three MFIs follow the *Grameen* model consisting of five-member groups. Upon completing 50 per cent of the repayment, a borrower becomes eligible to apply for a second loan, which is typically a bigger amount (Section 2 gives more details). We consider the total annual borrowing for each borrower. The MFIs vary in terms of the loan amount and the repayment cycle.

The borrowers are low-income women, all having children. They are engaged in activities like livestock rearing, pottery, candle making and other small informal businesses. We have collected data on their economic status, purchasing power, mobility, political awareness, attitude to domestic violence, and control over assets and income. These data are then used to construct an empowerment index using the principal component analysis (PCA) methodology (Sharaunga, Mudhara, and Bogale, 2016). We then regress the log of loan on the empowerment index, along with a set of controls. We find that the loan amount is positively and significantly related to the empowerment index.

However, the empowerment variable might be affected by the loans taken in the past or might be correlated with some of the control variables. We therefore instrument the empowerment variable. Our choice of instrument is the borrower's first child being a boy, which is entirely a random event. The child's sex should not directly affect the loan amounts that the mother would get in future. But in an environment where son preference is culturally ingrained, giving birth to a son can elevate a young woman's status within the household and help her gain some independence. This is the rationale we use to justify our instrument.

Our first stage regression of the two stage least square (2SLS) model shows that the first child's sex (male) is a strong determinant of mother's empowerment. The second stage instrument variable (IV) estimate shows that an exogenous increase in empowerment increases the loan amount. It also shows that the husband's income does not affect the loan outcomes of the women. Therefore, we argue that empowerment has a positive *causal* effect on creditworthiness.

As said above, a child's sex can affect the mother's present social status. Indian households are known to exhibit son preference (Das Gupta et al., 2003; Dyson and Moore, 1983), and this preference is stronger in rural areas for reasons of bequest, religious traditions and marriage dowry (Bardhan, 1988; Das Gupta et al., 2003; Mutharayappa, 1997).[21] Women who have given birth to a girl may be ill-treated by their in-laws families (Jejeebhoy, 1997). Therefore, it is reasonable to expect that mothers of boys may be given some independence and control over their own lives.[22]

It is noteworthy that for our IV we have used the sex of the *first* child, but not the second or the third child, or even the total number of sons. The reason is to avoid possible gender manipulation. Sex selective abortion is believed to be widespread in India, but researchers show that this occurs predominantly with the second pregnancy onward, conditional on the first child being a girl (Das Gupta et al. 2003; Rosenblum, 2013). Aborting the first child is very rare and unlikely (Arnold, Choe, and Roy, 1998; Jha et al. 2011).[23]

Is our empowerment model too specific to be applicable elsewhere? We test the robustness of our methodology using the Indian Human Development Survey (IHDS) data of 2011-12, for North India[24] and the rest of India. Although the households covered by the IHDS survey are

[21] The sons also maintain family names and inherit family wealth (Das Gupta et al., 2003, Mutharayappa et al., 1997), and by the Hindu religious rules, males are responsible for performing various family rites, for instance in the event of death (Mutharayappa et al., 1997). Most importantly, by the Hindu social custom, at the time of marriage the groom's family receives dowry - a substantial transfer in the form of wealth (like gold, land, durable goods and cash) - from the bride's family. Therefore, having a male child strengthens the social status of the household (Dyson and Moore 1983). Anecdotes of respite from domestic abuse or forfeiting dowry claims after giving birth to a boy are quite common.

[22] There is no evidence to suggest that grown up boys could have been used as an implicit collateral.

[23] Abortions are generally expensive and dangerous (15 to 20 percent deaths are caused due to unsafe abortions) (Duggal, 2004, Jha et al. 2011) and could negatively affect the reproductive health of women. First child is also seen as god's gift in the region. So, abortion is deemed as an act against god wishes.

[24] North India consist of the following ten states: Haryana, Delhi, Rajasthan, Bihar, Uttar Pradesh, Himachal Pradesh, Punjab, Uttarakhand, Chandigarh and Jammu and Kashmir

not comparable to the ones in our village survey, the dataset is very helpful for our purpose of studying empowerment because it contains both loan information and women's empowerment related information. However, it also has two major limitations. First, the loan information pertains to the household level, but not individual members of the household. Second, the data give the total number of boys and girls in the family, but not their birth order, which means we cannot use the same IV. To address these limitations, we separate those households that are listed as female-headed, relying on the assumption that the head of the household is responsible for the loans. We then construct the empowerment index for this subsample using the same PCA method, as done from our village survey data. Since the first child's sex cannot be used as IV from this dataset, we use widowhood as the IV for empowerment, and we find that empowerment does have a *causal* effect on the amount of loans in North India, but not in the rest of India.

Widowhood as an IV can be explained as follows. First, it is a random occurrence. Second, the absence of husband allows (and necessitates) a woman to be independent and to make strategic life choices[25]. That said, it is also true that widows in India are amongst the most vulnerable sections of society. Dreze and Srinivasan (1997) have shown that widows in India face severe intra-household discrimination. Therefore, expecting widowhood to contribute to empowerment is self-contradictory. Our argument is that when a widow suffers economic misfortune, we would expect them to take on greater consumption loans, but not non-consumption loans. The IHDS data contain information on consumption loans, as well as production, education and medical loans. We see that widows take a slightly larger amount of loan on average, but the difference between widows and non-widows is statistically insignificant. Therefore, we reconcile empowerment and vulnerability by arguing that probably widows are less likely to receive non-consumption loans. But amongst those women who get these loans, widows are likely to be more empowered than non-widows[26].

Indeed, our IV analysis shows that widowhood enables women to be more empowered and loans empowerment has a *causal* positive effect on non-consumption loans. This argument holds true for our North India subsample, which is consistent with our finding from the village

[25] In our female-headed household sub-sample of the IHDS data, widows have control over the household resources and 96 percent of them reported supports received from their natal and/or in-law families.
[26] In fact, our IHDS data show that widows were more empowered regardless of they took loans or not.

data. We also show with the IHDS data that empowerment positively affects the probability of getting loans.

But can the same be said about the whole of India? To answer the above question, we run the exact same model for the rest of India, and the IV estimates show that empowerment does not have a *causal* effect on the loan amount. In fact, it is education that becomes a strong determinant of loan amount. We also check that empowerment does not determine the women's access to loans in the rest of India. Although it seems puzzling, it can be explained in terms of the much higher status of women in Southern and North Eastern India. Thus, empowerment, as measured by our factors, is not critical for creditworthiness in the rest of India; instead, human capital is, as it should also be for a male borrower.

In sum, our paper makes the following contributions. First, we construct an empowerment index taking an array of factors into account both at a village level and regional levels. The index allows us to study empowerment as a *determinant* of creditworthiness. Second, while studying the individual contributions of the underlying factors of empowerment, we find that some factors like the women's control over assets, income and savings, their political awareness, and their attitude to domestic violence seem to be extremely important. Third, the empowerment process may be triggered by good luck (like giving birth to a son) or by personal tragedy (like widowhood). In the highly male-dominated environment of North India, either factor can help empower a woman and advance her creditworthiness. Elsewhere in India, human capital is much more critical for creditworthiness.

The paper is organised as follows. Section 2 describes the data and study area. Section 3 describes the construction of the empowerment index. Section 4 sets out the methodology for the paper. Section 5 reports the econometric results and Section 6 tests the robustness of the results. The concluding section discusses some limitations.

2. The study area and the data

The study covered a random sample of 211 women who were clients of three MFIs, a co-operative society, and several professional money lenders. The data were collected through two household surveys taken in 2015 and 2016 (see the timeline of the survey in Figure 1 in

Appendix), in a village in the state of Haryana, North India (see the map in Figure 2 in *Appendix*). We collected information regarding income, loans, investment, health, household composition, education, employment, assets, and other variables. In addition, we held informal discussions[27] and semi-structured interviews[28] to select the variables that constituted the empowerment index.

The village is 90 km away from the state capital, with 1143 households and a population of 6466, of whom 3420 are males while 3046 are females as per the Population Census 2011. Haryana is a relatively prosperous state with only 11% of the population living below the poverty line, but the state has the worst gender ratio in India - 879 girls for 1,000 males as compared to the national average of 917 girls for 1,000 males. The average literacy rate of Haryana is 76 %; male literacy stands at 84 % while female literacy is at 66 %, not far off from the national average. Hinduism is the main religion of the state with 87.46 % classified as Hindu. The state is also very agricultural with 65.12 % of of people living in rural areas. The village is in a fast-growing area with good transportation links and is endowed with a good irrigation system. The area is a low risk for natural disasters such as earthquake or floods.

The credit market of the village is served by three MFIs since 2014, named *SKS* (now known as Bharat Financial Inclusion Limited), *Utkarsh*, and *Janlaxmi*. Additionally, there are several moneylenders and a government supported co-operative society. The moneylenders, locally called *aadthis*, also double as traders in crops and agricultural inputs.

Most women in our sample are self-employed earning less than two dollars a day from their household businesses which are livestock farming, growing vegetables, garment making and other small businesses[29] (see Table 1). None of the businesses are registered with the government or have any permanent employees.

[27] We attended weekly and monthly meetings of microfinance institutions and used them to discuss empowerment with the women participants.

[28] The interviews were done with 15 women representing various age groups at their houses in the presence of a local social worker who helped with translation and conversations. The permission to interview women was obtained from them as well as from the head of the village (*sarpanch*). Consent was taken in verbal form. The interviews followed a semi-structured approach, giving participants the flexibility to discuss issues important to them. All the clients approached agreed to be interviewed for this study.

[29] Our sample consist of self-employed women who have taken loans for productive purposes. Most businesses are home-based. We admit this may not be representative of the whole country. This is a limitation of our study.

Table 1: Distribution of businesses owned by the borrowers in the sample

Business	%
Cultivation	12.80
Livestock	36.97
Garment making	11.37
Shops	17.54
Small informal businesses (pottery, candle, handicraft, basket making etc.)	9.95
Others[30]	9.00

All three MFIs use a version of the *Grameen* model. Borrowers are asked to form a group of five, and then the group members are expected to monitor each other's repayment as well as coordinate some activities (such as collection of repayment) to reduce the operational costs of the MFI. However, they all can receive, as well as repay, the loan at the same time (instead of taking turns). Eligibility to receive a second loan depends on both the individual and the group repayment record. As already noted, repayment of 50 percent dues makes one eligible for a second loan. The group is expected to meet every week or month (depending on their repayment cycle) for a short meeting when the members pay their dues and pledge honesty and timely repayment. We did not see any default or expulsion of a member from any group.

There is some difference between the MFIs in terms of the repayment cycle. The repayment cycle of *SKS* is weekly, which starts within a week of the loan disbursement. *Janlaxmi* and *Utkarsh* use a monthly cycle of repayment, which starts after a month of the loan disbursement. *SKS* and *Utkarsh* have similar loan products where a new borrower starts with a loan limit of Rs 15,000, which is then increased by an additional Rs 15,000 in the second loan cycle, and then by Rs 20,000 in the third loan cycle, and finally by Rs 30,000 in the fourth until to reach the overall cap of Rs 80,000[31]. For *Janlaxmi*, the first loan starts at Rs 30,000 and the second loan can go up to Rs 50,000. The repayment is collected by a loan officer during the weekly/monthly meeting of the group and a record is kept in individual borrower's passbooks.

[30] Including joint investments with husbands, trading of pulses, utensils, chemicals etc.
[31] 1$= Rs 70 (September 2018)

The co-operative society and traders are very flexible with their loan amount and repayment cycle. Usually, a co-operative loan is to be paid back within six months with agreed instalments subject to some adjustments in difficult times, but failure to repay the loan on time invites higher interest charges on the outstanding amount and/or being barred from future loans. Loans from traders are highly flexible and their interest rates are usually the same as the MFIs. All loans are for productive purposes; some are predictably seasonal.

Table 2: Loan products offered by various lenders:

Lender	Repayment Schedule	Interest rate per annum	Repayment	Initial loan
SKS	Weekly and fixed repayment amount of Rs 335 over the course of 54 weeks/one year	18-22 %	Weekly	Rs 15000
Utkarsh	Monthly and fixed repayment amount of Rs 1480 over the course of 12 months /one year	18-22 %	Monthly	Rs 15000
Janlaxmi	Monthly and fixed repayment amount of Rs 1930 over the course of 12 months /one year	18-22 %	Monthly	Rs 30000
Co-operative Society	Flexible repayment amount paid within six months	15-22 %	Flexible	Varies
Traders/local lenders	Depends on the relationship and negotiation with the lender	20-50 %	Flexible	Varies

The study focuses on the creditworthiness of the women borrowers which is measured by the cumulative amount of loan taken each year. Therefore, the main dependent variable is the log of total loan taken at the time of the survey. The descriptive statistics of the participants at baseline are provided in Table 3. The average borrower in our sample is 31.77 years old who has completed 5.5 years of education and lived in the village for 12 years. In 2015, she had a total loan (from all sources) of Rs 30,540, earned an annual income of Rs 35,810, and saved Rs 690 in the last month. They also owned assets worth of Rs 101,560. In 2016, the average loan size fell to Rs 21,350, and the annual income increased to Rs 42,280 leading to a significant increase in the last month saving to Rs 1,209. The decline in the loan could be due

to the possibility that some borrowers were reaching their MFI loan cap, and/or their optimal scale of business was reached and hence no further loan was needed.

Table 3: Descriptive statistics

	2015		2016	
VARIABLES	Mean	SD	Mean	SD
Income and expenditure ('000 Rs)				
Loan taken in the year	30.54	13.77	21.35	9.591
Assets worth	101.6	51.42	110.8	44.99
Income of the respondent	35.81	12.38	42.28	10.03
Income of the household	124.4	29.24	134.7	25.09
Level of investment in business activities	39.21	30.71	24.08	8.766
Borrower's savings per month	0.692	0.474	1.209	0.831
Household consumption on food per month[32]	3.404	1.049	3.919	0.918
Average working hours per week	31.98	12.52	35.29	10.53
Expenditure on children education	0.695	2.433	0.725	2.426
Expenditure on health	16.38	12.41	15.20	7.611
Expenditure on entertainment in the last month[33]	1.012	0.356	1.000	0.292
Borrower's characteristics				
Age (years)	31.77	4.913		
Age at marriage	19.60	1.686		
Years in the village	12.14	4.968		
Education years	5.526	3.129		
No of sons	1.294	0.585		
No of daughters	1.147	0.571		
First child son	0.672	0.472		
Size of the household	5.014	0.771		
No of working members	2.28	0.53		

[32] Consumption expenditure on food calculated by average monthly spending on rice, flour, milk and dairy products, pulses, vegetables, oil and spices.
[33] Expenditure on entertainment includes spending on cable TV, mobile, fairs, festivals, and picnics

House Quality[34]	0.578	0.495
Share of the lending institutions in loans		
Cooperative	0.0758	0.265
Traders/local lenders	0.137	0.345
Janlaxmi	0.0711	0.258
SKS	0.474	0.501
Utkarsh	0.242	0.429
Borrower's caste		
Other Backward Castes (OBC)	0.308	0.463
General Caste	0.251	0.435
Schedule Caste/Schedule Tribes (SC/ST)	0.441	0.498

3. Empowerment index

Although women's empowerment is a much-researched topic in development economics, there is no universally agreed definition of the term (Malhotra and Schuler, 2005)[35]. For example, Sen (1993, as cited in Malhotra and Schuler, 2005) viewed empowerment as "altering relations of power which constrain women's options and autonomy and adversely affect health and well-being". Keller and Mbwewe (1991, as cited in Rowlands, 1995) defined it as "a process whereby women become able to organize themselves to increase their own self-reliance, to assert their independent right to make choices and to control resources which will assist in challenging and eliminating their own subordination".

We take the definition adopted by Kabeer (1999:437). According to her, "empowerment is the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them". The ability needs to improve on three inter-related dimensions: resources (access to and claims over material, human and social resources), agency (processes

[34] A binary variable distinguishing between dwellings that are designed to be solid and include cemented flooring and strong roof compare to houses without a strong floor or roof. (Good = 1, Bad = 0)

[35] The literature has used several concepts like autonomy, power status and agency interchangeably (Malhotra and Schuler, 2005).

of decision making), and achievements (well-being outcomes). Following this conceptualisation, we consider the following four dimensions: economic, social, interpersonal and political.

Economic empowerment: Economic empowerment alters the economic relationship between a woman and her immediate environment. Within the family unit, it reduces the extent to which women are financially dependent on other family members, and consequently may improve her status in the family along with increased inter-spousal consultations in household matters (Kabeer, 2001). Women's control over economic resources such as loans, income and savings contribute to the process of economic empowerment.

To assess women's agency vis-à-vis income, savings and loans we asked them about how much control they have over these resources. We also asked them about the freedom to participate in the labour market, and freedom to buy certain things such as cooking utensils (costing below Rs 5,000) and furniture or jewellery (costing above Rs 5,000)[36].

Clearly, economic empowerment is important in enlarging the set of economic options, but it alone may not necessarily improve a woman's life. A woman also needs confidence and social skills to translate the options into practical actions. Malhotra and Schuler (2005) argue that it takes at least three-pronged empowerment - social, political and economic - to enable real change in women's welfares.

Social empowerment: Mobility is a widely used indicator of women's empowerment. It is especially important in the highly male-controlled environments of North India. To assess women's mobility in the public domain, we asked whether the respondent was free to move within the village to visit temple or friends without her husband's permission. We also asked if she could travel alone outside the village for family-related matters or medical needs.

The concept of social empowerment is crucially linked to women's access to public spaces and mobility in the community and beyond. To develop and maintain their position within a community, women must be able to engage socially - for example by attending meetings and

[36] The rupee limits were imposed after consulting with women to identify which level of asset ownership was sufficient for sustainable economic empowerment.

community events, and by forming their own network. This will improve their social trust, access to public information and abilities to influence the social norms, which ultimately yield strategic benefit for the society (Kabeer, 2001).

Interpersonal empowerment: Empowerment is a process of internal change, that focuses on a woman's sense of belief in her own decision-making abilities. Attitudes and perceptions reflect internal transformation and empower women from 'within' (Kabeer, Mahmud, and Tasneem, 2011). We asked questions on their attitude towards domestic violence and their ability to decide on family planning and children's (especially daughters') schooling, and to decide on sales/purchases of livestock. We asked a question regarding women's health to account for the physical condition needed for them to act upon the available opportunity. We also accounted for media exposure through access to TV and radio.

Political empowerment: Since there was an election held around the time of our first survey, we included some questions relating to political awareness. We asked them about their knowledge of the elected representative and if they had voted independently of their husband's preference. Political awareness is a proxy for women's understanding of their rights to fair wages and prices, social justice, and lawful treatments by the police or government officials.

Table 4 enlists the variables and corresponding data that will be used in our PCA to construct the empowerment index.

Table 4: Indicators of empowerment

Economic status/security	• Owns assets above Rs 10000 (Yes =1, No = 0) • Free to choose between staying home or participating in employment activities (Yes =1, No = 0)
Control over loan	• Full control (1) • Share loan with husband (0.5) • No control (0)
Control over income and savings	• Have control over their savings and income (Yes =1, No = 0)

Purchasing capacity	• Control over small purchases > Rs 5000 such as food, children products, cooking utensils and own clothes (Yes =1, No = 0) • Control over big purchases < Rs 10000 such as furniture/Jewellery (Yes =1, No = 0)
Decision making:	• Have a say in sale and purchase of livestock/ /housing equipment (Yes =1, No = 0) • Independent or have the majority control in taking decisions regarding child/daughter schooling, clothing, and food (Yes =1, No = 0)
Mobility	• Free to move around the village such as visit the temple or friends without husband's objection (Yes =1, No = 0) • Free to move outside village to doctors, relative or market, without husband's objection to going alone (Yes =1, No = 0)
Participation in public life	• Free to participate in the microfinance project/ attending meetings/ forming a group/ public life (Yes =1, No = 0)
Political awareness	• Know the name of their Sarpanch (Yes =1, No = 0) • Know the name of their MLA/MP (Yes =1, No = 0) • Voted in the election/will vote in the election (Yes =1, No = 0) • Independent of husband interference in the voting (Yes =1, No = 0)
Attitude towards domestic violence	• Is it wrong for a husband to beat his wife in any situation? (Agree =1, Neither Agree or Disagree = 0.5, Disagree = 0)
Family Planning	• Independent to take fertility and parenting decisions (Yes=1, Joint decision making = 0.5, No = 0)
Media exposure	• Access to radio, TV, and other sources of media (Yes =1, No = 0)
Health self-evaluation	• Generally healthy (1) • Occasionally sick (0.5) • Poor Health (0)

Before we proceed to the PCA model of the index construction, we need to accept certain limitations of our methodology. First, admittedly empowerment is a latent construct and at best we can only get an approximate estimate relying on some key, but not all, aspects of empowerment. For example, a woman may have the freedom to work, but will still not be able to work if she lacks confidence or necessary skills. Economic empowerment, in this instance,

does not translate into economic agency. Second, women's empowerment in certain context could also lead to disempowerment. For instance, social empowerment demands that women have greater visibility, mobility and engagement in their communities. Depending on the strength of cultural and religious norms in those communities, this could expose women to social hostility or even violence. Similarly, greater participation in economic activities by women could discourage other family members - especially men - from working and burden the women with more economic responsibility as well as household responsibility. Therefore, an additional care is needed to construct an empowerment index or scale due to its multi-dimensionality since combining inappropriate variables to measure empowerment could lead to its incorrect and inefficient estimation. Third, cultural and behavioural norms are likely to vary across space and time. A measure that signifies empowerment in one region or culture may have little relevance or different meaning in another. This is particularly evident in the case of measuring freedom of mobility which is more relevant in a patriarchal religious context where women are expected to remain at home than in a western context. Thus, consistency and comparability remain an issue. This is not unique to empowerment, but common to all qualitative variables.

Developing a universal measure of empowerment is beyond the scope of this paper. We accept the limitations mentioned above. We have taken utmost care to develop an empowerment index based on a series of factors that are relevant to the region, which were uncovered through one-to-one conversations with women and our own knowledge of the North Indian reality. For example, our informal discussions also suggested that good health of a woman is also important for empowerment because she would otherwise be regarded as a family burden. We therefore included a separate question on health.

Principal Component Analysis. We use the statistical procedure of principal components to determine the weights for an index of the variables mentioned above. PCA is a multivariate statistical procedure used to reduce the number of variables in a data set into a smaller number of components so that variations in the data can be accounted with the greatest accuracy (Vyas and Kumaranayake, 2006). PCA transforms original variables into uncorrelated indices, where each component is a linear weighted combination of the original variables.

Using a set of variables (X_1 , X_2,…, X_n), m principal components can be expressed as

$$PC_1 = a_{11}X_1 + a_{12}X_2 + \ldots\ldots + a_{1n}X_n$$
$$PC_2 = a_{21}X_1 + a_{22}X_2 + \ldots\ldots + a_{2n}X_n$$
$$\ldots\ldots$$
$$PC_m = a_{m1}X_1 + a_{m2}X_2 + \ldots\ldots + a_{mn}X_n$$

where a_{ij} represents the weight for the *i*-th principal component and the *j*-th variable.

The variance for each principal component is measured by the eigenvalue of the corresponding eigenvector. All components are uncorrelated, and they are ordered in accordance with their additional information content, starting from the largest. The first principal component captures the largest amount of information that is common to all of the variables, subject to the constraint that the sum of the squared weights is equal to one (Filmer and Pritchett, 1998; Vyas and Kumaranayake, 2006). The second component explains additional but less variation in the original variables than the first component subject to the same constraint. The last component will account for the least amount of variations in the original variables. PCA works in such a way that variables with low standard deviation would carry a low weight. For instance, if every woman in our sample has a TV in her house; exhibiting no variation between household, then the variable would be zero weighted and would be of little use in estimating the index.

Table 5: Descriptive statistics of variables used in computing empowerment index

Variables	2015	Factor Score	2016	Factor Score
Small purchases	0.991	0.050	0.995	0.065
	(0.097)		(0.068)	
Big purchases	0.692	0.238	0.834	0.220
	(0.097)		(0.068)	
Mobility in the village	0.924	0.151	0.962	0.157
	(0.265)		(0.191)	
Mobility outside the village	0.275	0.122	0.374	0.143
	(0.448)		(0.485)	
Know the name of the village head	0.991	0.192	0.991	0.194
	(0.097)		(0.097)	

Voted in the recent election	0.919	0.466	0.924	0.449
	(0.273)		(0.265)	
Know the name of the MLA/MP	0.858	0.455	0.858	0.442
	(0.350)		(0.350)	
Independent of husband interference in the voting	0.0711	0.142	0.0806	0.134
	(0.258)		(0.273)	
Self-employed or participate in the labour market	0.995	0.173	0.995	0.196
	(0.068)		(0.06 8)	
Owns asset above INR 10000	0.858	0.310	0.858	0.322
	(0.350)		(0.350)	
Control over savings and income	0.976	0.365	0.976	0.388
	(0.152)		(0.152)	
Independent in taking household decision regarding food, children's education etc	0.883	0.123	0.967	0.112
	(0.323)		(0.180)	
Have a say in purchasing livestock and household equipment	0.708	0.254	0.664	0.226
	(0.455)		(0.474)	
Free to participate in the microfinance project/ attending meetings/ public life	0.915	0.014	0.924	0.031
	(0.218)		(0.210)	
Control over loan	0.614	0.038	0.654	0.0166
	(0.373)		(0.373)	
Media exposure	1		1	
	(0)		(0)	
Is wife beating justified in any situation?	0.566	0.244	0.573	0.243
	(0.339)		(0.339)	
Independent to take fertility and parenting decisions	0.0806	0.135	0.0806	0.146
	(0.225)		(0.225)	
Cronbach's α	0.67		0.64	

Note: Factor scores are based on the first principal component. Standard deviation in parentheses.

The first principal component explains 17% of the variation in the variables used; this percentage is substantial but not overwhelming[37]. Table 5 presents the factor score from the

[37] Although the first principal component may well serve as a reasonable overall index, the question remains whether this component has all the relevant information (Filmer and Pritchett, 1998).

first principal component which shows that our index gives more weight to economic status, control over savings, political awareness, attitude towards domestic violence and purchasing capacity regarding expensive items. Since every woman in our sample has access to TV/radio, the variable of media exposure would have no effect on our index. We will now examine how empowerment affects the amount of loan.

4. Methodology

To estimate the relationship between women's empowerment and their creditworthiness, a model in the following form is employed.

$$\ln(L_{it}) = \alpha + \delta_1 EMPOWERMENT_{it} + \delta_2 Y_{it} + \theta_t + \mu_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

where i = 1,2,…, 211, t =1,2.

Here, $\ln(L_{it})$ is the log of volume of loans for the i-th women in the sample at year t. *EMPOWERMENT* is the total empowerment score; Y_{ij} is a vector of the borrower's individual and household characteristics, such as age, education years, caste, and months with the lender, household size and source of the loan. μ_i is an individual specific unobservable effect, θ_t is year fixed effect and ε_{it} is an iid error term.

To identify which empirical methodology - pooling, fixed effects or random effects model - is most appropriate, we perform two statistical tests: the first is the Hausman specification test (Hausman, 1978) to compare the fixed effect and the random effect models; the second is the Lagrange Multiplier (LM) test (Breusch and Pagan, 1980) of the random effect model (see Table 15 in the Appendix for fixed effects and random effects estimates). A rejection of null hypothesis in the Hausman test statistic would imply that the random effects estimators are inconsistent and that fixed effects estimates are more appropriate. In our case, the Hausman specification test failed to reject null hypothesis ($\chi^2(5) = 10.21$) and suggests support for the random effects model. A LM test for the random effects model based on the OLS residuals can be used to assess whether the Panel GLS model is appropriate than the strict OLS model. The Lagrange multiplier failed to reject the null hypothesis allowing us to conclude that the random effects model is not appropriate. Therefore, we run a simple pooled OLS regression.

However, *EMPOWERMENT* can be dependent on the loan as well as other omitted variables. We address this potential endogeneity bias by adopting the IV approach and using sex of the first child as an instrument for empowerment. In the 2SLS IV approach, our first stage treats empowerment index as a dependent variable and use dummy variables for the first child being son as an independent variable. In the second stage, we regress log of loan amount on the predicted value of empowerment index obtained from the first stage regression.

Indeed, our first stage regression shows that our instrument is a strong determinant of mother's empowerment. The second stage regression shows that (instrumented) empowerment increases the loan amount. Therefore, we can argue that empowerment has a positive *causal* effect on creditworthiness.

Now we need to explain our choice of the instrument. Whether the first child is a boy or a girl is purely a random event and could not directly affect the loan amounts the mother would get many years later. Can the *first* child's sex be manipulated through sex-selective abortion, given that India, and North India particularly, show strong son preference? The answer to this question, based on overwhelming evidence, is 'no'. Das Gupta et al. (2003) and Rosenblum (2013) show that the chance of sex-selective abortion arises predominantly with the second pregnancy onward, when the first child was a girl. Aborting the first pregnancy is very rare and unlikely (Arnold, Choe, and Roy, 1998; Jha et al. 2011), not to mention the health consequences associated with it. Moreover, in rural Haryana first child is also seen as God's gift and terminating pregnancy would be regarded as a sin. But the second or third child's gender selection is not uncommon. Because of this risk of non-randomness arising with later children, we took only the first child (being boy) as our instrument, and not total number of sons. In fact, when we tried total number of sons as an alternative instrument, we saw no relationship between the instrument and empowerment.

Now what would be the economic explanation for the significantly positive relationship between giving birth to a boy (as first child) and empowerment? We argue that in the male-dominated culture of North India, where women are ill-treated for giving birth to a girl for the costly future implications of dowry (among other reasons), the luck of giving birth to a son would elevate a young woman's status within the household (Jejeebhoy, 1997). She might be granted significant freedom in decision making and control over basic resources in her life. These are important steps in gaining independence and self-confidence in later life.

We may also argue that the luck of giving birth to two or three sons does not improve things dramatically, because the pathway to empowerment already opened due to the first son; gaining further empowerment has nothing to do with having additional sons. That is the reason the total number of boys does not work as an instrument. Similarly, giving birth to a boy after a girl does not also help much either, because it can only prevent deterioration of the woman's status. Likewise, giving birth to a girl after a boy may not be a great misfortune, given that the family already got a son they value so much. Thus, the first child being a boy is crucial.

Is it possible that a boy could be an implicit collateral or loan guarantor and thus can directly influence the loans? This is not plausible on several grounds. First, the loans are also very short term, which cannot be renegotiated for delayed repayment from a son's future income. In any case, MFIs or cooperative societies, who are the dominant sources of loan in our sample, do not follow such exploitative policies. Second, the average woman's age is about 32 years and the age at which she had her first child was 21. So, having an eleven years old son cannot help her secure a bigger loan even from a very exploitative moneylender[38].

5. Results

Our OLS and IV estimates are reported in Table 6. We see that both models show significant positive effects of empowerment on the loan amount. The underlying first stage regression of the IV model, presented in Table 11 in *Appendix,* show that the first-born son leads to 1.33 unit increase in women's empowerment and the relationship is significant at 1% level. Therefore, it is seen that having a first-born son contributes directly to women's experiences of empowerment. The number of education years completed also have a positive and significant relationship with empowerment.

The IV estimates show that for a unit increase in empowerment score, the loan amount is expected to increase by 12.8 percent (Column 2, Table 6)[39]. The number of education years completed has a negative impact on the amount of loan - probably because microfinance is

[38] To test the validity of this argument, we have regressed the loan amount on the interaction of the first-child dummy and mother's age. The interaction term is insignificant.
[39] We found no evidence of reverse causality with loan amount having no effect on the level of empowerment.

usually taken by less educated women and higher educated women are more likely to work in regular salaried jobs. The positive and significant coefficient of upper caste suggests that caste phenomena are strong in the region and upper caste women are expected to get a higher loan amount. Husband's income does not appear to have any effect on the loan amount which suggests women own status determines their loan outcomes[40]. We find that the number of working members, house quality (as a proxy for income), average hours worked per week and years in the village do not affect the amount of loan. The coefficients of the loan sources other than SKS MFI (which is the base category) are negative. Women involved in livestock and other business activities such as joint investments with husbands, trading of pulses, utensils, and chemicals have a higher loan amount compared to the women engaged in agriculture activities.

Table 6: Pooled OLS and IV estimation model

	(1)	(2)
VARIABLES	OLS	IV
Empowerment	0.035*	0.128***
	(0.021)	(0.045)
Education years	-0.008	-0.033**
	(0.013)	(0.015)
Months with the lender	0.122***	0.119***
	(0.034)	(0.035)
Months with the lender square	-0.001	-0.001
	(0.001)	(0.001)
Years in the village	-0.008	-0.011
	(0.007)	(0.007)
No. of working members	0.068	0.056
	(0.056)	(0.059)
Upper Caste	0.115	0.160**
	(0.073)	(0.078)
House quality	-0.010	-0.018

[40] We found that wife's income is a strong determinant of the loan amount without changing our main results, but for endogeneity reasons, we have not included it in our final regression.

	(0.063)	(0.061)
Average hours worked per week	0.001	-0.001
	(0.003)	(0.003)
Log of husband's income	0.199	0.099
	(0.125)	(0.112)
Source of the loan		
Utkarash	-0.077	-0.122*
	(0.051)	(0.064)
Janlaxmi	0.206***	0.132
	(0.075)	(0.096)
Moneylenders	-0.123	-0.151
	(0.127)	(0.112)
Co-operative Society	0.141	0.113
	(0.181)	(0.175)
Income generating activities		
Livestock	0.094	0.167
	(0.094)	(0.105)
Making cloths	0.018	0.077
	(0.143)	(0.139)
Shops	0.017	0.066
	(0.129)	(0.124)
Small informal business	-0.043	0.023
	(0.118)	(0.135)
Other activities	0.188	0.250**
	(0.120)	(0.126)
Year	-1.325***	-1.311***
	(0.228)	(0.236)
Constant	1.459***	2.107***
	(0.550)	(0.614)
R square	0.292	0.283
Cragg-Donald Wald F statistic		86.94
Observations	422	422

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

Column 1 presents the pooled OLS estimates and Column 2 presents the IV estimates of regression using log of loan amount as a dependent variable. We use agriculture as a base group for income generating activity dummies and SKS microfinance as the base group for the loan source dummies.

Column (1) of Table 6 presents the pooled OLS estimates that shows a positive impact of empowerment on the loan amount. In Column (2), after instrumenting for empowerment, the estimates show a similar pattern, with IV estimates bigger than the pooled OLS estimates. These results, together with the good performance of our instrument in general, suggest that more empowered women sustain bigger loans. The IV estimates are considerably larger than the pooled OLS estimates, suggesting that the uncorrected OLS model would have underestimated the true effect of empowerment on women's creditworthiness.

We also test for the relevance of the instrument in the first-stage regression. Staiger and Stock (1997) proposed a rule of thumb declaring the instruments weak when the first stage *F* statistic is less than 10. The F-statistic from the first-stage is sufficiently large, suggesting that our IV is powerful. Another approach, by Stock and Yogo (2005) is to reject the null hypothesis of weak instruments when the Cragg and Donald (1993) F-statistic exceeds a given threshold. In our case, we reject the null hypotheses of the weak instrument since Cragg-Donald F statistic (86.94) exceeds the threshold of 16.38 at 10%. By these criteria, we have a good instrument in the first-born son.

As an aside issue, we wanted to check which component of the empowerment index has bigger effect on the loan amount. For this purpose, as a separate exercised we have regressed the loan amounts on the individual components of empowerment, instead of the empowerment index (see Table 12 in the *Appendix*). We find that economic, political and interpersonal factors have a positive and significant relationship with loan amount, whereas social factors have no effect.

6. North Indian data: Robustness checks and supporting evidence

An important question is: How robust is our empowerment methodology? Can this be applied to a larger dataset, and check that the insight we got from our village data tally with North India as a whole? To answer these questions, we examine the IHDS data for 2011-12 for

North India and the rest of India (see Table 9 in the *Appendix* for summary statistics). The IHDS data contain very similar empowerment related information on adult women. Therefore, it presents a clear scope for testing our model.

However, there are two issues. First, the IHDS data contain the credit information at the household level, which does not help to identify the female borrowers. Therefore, we create a subsample of only female-headed households. Using this subsample, we then create a similar empowerment index using PCA (see Table 10 in the *Appendix*). Since the data also has information on women who did not take any loans, we can also estimate the probability of getting a loan. Second, IHDS data do not report the birth order of the child. Hence, we cannot use the first child's sex as an IV for empowerment. Instead, we use widowhood as an instrument.[41] We also use the Heckman two-step procedure to correct for self-selection bias (discussed in *Appendix B*).

Admittedly, the IHDS households are not *prima facie* comparable with our village survey households because IHDS borrowers are head of the household unlike the borrowers in our survey data. However, as Table 6 shows, the husband's income does not affect the wives' loans. Therefore, we can say that there is some similarity between the borrowers of the two datasets regarding the responsibility of the loan. Above all, both samples provide rich information on underlying factors of empowerment.

We now need to justify our choice of widowhood as an IV. First, it is a random and exogenous event, and it could not possibly have a direct effect on the amount of loans. One may argue that a widow would be in greater need of loans than a non-widow female. Based on Dreze and Srinivasan (1997) we also know that widows are amongst the most vulnerable women in India. However, *vulnerability* would lead to greater consumption loans, but not non-consumption loans. But amongst those women who get non-consumption loans, widows are likely to be more empowered. Second, the absence of husband allows a woman to be independent and to make strategic life choices. For this reason, women who do get bigger loans are likely to be more independent and empowered.

In other words, the process of empowerment may be triggered by misfortune and tragedies,

[41] We find widowhood has a positive association with empowerment (see Table 13 and 14 in the Appendix).

as it may be with good luck, like giving birth to a son. There is no unique pathway to empowerment. Both good and bad lucks can help a woman take the road to empowerment.

The IHDS data contain information on the largest loan which could be of several types of needs – consumption, production, education, medical, home building/improvement and marriage. From these, we exclude consumption and marriage. Production loans are typically short-term working capital credit. Education, home improvement and medical loans are somewhat related to production as well, because human capital is an important input for self-employment and home is also commonly used as a production base. Therefore, it is appropriate to include all these loans into a single non-consumption loan.

Table 7 below presents the IV results on the probability of taking any loan. Empowerment has a positive effect on the probability only in North India; the rest of India shows no effect. The results also suggest that households with better house quality (a proxy for income) are less likely to participate in the credit market. Upper caste female-headed households are less likely to participate in the credit market in the rest of India while caste does not have any effect in North India. Similarly, ration card only affects the probability of participation in the credit market in the rest of India. On the other hand, larger (female-headed) households and those keeping livestock are more likely to take loans in North India while no effect in the rest of the country. The Wald test confirms that the use of IV is justified for North India. However, in the rest of India sample, a probit model would have sufficed, although the results did not change.

Table 7: IV estimates for the probability of loan taken based on the IHDS data

	(1)	(5)
VARIABLES	NORTH	REST
Empowerment	0.125*	0.019
	(0.076)	(0.073)
Education years	-0.017	-0.009
	(0.013)	(0.009)
Age	-0.004	-0.010**
	(0.006)	(0.005)

Urban area	-0.009	0.014
	(0.140)	(0.093)
Upper Caste	-0.186	-0.228***
	(0.115)	(0.079)
Remittance receive from	0.213	-0.021
non-resident	(0.167)	(0.126)
Livestock	0.265**	0.132
	(0.119)	(0.090)
Size of the household	0.110***	0.006
	(0.037)	(0.031)
Land ownership	-0.061	0.132
	(0.124)	(0.106)
Ration Card	-0.098	0.346***
	(0.147)	(0.118)
House Quality	-0.278**	0.443***
	(0.114)	(0.084)
Occupations		
Cultivation	0.426	-0.040
	(0.513)	(0.259)
Allied Agriculture	0.488	-0.595
	(0.813)	(0.540)
Agriculture wage labour	0.403	0.020
	(0.527)	(0.256)
Non-agriculture wage	0.361	-0.020
Labour	(0.508)	(0.243)
Petty shop	0.780	-0.074
	(0.528)	(0.266)
Salaried job	0.295	-0.163
	(0.506)	(0.234)
Pension or rent	0.275	-0.416
	(0.515)	(0.258)
Others	0.199	-0.177
	(0.515)	(0.252)

Constant	-0.490	-0.402
	(0.597)	(0.341)
Observations	736	1478
Wald test of exogeneity	4.37**	0.01

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. All the variables here are described in Table 10 in the *Appendix*. The result from the first stage is in Table 13 in the *Appendix*. We use professional and organised business occupational group as the base group for the occupations dummy. The test of equality rejects the equality of coefficients across equations.

To address a potential selection bias in the loan amount model, we use the Heckman (1979) two-step model that conditions the second stage estimates on the first stage participation in the loan market. Table 8 below presents the IV results of the (second stage) effect of empowerment on the amount of the loan taken. We find that for one unit increase in the empowerment score, the loan amount is expected to increase by 33 percent in North India while having no effect in the rest of India. The coefficient of education is positive and significant for the rest of India while it shows no effect in North India. Larger households and those which receive remittances from a non-resident have a higher loan amount in North India. Loans taken from a formal source such as a bank or credit group increases the loan amount in the North and the rest of India. Caste does not seem to have any effect on the loan amount.

That empowerment has positive and significant effects in North India directly support our village level finding. Empowerment matters for businesses in environments where males are in a controlling position[42]. For the rest of India, where women enjoy much better status, our indicators of empowerment (which we identified through our in-person surveys in the North) do not capture enough variations in women's creditworthiness. It is more likely that in the rest of India female borrowers may be seen similarly creditworthy as male borrowers. Empowerment is of a lesser concern there, instead the borrower's human capital is much more important.

[42] In Northern India, conservative culture and social norms may discourage women to become economically self-sufficient (as showed by Ahmed & Sen (2018) in Bangladesh). In this environment, highly empowered women who have the capacity to challenge the societal norms are more likely to start businesses, absorb higher credit and have a greater control over the business decisions.

Table 8: IV estimates of loan based on IHDS data

VARIABLES	(1) NORTH	(2) REST
Empowerment	0.337**	-0.252
	(0.146)	(0.163)
Education years	-0.00382	0.0745***
	(0.0293)	(0.0145)
Age	-0.00585	0.0324***
	(0.0147)	(0.00815)
Urban	-0.212	0.193
	(0.217)	(0.159)
Upper Caste	-0.270	0.181
	(0.276)	(0.194)
Remittance Received	0.730**	0.141
	(0.312)	(0.222)
Livestock	0.452	-0.497***
	(0.297)	(0.158)
Size of Household	0.202***	-0.0348
	(0.0589)	(0.0557)
Land Ownership	0.124	-0.0342
	(0.185)	(0.231)
Ration Card	0.0581	-0.485
	(0.243)	(0.284)
Source of Loan		
Formal Loan	0.907***	0.475**
	(0.330)	(0.192)
Family Loan	-0.229	-0.560***
	(0.172)	(0.146)
Purpose of Loan		
House Loan	0.258	0.766***
	(0.262)	(0.167)

Medical Loan	-1.015***	0.126
	(0.303)	(0.230)
Education Loan	-0.515	0.0654
	(0.438)	(0.238)
Occupations		
Cultivation	2.378***	0.163
	(0.474)	(0.456)
Allied Agriculture	1.964***	1.152
	(0.564)	(1.195)
Agriculture wage labour	2.182***	-0.144
	(0.559)	(0.432)
Non-agriculture wage labour	1.963***	-0.441
	(0.474)	(0.431)
Petty shop	3.238***	0.00622
	(0.692)	(0.426)
Salaried job	1.365***	-0.0263
	(0.374)	(0.428)
Pension or rent	1.647***	0.905*
	(0.412)	(0.508)
Others	1.581***	-0.0968
	(0.406)	(0.457)
Mills	3.800***	-2.947***
	(1.221)	(0.755)
Constant	3.540***	11.74***
	(1.358)	(1.164)
Observations	302	544
Cragg-Donald Wald F statistic	132.17	33.691
R-squared	0.319	0.267

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the variables here are described in Table 10 in the *Appendix*. The results from the first-stage are in Table 14 in the *Appendix*. We use professional and organised business occupational group as the base group for the occupations, dummy for informal loan as the base group for the source of loan and dummy for productive loan as the base group of purpose of loan. The F-statistic from the first-stage and Cragg and Donald (1993) F-statistic shows that we have a good instrument as widowhood. The test of equality rejects the equality of coefficients across equations.

We have also constructed women's empowerment index using the principal component analysis based on the tetrachoric correlations coefficients taking only the variables with higher variance (see Table 16). The results are similar to our previous analysis (see Table 17). We find one unit increase in empowerment increased the loan amount by 26 percent.

7. Discussion and conclusion

Using primary data collected from a village in North India over two periods, and the IHDS data for all India this paper examines the impact of women's empowerment on their creditworthiness measured in terms of cumulative loan amount taken over time. An index for empowerment was created using four dimensions of empowerment: economic, social, interpersonal and political. Although empowerment is an elusive concept and an ideal index is beyond the scope of the paper, we took great care (through a detailed questionnaire and in-person interviews) to capture the critical observable factors underlying empowerment.

Our findings have some policy implications. First, one critical view of microcredit is that it does not reach the women who need it most. Our analysis shows that a more empowered woman gets more loans, regardless of her family wealth. Therefore, we argue that there is a need to decouple empowerment from microcredit either by policies focusing on empowering more women or by increasing the access of microcredit to lowly empowered women.

Second, our empowerment index shows that some variables such as women's economic status, their control over savings, political awareness, attitude towards domestic violence and purchasing capacity regarding expensive items are more important than other variables in determining women's empowerment. Hence, diverting resources to improve the outcome of these variables would increase the empowerment of women.

Third, although we see that giving birth to a son helps a woman to be on track for empowerment, by no means we advocate son preference. Instead, we recommend investing in resources for promoting gender equality and reducing gender discrimination in jobs, education, politics, and sports. Recent progress in education for girls and the government sponsored social

campaign for promoting gender equity (*Beti Bachao, Beti Padhao* -- Save a girl child, Educate a girl child) are showing good results (Government of India, 2018).

8. Appendix A: Tables and Figures

Figure 1: Timeline of the surveys

Figure 2: Location of the village

Source: Google Map

Table 9: Descriptive Statistics of variables used in IHDS

Variable	Description	Obs	Mean	Std.Dev.
Log of loan	Log of the amount of loan	888	10.231	1.437
Loan taken	Dummy if taken any loan	2273	.394	.489
Loan Amount	Loan amount in rupees	2273	30988	167775
Empowerment	Empowerment score	2269	.006	2.254
Education years	Number of education years completed	2273	3.832	4.447
Age	Age	2273	42.864	8.501
Urban area	Dummy if living in urban area	2273	.328	.47
Upper Caste	Dummy if belong to upper caste	2273	.285	.451
Land owner	Dummy if own any land	2273	.317	.465
Ration Card	Dummy if have ration card	2273	.888	.315
Remittance receive from non-resident	Dummy if any remittance received from a non-resident	2273	.422	.494
House Quality	Dummy for the quality of the house (good or bad)	2273	.650	.477
Size of the household	Number of people living in the house	2273	3.769	1.816
Livestock	Dummy if own any form of livestock	2273	.36	.48
Widow	Dummy if the client is a widow	2273	.577	.494
Productive loans	Dummy if loan taken for productive purposes such as business or agriculture	896	.249	.433
Education Loans	Dummy if loan for educational purpose	896	.100	.301
House Loans	Dummy if loan for improving the house	896	.295	.456
Medical Loans	Dummy if loan for medical purpose	896	.345	.476

Formal loans	Dummy if the loan is taken from formal source such as banks	896	.405	491
Informal Loans	Dummy if loan from Informal sources such as money lenders	896	.198	.398
Family Loans	Dummy if loan from family and friends	896	.397	.49
Occupations				
Cultivation		2269	.163	.369
Allied Agriculture		2269	.005	.073
Agriculture wage labour		2269	.113	.316
Non-agriculture wage labour		2269	.193	.394
Petty shop		2269	.061	.24
Salaried job		2269	.246	.431
Pension or Rent		2269	.094	.292
Others		2269	.107	.309
Independent/organized business		2947	0.02	0.13

Table 10: **Descriptive statistics of variables used in computing empowerment index for IHDS**

Variables	Mean	Standard deviation	Factor Score
Have the most say in cooking	0.891	0.311	0.1271
Have the most say in purchasing expensive items	0.596	0.491	0.3266
Have the most say in decision regarding child sickness	0.743	0.437	0.2839
Have the most say in decision regarding marriage of the child	0.591	0.492	0.3241
Have the most say in decision regarding work	0.710	0.454	0.1811

Have the most say in decision when fall sick	0.726	0.446	0.2852
Have the most say in decision regarding buying land	0.550	0.498	0.3406
Have the most say in decision regarding wedding expensive	0.646	0.478	0.3285
Can visit health centre without permission	0.362	0.481	0.2751
Can visit friends without permission	0.384	0.486	0.2614
Can visit shops without permission	0.417	0.493	0.2395
Can go short distance without permission	0.308	0.462	0.2857
Have the most say in number of children to have	0.516	0.500	0.2248
Have access to media	0.602	0.490	0.0174
Economic Status (currently working)	0.405	0.491	0.1404
Member of Mahila Mandal (women group)	.0708	0.256	0.0386
Member of self-help group	0.152	0.359	0.0430
Member of credit/saving group	0.082	0.274	0.0265
Member of political organisation	0.009	0.095	0.0319
Health self-evaluation	0.803	0.336	0.0302

An empowerment index (similar to the original index) was constructed using the data from IHDS as part of robustness check. This index consists of variable capturing various dimensions of empowerment such as mobility, participation level in public and political life, purchasing capacity, media exposure, family planning and economic status. The first principal component explains 33% of the variation in the variables used.

Table 11: First stage regression using empowerment as a dependent variable.

	(1)
VARIABLES	OLS
Dummy of first-born son	1.333***

	(0.174)
Education years	0.249***
	(0.029)
Months with the lender	-0.018
	(0.061)
Months with the lender square	0.000
	(0.002)
Years in the village	0.048***
	(0.016)
No. of working members	-0.058
	(0.221)
Upper Caste	-0.235
	(0.202)
House quality	0.317**
	(0.135)
Average hours worked per week	0.009
	(0.006)
Log of husband's income	0.368
	(0.177)
Source of the loan	
Utkarash	0.481***
	(0.154)
Janlaxmi	0.741***
	(0.205)
Traders	0.075
	(0.204)
Co-operative Society	0.255
	(0.227)
Income generating activities	
Livestock	-0.483***
	(0.182)
Making cloths	-0.513**
	(0.211)

Shops	-0.232
	(0.223)
Small informal business	-0.339
	(0.260)
Other occupations	-0.742***
	(0.249)
Year	0.238
	(0.322)
Constant	-2.904***
	(0.665)
Observations	422
R-squared	0.442

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

Table 12: Impact of various empowerment components on the loan amount

VARIABLES	(1)	(2)	(3)	(4)
Empowerment (Economics, Social,	0.335**	0.957	0.413***	0.273***
Political and Interpersonal)	(0.134)	(0.676)	(0.157)	(0.105)
Education years	-0.016	-0.024	-0.049**	-0.018
	(0.013)	(0.024)	(0.020)	(0.013)
Months with the lender	0.119***	0.142***	0.127***	0.110***
	(0.033)	(0.041)	(0.035)	(0.033)
Months with the lender square	-0.001	-0.002*	-0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Years in the village	-0.005	-0.032	-0.014*	-0.006
	(0.007)	(0.022)	(0.007)	(0.007)
No. of working members	0.020	0.024	0.114**	0.070
	(0.069)	(0.111)	(0.057)	(0.062)
Upper Caste	0.149*	-0.025	0.157*	0.119

	(0.084)	(0.137)	(0.085)	(0.073)
House quality	-0.079	-0.098	0.023	-0.024
	(0.073)	(0.100)	(0.071)	(0.063)
Average hours worked per week	-0.002	0.002	-0.000	-0.001
	(0.003)	(0.004)	(0.003)	(0.003)
Log of husband's income	0.060	0.142	0.162	0.128
	(0.126)	(0.158)	(0.115)	(0.120)
Source of the loan				
Utkarash	-0.058	-0.149	-0.111	-0.080
	(0.066)	(0.138)	(0.077)	(0.063)
Janlaxmi	0.091	0.406*	0.136	0.221**
	(0.111)	(0.232)	(0.104)	(0.106)
Traders	-0.167	0.241	-0.197	-0.120
	(0.124)	(0.262)	(0.129)	(0.111)
Co-operative Society	0.109	0.407	0.020	0.165
	(0.187)	(0.277)	(0.193)	(0.180)
Income generating activities				
Livestock	0.082	0.108	0.170	0.165
	(0.104)	(0.165)	(0.109)	(0.109)
Making cloths	-0.089	0.040	0.013	0.152
	(0.144)	(0.225)	(0.144)	(0.157)
Shops	-0.045	-0.112	0.107	0.014
	(0.144)	(0.233)	(0.132)	(0.127)
Small informal business	-0.087	-0.056	0.040	-0.050
	(0.140)	(0.235)	(0.146)	(0.126)
Other occupations	0.123	0.084	0.240*	0.278**
	(0.139)	(0.237)	(0.127)	(0.135)
Year	-1.403***	-1.494***	-1.348***	-1.232***
	(0.252)	(0.341)	(0.244)	(0.244)
Constant	0.624	0.028	0.559	0.809
	(0.661)	(1.182)	(0.667)	(0.580)
R-squared	0.277	0.182	0.278	0.274

Observations	422	422	422	422

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

Column 1 of Row 1 shows the effect of economic empowerment on loan amount. Column 2 of Row 1 shows the effect of social empowerment on loan amount. Column 3 of Row 1 shows the effect of political empowerment on loan amount. Column 4 of Row 1 shows the effect of interpersonal empowerment on loan amount. We use agriculture as a base group for income generating activity dummies and SKS microfinance as the base group for the loan source dummies.

Table 13: Result from the first-stage regression using empowerment as a dependent variable in the loan amount model.

	(1)	(2)
Empowerment	North India	Rest of India
Education years	0.0963***	0.0239
	(0.0184)	(0.0235)
Years in place	0.0512***	-0.0163
	(0.00879)	(0.0133)
Urban area	0.187	0.00977
	(0.184)	(0.245)
Upper Caste	0.835***	0.380
	(0.166)	(0.253)
Remittance receive from	-1.235***	-0.752***
non-resident	(0.172)	(0.242)
Livestock	-1.511***	-0.0800
	(0.173)	(0.232)
Size of HH	-0.284***	-0.264***
	(0.0360)	(0.0536)
Landowner	0.341**	-0.693***
	(0.163)	(0.264)
Ration Card	0.272	-0.490
	(0.198)	(0.404)
Source of loan		

Formal loan	-0.331	-0.445*
	(0.211)	(0.265)
Family loan	-0.257	-0.342
	(0.165)	(0.268)
Purpose of loan		
House Loan	0.171	0.278
	(0.202)	(0.246)
Medical Loan	-0.386**	0.414
	(0.191)	(0.275)
Education Loan	-0.0111	0.523
	(0.330)	(0.319)
Occupations		
Cultivation	-0.0162	0.941
	(0.667)	(0.627)
Allied Agriculture	-0.0672	1.411
	(1.030)	(1.607)
Agriculture wage labour	-0.455	0.768
	(0.693)	(0.615)
Non-agriculture wage labour	0.130	0.806
	(0.666)	(0.595)
Petty shop	-2.069***	0.426
	(0.678)	(0.666)
Salaried job	0.617	0.471
	(0.655)	(0.593)
Pension or rent	1.017	0.462
	(0.681)	(0.696)
Others	1.000	0.366
	(0.681)	(0.655)
Mills	-7.698***	-2.275***
	(0.373)	(0.682)
Widow	1.244***	1.035***
	(0.187)	(0.240)
Constant	5.787***	3.743***

	(0.858)	(1.057)
Observations	312	564
R-squared	0.751	0.221

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column 1 shows the estimate from North India, Column 2 shows the estimate from rest of India. The results shows that widowhood has a positive association with empowerment. We use professional and organised business occupational group as the base group for the occupations, dummy for informal loan as the base group for the source of loan and dummy for productive loan as the base group of purpose of loan.

Table 14: Result from the first-stage regression using empowerment as a dependent variable from the selection model.

VARIABLES	(2) NORTH	(6) REST
WIDOW	1.793***	1.261***
	(0.197)	(0.141)
Education years	0.004	0.015
	(0.017)	(0.014)
Age	-0.001	-0.019**
	(0.009)	(0.007)
Urban area	0.263	0.138
	(0.188)	(0.141)
Upper Caste	-0.078	0.051
	(0.155)	(0.119)
Remittance receive from	-0.643***	-0.734***
non-resident	(0.187)	(0.142)
Livestock	-0.132	-0.233*
	(0.164)	(0.135)
Size of the household	-0.193***	-0.132***
	(0.046)	(0.045)
Land ownership	0.002	-0.451***

	(0.170)	(0.155)
Ration Card	0.079	0.104
	(0.201)	(0.173)
House Quality	0.348**	-0.122
	(0.153)	(0.127)
Occupations		
Cultivation	0.172	0.881**
	(0.686)	(0.384)
Allied Agriculture	0.149	0.030
	(1.098)	(0.786)
Agriculture wage labour	0.295	0.943**
	(0.709)	(0.379)
Non-agriculture wage	0.556	0.766**
Labour	(0.677)	(0.364)
Petty shop	0.094	0.710*
	(0.707)	(0.403)
Salaried job	0.269	0.468
	(0.677)	(0.358)
Pension or rent	0.057	0.346
	(0.690)	(0.391)
Others	0.041	0.089
	(0.689)	(0.387)
Constant	-0.966	0.284
	(0.803)	(0.514)
R-squared		
Observations	736	1,478

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column 1 shows the estimate from North India, and Column 2 shows the estimate from rest of India. We use professional and organised business occupational group as the base group for the occupations dummy.

Table 15: Fixed effects and random effects model

	(1)	(2)
VARIABLES	FE	RE

Empowerment	0.262	0.040*
	(0.164)	(0.020)
Months with the lender	0.203***	0.120***
	(0.041)	(0.027)
Months with the lender square	-0.002**	-0.001
	(0.001)	(0.001)
Years in the village	0.137	-0.007
	(0.359)	(0.007)
Average hours worked per	-0.007	0.000
week	(0.008)	(0.003)
Education years		-0.009
		(0.011)
No. of working members		0.088
		(0.067)
Upper caste		0.107
		(0.071)
Utkarash		-0.076
		(0.074)
Janlaxmi		0.205*
		(0.121)
Traders		-0.142
		(0.104)
Co-operative Society		0.165
		(0.126)
House quality		-0.002
		(0.061)
Income generating activities		
Livestock		0.095
		(0.099)

Making cloths		0.008
		(0.122)
Shops		0.001
		(0.112)
Small informal business		-0.051
		(0.127)
Other occupations		0.187
		(0.121)
year	-2.241***	-1.309***
	(0.439)	(0.144)
Constant	4,515.143***	2,639.582***
	(881.018)	(290.067)
Breusch and Pagan Test		1
Hausman Test	10.21	10.21
Observations	422	422
R-squared	0.308	

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is log of loan amount. Column 1 shows the fixed effect estimates and column two shows the random effect estimates.

Table 16: Variables used in computing the empowerment index based on tetrachoric correlation coefficients

Variables	Factor Score
Big purchases	0.46
Mobility outside the village	0.34
Know the name of the MLA/MP	0.29
Owns asset above INR 10000	0.35
Independent in taking household decision re food, children's education etc	0.49
Control over loan	-0.0251

Is wife beating justified in any situation?	0.44

Table 17: IV estimates of loan amount using the empowerment index based on tetrachoric correlation coefficients

VARIABLES	Log Loan
Empowerment	0.262**
	(0.123)
Education years	-0.005
	(0.011)
Months with the lender	0.118***
	(0.027)
Months with the lender square	-0.001
	(0.001)
Years in the village	-0.006
	(0.007)
No. of working members	0.040
	(0.069)
Upper Caste	0.042
	(0.060)
House quality	-0.053
	(0.060)
Average hours worked per week	-0.000
	(0.003)
Log of husband's income	0.104
	(0.133)
Utkarash	-0.270**
	(0.126)
SKSMFI	-0.167
	(0.124)
Janlaxmi	0.011
	(0.155)
Informal Lending	-0.265**
	(0.131)
Livestock	0.102
	(0.104)
Making cloths	0.058
	(0.126)
Shops	0.000
	(0.113)
Small informal business	-0.035
	(0.128)
Other activities	0.196
	(0.123)
Year	-1.316***

	(0.143)
Constant	2,654.115***
	(288.956)
Observations	422
R-squared	0.256

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

2.9 Appendix B: Identification Strategy for IHDS data

The model consists of the following equations:

$LOAN_i = 1\left(x_{3i}b_3 + \varepsilon_{i3} > 0\right)$….. Selection equation (1)

E$MP_i = x_{2i}b_2 + a_2 WIDOW_i + \varepsilon_{i2}$ …… Empowerment equation (2)

$ln(LA_i) = x_{1i}b_1 + a_1 EMP_i + \varepsilon_{i1}$ ….. Loan amount equation (3)

Loan amount equation is the equation of interest where $ln(LA_i)$ is the log of the loan amount borrowed by women *i*. EMP_i is a potentially endogenous variable, x_i represents the vector of other control variables, and ε_i is the error term. The second equation is a projection for the endogenous variable EMP_i using $WIDOW_i$ as an instrument variable. Selection equation estimates the probability of participating in the credit market where $LOAN_i$ equals one if the women has taken a loan and zero otherwise.

The estimation strategy of this model can be summarized as follows. In Step 1, we estimate the likelihood of participating the credit market. In Step 2, we compute the Inverse Mills Ratios (IMR) and plug it in the loan amount equation to be estimated by 2SLS along with WIDOW as an instrument. The coefficient of IMR is significant for North India and the whole of India implying that selection bias is prevalent in the model while, the insignificant coefficient of IMR in the rest of India sample suggests that selection bias is not important for this group.

Chapter 3

The Impact of Business Training on Female Microfinance Clients: Evidence from a Mixed-Method Evaluation in Rural North India

Abstract

Business training is a broadly implemented tool for development to build the human capital of microentrepreneurs by teaching basic business practices in order to improve the income and end the cycle of low investment in their businesses. However, the impacts of such programmes are unclear. Both the need for business training, and the lack of clarity regarding its impact, are particularly notable in relation to women. Women in the developing world are increasingly self-employed out of necessity - but with low productivity. Poverty alleviation and gender equity are highly contingent on the success of women's businesses. This study evaluates the impacts of a business training programme to women clients of a microfinance institution in a village in North India using a mixed-method approach where the women were assigned to training exogenously. The treatment group from one microfinance institution received thirty-to-sixty-minute business training sessions during their regular weekly meetings for ten weeks, while clients in the control group remained as they were, not subject to any training or other development programmes. We examine the impacts of the treatment over two years and conduct follow-up interviews to understand the results in greater detail. The results show that treatment increased the income of the clients whilst reducing the level of investment. The qualitative evidence suggests that these women had aspirations to grow after acquiring capital but realised after training that their original investment plans were unnecessarily large in relation to their business goals

1. Introduction

A host of research in development economics and entrepreneurship is focused on financial constraints, but very little attention has been given to the effects of increasing the skills of micro-entrepreneurs - especially women. For instance, empirical studies have examined financial constraints with lending experiments (Banerjee, Karlan, and Zinman 2015; Burgess and Pande, 2005), with cash grant experiments, (de Mel, McKenzie, and Woodruff 2008; Karlan, Knight, and Udry, 2015; McKenzie, 2015), and with insurance (Giné, Townsend, and Vickery, 2008). Although liberalisation of the financial industry and technological progress in the financial sector have increased the availability of financial products to the poor in rural India, much of the population, and especially women, are ill-equipped to make informed business decisions. It is well established that capital alone cannot guarantee the success of microenterprises and that entrepreneurial skills are needed to make efficient use of limited capital (Bruhn, Karlan, and Schoar, 2010).

Recent years have seen a series of interventions offering business and financial training to micro-entrepreneurs. Microfinance institutions (MFIs), governments, NGOs and donors often support policies to promote entrepreneurship in order to improve the livelihood of poor people and to mitigate poverty. According to MIX Market database, one-third of microfinance institutions claim to offer enterprise skills and development training to their clients. However, the impact of these business training programmes is often unclear, and more research is required to understand the way poor entrepreneurs make their investment decisions (de Mel et al. 2008).

Both the need for business training, and the lack of clarity regarding its impact, are particularly notable in relation to women. This is due to the fact that gender differences in education and/or business networks tend to make women relatively uninformed about investment opportunities and untrained in basic cost-benefit analysis (Karlan and Valdivia, 2011). A patriarchal society (in countries like India) contributes to the low bargaining power of women in marriage, which limits their control over finances (Field, Jayachandran and Pande, 2010). These societies continue to fix rigid gender roles and prescribe behavioural norms that are often discriminatory against women in ways which affect commercial outcomes. Local traditions - such as forbidding interaction with men outside a woman's family; religious practices such as wearing a veil or purdah in Islam (Roomi and Harrison, 2010), and division

of labour according to the caste system in Hinduism; and cultural factors such as social rejection of women as entrepreneurs; gender discrimination, and family responsibilities - can also inhibit the acquisition of entrepreneurial competence (Field et al. 2010; Vinnicombe and Singh, 2002). Moreover, less educated women in rural areas lack skills in, and understanding of, basic business concepts such as costs, profits, price setting, sales, negotiation, marketing; which are needed to run a small business efficiently.

Substantial capital, risk, and effort are needed to start and run a business (Hisrich and Peters, 1998). These needs are magnified for women entrepreneurs, who are not only competing in a male-dominated domain but are subject to deep-seated discrimination as a result of patriarchal socio-cultural values and traditions (Bates, 2002). Women entrepreneurs have reported facing more significant and more systemic barriers to accessing formal financial services in the developing countries (Rose, 1992; Diagne, Zeller and Sharma, 2000; Narain, 2009; Mel et al. 2009). Despite the many programmes designed to motivate women's entrepreneurship, relatively few women start and develop their own businesses (Carter, 2000; Carter and Rosa, 1998).

One key motivation for providing business training to poor clients in the developing world is that it could help them to make better-informed choices regarding their business and household finances which in turn could increase their well-being. A strong association has been found between financial literacy, business understanding and household well-being (Cole, Sampson and Zia, 2009). Good money management is essential for the poor in dealing with life-cycle events, meeting day-to-day finances, and reducing vulnerability to income shocks (Karmakar, 2011). Without basic levels of business literacy, it is challenging for the uneducated poor to use financial services appropriately and with confidence. Furthermore, empirical evidence suggests that a lack of access to business education and limited knowledge of money management contribute to over-indebtedness (Gathergood, 2012), which perpetuates the cycle of poverty and makes the efforts of microfinance lenders redundant.

Past literature has established that women's entrepreneurial activities make a significant contribution to the development of communities, regions and countries (see Brush et al. 2002; Dionco-Adetayo, 2005). The establishment and development of women-owned enterprises not only contributes to a thriving society - benefiting economic, political and social development; but also creates a powerful effect on how women view themselves (Roomi and Harrison, 2010).

This leadership of women encourages the dismantling of existing social barriers and perceptions of weakness and inferiority which play a pivotal role in women's liberation, and empowers them to realise their respective goals and ambitions. Given the importance of entrepreneurship in the development process, it is important to understand how poor business decisions are caused by a lack of women's business skills and hamper the growth of women's micro-enterprises.

Entrepreneurial talent is inherent in all people; but for the potential to be realised, awareness, motivation and management abilities must be acquired to address problems and take calculated business risks in running day-to-day business operations (Allen and Truman, 1993). Many of the barriers to developing entrepreneurial capacity which women face could be overcome by business training and individual capacity development programmes. Knowledge transfer through training could help women to more-efficiently allocate capital and labour; to make better business decisions to improve marketing; and, to negotiate help in choosing the best financial products according to their needs - and hence enhance their ability to perform. In addition to the positive impact on the client´s business and her household, the training could also offer benefits for the lending institution. If clients' businesses improve, they are in a better situation to repay their loans, demand more financial capital and expand their businesses. Microfinance was introduced as a mechanism to provide credit facilities to the poor; however, provision of credit alone - without business and financial knowledge - will not be sufficient for enterprises owned by poor borrowers to perform at an optimal level (Kessy and Temu, 2010).

Much debate exists in the development finance community regarding whether lenders should focus on being sustainable and increasing their outreach before adding the component of entrepreneurial training for their clients (MkNelly, Watetip, Lassen, and Dunford, 1996). Swain and Varghese (2011) pointed out that microfinance membership is itself a training in three ways. First, self-discipline is taught through the structured cycle of working, saving and repaying. Second, the project-based approach to microfinance membership increases productivity through practice, helping members to self-evaluate, improve and optimise their work independent of further investment in human capital. Third, regular meetings create an environment where members can share learnings about work-related issues, to improve their own activities. Although training may be an extra cost for a microfinance agency in the short term (which may well be passed on to clients), it is likely to have a positive long-term impact

on loan size, repayment and retention. Giné and Mansuri (2014) found training to be profitable to the lenders as the number of larger loans demanded by the clients increased without an increase in default rates or lending officers' workload. Karlan and Valdivia (2011) found similar results in their research, although the benefits came from default reduction and an increase in client retention as opposed to demand for larger loans.

In this paper, we investigate one typical training programme to assess the effectiveness of integrating business training with microfinance services given to women clients of an MFI in a village in Northern India. A randomly chosen group received 30-60 minutes training after every weekly meeting for 10 weeks. We conducted a baseline survey before the intervention, a follow-up survey one year later and in-depth interviews two years later. We find that the treatment significantly reduced the amount of funds invested by the borrower in their commercial activity and increased the income of the clients. We found no impact from training on most outcomes such as the size of loans or change in value of assets of the borrower and the number of working hours per week. We found a mixed impact of training on the level of savings.

Almost all of the research regarding the economic impacts of business training on women in rural settings are quantitative studies. To the best of our knowledge, this is the first study that uses a mixed-method approach combining qualitative and quantitative data to evaluate the role of business training in women microentrepreneurs.

The rest of the paper is organised as follows. Section 2 briefly describes the related literature, and Section 3 details the intervention and its intended effect. Section 4 describes the data, Section 5 describes the methodological approach used to establish causal effects of the training on a wide variety of outcomes, Section 6 presents the results, and Section 7 closes with a discussion of results and concludes the paper.

2. Related literature

A growing literature has investigated the low level of entrepreneurial skills in the general population and how business training can improve business outcomes and household welfare. Using a randomised control trial, Karlan and Valdivia (2011) examined the impact of adding business training to a group lending program for female microentrepreneurs in Peru. They

found that training improved business knowledge, business practices and revenues but the results were more mixed regarding real outcomes, such as sales or profit. They observed larger effects for the participant that expressed less interest in training in the baseline survey. The microfinance institution also benefited from the training through higher repayment and client retention rates. Field et al. (2010) studied the constraints to women's entrepreneurial choices and found that training increased business income for upper caste Hindu women who were more likely to borrow and engage in labour market activities, whereas the training had no effect on lower caste Hindu women or Muslim women. They argued that business training helped women whose businesses had been held down by social restrictions, but women subject to extreme restrictions could not respond to training as they had little agency to change their aspirations. Calderon, Cunha, and Giorgi (2013) offered a 48-hour business skills course to female entrepreneurs in rural Mexico and found that training significantly increased profits. This was driven by a combination of higher revenues, reduction in costs, greater number of clients served and increased use of formal accounting methods.

Several methods of providing training have also been researched. Using a randomised controlled trial in Togo, West Africa, Campos et al. (2017) found that a psychology-based personal initiative training approach - which teaches and promotes a proactive mindset that focuses on entrepreneurial behaviours – increased firms' profit compared to traditional business training. It also boosted innovation helping treated recipients to come up with more new products and business ideas than the control group. Mel et al. (2014) tracked the impact of two treatments – training only and training plus a cash grant - to women clients over two years in Sri Lanka. They found that training improved business practices, but it did not have any impact on business profits, sales or capital stock. The grant plus training combination increased business profitability in the first year, but the effect was temporary and dissipated in the second year.

A few researchers have also studied the impact of training on business start-up and survival. Klinger and Schundeln (2011) examined the impact of a training and business development programme using data from three Central American countries and found that business training was successful in encouraging the creation of new businesses and the expansion of the existing ones. Bruhn and Zia (2011) found that business and financial training did not influence business survival, but it significantly improved business practices, investments, and loan terms for surviving businesses among young entrepreneurs in Bosnia and Herzegovina. They observed

that businesses in the treatment group were more likely to implement new production processes and separate personal and business accounts.

Gender differences in the outcomes of training have also been researched. In their study in Pakistan, Giné and Mansuri (2014) found that business training reduced business failure, improved business practices, financial and labour allocation decisions among men. Women improved their business knowledge but showed no improvement in other outcomes. They reported that business training was not cost-effective for the microfinance institution, despite having some positive impact on clients. Berge, Bjorvatn, and Tungodden (2012) evaluated the effect of financial grants and a business training program for clients of a microfinance institution in Tanzania. Business training substantially improved men's business practices and outcomes, while little effect was found on female entrepreneurs. Roomi and Harrison (2010) argue that the women-only training that helps participants to develop capital and competence could remove the barriers perceived by women entrepreneur in certain social contexts where women are discriminated against, have rare opportunities to learn skills and are subjugated due to socio-cultural values and traditions in the name of religion.

Field et al. (2015) used a behavioural approach to training to address social norms. They show evidence that the lack of a professional network or peer support are found to affect women's entrepreneurial success negatively. They found women who attained business training with a friend, as opposed to those who attended alone, were more likely to have taken out a business loan, significantly expanded their businesses, or increased household income and expenditure. Those who belonged to more restrictive social groups showed greater improvements to peer involvement.

Some studies have focused on increasing financial literacy to improve business outcomes. Drexler, Fischer, and Schoar (2010) conducted a randomised evaluation with a bank in the Dominican Republic to track the impact of two treatments - standard accounting training versus rule-of-thumb training - that taught basic financial skills to micro-entrepreneurs. They found that the rule-of-thumb training had a significantly larger impact than the standard accounting training and was more successful in improving firms' financial practices, reporting quality, and revenues. Using a randomised experiment Carpena, Cole, Shapiro, and Zia (2011) examined the impact of a five-week comprehensive video-based financial education program with modules on savings, credit, insurance and budgeting given to poor households in India. They

concluded that treatment significantly improved basic awareness of financial choices and attitudes toward financial decisions. However, it did not increase financial numeracy and participants struggled to calculate and compare interest returns, insurance costs, or household income and expenses.

The issue of building managerial capital through consulting and mentoring has attracted increasing attention of late. Bruhn, Karlan, and Schoar (2010) conducted a randomised evaluation of consulting services in which small businesses were paired with a local management consultant for one year and found that access to management consulting led to improvements in firm's performance in terms of return-on-assets and total factor productivity. They found a significant increase in "entrepreneurial spirit" among owners complemented by an increase in the number of employees and total wage bill several years after the program. Bloom, Eifert, Mahajan, McKenzie, and Roberts (2013) examined the impact of consulting services on the business practices of large Indian textile firms. The intervention raised the average productivity through improved quality, efficiency and reduced inventory; increased decentralisation of decision making; and encouraged the use of modern management tools.

In summary, the impact of training is unclear overall, and especially unclear in relation to poor women clients receiving microcredit. This paper attempts to extend this line of research by investigating the impact of training on women clients on business outcomes and household outcomes using data gathered through household surveys and in-depth interviews.

3. The intervention and its intended effect

The intervention:

The business training course under discussion was developed by a local NGO working in the region focused on women issues**.** The training programme was designed to meet the needs of women with a focus on improving financial literacy, business skills, women's rights, and health. The training sessions lasted thirty-to-sixty-minutes after every meeting and were compulsory. The attendance rate was high, and most women attended all ten sessions demonstrating a willingness to learn business management practices.

Although most of the training was related to business and financial literacy, two sessions were focused on women's rights, the legal rights of business owners, health and other social

aspects. The business training focused on marketing, identifying customers, investment, record keeping, purchasing of equipment, costing, stock control, and financial planning. Financial literacy covered aspects of budgeting, saving, profit, separating business expenses from household expenses, meeting financial goals, debt management, understanding costs and the risks associated with borrowing money, comparing loan terms and conditions to get the best loan products, calculating rate of interests and instalments, and understanding the consequences of delinquency and default. All of the sessions were taught by qualified local instructors.

The intended effect:

The main aim of the business training is to improve the business outcomes and welfare of the clients, with a secondary goal of benefit to the microfinance institution. These improvements should lead to more investment in the client's business and increased demand for capital. In addition, there may be improvements in household outcomes: increases in savings, personal income and the value of assets. Some common business indicators such as profit, or sales were considered but discarded. In very small – especially agricultural - businesses, levels of profit and sales volume tended to vary dramatically with season and weather; while less financially-literate respondents could not provide reliable periodic accounting data.

Better performing businesses may demand more services and may be less likely to default if they are satisfied due to better loan terms, higher cash flow, or a stronger feeling of reciprocity (Karlan and Valdivia, 2011). On the other hand, well-informed clients could better allocate their capital and labour efficiently. However, stronger businesses may graduate to larger formal sector banks beyond the need for MFI services, and thus the business training could also lead to lower client retention for the MFIs in the long term.

4. Data

This evaluation uses three key data sources: a baseline survey, an endline survey one year later and in-depth interviews with 18 participants two years later.

The quantitative study covered a random sample of 211 women who were clients of three MFIs, a co-operative society, and a small number of professional money lenders, collected through two household surveys taken in 2015 and 2016 (see timeline in the *appendix*), in the

village *Thol* (and its surrounding area) in the state of Haryana. The survey collected information regarding income, loans, investment, health, household composition, education, employment, assets, and other variables[43].

Table 1: Distribution of occupations of the participants

Occupation	% of whole sample	% Treatment	% Control
Agriculture (Crops)	13	18	13
Livestock	34	40	34
Cloth-making	11	10	11
Shops	18	22	16
Business Investment	10	4	12
Other small businesses such as pottery, basket making etc.	12	6	14

All three MFIs use a version of the *Grameen* group lending model. Like the *Grameen* model, borrowers are asked to form a group of five, and subsequently, the group members are expected to monitor each other's repayment as well as coordinate some activities (such as collection of repayment) to reduce the operational cost of the MFI. The repayment is collected by a loan officer during the weekly/monthly meeting of the group and a record is kept in individual passbooks. SKS MFI clients meet in a group of 50 to repay their instalments two times (Tuesday and Satuday) every week. The group that meets on Tuesday every week was randomly selected by the microfinance institution and a local NGO for the purpose of providing business training. We compare this chosen group with a similar *SKS MFI* group that meets on Saturday every week as well as clients from other MFIs (*Utkarsh* and *Janlaxmi*), a cooperative society, and professional money lenders working in the area. Hence, we have three control groups. Control I which consists of clients from SKS microfinance only who did not receive the training. Control II consists of all the clients from Control I and clients from other MFIs (*Utkarsh* and *Janlaxmi*) who did not get the training. Control III which consists of everyone in our sample who did not receive the training.

[43] See chapter 2 for more details on the village, women and lenders and their loan structures

Table 2: Various treatment and control group

Treatment	SKS MFI clients who received the training
Control I	SKS MFI clients who did not receive the training
Control II	Control I + *Utkarsh* and *Janlaksmi* clients
Control III	Control II + borrowers from Co-operative society and other informal sources

We also check if the probability of receiving training was ex-ante same for all borrowers using a probit model for the data collected at the baseline. We find that individual and household characteristics have no effect on the probability of receiving a training confirming that randomisation was successful (see table 7 in the *appendix*).

From Table 3 below, we can see that treatment and control groups are not significantly different from each other. The average woman in our sample is 31.77 years old who have completed 5.5 years of education and lived in the village for 12 years. At the baseline, the average client had a total loan (from all sources) of Rs 30,540, have invested Rs 39,210, earned an annual income of Rs 35,810, saved Rs 690 in the last month and spent Rs 3,400 on food per month[44].

Table 3 below shows the means, standard deviation and p-values of key financial, household, and individual characteristics of the control and various treatment group. The p-value suggests that control and treatment groups are not significantly different from each other for most variables.

[44] Consumption expenditure on food calculated by average monthly spending on rice, flour, milk and dairy products, pulses, vegetables, oil and spices.

Table 3: Baseline Summary Statistics (Year 2015)

VARIABLES	All	Training (Only SKS)		Control I (Only SKS)			Control II (All MFIs)			Control III (All)		
	Mean	Mean	SD	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Loan Amount	30.54	32.52	10.38	37.17	14.51	0.07	30.95	13.20	0.45	29.92	14.64	0.24
Months with Lender	8.58	9.12	2.00	10.52	2.35	0.00	9.29	2.06	0.62	8.41	2.69	0.09
Assets Value	101.56	101.60	41.86	104.20	44.62	0.76	94.57	45.93	0.35	101.55	54.16	1.00
Income (client)	35.81	33.92	11.61	36.26	11.71	0.32	36.64	11.90	0.18	36.39	12.59	0.22
Income (Household)	124.36	122.84	30.30	127.46	31.14	0.45	125.09	28.99	0.65	124.84	28.98	0.67
Savings last month	0.69	0.70	0.42	0.78	0.55	0.42	0.72	0.49	0.83	0.69	0.49	0.89
Consumption on food per month	3.40	3.30	1.18	3.44	0.92	0.51	3.43	1.06	0.48	3.44	1.01	0.41
Level of Investment	39.21	43.40	18.28	38.10	16.43	0.13	38.16	23.72	0.17	37.91	33.59	0.27
Age	31.77	32.40	6.39	31.80	4.32	0.58	31.69	4.27	0.40	31.57	4.36	0.30
Education years	5.53	5.10	3.38	5.36	2.74	0.67	5.21	3.01	0.84	5.66	3.05	0.27
Hours worked/week	31.98	29.66	11.58	31.60	12.07	0.41	33.36	12.59	0.08	32.70	12.75	0.13
Years in village	12.14	13.04	6.56	12.22	4.31	0.46	11.99	4.27	0.22	11.86	4.35	0.14
Size of the HH	5.01	4.98	0.87	5.12	0.66	0.37	5.09	0.74	0.42	5.02	0.74	0.72
Observations	211	50		50			111			161		

p-values for differences of means against the treatment.

Amount of loan, consumption, investment, savings, income, and assets value are described in terms of Rs 1000s.

Qualitative data was collected from a sub-sample of 18 participants from the treatment group randomly chosen for interviews to examine the perceived impact of training. The interviews were conducted at the clients' house in the presence of a local social worker who helped with translation and conversation. The interviews lasted around an hour. Permission to interview clients was obtained from them and their family as well as from the head of the village (*sarpanch*). Consent was taken in witnessed verbal rather than written form. The interviews followed a semi-structured approach, giving participants the flexibility to discuss issues important to them. All the client approached agreed to be interviewed for this study.

5. Methodology

In order to meet the study objectives, we used an embedded design approach (Creswell and Clark, 2017) where we embedded qualitative data within a quantitative methodology. Here, the qualitative data plays a supplemental role within the overall design. By interviewing the participants from the treatment group, we aim to better interpret the findings of the intervention study. Embedded design is described in the figure below:

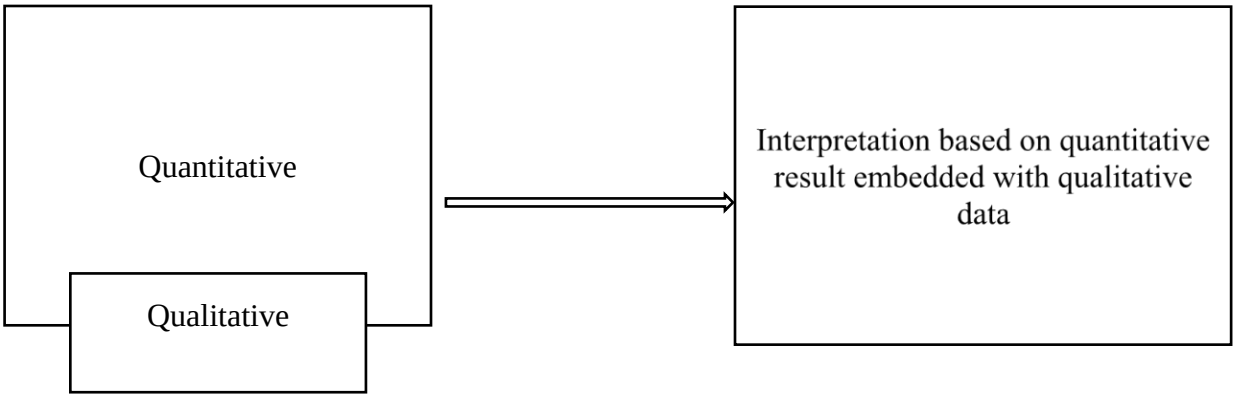


Figure 1: Embedded design for mixed-method evaluation

In our research, quantitative methods were used to assess causality through econometric analysis. To isolate the causal impact of the training, we estimated a series of difference-in-differences models of the following form:

$$Y_{it} = \alpha + \beta T_i + \delta POST_t + \gamma(T_i * POST_t) + \varepsilon_{it} \text{ ..... (1)}$$

Where Y_{it} denotes an outcome variable for client *i* at the time *t,* T is a dummy for getting training, *POST* is an indicator for the post-intervention period, and ε denotes an error term. The average treatment effect is given by γ in the above equation. Differences-in-differences (DiD) allow us to compare the change before and after this intervention against the same change in the other untreated group. In addition, the DiD estimator requires that in the absence of treatment, the difference between control and treatment groups would be constant over time (Angrist and Pischke, 2008). This is the key identification assumption of DiD and is known as the common (or parallel) trend assumption. It is not possible to test this assumption – since we cannot observe the treated group in the absence of treatment. However, since randomisation has assured that there are no significant differences between control and treatment, we can argue that any differences in post-treatment can be causally attributed to the treatment and our estimator provides an unbiased estimate of the impact of business training.

Quantitative studies sometimes overlook a lot of personal information: for example, information about sensitive issues such as discrimination, cultural and traditional practices. Sometimes the information collected is inaccurate or incomplete because the participant is illiterate and cannot recall the figures for important variables. Quantitative surveys also lack information on contextual factors to explain variations in behaviour between households with similar economic and demographic characteristics (Bamberger, 2000). Moreover, a method which relies solely on quantitative data is inflexible as it is hard to modify instruments once the study begins.

The underlying assumption of a mixed-methods approach is that the integration of qualitative and quantitative methods can address some research questions more comprehensively and may generate deeper insights than by using either of the two methods independently (Moffatt et al. 2006, Rao and Woolcock, 2003). By only using quantitative study, development economists may constrain their ability to understand critical economic issues embedded in the social, cultural and political landscape. For instance, an analysis of an informal economy may fail to notice marginal work crucial for policy-making – such as the market for drugs, sex, and political favours which

requires a strong rapport with the respondent – rapport that a short visit to field a questionnaire will not provide (Bamberger, Rao and Woolcock, 2010).

Given some of the weaknesses of a quantitative study, there is a need in the field of development studies to incorporate qualitative study along with quantitative analysis. To complement the quantitative results, qualitative data was collected using semi-structured interviews to explore participants views about the intervention and its outcome, to understand the process of decision making, and the role of customs and tradition.

6. **Results**

We divided the analysis into various categories of business and household outcomes. Our primary focus was on the level of investment, income, size of the loan and return on investment. The richness of our survey also allows us to measure the treatment effect on other secondary business outcomes such as hours worked per week; and household outcomes such as income, assets, and savings.

Level of investment

Table 4: Impact of training on level of Investment:

	(1)	(2)	(3)	(4)	(5)	(6)
Log of Investment	CONTROL I	CONTROL I	CONTROL II	CONTROL II	CONTROL III	CONTROL III
Business Training	-0.087	-0.215	-0.277**	-0.344***	-0.314**	-0.392***
	(0.176)	(0.166)	(0.132)	(0.123)	(0.129)	(0.121)
Covariates	No	Yes	No	Yes	No	Yes
Observations	200	200	332	332	422	422
R-squared	0.200	0.356	0.161	0.322	0.132	0.287

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Covariates include age, education years, size of the household, quality of house, loan source dummy, months with lenders, caste dummies.

The results in Table 4 shows that the treatment decreased the level of investment by 31 % (without covariates, Column 5) and 39 % (with covariates, Column 6) for Control III sample and 27 % (without covariates, Column 3) and 34 % (with covariates, Column 4) for the Control II sample. The coefficient is negative but not significant for the Control I sample.

It is important to stress that these results do not necessarily negate the value of the training. One possible cause for this result could be that clients realise that they have limited knowledge and are ill-suited to run larger businesses - and hence cut down their investment and shed unproductive assets. The qualitative evidence confirms this result that the business training made clients more aware of negative factors like risk, competition, consequences of default etc., resulting in a more cautious approach.

One of the respondents to our interview said:

"After getting the classes (training), I realised how much resources would be needed to scale up my business. There is also huge competition in my business, not just from women but from other men (with better attributes) as well. I am not experienced or qualified to deal with the risk of investing a large sum of money in the business at this stage. Now I am focused on better utilisation of the resources I have."

Another respondent said:

"Training motivated me but also helped me to understand my customer and the market. I realised I cannot just increase my sales with more investment."

This is an important result which might have long-run implications as the clients may otherwise fall into a debt trap if their entrepreneurial project fails after heavy investment. So, by understanding their ability and risks involved in running a business, clients are in a better position to manage their finances and investments. It might be possible that these women had unrealistic aspirations to grow after acquiring capital but realised after training that they did not have the

capacity to expand the business in a small market. Our findings are opposite to the one by Bruhn and Zia (2011) who found that training increased the level of investment among young entrepreneurs in Bosnia and Herzegovina.

Level of income

Table 5: Impact of training on level of Income:

	(1)	(2)	(3)	(4)	(5)	(6)
Log Income	CONTROL I	CONTROL I	CONTROL II	CONTROL II	CONTROL III	CONTROL III
Business	0.226*	0.243**	0.223**	0.280***	0.233***	0.293***
Training	(0.125)	(0.114)	(0.115)	(0.112)	(0.116)	(0.112)
Covariates	No	Yes	No	Yes	No	Yes
Observations	200	200	332	332	422	422
R-squared	0.105	0.353	0.103	0.349	0.090	0.359

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Covariates include age, education years, size of the household, log of level of investment, quality of house, and caste dummies.

Table 5 shows that the training increased the level of income for all the treatment group. Despite reducing investment, an increase in income could be due to an increase in efficiency and cost cutting through improved business practices learned through training.

Our results were echoed by one recipient of training:

"The programme taught me how to manage my costs and inventory. I understood the risks and costs associated with borrowing. Syncing borrowing during peak season in line with buying stock helped me to increase the profits and income with less hassle."

A number of women in our interviews linked training with diversifying their income through experimentation with new business opportunities. Two respondents said:

"Training helped me to understand the market and encouraged me to make use of the existing resources. The case study in training gave me an idea to put my savings in something unfamiliar but profitable business. Since I noticed the price of chicken always increase in the winters, I invested some of my loans in setting up a small chicken poultry farm in our allotment which does not require much attention. I sold the chicken when the price was high."

"Business training informed me of various investment schemes with greater returns. The implementation support given in the training helped me reduce the costs and wastage of resources. I learned how to make the most of my resources such as converting my backyard into a small vegetable garden."

Another respondent linked training to a reduction in business operating costs and increase in efficiency:

"Training provided me with the confidence for negotiating prices, earlier I would accept any price given by the seller. I also learned how to price my products with changes in demand. Keeping an account of expenses helped me to understand my business spending. By putting what I learned in the training into practice, I greatly reduced my costs and achieved the financial goals I set."

This is similar to the study by Field et al. (2010) who evaluated a two-day training program for clients of an Indian microfinance institution found that training program increased the personal labour income of the clients.

Size of loans

Table 6: Impact of training on the amount of loan:

	(1)	(2)	(3)	(4)	(5)	(6)
Log Loan	CONTROL I	CONTROL I	CONTROL II	CONTROL II	CONTROL III	CONTROL III

Business	0.006	0.023	-0.156	-0.122	-0.081	-0.118
Training	(0.125)	(0.122)	(0.097)	(0.093)	(0.141)	(0.129)
Covariates	No	Yes	No	Yes	No	Yes
Observations	200	200	332	332	422	422
R-squared	0.229	0.348	0.167	0.303	0.102	0.305

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Covariates include age, education years, size of the household, quality of house, loan source dummy, months with lenders, and caste dummies.

The results in Table 6 shows that the training did not have any effect on the loan size. This raises the question of why - if training reduces investment - the loan size has not reduced. It is possible that trainees gained a better understanding of concepts like cash-flow, reserves of working capital, and risk avoidance – and hence borrowed contingency funds which were not directly invested in the business. Several women indicated that they felt a sense of security in having additional capital available, even when their business plans did not demand it. Further research would be needed to determine if this need for a financial comfort blanket was gender-linked or associated with the poor background of the borrowers, who saw unequivocal value in having funds in reserve, regardless of the costs incurred in interest. This also suggests that size of loan is influenced by combination of factors and not simply dependent on the investment needs of the business.

These results are similar to previous studies where Karlan and Valdivia (2011), Drexler et al. (2012) and Bruhn and Zia (2012) found no significant impacts of training on the likelihood of taking loans or loan size. However, Giné and Mansuri (2014) found that training leads to a 16 % increase in loan size for male clients but a reduction in loan size for females. Our results are opposed to the findings of Valdivia (2012) in Peru, which found that training led to an increased use of business credit from formal or informal sources.

Return on Investment

An alternative measure of business profitability is return on investment (income -investment), which evaluates the efficiency of investment. Table 7 shows that the training significantly increased the return on investment for all the treatment groups. This suggests that the borrowers who got training benefitted from it greatly.

Table 7: Impact of training on return on investment:

	(1)	(2)	(3)	(4)	(5)	(6)
Log Loan	CONTROL I	CONTROL I	CONTROL II	CONTROL II	CONTROL III	CONTROL III
Business Training	10.76*** (4.12)	10.73** (4.14)	13.06*** (3.84)	13.04*** (3.86)	13.73*** (4.06)	13.71*** (4.10)
Covariates	No	Yes	No	Yes	No	Yes
Observations	200	200	332	332	422	422
R-squared	0.47	0.49	0.32	0.34	0.20	0.22

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Covariates include age, education years, log of level of investment, size of the household, quality of house, and caste dummies.

Other variables:

We do not see a corresponding shift downward in average hours per week worked by women where the coefficient is positive but not significant (see Table 9 in the *appendix*), which indicates that treated clients may be spending more hours on their business per unit of investment. Since income has increased for the treated clients, it may have increased their working hours as well. Our interviews suggest that it may be because it takes more time to adapt to better business practices whose benefits we may see in the long run.

On being asked if she is spending more time after training, one respondent confirmed this.

I am doing things like the way madam (the trainer) suggested. I go to various suppliers to match the price and negotiate to get the best deal for myself. At the end of the day, I record all the sales, expenses and profits to see if I am better staying at my shop or working as an agricultural labour.

These findings are similar to Karlan and Valdivia (2011) who found no change in the number of workers, family or hired, employed at the family business. Calderon et al. (2013) also found no differential in terms of hours worked per week by the treated entrepreneur.

We find no impact of training on the value of assets (non-land) or on the savings (similar to Karlan and Valdivia 2011) except with the Control I sample significant only at 10 % (see Table 9 in the *appendix*). We did not measure the impact of training on business practices and financial literacy since existing research has already strongly demonstrated a positive relationship between them and additional evidence would offer little value.

It was generally assumed that this kind of training provides the knowledge that would help clients develop skills to run their businesses in a way which would help them to grow and have a positive impact on the household and business outcomes. If growth was supposed to be achieved by expansion of business through investment, our results suggest the opposite. Though there may be a positive side to the findings. Training may have helped the clients to avoid misallocation of capital and labour through over-investment by learning about their limited skills. Loans represent a cost as well as a benefit, and if clients learn how to manage their cash flows better, they perhaps will need less debt.

Spillover:

The simple comparison of outcomes of participants and non-participants only gives a consistent estimate of the programme's effectiveness when there are no spillovers between participants and non-participants. Spillover problems arise whenever one individual is affected by the treatment status of another individual and hence, spillovers make it difficult to estimate the causal effect of the treatment.

In our research spillovers can occur in two ways. Firstly, treated clients could pass on the knowledge to the borrowers in the control group or those who did not get the training could copy some of the techniques or new products introduced by clients that have participated in the training. Secondly, if the gains from the treatments are mainly due to taking business from the control group borrowers, then the assumption that outcomes of each firm are not affected by the treatment statuses of other firms is violated. As a result, the experimental estimate no longer provides the average impact of training for the sample population.

Our interviews with the clients suggest that spillover effects will be low in our research since the women who got the training were selected to be in a group of five of the people they knew and trusted the most. Interactions with other women in most cases were very unlikely; hence, the probability of passing the training knowledge to other borrowers is very low. However, our experimental design does not allow us to examine if the treatment borrowers are taking business from the control group. To investigate this issue, more information is needed. Experimental variation in the intensity of the treatment within different geographical areas could be used to test for and measure these spillovers (McKenzie, and Woodruff 2008). A first attempt in this direction for business training is found in Calderon et al. (2013), who randomly assigned 17 villages into 7 treatment villages and 10 control villages, with half the individuals in the treated villages assigned to training. They did not find any spillover effects on business knowledge despite the small size of the village where firms mostly make or sell goods for local consumption. However, a large impact on the use of formal accounting methods was discovered for the control group.

7. Discussion and conclusion

Business training programmes like the one described in this paper aim to improve clients' income and to end the cycle of low investment by the owners of microenterprises by teaching basic financial and marketing practices, yet the impact of such programmes is mixed. In this paper, we investigate whether a training and business development programme can improve business outcomes such as the level of investment, income and loan size; and improve household outcomes such as the level of savings, hours worked, and assets. For this, we examine the impact of business training provided to women clients of a microfinance organisation in Northern India.

A general view is that capital alone cannot overcome the barriers to increase in business investment; and that micro-entrepreneurs need basic business skills to make efficient use of limited capital. We find that business training reduced the level of investment in the business. Our interviews suggest that women may have realised through training that their original investment plans were unnecessarily large in relation to their business goals; and they understood more clearly the risks of growing their business too quickly. If this is true, then the treatment group will benefit in the long run. The women in the control group with higher investments may quit their businesses after suffering losses realising that they are not equipped to manage such level of investments. This is an important result which might have long run implications in terms of market dynamics as well; for example, the disappearance of control group businesses might allow treated businesses to grow to a more efficient scale. Calderon et al. (2013) found that training induced the low-ability entrepreneurs to quit their businesses whereas the most significant effects are recorded amongst the high ability entrepreneurs. However, we cannot be sure that the decrease in the level of investment accompanied by an increase in income is a positive thing. It could also be true that an increase in income today comes from a decrease in the income of the future.

The increase in income for the treatment group, despite reducing investment, is likely to come from an increase in efficiency - through cost-cutting brought about by improved business practices learned from training. Surprisingly, training did not reduce the amount of loan for the treated group, even though it reduced the level of investment. One possible reason that treated clients gained a better understanding of concepts like cash-flow, reserves of working capital, and risk avoidance – and hence borrowed contingency funds which were not directly invested in the business. Regarding other outcomes, we found no impact of treatment on assets worth, and the average hours worked per week.

In similar studies to ours, the question generally asked is whether we can improve the likelihood of business success by improving entrepreneurial skills through training. Some of these studies go further by asking if entrepreneurship can be taught or if it is a personal trait that entrepreneurs are born with (Klinger and Schundeln, 2011). The evidence suggests that lack of entrepreneurship hinders economic growth. Business success here is measured by the expansion of a business through an increase in investment. If this argument is to be considered, our results

suggest that in this case business training failed to help these micro-entrepreneurs 'grow'. However, the income of the treated clients has significantly increased without increasing investment. It may be because treated clients are perhaps more efficient and productive after getting the training. Alternatively, training may have made businesses more robust, and better able to deal with market disruptions – this is supported by the fact that loan size remained constant while investment decreased.

We also acknowledge that we need to be patient with these complex interventions to allow them the time they need for their full impacts to materialise. Results can differ in the long term. De Mel et al. (2012) found that the impact of training differs in the short and medium term in their study. They found that business training for women out of the labour force led to significant increases in business entry in the first year, whereas, control group caught up in terms of business ownership rate after 16 and 25 months. Hence, a long-term study is needed to check this assumption.

Another concern relates to the unexpected failure to find improvements in some key outcomes. This may arise through a variety of causes. Firstly, it simply may not be possible to transfer the necessary practical skills through training alone. Secondly, it may reflect failures in this specific intervention: possibly weaknesses in the training content or quality of delivery. Thirdly, the failures may have arisen due to client attitudes: possibly undervaluing the training because it was offered free of charge. As there was no mechanism in place to check how much knowledge the clients absorbed – no formal assessment of learning – it was not possible to directly evaluate whether the training itself was successful. More research is needed on this aspect.

Despite the results put forward in this research, the question regarding the impact of business training remains critical for further studies. Future research needs to focus on the following aspects to get a precise assessment of the value of training - some measure of knowledge transfers at the completion of training, some measure of spillover from treatment to control groups (an assessment of changes in knowledge in the control group); additional interviews across the treatment and control group over time to identify the rationale and causation behind the changes in outcomes. Future studies should also explore different type of training mechanism and delivery methods

according to the education and knowledge level of the participants. This need was echoed in our interviews where some of the women found some of the training material to be very elementary. Hence, designing a training approach suited to the ability of the participants to absorb the training content would be beneficial in understanding the entrepreneurial behaviour of the clients. Since our findings are based on the sample of women in Haryana, North India, we do not recommend generalising the results beyond this selected group of women.

We argue that the methodological strategy advocated by a mixed-method approach involving qualitative and quantitative data collection, analysis and verifying econometric impact survey findings through in-depth interviews have enhanced the overall quality of the evidence base. For policy purposes, large econometric impact assessment continues to be important, but they are too complicated, time-consuming, inflexible and expensive. To understand how and why some interventions work, and what can be done to improve the situation, the addition of qualitative analysis to quantitative approach is certainly helpful and possible necessary. Hence, we make a case for a mixed-method approach which can generate a deeper analytical and interpretative framework than could be obtained by using either quantitative or qualitative methods alone.

8. Appendix A: Tables and Figures

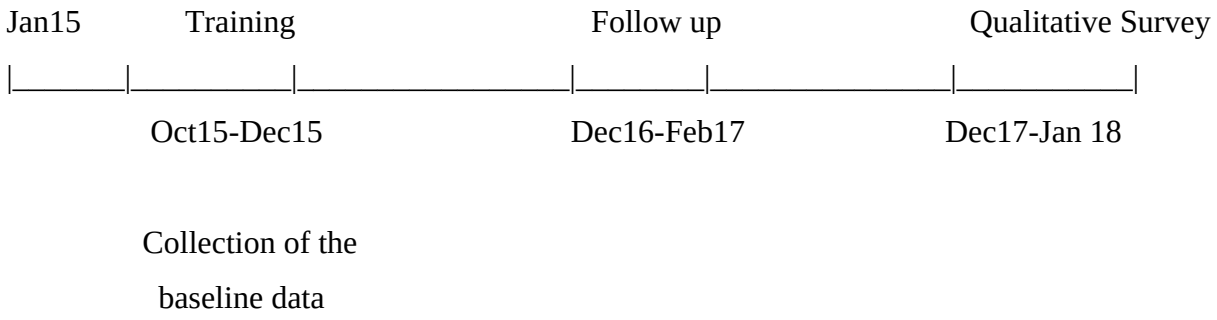


Figure 2: Timeline of the intervention and data collection

Table 8: Probit model estimating the probability of getting training

VARIABLES	TRAINING
Age	-0.662
	(33.836)
Education years	-0.036
	(0.039)
Age at marriage	0.629
	(33.836)
House quality	-0.198
	(0.254)
General caste	-0.198
	(0.334)
SC or ST	-0.082
	(0.270)
Months with the lender	0.075
	(0.050)
Years in the village	0.680
	(33.836)
House worked per week	0.006
	(0.010)
Number of sons	0.434
	(0.273)
No of daughters	0.278
	(0.247)
Constant	-2.087
	(1.665)
Observations	211

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
The dependent variable is 1 if the woman received the training and 0 otherwise.

Table 9: Impact of Business Training

	(1) CONTROL I	(2) CONTROL I	(3) CONTROL II	(4) CONTROL II	(5) CONTROL III	(6) CONTROL III
Log Savings						
Training	0.130*	0.117*	0.037	0.013	0.016	-0.018
	(0.072)	(0.068)	(0.063)	(0.058)	(0.062)	(0.055)
R-squared	0.174	0.348	0.198	0.389	0.207	0.424
Log Assets						
Training	0.086	0.048	0.022	-0.011	0.043	0.005
	(0.111)	(0.086)	(0.103)	(0.089)	(0.100)	(0.086)
R-squared	0.029	0.477	0.043	0.353	0.026	0.339
Hours Worked						
Training	2.760	2.817	1.717	1.990	1.897	2.185
	(2.999)	(2.955)	(2.680)	(2.500)	(2.646)	(2.487)
R-squared	0.030	0.103	0.039	0.113	0.027	0.108
Covariates	No	Yes	No	Yes	No	Yes
Observations	200	200	332	332	422	422

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Covariates include age, education years, size of the household, quality of house, loan source dummy, months with lenders, and caste dummies.

Chapter 4

Make Microfinance Great Again: Does Flexibility in Repayments Affect Entrepreneurial Behaviour in North India?

Abstract

Microfinance has been traditionally intended to benefit borrowers – especially poor borrowers; however, recent evaluations of microfinance products have found limited evidence of the transformative effects claimed by its proponents. Anecdotally, many borrowers typically blame the contract models used to manage the loans. Most microfinance institutions follow a rigid non-negotiable contract model where every client must repay in fixed weekly instalments starting immediately after disbursement of the loan. These offer no flexibility to borrowers who are poor and have seasonal income. Previous research has also shown that such contracts can affect the economic well-being of poor borrowers leading to underinvestment of capital, selling of productive assets, over-indebtedness through cross-financing from informal sources, reduction in consumption, income, and in some cases, a deterioration in the borrowers' mental health arising from stress and worry. If lenders offered more flexibility in loan repayment schedules, would it help to overcome some of these problems? To explore this, we tested whether clients' business and household outcomes were sensitive to various repayment schedules using a mixed-method approach collecting quantitative and qualitative data from the clients of three microfinance institutions, a cooperative society and a few local traders specialised in business lending in a village in North India. We analysed alternatives to the rigid contract model, focussing on the degree of flexibility and the length of gap between repayments in the loan schedule. This study finds that flexible and monthly repayment schedules increased the level of business investment compared to a weekly repayment schedule; however, this did not translate into an increase in income for the borrower. The study also finds that clients on a monthly repayment schedule tended to borrow more and save more than clients on a weekly repayment reschedule. Based on the results, this study makes a strong case in favour of flexible and infrequent loan repayment contracts.

1. Introduction

Microfinance, an innovative provision of financial services for those without access to traditional formal banking, is often hailed as one of the most promising tools for fighting against global poverty. It has generated global attention over the last two decades, especially since the UN declared 2005 the 'Year of Microcredit' and the 2006 Nobel Peace Prize was awarded to Muhammad Yunus and the Grameen Bank. It is frequently claimed that by providing the poor with cheap credit for self-employment, microfinance can improve the economic and social conditions of borrowers (see Nobel Peace Prize 2006 citation). This has led to a significant expansion of this sector in the last decade. According to the World Bank (2015), several thousand microfinance organisations globally were lending between $60-100 million to around 200 million clients. There are 32.5 million of these clients in India, and 90 percent of them are women (MFIN Micrometer, 2016).

Despite the popularity of microfinance, empirical evidence suggests that access to microcredit programmes has a limited impact on clients' lives (Armendáriz and Morduch, 2010; Banerjee, Duflo, Glennerster, and Kinnan, 2015; Karlan and Zinman, 2009). This is particularly surprising given the substantial evidence that credit constraints limit the expansions of small businesses (Banerjee and Duflo 2012) and that borrowers' returns to capital in microenterprises are high (De Mel, McKenzie, and Woodruff, 2008). A growing body of evidence suggests that the participation rate in many microfinance programs remains low (Banerjee et al., 2015), dropout rates are high, and the demand for larger loan sizes is less (Meyer, 2002). There is clearly a paradox here: if the borrowers need the loans, and the loans appear to benefit the borrowers, why are the borrowers still reluctant to engage?

One of the reasons is that the rigid weekly repayment structures generally offered by microfinance institutions (MFIs) have failed to meet the investment needs of poor borrowers - especially those who have seasonal and irregular income and cash flow. The use of a classic microcredit contract with immediate and frequent (weekly) repayment obligations - in order to reduce defaults and instil fiscal discipline (Armendáriz and Morduch, 2010; Jain and Mansuri, 2003; Meyer, 2002) - may actually inhibit investment and reduce the ability of poor clients to extricate themselves from poverty.

A standard microfinance contract includes a small initial loan, fixed and regular repayments usually starting within a week of first disbursement, progressively larger lending and zero tolerance toward default (Labie, Laureti, and Szafarz, 2013). However, MFI clients are almost always poor with irregular income throughout the year. This frequently results in a cash flow disconnect when a repayment is due. Sometimes clients resort to selling productive assets, labour or crops in advance (Khandker, 2012), underinvesting (Field, Pande, and Papp, 2010), skipping meals and reducing consumption (Shoji, 2010) only to then borrow from local money lenders at a very high interest rate (Jain and Mansuri, 2003) in order to repay loan instalments to the MFI. Considering this, there are clear potential benefits for clients in having a loan contract that either lets them align their repayments with their income; or have a longer gap between repayments.

This paper analyses the effect of various repayment structures on borrowers entrepreneurial and household outcomes[45]. More specifically, we compare the rigid weekly repayment schedules with two alternatives – first, a monthly repayment schedule instead of weekly one; and second, a flexible repayment structure tailored to borrowers' needs. The study utilises a mixed-method approach collecting quantitative and qualitative data from the clients of three microfinance institutions, a cooperative society and a few local traders specialised in business lending in a village in North India.

For the sake of clarity, we should establish some of the key loan characteristics under consideration. Microfinance loans in India are generally intended for poor borrowers with negligible credit history and little financial literacy (Armendáriz and Szafarz, 2011). It has therefore been usual for MFIs to design and implement their lending in such a way that helps borrowers to learn financial discipline and prudence. In practice, this means that the schedule of repayment must be frequent, and the terms of repayment must be rigid: hence the default repayment scheme for micro-loans is invariably weekly and non-negotiable. The schedule typically requires a borrower to start their repayments immediately after receiving the loan. In this paper, this is what we mean by a 'traditional' repayment scheme, and we contrast this approach

[45] We measure outcomes such as level of investment, loan amount, average annual income, savings in the last month, consumption expenditure on food in the last month, change in the value of non-land assets of the borrower and number of working hours per week.

with other more 'flexible' schedules. There is clearly a difficulty in comparing traditional loans with flexible loans, as 'flexible' loans may by definition vary widely in their terms, schedules, conditions and rigour. There is no such thing as a single 'flexible' loan. We will, therefore, consider two alternatives to the traditional approach - at opposite ends of the flexibility spectrum. The first direct comparison is with monthly (infrequent) repayment schemes - offered by some MFIs - but we also draw less-direct comparisons with the highly flexible credit which is often available from local lenders such as cooperative societies and traders - with access to local information and insight - can tailor both their products and their repayment terms to individual borrowers' needs and circumstances over time.

The results from this study provide rigorous evidence that clients' investment and other business and household outcomes are sensitive to the repayment obligations. Borrowers with monthly and flexible repayments have a higher level of investment and savings compared to those with fixed weekly schedules. Monthly repaying clients have a higher loan amount and are less likely to take an additional loan from external sources compared to weekly repaying clients.

The rest of the study is organised as follows. Section 2 gives some background on various repayment structures; Section 3 describes the data; Section 4 presents the methodology, Section 5 shows the results, and Section 6 contains a summary and discussion.

2. Background

Collins et al. (2009, p. 181) describe product flexibility as the "ease with which transactions can be reconciled with cash-flows". Labie et al., (2013) emphasises that flexibility can take different forms and distinguishes three types of flexibility: ex-ante, ex-post, and full flexibility. With ex-ante flexibility, financial terms are adapted to a client's expected cash-flow in advance seeking to remove uncertainty in repayment expectations. With ex-post flexibility, alterations to a pre-established transaction plan are allowed in response to an unfavourable outcome. With full flexibility, there is no predetermined repayments plan and repayments can be authorised at any time. Despite the range of flexibility options available, MFIs typically disparage the approach.

In designing microcredit products, MFIs do not usually seek to provide flexibility as they are afraid that flexibility might break the repayment discipline of borrowers, resulting in higher default rates. However, the evidence is mixed regarding default rates. Using a field experiment in West Bengal, India, Field et al. (2010) found that flexibility in microfinance contracts in terms of introducing a grace period of two months significantly increased borrower defaults. On the other hand, in their study in Madgascar, Weber and Musshoff (2017) found that loan delinquencies of farmers with flexible loans and repayment grace periods are not much different from those of farmers with standard loans. In a randomised experiment with microfinance borrowers in Uttar Pradesh, India, Barboni and Agarwal (2018) offered borrowers of treated branches the opportunity to self-select between the standard, rigid contract and a more expensive flexible contract compared to the control branches who were offered the standard rigid contract. They found that the clients in treated branches had higher repayment rates and higher business sales.

It is worth stressing that the high repayment rates proclaimed by the microfinance industry do not necessarily mean that their customers are doing better, nor does it reflect the struggles clients face while repaying debt obligation through rigid instalments. Often, MFIs resort to coercion and high-pressure tactics for loan recovery (Karim, 2011) which have in some instances resulted in suicide by borrowers in India (Biswas, 2010). Borrowers who default on repayments also face being barred from any future access to loans, as well as a range of further social penalties including humiliation, social pressure, verbal hostility, harassment, shame, and loss of face among community members (Sett, 2015). When potential borrowers have a high level of fear about defaulting, this affects the level of participation: potential borrowers either do not borrow, borrow less, or drop out of the scheme early (Boucher and Guirkinger, 2007; de Janvry, Sadoulet, Coulibaly, and Abordonado, 2013). Even when clients manage to repay weekly instalments on time, the lack of autonomy or loss of control over their actions due to the lack of flexibility in the repayment schedule could lead to sub-optimal task performance, lower motivational levels and lower experienced of well-being (Chakravarti, 2006; Moller, Ryan, and Deci, 2006).

The use of rigid frequent repayments in microfinance is also related to over-indebtedness by cross-financing of repayments from informal sources and discouraging credible borrowers from taking out further loans. Jain and Mansuri (2003) found that the use of frequent repayments

expanded the volume of informal lending and raised interest rates in the informal sector. Pearlman (2010) argues that a lack of flexibility in microfinance contracts could be the reason for borrowers avoiding using formal credit providers, and instead continue to rely on informal moneylenders. Karlan and Mullainathan (2006) observed that rigid contract schedules constrain loan size and deter some solvent borrowers from taking out loans. Rahman (1999) found that many households in his study village in Bangladesh used income from agriculture or wage labour, sold assets and reduced household consumption in order to finance their weekly instalments.

Early initiation of repayment may also lead to entrepreneurs underinvesting in their businesses since they are often obliged to set aside a portion of the loan at the outset for immediate repayment. A rigid repayment structure demanding frequent instalment payments causes an additional difficulty for the borrower. It limits the type of project that can be financed with the microcredit loan. Rigidity and frequent repayments in microcredit could certainly deter clients from making an illiquid investment with potentially higher returns. For instance, Field et al. (2010) showed that clients with a grace period of two months were more likely to start businesses and invest in less liquid assets with higher returns if there were a relaxation of liquidity demands in the early phase of the loan cycle. Flexibility in repayments could also improve a client's ability to deal with short-term shocks to household income. In an experiment in India on microfinance clients working in dairy farming, Czura (2015) found that flexible repayment schedules significantly improved the ability of the borrower to absorb shocks and resulted in higher income due to increase in investment and productivity.

In addition, there are clear operational benefits for lenders in adopting less rigid, less frequent repayment schedules. MFIs can lower costs by reducing the frequency of repayments in terms of fewer meetings, fewer collections, and fewer transactions. Field and Pande (2008) suggest that MFIs can reach up to four times as many clients without hiring additional collection officers by changing the repayment schedule from weekly to monthly and thereby significantly expanding operations without incurring any loss. In line with the argument that microfinance is seen as a powerful tool for poverty alleviation (Armendáriz and Szafarz, 2011). Khandker, Khalily, and Samad, (2012) show that flexible microcredit helps in reaching the ultra-poor and seasonally poor

in Bangladesh. The reduction in cost could also lower interest rates and enhance the ability to service more clients.

An easing of rigid repayment schedules could also contribute to broader goals. Since poverty is a multidimensional construct involving both economic deprivation and psychological well-being (Chakravarti, 2006; Narayan-Parker and Patel, 2000), it is logical that if policymakers and MFIs really wish to tackle 'poverty', they take a holistic view in designing financial products which address the poor clients' fundamental needs of economic prosperity and psychological well-being (Sett, 2015). Repayment flexibility can reduce financial stress as noted by Field et al. (2012), where they found that the clients with monthly repayment obligations were less likely to report feeling "worried, tense, or anxious" about repaying; were more likely to report feeling confident about repaying; and reported spending less time thinking negatively about their loan compared to the weekly clients.

Despite the clear potential to better meet the needs of MFIs and their clients, there is limited evidence on the effects of deviating from the traditional weekly repayment contract's design and most of it is focused on delinquency and default rates. Not much attention has been given to other important business and household outcomes. This research aims to narrow this knowledge gap.

3. The study area and the data

The quantitative study covered a random sample of 161 women who were clients of three MFIs, a co-operative society, and a few local traders or village financiers collected through two household surveys taken in 2015 and 2016 (see timeline in the *appendix of Chapter 3*), in the village *Thol*[46] and its surrounding area in the state of Haryana. The survey collected information regarding income, loans, investment, health, household composition, education, employment, assets, and other variables. The qualitative research involved semi-structured interviews with 28 clients [47]in 2018.

[46] See Section 2 of Chapter 2 for more details on the village, women, and lenders.
[47] 10 participants from weekly, 10 participants from monthly and 8 from flexible group.

The credit market of the village is being served by three microfinance organisations: *SKS* (now known as Bharat Financial Inclusion Limited), *Utkarsh*, and *Janlaxmi* since 2014. Additionally, there is a government supported Cooperative Society and several traders (specialised in productive loans). Most women in the sample are self-employed in household businesses such as livestock, agriculture, small shops, and garment making (see Table 1). None of the businesses are registered with the government or have any permanent employees.

Table 1: Primary income generating activities of the borrowers

	% ALL	% weekly clients	% Monthly clients	% Flexible clients
Cultivation	12.80	13	12.12	15.33
Livestock	36.97	40	36.36	33.11
Cloth-making	11.37	11	12.12	13.11
Shops	17.54	17	19.70	17.56
Business Investment	9.00	12	7.58	6.56
Other small businesses such as pottery, basket making etc.	9.95	7	12.12	14.33

All three MFIs use a version of the *Grameen* group lending model. Like a *Grameen* model, borrowers are asked to form a group of five and, subsequently, the group members are expected to monitor each other's repayment as well as share some coordination activities (such as collection of repayments) to reduce the operational costs of the MFI. However, they all can receive as well as repay the loan at the same time (instead of taking turns to do the same). Eligibility to receive a second loan depends on both the individual and the group repayment record. Repayment of 50% dues makes one eligible for a second loan. The group is expected to meet every week/month for a short meeting during which the members pay their dues and repeat their pledge to the group to maintain honesty and continue to repay on time. Thus, the group offers both a screening device and partial monitoring, but the liability remains individual. During the study period, there was no case of default or expulsion from a group.

There is some difference between the MFIs in terms of the repayment cycle. The repayment cycle of SKS is weekly (control group) which starts within a week of the loan disbursement, whereas *Janlaxmi* and *Utkarsh* use a monthly cycle of repayment (treatment 1), which starts after a month of the loan disbursement. *SKS* and *Utkarsh* have similar loan products where a new borrower starts with a loan limit of Rs 15,000 ($215), which is then increased by an additional Rs 15,000 ($215) in the second loan cycle, and then by Rs 20,000 ($285) in the third loan cycle, and finally by Rs 30,000 ($430) in the fourth until to reach the overall cap of Rs 80,000 ($1145) is reached. For *Janlaxmi*, the first loan starts at Rs 30,000 ($430) and the second loan can be up to Rs 50,000. The repayment is collected by a loan officer during the weekly/monthly meeting of the group, and a record is kept in individual passbooks. Hence, the clients of SKS meets 54 times a year for paying their instalment compared to only 12 times a year for *Utkarsh* and *Janlaxmi* clients.

The Cooperative society and traders are very flexible both with their loan amount and repayment cycle. Usually, a Cooperative loan is to be paid back within six months with agreed monthly instalments of variable amount. Instalments can be adjusted in difficult times, but failure to pay the loan on time can invite penalties in the form of higher interest charges on the outstanding amount and/or being barred from future loans. The 'flexibility' in lending from traders varies depending on the borrower's relationship with them. These lenders in the samples, also known as *aadthis*, are a special category of professional money lenders in the village who are grain traders but also serve the function of lending in the absence of concrete formal financial infrastructure. They provide facilities for both credit and savings, and act as a village bank. Due to heavy competition in the village lending sector, their interest rates are usually the same as the MFIs. The loans are usually seasonal and for productive purposes, and lenders preferred to be paid just after the profits from the investment is realised. One of the clear benefits of borrowing from these two groups is that the repayment schedule can be harmonised with the occurrence of investment returns.

Table 2: Loan products offered by various lenders:

Lender	Repayment Schedule	Interest rate	Group	Initial loan
SKS MFI	Weekly and fixed repayment	18-22 %	Weekly	Rs 15000

	amount of Rs 335 over the course of 54 weeks/one year		(Control)	
Utkarsh	Monthly and fixed repayment amount of Rs 1480 over the course of 12 months /one year	18-22 %	Monthly (Treatment 1)	Rs 15000
Janlaxmi	Monthly and fixed repayment amount of Rs 1930 over the course of 12 months /one year	18-22 %	Monthly (Treatment 1)	Rs 30000
Cooperative	Flexible and repayment amount paid within six months.	15-21 %	Flexible (Treatment 2)	Varies
Traders	Flexible and harmonised with the investment return of the borrowers	15-24 %	Flexible (Treatment 2)	Varies

The descriptive statistics of the participants at baseline are provided in Table 3. The average woman in our sample is 31.77 years old and has completed 5.5 years of education and lived in the village for 12 years. The average client has a total loan size of Rs 29920 ($430), an income of Rs 36200 ($515), saves Rs 700 ($10) every month, consumes food worth Rs 3400 ($48.64) every month and own Rs 101550 ($1452) worth of non-land assets. On average, clients have invested (business spending on items such as inventory, raw material, labour, and land) Rs 37910 ($542) while working 32 hours per week. Information regarding expenditure on health, children's education, house quality[48], and other personal characteristics was also collected in the survey. The p-value suggests that control and treatment groups are not significantly different from each other for most variables.

[48] A binary variable distinguishing between dwellings that are designed to be solid and include cemented flooring and strong roof compare to houses without a strong floor or roof. (Good = 1, Weak = 0)

Table 3: Baseline Summary Statistics

Variable	ALL		Weekly (SKS)		Monthly (*Utkarsh* and *Janlaxmi*)			Flexible (Cooperative and traders)		
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	p-value	Mean	Std.Dev.	p-value
Income, loan and expenditure ('000 Rs)										
Loan taken in the year	29.92	14.64	37.17	14.51	26.23	9.86	0.00	27.28	17.72	0.00
Investment in business activities	37.91	33.59	38.10	16.43	38.21	28.14	0.98	37.27	51.30	0.91
Income of the respondent	36.39	12.59	36.26	11.71	36.92	12.13	0.77	35.76	14.33	0.85
Income of the household	124.84	28.98	127.46	31.14	123.29	27.36	0.45	124.20	29.27	0.60
Borrower's savings per month	0.69	0.49	0.78	0.55	0.67	0.43	0.23	0.62	0.50	0.14
Household consumption per month	3.44	1.01	3.44	0.92	3.42	1.17	0.95	3.46	0.85	0.90
Non-land asset worth	101.55	54.17	104.20	44.62	87.27	45.89	0.05	119.56	68.52	0.19
Monthly expenditure on education	0.73	2.76	0.56	0.53	0.46	0.48	0.26	1.32	5.16	0.30
Yearly expenditure on health	15.54	11.64	17.78	14.62	13.85	8.67	0.07	15.53	11.55	0.41
Household and Clients characteristics										
Education years	5.66	3.05	5.36	2.74	5.09	3.21	0.63	6.82	2.86	0.01
Age	31.57	4.36	31.80	4.32	31.61	4.26	0.81	31.27	4.62	0.56
Years in the Village	11.86	4.35	12.22	4.31	11.82	4.26	0.62	11.53	4.58	0.45
Size of the Household	5.03	0.74	5.12	0.66	5.06	0.80	0.67	4.87	0.73	0.07
Average hours worked per week	32.70	12.75	31.60	12.07	34.70	12.90	0.19	30.98	13.15	0.92
Months with lenders	8.41	2.69	10.52	2.35	8.36	1.16	0.00	6.13	2.80	0.00
House quality	0.60	0.48	0.64	0.48	0.57	0.49	0.48	0.62	0.49	0.85
General Caste	0.24	0.43	0.20	0.40	0.16	0.37	0.64	0.42	0.49	0.01
Schedule Castes and Tribes	0.44	0.49	0.52	0.50	0.45	0.50	0.48	0.35	0.48	0.10
Other Backward Castes	0.30	0.46	0.28	0.45	0.37	0.48	0.26	0.22	0.42	0.52
Observation	161		50		66			45		

p-values for differences of means against weekly. 1$ = Rs 70 (September 2018)

The choice of repayment structure was exogenous for both the lenders and the borrowers. All three MFIs offer the same repayment structure and loan products regardless of the region they operate in, implying that the repayment scheme has no relationship with the location or the borrowers' characteristics. The borrowers are indifferent to the repayment structure which is verified using a probit model (see Table 4 in the *appendix*) on the probability of participation in any of the repayment structures. We find borrowers' characteristics have no influence on the participation in a specific repayment structure (except education and belonging to upper caste has a positive and significant relationship with the participation in flexible lending). Hence, it can be argued that neither the borrowers nor the MFIs chose this scheme considering the borrowers' characteristics in the area.

Our qualitative enquiries suggest that the clients felt indifferent to the credit repayment structure, and simply getting a loan was the most important factor in joining the MFI or other lenders. Most of the clients of MFIs were introduced by their friends or joined because their friends were already members.

One respondent confirmed this:

"One of my neighbours was a member of SKS Microfinance. She suggested that the rest of us should form a group and sign up for a loan. Within two weeks, we were given a loan of Rs 15000 with no assets to give as collateral."

Prospective clients first express their interest in getting a loan, then a loan officer goes to the client's house and evaluates if the client fulfils all the criteria for the loan. If the client agrees to all the loan conditions and has a guarantor, a contract is signed between MFI and the client.

4. Methodology

The study uses a mixed-method approach, which includes a questionnaire survey for quantitative data and semi-structured interviews with randomly selected borrowers. The mixed-method is considered to be very efficient in answering research questions compared to the quantitative and qualitative approached when used in isolation[49] (Creswell, 2002). The

[49] See Chapter 3 for more details on the mixed-method approach.

quantitative data was complemented with qualitative questions that asked respondents to explain the reasons for changes in the outcomes of their businesses over the time-period considered.

We divided the analysis into various categories of business and household outcomes. Our primary focus is on the level of investment, income and loan amount. The survey allows us to measure the impact of various repayment structures on other business outcomes such as hours worked per week; household outcomes such as the amount of non-land assets, savings in the last month, and consumption on food in the last month. Due to the relatively small sample size, it was not feasible to compare rates of default – in fact, during the course of the study, the default rate was zero in both control and treatment groups.

For the quantitative analysis, this study uses difference-in-differences (DID), which allows us to compare the change before and after this intervention against the same change in another untreated group. Any difference in post-treatment characteristics can then be causally attributed to the treatment. To isolate the causal impact of the various repayment structures, a series of DID models were estimated in the following form:

$$Y_{it} = \alpha + \beta_1 M_i + \beta_2 F_i + \delta POST_t + y_1(M_i * POST_t) + y_2(F_i * POST_t) + \theta X_{it} + \varepsilon_{it} \ldots. (1)$$

Where Y_{it} denotes an outcome variable for client i at the time t, M is a dummy for Monthly repayment schedule and F is the dummy for flexible repayment schedule, *POST* is an indicator for the post-intervention period, X is a vector for individual and household characteristics and ε denotes an error term. The average treatment effect is given by y_1 and y_2 in the above equation.

Prediction

By reducing the liquidity needs in the early phase of a client's loan cycle, flexible repayment should increase the client's investment in business and their ability to take on illiquid investments with higher return and risk. The impact of risky investment can have a varied effect on the business and household outcomes as they depend on the variability of returns. Illiquid investments carry higher risk; for instance, in case of emergency, clients may have to sell their investment at a loss. In this case, clients may have to cut down their consumption, use their savings and sell their assets to pay for the loan.

In contrast, rigid weekly repayment may require the client to keep some money from the loan amount to pay for the instalment due to start immediately after the loan disbursement. In this case, clients are more likely to (under)invest in a less risky and liquid asset with low returns and hence limit the likelihood of default and potential income growth.

5. Results

The results show that the client's investment behaviour is sensitive to the design of the debt contracts. The study found a significant increase in business investment for the treatment clients (see Columns 1 and 2 of Table 5 in the *appendix*). The average client with monthly and flexible repayments invests roughly 33 percent and 35 percent more respectively on business items compared to weekly clients. These results are consistent with the predictions that a flexible and infrequent repayment schedule increases the business investments. Qualitative enquiry suggested that clients with weekly repayment schedules kept a portion of their loan to allow repayment of their first few instalments, reducing the funds available to the business.

One of the clients who has a sweet shop in the survey confirmed underinvesting in their business. She said:
"I got a second loan for stocking up sweets to sell during Diwali. A part of that loan went for advance payment to the supplier to confirm my bulk order. The rest of it was set aside to pay for the weekly instalments since it will take weeks to sell enough sweets to make a profit - weeks in which I still have to make regular repayments on the loan. This adds to the cost of borrowing"

However, the increase in investment has not translated into an increase in income. We do not find significant differences between the income of the groups belonging to various repayment schedules (see Columns 3 and 4 of Table 5 in the *appendix*). This suggests that monthly and flexible repayment clients invest their loans in riskier though presumably higher expected return business ventures and some of these investments did not pay off. It may also be that some of the investment takes a longer time to realise, and hence, it does not show in the survey yet. For instance, some crops (vegetables like potatoes) with low return takes only a few weeks to harvest whereas the return from cash crops (like sugarcane) takes around 12 -16 months and usually have a very high return.

The average client with monthly and flexible repayments had roughly 16 percent and 20 percent more savings in the last month respectively compared to the weekly repaying clients (see Column 5 and 6 of Table 5 in the *appendix*). The study did not find any significant difference between the level of food consumption for various repayment schedules. This is a similar result to Czura (2015), however, opposite to the research by Shoji (2010)[50].

The study also finds that a monthly repayment schedule increases the amount of loan taken by 27.5 percent; however, no effect was found with flexible repayment (see Column 7 and 8 of Table 5 in the *appendix*). The use of monthly schedule repayments also reduces the probability of taking an additional loan. We find that monthly repayment clients are 38.5 percent less likely to take an additional loan (see Table 6 in the *appendix*). The qualitative enquiries suggest that these additional loans are usually taken from small moneylenders who charge a very high interest rate and sometimes to pay for repayments of the initial MFI loan. These findings are comparable to Jain and Mansuri (2003), who show that the use of regularly scheduled repayments in microfinance loans may be a reason why informal lenders still thrive in regions where microcredit has been firmly established.

The interviews suggest that some women who are struggling to pay their instalments turn to the informal sector for help. This phenomenon was echoed by one respondent who pays their instalment weekly:

"Our business (agriculture) is seasonal, and we are poor with no savings. It is hard to pay every week when there is no source of income during the low season. We have to borrow from neighbours, friends or informal lenders (quick loans at a very high interest rate) in order to pay the weekly instalments. Borrowing from some people could be very humiliating and stressful since they will keep reminding you about the money. It also adds to the amount you already owe."

Microfinance is seen as a tool to protect the poor from village moneylenders (*loan sharks*) who usually charge a very high-interest rate. However, rigid and inflexible microcredit

[50] Shoji (2010) worked with very poor people in Bangladesh during the natural disaster, a very different setting compared to ours.

contracts may have helped them survive by taking advantage of the information symmetry between microfinance institutions and clients (Jain and Mansuri, 2003).

One woman did not increase her loan size after given a choice and linked weekly instalments with stress:

"Finding money for the repayment every week causes me real worry and stress. Until I have money for the instalment, I feel anxious and agitated all the time. Taking a bigger loan and paying even higher instalments will make it worse."

The study did not find any significant differences between average hours worked per week between the control and treatment groups. This shows that the increase in investment is not complemented by an increase in the hours worked. One explanation could be that by an increase in investment in raw materials, labour, land etc, some clients may be able to increase the output as well as hours worked. However, this increase could be offset when some clients invests in better resources (like machinery) to increase productivity and hence, reduce the hours spent on work. Selling of assets to repay loans or in case of loss were rare in the sample. We do not find significant differences in the asset worth of the clients belonging to various repayment schedules.

The qualitative enquiry suggested that women with weekly repayment schedules have a lower satisfaction with the loan product compared to monthly and flexible repayment borrowers. Lack of time to attend weekly meetings was also given as the reason for somewhat less satisfaction. Women with weekly repayment schedules reported higher incidences of being stressed on the day before an instalment was due. On the other hand, monthly group members reported making business purchases in bulk more frequently compared to the women in the weekly group. Incidents of delaying expenditure on healthcare reported were also higher in the weekly group.

Weekly repaying women also emphasised the importance of the social interactions in the regular weekly meetings: particularly valuable experience given the traditional norms of female isolation in the region. Social interaction for the women with a monthly repayment was rare outside their group. Research by Feigenberg, Field, and Pande (2013) shows that more frequent meetings can increase social capital. Past literature has discussed the benefits of social capital in a wide variety of fields including its potential to enhance livelihood stability,

employment generation, poverty reduction and improvement in quality of essential services (Krishna, 2003), economic development (Feigenberg, Field, Pande, Rigol, and Sarkar, 2014); community development (Blair and Carroll, 2008); women's collective empowerment (Sanyal, 2009); and health outcomes (Pronyk et al., 2008). Understanding the benefit of social capital generated through weekly meetings is beyond the scope of this research. However, the qualitative inquiries suggest that more women from the weekly group reported asking for help to pay instalments from friends and relatives. This might be due to an increase in social capital and economic co-operation among women. Although, regularly asking for help from husbands for repaying instalments also led to conflict in the homes for some individuals in the weekly group.

6. Discussion and conclusion

Classic microfinance loan contracts characterised by rigid weekly repayment schedules offer little flexibility – and little benefit - to borrowers who are poor and have seasonal income. Such contracts can also negatively affect the economic well-being of poor borrowers leading to underinvestment of capital (Field et al., 2010), selling of productive assets (Khandker, 2012), over-indebtedness through cross-financing from informal sources at a higher interest rate (Jain and Mansuri, 2003), reduction in consumption (Shoji 2010), income (Czura, 2015), and in some cases, increase in financial stress (Field, Pande, Papp, and Park, 2012). Flexibility in the microloan repayment schedule can overcome some of these problems. Based on the results, this study makes a case in favour of flexible and infrequent loan repayment contracts.

The findings suggest that a flexible and infrequent repayment structure can break the series of low investment in microenterprises by the borrowers. Although these results are promising, the study finds that an increase in the level of investment has not translated into an increase in income for the borrower. We also find that the monthly and flexible repaying clients had a higher loan amount driven by an increase in investment. Our research shows that weekly paying clients are more likely to take an additional loan – this could imply that they are struggling to pay their weekly instalments.

The qualitative research done in this study supports a shift away from classic microfinance weekly repayment to monthly and flexible repayment structure. The qualitative enquiry suggested that weekly repaying clients invested less of their loan amount, had less satisfaction

with loan products, reported more frequent incidences of being stressed before an instalment was due, higher incidences of asking for help in paying instalments from friends and relative and delayed expenditure on healthcare.

Considering this, microfinance institutions have an opportunity - arguably a responsibility - to build financial products aligned with the needs of their consumers without moving away from the core objective of reducing poverty in a profitable and sustainable manner. Such a model may require MFIs to work more closely with their consumer to understand their requirements and build customised products depending on the consumers' cash flows. It is certain that to overcome the barrier which the current microfinance model presents, there is a need to shun the "one size fits all" approach to rigid microfinance contracts. Flexibility may deteriorate payment incentives; however, MFIs can use sanctions (such as barring from future loans) and rewards (such as an increased loan size and reducing interest rates) and collect more detailed information on its clients (Labie et al., 2013). MFIs could take advantage of informal financial channels to collect information on prospective borrowers (Hamp and Laureti, 2011) or hire local payment collectors from the same area to the clients to facilitate screening, and to monitor and mitigate moral hazard problems[51] (Labie et al., 2013). The optimal combination of flexibility and discipline would require lenders to innovate on their product design, lending technologies, and risk management strategies and to dramatically improve their information base (Sett, 2015). Flexibility may result in higher costs for MFIs through enforcing loan contracts, deploying more staff in the field to monitor clients, acquiring information on clients to evaluate their preferences and repayment capacity. However, at the same time, MFIs can also lower costs by reducing the frequency of repayments and may be able to lower interest rates, scale up operations, and reach additional clients in remote or previously under-served locations.

Although the present study confirms the general benefits of flexibility in setting repayment terms, that approach is not easy for most microfinance organisations to implement. Not least because an MFI needs to maintain repayment discipline among its clients, and an MFI must invariably achieve this without the benefit of in-depth information about each client's individual circumstances – the kind of local knowledge which is frequently available to

51 For instance, Ghana Barclays bank works with *susu* (deposit) collectors who understand the local economy and *Safesave* in India hires local collectors.

informal lenders, who can consequently be flexible in their terms of credit. Nevertheless, the benefits are real, and the challenge rests with the microfinance organisations to seek ways of transferring these flexibility benefits to the formal sector, by more efficient and effective design of loan contracts. The key objective should be to match the terms of repayment with the cash-flow needs of the client.

Until now, MFIs have largely ignored the demand for flexible financial products, however, increasing competition in the microfinance industry may encourage MFIs to rethink their product design. For MFIs to continue growing, it is essential to pay attention to their clients' needs, preferences, behaviours and well-being. We hope this study will help MFIs to rethink and re-focus their lending approach and help them make the shift towards flexible products.

Although this paper draws a clear conclusion - that a traditional rigid weekly repayment structure is not the best option - the scope of this research to date does not allow us to state with confidence what the best option actually is. We conclude that flexibility is best, but 'flexibility' is a broad term, which includes the introduction of grace periods (Field et al., 2010), clients' involvement in choosing their preferred repayment structure (Barboni and Agarwal 2018), as well as simply requiring less frequent repayments (monthly rather than weekly) and offering a greater range of loan products to cater for a wider range of client needs. Or, of course, any mixture of these. Both further qualitative and quantitative research is needed to understand in detail the cash-flow and other challenges faced by poor clients in repaying debt obligations, and so to seek the elusive balance between maximising economic benefit for the client while minimising economic risk to the lender. Future studies should also focus on more enhanced versions of flexibility, comparing financial products differing in their degree of flexibility, and understanding the conditions under which flexibility works well.

Finally, this study recommends qualitative research, along with quantitative analysis, to understand the struggles and challenges (economical and psychological) clients face while repaying debt obligation through rigid instalments, and how flexibility in the loan contracts can improve their business outcomes. In this regard, the qualitative research set this study apart from the past literature on the repayment schedule and has been instrumental to our understanding of the obstacles to progress created by rigid weekly microfinance contracts.

7. Appendix A: Tables

Table 4: Probit model for participation in the following repayment structures

VARIABLES	WEEKLY	MONTHLY	FLEXIBLE
	1	2	3
Age	-0.773	0.893	-0.614
	(27.502)	(48.962)	(30.265)
Education years	-0.024	-0.041	0.097***
	(0.031)	(0.032)	(0.038)
Size of the household	0.048	0.059	-0.198
	(0.118)	(0.123)	(0.146)
House quality	-0.088	-0.166	0.337
	(0.190)	(0.200)	(0.228)
General Caste	-0.098	-0.476*	0.663**
	(0.246)	(0.265)	(0.283)
SC/ST	0.039	-0.107	0.134
	(0.210)	(0.218)	(0.257)
Years in the village	0.786	-0.913	0.622
	(27.502)	(48.962)	(30.265)
Age at marriage	0.733	-0.855	0.620
	(27.502)	(48.962)	(30.265)
Constant	0.509	-0.830	-1.069
	(1.257)	(1.311)	(1.455)
Observations	211	211	211

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is 1 if the client is paying weekly (Column 1), monthly (Column 2) and flexible (Column 3).

Table 5: Impact of repayment schedule

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Investment		Income		Consumption		Loan Amount		Savings		Asset Worth		Hours worked	
Monthly	0.334**	0.331**	0.000	0.002	0.025	0.024	0.285**	0.275**	0.163**	0.161**	0.111	0.109	1.833	1.811
	(0.135)	(0.133)	(0.07)	(0.070)	(0.060)	(0.057)	(0.109)	(0.105)	(0.071)	(0.064)	(0.110)	(0.102)	(3.032)	(2.902)
Flexible	0.322*	0.357**	-0.030	0.009	0.021	0.028	-0.106	-0.101	0.168**	0.198**	-0.012	0.013	0.400	0.536
	(0.171)	(0.169)	(0.09)	(0.079)	(0.061)	(0.056)	(0.238)	(0.218)	(0.081)	(0.063)	(0.116)	(0.108)	(3.476)	(3.390)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	322	322	322	322	322	322	322	322	322	322	322	322	322	322
R-squared	0.12	0.18	0.07	0.25	0.10	0.26	0.15	0.27	0.22	0.36	0.09	0.21	0.04	0.13

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

The outcome variables are log of investment (col 1 and 2), log of income (col 3 and 4), log of loan amount (col 7 and 8), log of savings (col 9 and 10), log of asset worth (col 11 and 12), average hours worked last week (col 13 and 14). Covariates used here are age, education years completed, house quality, caste, and size of the household.

Table 6: Impact of repayment schedule on taking an additional loan

	(1) Probability of taking an additional loan
Monthly	-0.385**
	(0.190)
Flexible	-0.253
	(0.241)
Covariates	Yes
Observations	322

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10

The dependent variable is 1 if the client took an additional loan and 0 otherwise

Covariates here are age, education years completed, house quality, caste, and size of the household.

Concluding Remarks

This dissertation examines several topics related to development economics, more specifically focusing on credit for poor people. Over four essays, we explore some of the key areas where credit is falling short of its promises. These are caste discrimination, women's empowerment, borrowers with limited business knowledge, and inflexible repayment structure of microloans. The study uses primary data collected from a village in the Indian state of Haryana from the clients of three microfinance institutions, cooperative credit societies and professional money lenders between 2015 and 2017 over three field visits; and from the India Human Development Survey data of 2005 and 2011-12.

The first chapter of the thesis examines the extent of caste discrimination in the Indian credit sector and how it has changed over recent time. We find that caste is still a worryingly potent determinant of lending outcomes. Of course, there are significant differences between general and other lower castes regarding their human and physical assets, household circumstances and business characteristics that partly explain the gap in credit extended to them. However, a significant portion of the credit differential between the castes cannot be explained by these objective factors, suggesting that the evasive hand of discrimination has a role to play Recognising that caste-based prejudices have deep roots in Indian society, the nation's government has launched various programmes over time to improve the provision of financial services to the lower castes. One key finding can be drawn from the results of our research: these schemes have not been very effective.

The second chapter of the thesis examines the impact of women's empowerment on their creditworthiness measured in terms of the cumulative amount of loan taken by women over time. We created an index for empowerment using four dimensions: economic, social, interpersonal and political. Since empowerment is an endogenous variable, we use instrumental variables regression to examine this relationship using the dummy of the first-born son as our instrument. The study concluded that empowerment has a positive impact on the total loan amount. This finding is consistent with results obtained for North India from a separate dataset that is nationally representative. However, these findings were not reflected nation-wide, showing evidence of regional variation in lending patterns and motivations.

It is a general view that capital alone cannot overcome the barriers faced by poor clients to make efficient use of their loan. Two of the most important barriers are a lack of business knowledge, and seasonal or cyclical business income. In the third and fourth chapters, we explored how the microfinance industry responds to those barriers.

The third chapter of the thesis studies the impact of business training offered to micro-entrepreneurs. One positive, though unsurprising finding, was that better training led to better business - the borrowers who were trained increased the income from their businesses. Other findings, though, were surprising. It might be logical to assume that those with business training would invest more in their businesses and seek to grow. Instead, we found that business training to micro-entrepreneurs led to a decrease in the level of investment in their business. Our interviews suggest that poor businesswomen tended to realise through training that their original investment plans were unnecessarily large in relation to their business goals; and they understood more clearly the risks of growing their business too quickly. However, the reduction in the level of investment did not affect the loan size suggesting the belief among treated women that any unused funds would mitigate risk and act as a safety blanket. Business training in this regard seems to allow borrowers to be more risk tolerant regarding loan default, but more risk-averse regarding their businesses.

The fourth chapter, like the third, focuses on the possible solution rather than the problem. For many small businesses, especially in agricultural areas, the problem of seasonal income is well-established in relation to credit. The challenge is to discover how to make regular loan repayments based on irregular, and unpredictable, income. In rural India, informal and back-street lenders offer loans of last resort to allow borrowers to deal with this issue - begging the question 'if the borrowers are going to turn to informal lenders anyway, what is the point of MFIs?'. This, therefore, is an important problem. The solution that we focus on is repayment flexibility. The idea of frequent repayments has long been fundamental in microfinance, underpinned by aspirations of developing traits of fiscal prudence and credit discipline in poor borrowers. We tested whether clients' business and household outcomes were sensitive to various repayment schedules using a mixed method approach. We analysed alternatives to the rigid contract model, focussing on the degree of flexibility and the length of gap between repayments in the loan schedule. Our findings strongly challenge the traditional microfinance reliance on regular weekly meetings as a standard repayment regime. Borrowers with monthly

and flexible repayments had a higher level of investment and savings compared to those with fixed weekly schedules. Monthly repaying clients also borrowed a higher loan amount compared to weekly repaying clients.

The findings of this thesis should be of interest to both policymakers and academic researchers. In the first chapter, contrary to widespread assumptions about the diminishing significance of caste in modern India, the scale and consistency of discrimination observed over time offers a sobering counterpoint. The large endowments difference between social groups indicates that there is a need to promote educational and training opportunities for the lower castes. The government should also take more steps to ensure that the disadvantaged sections of society get fuller and more consistent participation in schooling, employment, and health programmes to reduce pre-market discrimination. Policy-makers need to adopt a broader range of strategies to tackle the deep-seated and multi-faceted challenge of systemic discrimination. Initiatives need to include the improvement of financial literacy across lower castes, encouragement of positive discrimination, active monitoring of caste bias, and more focused research into the causes and nature of persistent caste discrimination. In the second chapter, our results show that highly-empowered women gain better outcomes from microfinance being able to borrow more. This suggests that there is a need to decouple empowerment from microcredit either by policies focusing on empowering women or by increasing access to microcredit for lowly-empowered women.

In the third and fourth chapters, we endorse both the 'solutions' under consideration: business training and flexible repayment schedules. MFIs are moving in the right direction, but they need to finetune their trajectory by focusing on factors which threaten to steer them off-course. In the third chapter, we recommend designing a training approach more suited to the ability of poor participants to absorb the training content. In the fourth chapter, we make a strong case in favour of flexible and infrequent loan repayment contracts becoming the norm in microcredit, rather than the exception.

The thesis opens numerous avenues for further research. To tackle caste discrimination, a deeper understanding of the sources and causes of discrimination is needed in order to formulate policies to reduce its incidence and effects; however, to do this, it is first necessary to identify the nature and scale of discrimination more clearly. Hence, continued research is needed to measure discrimination over time. In the second chapter, we acknowledge that some

of the variables used for measuring empowerment in past literature might not be very helpful in the present since the behaviour and social norms that assess empowerment are constantly evolving. Hence, there is a need for more research in understanding new dimensions of empowerment. Only with a deeper understanding of the process of empowerment, we can reduce gender inequality and formulate policies to reduce its incidence and effect.

In the third chapter, further research needs to focus on the following aspects to get a precise assessment of the value of training - some measure of knowledge transfer at the completion of training; some measure of spill-over from treatment to control groups (an assessment of changes in knowledge in the control group); additional interviews across the treatment and control group over time to identify the rationale and causation behind the changes in outcomes. It is also crucial that trainers assess and analyse the existing financial beliefs and misconceptions of poorer trainees. Future studies should also explore different types of training mechanism and delivery methods according to the education and knowledge level of the participants. On the work regarding repayment flexibility, further research should focus on more enhanced versions of flexibility, comparing financial products differing in their degree of flexibility, and understanding the conditions under which that flexibility works well.

Finally, this research benefited hugely from the qualitative fieldwork done in North India which was instrumental in understanding the complex topics researched in this thesis. Quantitative studies often overlook key personal information: for example, local information about sensitive issues such as caste discrimination, cultural beliefs and traditional practices. Quantitative surveys also lack information on contextual factors to explain variations in behaviour between households with similar economic and demographic characteristics. Given some of the weaknesses of the quantitative approach, there is a need in the field of development studies to incorporate qualitative study along with quantitative analysis. To understand how and why some interventions work, and what can be done to improve matters, the addition of qualitative analysis to quantitative approach is certainly helpful and could even be necessary. Hence, we make a case for a mixed method approach which can generate a deeper analytical and interpretative framework than could be obtained by using either method alone.

Appendices

Appendix 1: Indian microfinance inclusion index

India, the home to the largest number of poor in the world, has long cherished the dream of universal financial inclusion, but traditionally this dream has been pursued through expansion of large nationalised banks, which unfortunately exclude the poor due to lack of collaterals. Where banks and other formal financial institutions have failed to cater to the needs of poor, microfinance providers have made remarkable progress in reaching out to the poorest. According to the Microcredit Summit Campaign, the number of poor households with a microloan has grown from 58.06 million in 2006-2007 to 90 million in 2013-14.

But the picture of healthy growth in microfinance hides a picture of uneven spread or regional inequality in the coverage of microfinance. While India's largest and poorest state Uttar Pradesh is relatively unserved by microfinance, the Southern state of Andhra Pradesh has more microfinance clients in the world except for Bangladesh. As a whole, the Southern region outperforms the rest of India. One may wonder why the Northern states, which had given birth to the Green Revolution and should have had a vibrant market of agricultural and microcredit, have the lowest growth of microfinance services in India. If microfinance agencies are able to direct loans for agriculture in the southern states, why don't they do that in other regions? The uneven spread of microfinance is an important issue because it has a direct bearing on poverty and income inequality.

Considering this, we created an Index of Microfinance Inclusion (IMFI) to assess the degree of financial inclusion and distribution of microfinance services for poor across Indian states. Although there are several financial inclusion indices are available, but this index focuses on the financial inclusion for the poor people and all the variables have adjusted with respect to the poor population (and not the entire population). A country financial inclusion index does not show the full picture of how the people below the poverty line are included in the finance sector given that access to finance is important for economic growth and poverty alleviation.

To measure this index, we have used a multidimensional approach taking three dimensions and have given equal weight to all of them:

Penetration of microfinance: This is one of the most important indicators of financial inclusion. The number of poor people using (have account or involved) the microfinance services is a measure of the penetration of microfinance in the state. Thus, if every adult under the poverty line has access to microfinance, then the value of this measure would be equal to 1. The indicator we used for this dimension is the number of microfinance accounts as a proportion of the total poor population.

Availability of the microfinance: Availability of microfinance can be indicated by the number of outlets from where finance is provided to the poor population with respect to poverty and area of the state.

Usage of the microfinance: Merely having an account with an MFI/bank or involvement with an SHG does not ensure the financial inclusion. These facilities should be adequately utilised well to reap the benefits they come with. The volume of loan outstanding and savings as a proportion of the poor population is used as an indicator for this dimension

Table 1: Dimensions and indicators of the index

Dimensions	**Indicators**
Penetration of microfinance	No of MFI clients/ Poor Households
	No of SHGs/Poor Households
Availability of the microfinance	No of MFI branches/ Poor Households
	No of SHG federations (NGOs/Govt)/Poor Households
	Bank Branches/Poor Households
	No of MFI branches/ 1000km^2
	SHG federations (NGOs/Govt)/ 1000km^2
	Bank Branches/1000km^2
Usage of the microfinance	Volume of loans outstanding of MFI with banks/Poor Households
	Volume of loans outstanding of SHG with banks/Poor Households
	Volume of savings of SHG/Poor Households

Methodology

We are using the same multidimensional approach used by the United Nations Development Programme (UNDP) to compute the Human Development Index (HDI), and Gender-related Development Index (GDI).

The index is calculated by first calculating a dimension index for each dimension (penetration p_i, availability a_i and usage u_i). The dimension of index for the i^{th} dimension, dp_i, da_i, *and* du_i, is computed by:

$$dp_i, da_i, or\ du_i \ = \ wi\ \frac{(A_i - m_i)}{(M_i - m_i)}$$

where,

w_i = Weight attached to the dimension i.

A_i = Actual value of dimension i.

m_i = minimum value of the dimension i.

M_i = maximum value of the dimension i.

The formula above ensures that higher the value of d_i, higher the state's achievement and it will be $0 \leq dp_i, da_i, du_i \leq 1$ where 1 is the highest achievement and 0 is the lowest achievement in the dimension.

The index of microfinance inclusion (IMFI) for the i_{th} state is measured by the normalised inverse Euclidean distance of the point (p_i, a_i, u_i) from the highest point (1, 1, 1). For which the formula is:

$$\text{IMFI}_s = 1 \ - \ \frac{\sqrt{\left(1-dp_i\right)^2 \ + \ \left(1-da_i\right)^2 \ + \ \left(1-du_i\right)^2}}{\sqrt{3}}$$

where $\sqrt{\left(1-dp_i\right)^2 \ + \ \left(1-da_i\right)^2 \ + \ \left(1-du_i\right)^2}$ is the Euclidean distance from the highest point. Dividing the same with $\sqrt{3}$ normalizes it in the three-dimensional space. Thus, for any state, the lower the distance from ideal, the higher is IMFI.

Results

Using data[52] on all three dimensions for 32 states including 3 union territories (UT), we have computed the value of IMFI. We have categorised into three categories:

(i) $0.4 < IMFI \leq 1$ – high financial inclusion
(ii) $0.25 \leq IMFI < 0.4$ – medium financial inclusion
(iii) $0 \leq IMFI < 0.25$ – low financial inclusion

Regions	**d_1 (Penetration)**	**d_2 (Availability)**	**d_3 (Usage)**	**MF INDEX**
High Financial Inclusion				
Andhra Pradesh	1.00	0.74	1.00	0.85
AandN Islands (UT)	0.76	0.80	0.82	0.79
Kerala	0.40	1.00	0.36	0.49
Medium Financial Inclusion				
Tamil Nadu	0.69	0.22	0.37	0.39
Puducherry	0.59	0.08	0.40	0.32
Tripura	0.78	0.03	0.27	0.29
Karnataka	0.57	0.09	0.28	0.29
Goa	0.21	0.37	0.20	0.26
Low Financial Inclusion				
Mizoram	0.36	0.02	0.33	0.22
West Bengal	0.34	0.19	0.13	0.22
Sikkim	0.27	0.12	0.13	0.17

[52] The data used in this index comes from Bharat Microfinance Report 2014 which can be retrieved from here: https://www.microfinancegateway.org/library/bharat-microfinance-report-2014

New Delhi	0.16	0.08	0.19	0.14
Uttarakhand	0.25	0.08	0.10	0.14
Maharashtra	0.20	0.08	0.08	0.12
Odisha	0.19	0.10	0.08	0.12
Rajasthan	0.09	0.17	0.04	0.10
Punjab	0.12	0.10	0.04	0.09
Assam	0.17	0.02	0.07	0.09
Meghalaya	0.12	0.05	0.06	0.08
Himachal Pradesh	0.04	0.11	0.06	0.07
Haryana	0.10	0.05	0.06	0.07
Gujarat	0.10	0.03	0.04	0.05
Manipur	0.08	0.01	0.06	0.05
Madhya Pradesh	0.09	0.02	0.03	0.05
Chandigarh	0.03	0.08	0.01	0.04
Bihar	0.07	0.02	0.03	0.04
Jharkhand	0.06	0.01	0.02	0.03
Uttar Pradesh	0.05	0.01	0.03	0.03
Chhattisgarh	0.06	0.00	0.02	0.03
Arunachal Pradesh	0.03	0.00	0.04	0.02
Nagaland	0.01	0.01	0.01	0.01
Jammu and Kashmir	0.00	0.01	0.00	0.00

We computed the index for microfinance inclusion for 32 states using the multidimensional approach. Andhra Pradesh leads the index with the highest value of 0.85, Andaman and Nicobar and Kerala follow with 0.79 and 0.49. These are the only three states which fall under high financial inclusion. Andhra Pradesh has the highest value for the penetration and usage dimension whereas Kerala leads in availability.

Tamil Nadu, Puducherry, Tripura, Karnataka, and Goa fall under medium financial inclusion. All other Indian states fall under low financial inclusion which indicates most of the Indian poor do not have access to the formal finance. All the southern states fall under either high or medium whereas all other northern, eastern and central states fall under low financial inclusion. It is also interesting to note that states like Maharashtra and Odisha which are known to have a good microfinance infrastructure have a very low value of 0.12 because of the high poverty level. This means the microfinance services here are still not reaching most of its poor.

The index of microfinance inclusion yielding a single numerical value is an excellent communication tool to assess the financial inclusion for the poor population. The policymaker can also use the index in allocating resources in requirement with each dimension. For example, in Tripura, Tamil Nadu and Mizoram, the penetration of microfinance services is quite high, but the availability and usage are really low. By allocating more resources to availability and usage dimension, policy makers can raise the microfinance profile in these states. Subject to availability of the data, the index can be used to compare the extent of financial inclusion for poor across different countries (or states) and to monitor the progress of the lower section of the society.

Appendix 2: Household Survey Questionnaire Example

Interviewer ID	01
Year	2015
Interviewer Name	Abhilasha
Village	Thol
Address	Outer Road Basti
Age	34
Gender	Female
Caste	SC/ST
Religion	Hindu
Age at marriage	20
Years in Village	14
Education years	5
Can you read and write?	Yes
Primary source of income for the respondent	Bee keeping
Size of the household	6
No of working members in the family	3
Husband's age	35
Son age and year of education	12 years, 7 years 6 years, 2 years
Daughter age and years of education	4 years, 1 years
School for children	Private school
Husband occupation	Labour

House quality	Good
Do you rent or own the house?	Own
Modern Toilet and drainage	Yes
Cooking fuel	LPG
Does the household have a ration card?	Yes
Do you have Aadhar card?	Yes
Loan Size	50,000
Repayment	Weekly
Loan Cycle	3
Source	SKS Microfinance
Other loans	-
Months with the primary lender	13
Purpose of the loan	Bee keeping
Did you miss any instalment or had to borrow from other members?	1
Did you miss any meetings?	0
Income of the respondent	50,000
Total income of the Household	150,000
Savings of the borrowers in the last month	1000
Consumption on food expenditure per month (average monthly spending on rice, flour, milk and dairy products, pulses, vegetables, oil and spices)	3,500
Level of investment in the year	45,000

Health expenditure in the last month including medicines	1,200
Expenditure on entertainment (spending on cable TV, mobile, fairs, festivals, and picnics)	1,100
Assets worth	120,000
Have a bank account?	No
Expenditure on children education	1
Keep records of transaction	Yes
How many sickness days in the family in the last month?	8
How many employment days missed by client due to sickness?	6
Do children help in the business?	Yes
Did she receive any training?	No
Hours of training	0
Average Hours worked	28
Empowerment Status questions -	
Do you own assets above Rs 10000?	No
Are you currently working and earning?	Yes
Level of control over loan	Medium
Do you have control over your savings?	Yes
Do you have control over your income?	Yes
Do you have the majority control over small purchases above Rs 5000 such as food, children products, cooking utensils and own clothes?	Yes
Do you have the majority control over big purchases above Rs 10000 such as furniture/Jewellery?	No

Do you have the majority say in sale and purchase of livestock/ /housing equipment's?	No
Do you have the majority control in taking decisions regarding child/daughter schooling, clothing, food, etc.	Yes
Are you free to move around the village to visit the temple, friends, etc. without husband's objection?	Yes
Are you free to move outside village to doctors, relative or market, without husband's objection to going alone?	No
Do you know the name of their Sarpanch?	Yes
Do you know the name of their MLA/MP?	Yes
Did you vote in the election/will vote in the election?	Yes
Are you independent of husband interference in the voting?	No
Is it wrong for husbands to use physical violence against their wives in any situation?	No
Are you independent to take fertility and parenting decisions?	No
Do you have access to radio, TV, and other sources of media?	Yes
Health self-evaluation	Good

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