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Whether Caste Impedes Access to Formal Agricultural Credit in India? Evidence from NSSO Unit Level Data

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WHETHER CASTE IMPEDES ACCESS TO FORMAL AGRICULTURAL CREDIT IN INDIA? EVIDENCE FROM NSSO UNIT LEVEL DATA

Karthick V[*] and S Madheswaran[**]

Abstract

Despite many initiatives and policies that have been taken by the government on access to credit for agricultural growth, the declining share of formal credit (mainly from cooperatives and commercial banks) from 1991 to 2012 has affected marginal and small landholders' access to credit. Besides, caste is the main predictor of economic outcomes in India that determines access to credit of marginalised communities. Hence, using large national-level unit data of NSSO (AIDIS) and bivariate probit econometric model, we have analysed whether access to cooperative and commercial banks credit is determined by caste. Our findings show that, in India, both commercial, as well as cooperative bank, discriminate against both SCs and STs in access to credit. Thus, this study endorses the critical appraisal of the existing policies of formal credit towards an increase in access to credit for better agricultural growth.

Keywords: resource inequality, wealth index, determinants of agricultural credit, access to credit, caste discrimination.

Introduction

Credit is considered as the most significant input to obtain all other inputs for agriculture productivity. After Independence, the Government of India (GoI) tried to increase formal credit lending to the farmers. To analyse the possibility of farmers' access to formal credit, the RBI constituted the first All India Rural Credit Survey Committee (AIRCSC) in 1954. Following this, many initiatives have been taken to improve formal credit lending in rural areas. The major initiatives are nationalisation of the large commercial banks in 1969 and 1980, the establishment of Regional Rural Banks (RRBs) in 1975, and the National Bank for Agriculture and Rural Development (NABARD) in 1982. Agricultural farmers receive formal credit from both commercial as well as cooperative banks through numerous credit schemes and programmes such as the Special Agricultural Credit Plan (1994–1995), Kisan Credit Cards (1998–1999), the Doubling Agricultural Credit Programme (2004), the Interest Subvention Scheme (2010–2011), and, more recently, the Pradhan Mantri Jan Dhan Yojana (2014). Commercial banks are large and centralised entities under the RBI's regulations and, thus, the policy guidelines urge commercial banks to enable better access to credit among marginalised sections of the society. As advised by the National Credit Council in 1967, commercial banks should compulsorily lend 40% of their total lending portfolio to the priority sectors. Besides, 18% of 40% of the adjusted net bank credit (ANBC) is allocated for agriculture. Among them, a target of 8% is prescribed for marginal and small farmers. Also, a separate 10% of ANBC is prescribed for marginal and small farmers under the weaker sections category which

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includes both Scheduled Castes (SCs) and Scheduled Tribes (STs). Contrarily, cooperative banks are decentralised and independent entities under the Cooperative Societies Act, 1912. With 93,913 branches in rural areas, as in the financial year 2016, cooperative banks lend to farmers either through short-term or long-term credit (RBI, 2017). Both the term credit schemes work at the village level through the Primary Agricultural Cooperative Societies (PACS) under the supervision of District Central Cooperative Banks (DCCB) which are overseen by the State Cooperative Banks (SCB). As a result, during the last decade (2008–09 to 2018–19), compound annual growth rate (CAGR) of agricultural credit flow in the country was at 15.1% and, further, CGAR of the term loans and crop loans stood at 18.9% and 13.4% respectively during the same period (NABARD, 2019).

However, a key question of financial inclusion is whether access to credit enabled the socially and economically disadvantaged groups in India. Many studies have reported that, as a social identity, caste in India is the main predictor of economic outcomes that determines access to resources and opportunities such as access to irrigation water (Anderson, 2011), capital and labour inputs (Banerjee and Munshi, 2004), educational and occupational choices (Munshi and Rosenzweig, 2006). Since the first AIRCSC (1954) committee to recent studies such as Kumar (2013a), Kumar *et al* (2015), Rao (2017 & 2018), Karthick and Madheswaran (2018), all have found that access to financial services depends on socio-economic status in India. To some extent, even if access to credit is abled, only the upper-caste agricultural households' amount of borrowing is higher than that of their lower caste counterparts (Sarap, 1990; Jodhka, 1995; Drèze *et al,* 1997; Rao, 2017 & 2018; Karthick and Madheswaran, 2018). Given this background, we attempt to analyse the determinants of access to formal credit among agriculture households in India at disaggregate level i.e. commercial banks as well as cooperative banks.

This study is organised as follows. Section 2 provides a brief review of the literature to contextualise the study. Section 3 describes the sources of data and methodology. Section 4 explains the descriptive statistics of agricultural households' asset positions, access households and their gap, and amount borrowing. Section 5 explains the econometric results. Lastly, section 6 concludes and gives the way for policy implications.

A Brief Review of the Literature

Formal credit can be used to maximise the yield at a given level of capital stock by building up capital stocks such as irrigation facilities and using machines. Some studies have estimated the benefits of formal credit in developing countries (Binswanger and Khandker, 1992; Carter, 1989; Carter and Weibe, 1990; Pitt and Khandker, 1996; Khandker and Farooqui, 2003; Bhalla and Singh, 2010; Awotide *et al,* 2015; Narayanan, 2015). These studies have found that access to formal credit among agricultural households contributes to an increase in agricultural productivity and household income. However, the links between formal credit and agricultural productivity or household income are not very well documented in India.

The literature on the effects of credit on farmers' income and economic development is scanty. The study of Binswanger and Khandker (1992) is the best-known study which deals with the impact of formal rural credit in the context of India. In their study, the authors found that formal credit increases

rural income and productivity. But the land size-based class tends to influence the access to credit from both formal and informal sources. Hence, the share of marginal and small farmers in agricultural credit disbursed has declined (Mehrotra, 2011). As a result, the flow of agriculture credit has not been inclusive and there has been a "non-inclusive" stance of commercial banks in disbursing credit towards marginal and small farmers. This happened despite the increasing capacity of marginal farmers to absorb credit compared to large farmers (Chand *et al,* 2011) showing that banking in villages is largely carried out through the large farmers. Hence, it is evident that it is not just the collateral that makes the difference in access to formal credit across the social groups, but the bank bureaucracy due to the influence of large farmers (Kumar, 2013a).

From the supply side, the declining share of formal credit is a sign of the disadvantage to the SCs and STs as a majority of them are marginal and small farmers. According to the All India Debt and Investment Survey (AIDIS - 1991, 2002, and 2012), the share of formal credit has been declining from 66% in 1991 to 61% in 2002, and further to 59% in 2012. This decline was primarily due to the fall in the share of commercial banks and RRBs, and that of cooperative banks (NABARD, 2019). The declining credit share of both marginal and small farmers to total agricultural credit has also impacted both SCs and STs (Mehrotra, 2011). Many studies also have reported that crises in governance and active politics and the influence of large farmers or upper caste farmers in cooperatives created a disadvantage to the lower caste farmers (Shah, Rao, and Vijay Shankar, 2007; Kumar, 2013a).

Farmers' access to agricultural credit from formal sources depends also on their caste. Even today, the Indian caste system brands social identity that remains a permanent predictor of economic status. Many studies have already shown that caste is associated with occupation and employment (Thorat and Attewell, 2007; Madheswaran and Attewell, 2007; Ito, 2009; Prakash, 2015), income and expenditure (Deshpande, 2000), and capital (Kijima, 2006). Similarly, caste can influence access to credit in agriculture. Some studies have specified that upper caste agricultural households accessed more credit than the lower castes in India (Drèze *et al,* 1997; Sarap, 1990). Some studies also mentioned that the commercial banks do not discriminate against lower caste farmers in lending, but cooperative banks do as they are prone to interest group capture at the local level (Jodhka, 1995; Kumar, 2013a). However, Rao's (2018) study shows that both commercial and cooperative banks follow inequality practices against lower caste groups. There are a few studies such as Dréze *et al* (1997), Burgess and Pande (2005), Pal (2002), GoI (2007), Kumar (2013a) and Umanath *et al* (2018) arguing the same.

As a result, caste identity, the declining share of credit, and large farmers' influence affect mainly SCs and STs as most of them belong to marginal and small farmers (Dev, 2012). But only a few studies like Kumar (2013a), Kumar *et al* (2015), and Rao (2018) have analysed the determinants of agricultural credit and only Kumar (2013a) have analysed the determinants of access to formal credit at the sub-bank level. Still, the details are less clear, and more determinants need to be accounted for. Therefore, we have engaged with this study to analyse the determinants of formal agricultural credit in rural India.

Sources of Data and Econometric Methodology

Sources of Data

The data used for this study is AIDIS 70th round (2012), a unit-level data of the National Sample Survey Organisation (NSSO). This dataset provides rich information on debt and borrowing details, quantitative information on the stock of assets, the incidence of indebtedness, capital formation, liabilities of the household and amount of capital expenditure incurred by the household. As the bank loan application permits the borrowers to select their social category only if they belong to the Hindu religion and the Constitution of India allows only Hindus to have a social group under Articles – 29 to 30 and 350A to 350, the samples of 31,162 agricultural households for analysis are drawn from Hindus only. By using this dataset, the determinants of formal agricultural credit among agricultural households in rural India have been analysed. In our study, *agricultural household* means a household that possesses an area of irrigated crop, unirrigated crop, orchards and plantations crop, forest crop, and aquaculture purpose, and *agricultural credit* means credit borrowed for the purpose of current and capital expenditure for agricultural activities.

Econometric Methodology: *Bivariate Probit Model*

Agricultural households usually obtain more than 90% of agricultural credit from either commercial banks and/or cooperative banks. Due to this fact, we model the loan amount of agriculture by using a non-censored bivariate probit model (i.e. full observability model). The bivariate probit model is a system of two seemingly unrelated probit equations where the analysis of the correlation between two binary variables, such as commercial bank and cooperative bank, are captured by the conditional tetrachoric correlation of the error terms (Greene, 2018). We also use the univariate probit model to analyse the access to formal credit where the dependent variable is binary (access to formal credit = 1, otherwise = 0), and the independent variables are both qualitative and quantitative in nature. Generally, the univariate probit model assumes that the binary dependent variable Y_i is determined according to whether a latent dependent variable Y_i^* is positive or negative, where the latent variable is related to the independent variables X_i through a linear specification with an error term $\varepsilon_i \sim N[0,1]$. But, the bivariate probit model specifies that there are two latent dependent variables in two linear equations that each determine one of the dependent binary outcomes being modelled (whether a household has a commercial and/or cooperative loan). Allowing Y_{1i} (respectively, Y_{2i}) to represent the binary outcome corresponding to whether a household has a commercial (respectively, cooperative) bank loan, and X_{1i} and X_{2i} to be the corresponding vectors of explanatory variables. Hence, we have two equations as follows,

$$Y_{1i}^* = X_{1i}^{'}\beta_1 + \epsilon_{1i} \text{ and}$$

$$Y_{2i}^* = X_{2i}^{'}\beta_2 + \epsilon_{2i}$$

Where,

$$Y_{1i} = 1 \text{ iff } Y_{1i}^* > 0 \text{ and } Y_{2i} = 1 \text{ iff } Y_{2i}^* > 0$$

Unlike the univariate probit model, in the bivariate probit model, the error terms (ϵ_1, ϵ_2) are assumed to have a joint, bivariate standard normal distribution with $E(\epsilon_{1i}) = E(\epsilon_{2i}) = 0$, $V(\epsilon_{1i}) = V(\epsilon_{2i}) = 1$, and $Cov(\epsilon_{1i}, \epsilon_{2i}) = \rho$. The advantage of the bivariate probit model is that it takes into consideration the correlation between the error terms in the two equations. This allows us to determine the probabilities for all four possible combinations of the type $\{Y_{1i}, Y_{2i}\}$ such as $\{Y_{1i} = 1, Y_{2i} = 0\}$, $\{Y_{1i} = 1, Y_{2i} = 1\}$, $\{Y_{1i} = 0, Y_{2i} = 1\}$, and $\{Y_{1i} = 0, Y_{2i} = 0\}$. For instance, if

$$Prob\ (Y_{1i} = 1, Y_{2i} = 0) = Prob(Y_{1i}^{*} > 0, Y_{2i}^{*} < 0)$$

$$= Prob\ (\epsilon_{1i} > -X_{1i}^{'}\beta_1, \epsilon_{2i} < -X_{2i}^{'}\beta_2)$$

$$= \Phi\left(X_{1i}^{'}\beta_1\right) - \Phi_2\left(X_{1i}^{'}\beta_1, X_{2i}^{'}\beta_2\right)$$

Where ϕ_2 represents the cumulative distribution function of the bivariate standard normal distribution. In a **bivariate probit model with full observability**, i.e. four possible outcomes with a covariance ρ, the model naturally leads to the most efficient estimates (Ashford and Sowden, 1970; Zellner and Lee, 1965). If only one possibility is observed when the other three combinations are indistinguishable, then this case is called a **bivariate probit model with partial observability** (Mohanty, 1995; Poirier, 1980). In our study, we have used the full observability model to compare the access to credit between cooperatives and commercial bank credit among agricultural households.

Results and Discussion

Resource Inequality and Wealth Index (WI)

Indian agriculture is mainly dependent on marginal and small farmers (86.4% as per NSSO, 2012). Ironically, their resources and wealth standings are always lower than that of large farmers. Implicitly, it indicates that the marginalised communities' share of resources is the lowest in the country as their population is more among marginal and small farmers. Due to this unequal resources and wealth standings, most of the marginal and small farmers are affected by agrarian distress. Thus, the highest number of suicides are reported among marginal and small farmers (Vaidyanathan, 2006; Jeromi 2007; Singh *et al*, 2008; Posani 2009, Mohanty 2013). Therefore, many studies have reported that both marginal and small farm households are the most vulnerable in the agricultural sector. However, only a few studies have identified that the most vulnerable sections within the marginal and small categories are SCs and STs (Dev, 2012; Rao, 2017). Hence, Dr. Ambedkar also argued that in India, the evils of smallholdings are due to both their social and economic conditions (Government of Maharashtra, 1979). Hitherto, many studies are reinforcing his argument that caste-based identities facilitate class-based exploitation (Omvedt, 1978; Rudra, 1978; Gough, 1980). Therefore, the caste system wields a significant influence on economic outcomes in rural India (Deshpande, 2000). Access to land, a principal means of production, is one such classic example that controls the labour force and leads to forms of exploitation (Prasad, 2015).

The AIDS data tells more clearly about the inequality of land access during 2012 (Table 1). The SC households are the second highest (23%) among Hindus but, ironically, their share of self-employmentt in agriculture (13.9%) is the lowest across the social groups. Meanwhile, landlessness

share of the SCs (31%) is more than their total share (23%) and also double the amount than that of the Forward Castes (FC) where their landlessness share is lower than their share of total households (19.9%). In comparison with the other three social groups, SCs are the most underprivileged group in terms of both landlessness and self-employed agricultural households. The other three groups had a greater proportion of self-employed household status than the SCs and their proportion is even higher than their landlessness status. In terms of casual labour also, SCs are deprived as their proportion (28%) is more than their share (23%) of the total households. These results clearly indicate that most of the SC households are exploited as agricultural labour and few of them are identified as self-employed land owned farmers.

Table 1: Resource Inequality of Agricultural Households in India by Social Groups

Particulars	ST	SC	OBC	FC	All
Total Hindu households (Rs. in crores)	1.63 (12.4)	3.03 (23.0)	5.89 (44.7)	2.61 (19.9)	13.16 (100)
Landless households (Rs. in crores)	0.58 (10.0)	1.80 (31.1)	2.49 (43.0)	0.93 (16.0)	5.80 (100)
Self-employed agricultural households (Rs. in crores)	0.74 (14.5)	0.71 (13.9)	2.44 (47.5)	1.24 (24.1)	5.13 (100)
Casual labour agricultural households (Rs. in crores)	0.09 (16.0)	0.16 (28.2)	0.24 (41.5)	0.08 (14.3)	0.58 (100)
Operational holdings of agricultural households (Rs. in crores)	1.05 (14.3)	1.22 (16.6)	3.40 (46.1)	1.69 (22.9)	7.36 (100)
Operational area of agricultural households (Rs. in crores)	0.93 (13.4)	0.74 (10.7)	3.22 (46.4)	2.05 (29.5)	6.95 (100)
Agricultural area of agricultural households (hectare)	0.87	0.58	0.92	1.22	0.92
Irrigated area of agricultural households (hectare)	0.76	0.49	0.76	1.02	0.77
Net worth (Rs. in lakh @ 2012 prices) [a]	5.86	7.69	13.96	21.09	13.34
Net worth ratio [b]	0.28	0.36	0.66	1.00	0.63
Wealth Index (%)	0.50	0.50	0.81	0.99	0.75

Source: Author's calculation based on NSSO unit-level data (AIDIS) 70th (2013) round.

Notes: Figures in parentheses are percentages.

[a]Net worth means the difference between average asset value and average outstanding.

[b]Net worth ratio is defined as the ratio between non-FCs and FCs.

According to NSS data, SCs constitute 16.6% of agricultural operational households to the total but they possess only 10.7% of operated land which is even lower than both their self-employed position (13.9%) and total households (23%). In the case of STs, both agricultural operational households and their operated land share are a little higher than SCs but still, it is lower than the other two groups. Both SCs and STs agricultural operational area are lower than their respective households' share, whereas the FC possess a higher share in operated area than their share in the number of operating households. The average size of the agricultural area, in terms of a hectare (ha), is relatively lower (0.58) among SCs than that of other caste groups (ST=0.87, OBC=0.92, FC=1.22). Also, due to the SCs' lower share of the area of irrigated land, it is generally assumed that they require less amount of credit from the credit market. But both their high landlessness and less owning land status speak of the necessity of land distribution to the SCs from movements like land donation to balance the resource inequalities across social groups.

Apart from land holdings, economic resources undoubtedly occupy the leading role in access to formal credit. Their economic resource-poor or resource-less status creates a weak 'initial condition' for those groups who find themselves at the bottom. These could be due to historical factors or natural conditions (e.g. arid or desert areas) or endowments. According to Kannan (2016), the resource inequalities are due to lower wealth as well as income. In our study, we discuss wealth because this is necessary to borrow loans. The wealth status is indicative of not only the ability of households in different categories to withstand times of stress but also to a basic 'capital' to derive a flow of income as well as social status. From Table 1, we could also see the value of net worth per household is in favour of rich and upper caste farm households and less in the case of the lower caste groups. Net worth is an important factor as bankers seek it to offer credit through the formal loans which are calculated based on asset positions and the liability of the household. The net worth ratio shows that in comparison with FC, every other social group has lost out by showing a decline in their net worth ratios. This is the worst among the SCs and STs as their net worth is lower by as much as 64% and 72% respectively than the FCs during 2012.

In support of Kannan's (2016) net worth and its ratio for the wealth, we have also calculated Wealth Index (WI) by scoring each variable from 0 to 100 based on the value of the variables. Further, we have calculated the average of all variables score for one year. The WI could be an explanatory factor for accessing credit. From Table 1, we can understand that both SC's and ST's wealth status is low as indicated by WI which is 0.50% each and the highest is for FCs as their WI is 0.99%, whereas the WI for the OBCs is 0.81%. The WI of the SCs and STs is, in fact, lower than the national average 0.75%. As a result, it can be said that determinants of credit by agricultural households are bound to their resource inequality which is compounded by social discrimination as caste hierarchy leads the social system in India.

Inequality of access to credit

The nationalisation of the banks, in India, became instrumental to stimulate investment and to enhance production by increasing input application in the sector (Binswanger and Khandker, 1992; Agrawal *et al*, 1997; Bhalla and Singh, 2010). That impact on agricultural production, efficiency, and productivity have been witnessed in due course of time. The agricultural credit system has helped in many ways. Formal credit could be availed to purchase inputs over the cropping season which enabled a farmer to maximise yield with a given level of inputs. Therefore, providing credit is of vital importance in bringing social mobility to the agricultural population and giving it a position of greater influence (Dantwala, 1952). But, differences in access to quantity and quality of formal credit among caste groups will explain many differences in crop yields and land productivity (Rao, 2017). There are studies that elucidate that the farmers' access to credit from formal sources depends on their caste (Drèze *et al*, 1997; Sarap, 1990; Jodhka, 1995; Kumar, 2013). Hence, one can say that it is not just the collateral that makes the difference, it is caste-identity that makes the difference in access to credit. Therefore, in our study, we have analysed the access to credit for agriculture through the participation of agricultural households in the credit market and their mean amount of credit.

The access to formal credit to agricultural households of SCs and STs is less than of FCs during 2012 (Table 2). There is almost 17% of the difference in access to formal credit between SCs and FCs agricultural households as only 12% of SCs accessed (29% in the case of FCs) in the same period. The share of STs' access to formal credit is around 9% which is 20% lower than FCs in 2012. Although all caste groups get access to credit from both commercial banks and cooperatives, only SC and ST shares, compared to FC, are low. While the share of SCs and STs in commercial banks are 11% and 9% respectively, in the cooperatives their shares are 12% and 7.7% respectively. Only to these two groups, the share of access to credit from formal sources is lower than their agricultural households' share. It is a surprise that even after many policies and programmes, still marginalised sections' access to credit is low. These differences in access to both commercial and cooperative credit across social groups may change crop yields and land productivity among them (Rao, 2017).

Table 2: Households' shares and their access to credit in rural areas during 2012

Particulars	ST	SC	OBC	FC	Total
Agricultural households (Rs. in crores)	1.05 (14.3)	1.22 (16.6)	3.40 (46.1)	1.69 (22.9)	7.36 (100)
Access to formal credit (Rs. in crores)	0.15 (8.8)	0.21 (12.4)	0.86 (49.8)	0.50 (29.0)	1.72 (100.0)
Access to commercial credit (Rs. in crores)	0.07 (9.0)	0.08 (11.0)	0.39 (52.1)	0.21 (27.9)	0.75 (100.0)
Access to cooperative credit (Rs. in crores)	0.07 (7.7)	0.11 (12.4)	0.45 (49.0)	0.28 (30.8)	0.92 (100.0)

Source: Author's calculation based on NSSO unit-level data (AIDIS) 70th (2013) round.

Notes: Figures in parentheses are percentages.

The differences in the average amount of formal credit across the social groups are given in Table 3. In our study, the loan per household means it includes both previously unpaid and currently received loans. In the overall formal credit sources, the average amount of credit for both SCs and STs is much lower than that for FCs during the last two decades. Their average amount of credit is even less than the national average across all three rounds of NSS data. The ratio of the mean credit shows that both SCs and STs are availing only half of the FCs' share. In the case of commercial banks' credit, SC agricultural households are more disadvantaged groups than others as their average amount of credit Rs. 44,555 which is lower than others. In the case of cooperatives, the STs are the most disadvantaged group, their average amount of credit is Rs. 35,557. The average amount of credit differences and the calculated credit ratios (which is less than 1) show that there is unambiguous evidence that caste determines the access to formal credit. This is evident from the calculated t-value which is highly significant at a 1% level.

Table 3: Agency-wise Credit Distribution of Agricultural Households by Social Group (Rs @ 2012 prices)

Particulars	ST	SC	OBC	FC	All
Formal credit					
Mean (Rs.)	44,256	47,774	74,697	98,526	75,557
Ratio to FCs	0.5	0.5	0.8	1.0	0.8
t-test	10.99***	11.29***	5.31***	-	-
Commercial bank					
Mean (Rs.)	56,260	44,555	85,416	1,29,297	90,533
Ratio to FCs	0.4	0.3	0.7	1.0	0.7
t-test	6.66***	9.93***	4.21***	-	-
Cooperative credit					
Mean (Rs.)	35,577	51,456	60,521	72,385	61,137
Ratio to FCs	0.5	0.7	0.8	1.0	0.8
t-test	7.34***	5.67***	4.07***	-	-

Source: Author's calculation based on NSSO unit-level data (AIDIS) 70th (2013) round.

Note: *** .01 level

Unlike both SCs and STs, access to credit among OBC households is more like their total households. But their average amount of credit disbursing is less compared to that of FCs. The data shows that regardless of their sources of borrowing, the farmers who belong to the lowest caste groups receive fewer loans on average than OBCs, who in turn receive fewer loans than FCs. Generally, the situation in an ideal world is that a lender such as a bank would evaluate the creditworthiness of a borrower using the information that would be furnished in the loan application form. That creditworthiness of the agricultural household can predict their future repayment ability. Also, their repayment histories and ownership of assets are used as security. However, since the lower caste borrowers are poorer and have fewer assets, they receive loans less often. But if we take loan-relevant characteristics into account explicitly, then caste should not normally be relevant to the lender's decision. Nevertheless, we find that both commercial and cooperative banks favour FC farmers in lending and are discriminating against the SCs and STs based on their caste. Rural cooperative banks are small, decentralised, relatively independent, and lack direct oversight from the RBI. Therefore, the cooperative banks are influenced by the large farmers who are FCs generally. But, unlike cooperatives, the commercial banks are large, centralised entities with multiple branches and are directly overseen by the RBI. Still, the results of the commercial banks' discriminatory behaviour against SCs and STs show that the policies of the government have failed to address the inclusion of marginalised groups for access to credit realms. Since these households are unlikely to have anything to offer as collateral like land, building, and machineries, formal credit would be difficult to come by. The result of our study is consistent with studies like Drèze *et al* (1997) and Sarap (1990), Kumar (2013a and b), Kumar *et al* (2015) and Rao (2018). As a result, our study shows that caste plays a major role in determining the access to agricultural credit in rural India.

Besides, we have also measured the differences even in the interest rate that is being charged by the formal lenders to the borrowers. The general idea of lending to farmers through formal agencies came up because of the high rate of interest charged by informal lenders like money lenders, traders,

and landlords. However, a few studies have said that agricultural households are charged with high-interest rates by both formal and informal sources (Basu, 1989; Lahiri and Mookherjee, 2015; Maitra *et al*, 2015). But, a study by Rao (2018) found that the interest rate differences are also existing across social groups. In his paper, he argues that interest rate differences are minute in the case of loans borrowed from formal agencies across farm-size class and caste groups. Though the difference is minute, this should be equal across all households according to the policies. He also mentioned that agricultural households from SC groups pay slightly higher interest on loans from commercial banks. We also found a similar kind of result from our study and the NSS data shows that the rate of interest in agriculture is not uniform across social groups in the credit market (Table 4).

Table 4: The Interest Rate on Agricultural Borrowings by the Social Groups During 2012

Particulars	ST	SC	OBC	FC	All
Formal sources (%)	7.2	8.4	7.8	7.6	7.8
Commercial bank (%)	7.4	8.4	7.9	7.3	7.7
Cooperative bank (%)	6.2	7.5	7.2	7.3	7.2

Source: Author's calculation based on NSSO unit-level data (AIDIS) 70th (2013) round.

The rate of interest charged by the formal sources is 8.4% to the SCs which is higher than others during 2012. So is the case with both commercial and cooperative banks, they have charged more interest (8.4% and 7.5% respectively) to the SCs than others in that period. There could be two reasons for this change in the interest rates among SC households. One could be less access to credit which means that since SCs' access to credit is less, the average rate of interest is high among them than for others. Another reason could be the negative discrimination behaviour of the bankers who charge more interest rates to this group. However, the STs' interest rate for credit is 7.2% in 2012. This leads to two arguments which are that the expectation of the existing rural credit programmes to break the monopoly power of informal lenders and their interest rates has failed and/or the banks charge more interest on credit to a marginalised community.

Due to the financial sector reforms in 1991, interest rates for agricultural credit have declined. However, deregulation of interest rates of cooperatives and RRBs, deregulation of lending rates of commercial banks for loans above Rs. 2 lakhs, and introduction of Kissan Credit Card (KCC), and stipulation of interest rate not exceeding 9 per cent for crop loans up to Rs.50,000 extended by the public sector banks are the other important structural changes in agricultural credit (Mohan, 2004). Even after all this, the interest rate varies across social groups during 2012, showing that there should be checks and balances to implement the schemes to earn better social benefit, in other words social justice. However, as a result, different kinds of interest rates charged by both the commercial and cooperative lenders reveal that still, exploitation is there in the credit market in the form of discrimination. Therefore, an unbiased and neutral credit delivery system is needed to prevent inequality in borrowing by marginalised caste groups.

Econometric Results

Determinants of access to formal credit: *Probit results*

Access to credit is determined by many quantitative and qualitative variables. Therefore, we have divided these variables into four models and analysed the crucial role of each factor in access to formal credit by using the probit model. Model I include only social group characteristics i.e. caste dummies to analyse whether caste influences access to credit. Model II includes a set of economic variables along with social group dummies such as irrigated land, asset values and land-size classifications. The reason for including irrigated land is that more irrigated land is assumed to take up more credit as it needs more inputs than the unirrigated one. High asset values yield higher chances of getting a loan, where asset value means values of land, livestock, machineries and tools, ornaments and jewels, and other financial assets. Model III includes demographic factors such as household size, age of head, and education level of the head. With the aim of sustainable development in agriculture, the United Nations has declared 2014 as the International Year of Family Farming. Also, studies such as Adikwu (2014), Lowder *et al* (2016) and Gollin (2018) have mentioned that the size of the family has a significant effect on agricultural productivity. Hence, we assumed that due to a greater family size and higher productivity, the repayment of the loan will become easy for the farmers. Similarly, the age of the household's head and his/her education level is expected to be significant as the experience, when age increases, and more awareness, when education rises, may increase the likelihood of access to credit. Generally, agricultural productivity differs based on geographical factors. Since access to credit for agriculture also may vary across states, in our Model IV, we have added state regions as geographical factors along with others (Details of state regions is in Appendix I). The descriptive statistics and definitions of the variables used in both probit and bivariate probit models are given in Appendix II.

Table 5: Determinants of Access to Formal Credit: Probit Results

Variables type	Variables	Model I	Model II	Model III	Model IV
Social characteristics	OBC	-0.0835*** (-4.48)	-0.0077 (-0.40)	0.0041 (0.21)	0.0133 (0.66)
	SC	-0.3733*** (-15.18)	-0.1354*** (-5.24)	-0.1217*** (-4.63)	-0.0977*** (-3.65)
	ST	-0.4097*** (-17.14)	-0.2016*** (-7.72)	-0.1800*** (-6.76)	-0.1328*** (-4.89)
Economic characteristics	Irri area		0.1007*** (6.93)	0.0970*** (6.54)	0.0879*** (6.01)
	Ln Asset		0.1468*** (17.2)	0.1223*** (13.62)	0.1084*** (11.43)
	Marginal		-0.6177*** (-12.89)	-0.6260*** (-12.96)	-0.6469*** (-13.16)
	Small		-0.1820*** (-3.87)	-0.1845*** -3.91	-0.1761*** (-3.69)
	Semi-medium		0.0096 (0.20)	0.0093 (0.19)	0.0179 (0.37)
Demographic characteristics	HHsize			0.0213*** (6.61)	0.0190*** (5.79)
	Age			0.0038*** (6.18)	0.0046*** (7.38)
	Primary			0.0883*** (3.60)	0.1251*** (5.01)
	Middle			0.1150*** (5.05)	0.1608*** (6.93)
	Secondary			0.0990*** (4.28)	0.1461*** (6.22)
	Graduate			0.1005* (2.40)	0.1469** (3.48)
Geographic characteristics	North				-0.2090*** (-7.03)
	Central				-0.0916*** (-3.64)
	East				-0.0695* (-2.51)
	Northeast				-0.9505*** (-21.49)
	South				-0.1889*** (-6.63)
Constant		-0.3144*** (-20.98)	-2.0187*** (-15.33)	-2.0337*** (-15.21)	-1.7445*** (-12.38)
Log pseudolikelihood		-19239.3	-17846.6	-17791.3	-17487.4
Wald Chi-square		460.62	2831.84	2929.76	3362.68
Pseudo R-square		0.012	0.0835	0.0864	0.102
Number of observations		31,162	31,162	31,162	31,162

Source: Author's calculation based on unit-level data (AIDIS), NSSO, 70th (2013) round.

Notes: Dependent variable is access to formal credit.

Figures in parentheses are t values.

* .05 level

** .01 level

*** .001 level

The probit model result reveals that access to formal credit is determined by many factors (Table 5). As per Model I, the access to credit depends on the caste, and, in comparison with the advantaged FCs, the low/disadvantaged groups' (OBCs, SCs, and STs) access to credit from a formal bank is lower. Since the lower strata agricultural households get lower access, it is shown that access to

credit also follows the pattern of social hierarchy as in other economic outcomes in India. While STs' likelihood of access to credit (40%) is lower than that of SCs (35%), the SCs are lower than the OBCs (8%). When the economic variables (Model II) are introduced in the analysis, the effect of caste dummies in the likelihood of access to credit is changing as it is expected. However, the caste effect is not changing to the groups of both SCs and STs and, still, the likelihood of access to credit for them is as low compared to that of FCs. Even after including demographic variables (Model III) and geographic variables (Model IV) the effect on both SCs and STs does not disappear as in the case of OBCs. The distinguishing point is that the OBCs' economic variables such as irrigated land and asset values will stand for them in access to formal credit even though their caste order is below the FCs. Both SCs and STs' access to formal credit has less/no effect even after including their economic indicators. This shows that caste plays a crucial role in access to formal credit in India as it is mentioned in the works of literature such as Kumar *et al* (2007), Kumar *et al* (2015), and Kumar (2013a). The Model IV result also determines, besides the caste problem, the other factors that influence the access to formal credit. Significant and positive variables such as irrigated land, asset values, household size, age and education of household head also determine the likelihood of access to formal credit. If the positive and significant education levels of the head increase, then the household's likelihood of access to formal credit also increases. For example, if the education level of the household head is at the primary level, then his likelihood of access to credit is 12%. Suppose that his/her education level increases to graduate level, then his/her likelihood of access to credit is 14%. It implies that education in agriculture is most important as it creates awareness of credit. Lending institutions also may have more confidence in educated households, as they are likely to have better employment opportunities in the non-farm sector and thus have additional income to repay the loans.

Land size plays a crucial role in enhancing agricultural households' access to formal credit. In comparison with large land-size households, the negatively significant land class variables such as marginal and small land-size households have less likelihood of access to formal credit. In the case of geographical indicators, the western part of Indian states is privileged in access to formal credit due to the high growth rate of the cooperative credit during the 1990s to 2000s in this region (Chavan, 2015). The negative and significant other Indian state regions have less likelihood of access to formal credit from formal sources.

Determinants of Access to Commercial and Cooperative Bank Credit: *Bivariate probit results*

Further, we have used Model IV to analyse the determinants of access to credit at the disaggregated level. We have used an appropriate bivariate probit model for the analysis where two latent dependent variables are access to commercial bank credit and/or cooperative credit. Around 71% of households (22,018) in our sample do not have a loan from either type of bank. Of the remainder, only 14% (4,300) have loans from commercial banks and only 15% (4,606) households have loans from cooperative banks, while a small number i.e. 1% (238) have loans from both types of bank. Bivariate probit is the most appropriate model in this case because it is a system of two seemingly unrelated probit equations where the analysis of the correlation between two binary variables, such as commercial

bank and cooperative bank, are captured by the conditional tetrachoric correlation of the error terms (Greene, 2018).

Table 6: Determinants of Access to Commercial and Cooperative Bank Credit: Bivariate Probit Results

Variables type	Variables	Commercial	Cooperatives
Social characteristics	OBC	0.0619 ** (2.66)	-0.0064 (-0.28)
	SC	-0.0711* (-2.24)	-0.0903** (-2.83)
	ST	-0.1306*** (-3.92)	-0.1163*** (-3.72)
Economic characteristics	Irri area	0.0268** (2.67)	0.0321** (3.33)
	Ln Asset	0.1752*** (16.25)	0.0058 (0.55)
	Marginal	-0.3176*** (-6.00)	-0.6892*** (-13.99)
	Small	-0.0605 (-1.17)	-0.2022*** (-4.20)
	Semimedium	0.0255 (0.49)	-0.0521 (-1.07)
Demographic characteristics	HHsize	0.0234*** (6.37)	0.0017 (0.45)
	Age	0.0029*** (4.09)	0.0041*** (5.78)
	Primary	0.0772** (2.63)	0.1087*** (3.77)
	Middle	0.1005*** (3.71)	0.1572*** (5.91)
	Secondary	0.1511*** (5.63)	0.0771** (2.83)
	Graduate	0.1503** (3.21)	0.0741 (1.50)
Geographic characteristics	North	0.1936*** (5.37)	-0.2877*** (-9.10)
	Central	0.4906*** (16.05)	-0.4976*** (-18.13)
	East	0.3814*** (10.98)	-0.4391*** (-14.21)
	Northeast	-0.3640*** (-6.18)	-1.1503*** (-20.47)
	South	0.0971** (2.67)	-0.2869*** (-9.35)
Constant		-3.8558*** (-23.70)	-0.4913** (-3.13)
Rho (ρ)		-0.4620	(-30.56)
Log pseudolikelihood		-23636.5	
Wald Chi-square		4767.72	
Number of observations		31162	

Source: Author's calculation based on unit-level data (AIDIS), NSSO, 70th (2013) round.

Notes: Dependent variables are access to commercial credit and cooperative credit.

Figures in parentheses are t values.

* .05 level

** .01 level

*** .001 level

Results from our bivariate analysis also show that most of the variables are significant and determine the access to credit from commercial and cooperative banks (Table 6). The variables that determine access to commercial bank credit are not significant for cooperative credit access. Among social group dummies, OBC is significant and positive for commercial bank credit access which means that OBCs are relatively better in access to credit than the FCs. But the same OBC variable is not significant in access to credit from cooperative banks and the negative sign shows that OBCs' access to credit is lower than that of FCs. The negatively significant coefficients of both SCs and STs show that

irrespective of credit agencies, these caste groups are discriminated against in access to credit. The non-significant level of the asset values shows that access to credit from cooperatives tend to face bias based on caste instead of the net worth of the loan seeker. As cooperatives are decentralised and mostly dominated by the local political leaders, it may be possible in rural India. Land-size of the households plays a vital role in access to credit from both banks. Irrespective of banks, fewer landholders get fewer loans than the large landholders. While the marginal land agricultural household's likelihood of access to credit from a commercial bank is 31% less than that of the large farmers, in cooperatives, this number is around 70% less than that of what the large farmers receive. This shows that still, large farmers' influence is more in cooperative banks. The significance of education level is different between commercial and cooperative banks. As we have seen in probit results, bivariate probit also shows that when the education level increases, the likelihood of access also increases. But the important point is that if the household head is a graduate, then their awareness about the credit will be high and that leads them to approach commercial bank than a cooperative bank for credit. Hence the significance of the graduate is null in the case of cooperatives. That can be seen from the result that after middle-class education, the access to credit from cooperatives is decreasing whereas in commercial banks, it is increasing. The negative and significant region dummies in cooperatives reflect upon the results as Chavan (2015) stated that the number of cooperatives is more in the western region. Hence, access to cooperative credit is more in the western region than in the other regions. In the case of commercial access to credit, except in the northeastern region, in all other regions, agricultural households' access to credit is more than in the western region. The findings of our results differ from the earlier study of Kumar (2013a) as he mentions that a commercial bank doesn't discriminate based on caste. Nevertheless, we found that banks discriminate between borrowers based on their caste in access to agricultural credit. Our results suggest that concerted efforts are still required to increase SCs' and STs' access to institutional credit.

Conclusion and Policy Implications

Agricultural credit from formal agencies can play a significant role to determine farm incomes, thereby eradicating poverty and inequality. But only socially and economically upper-caste agricultural households can avail formal credit lines in an easy manner. The net worth ratio is most important for loan access and, of them, the land is the most commonly used collateral for agricultural credit. But, due to the caste embedded society in India, the nature of land ownership follows caste ladders. Certainly, that inherent advantage makes upper-caste agricultural households' access to formal credit greater. The access to agricultural credit must be inclusive in nature to include all sections of society for increasing agricultural productivity and to achieve inclusive growth. But our empirical analysis shows that still, caste influence is persisting in the economic activities of households in India. Already, a large portion of farmers is outside the fold of formal credit and their dependency on informal credit is a matter of concern in rural India. Still, both SC and ST farmers are highly deprived in terms of access to credit from formal agencies. This inequality of access to credit proves that the policies and programmes initiated by the government have failed to achieve inclusive growth. To overcome this hurdle, the formal credit agencies should develop more flexible products and services to enable the qualification of

different social groups' households in accessing credit. The existing RBI guidelines that advocate commercial banks to train the farmers about financial activities should also be strengthened and appraised. Under the credit facilities to Scheduled Castes and Scheduled Tribes (2017) of the RBI policy, the banks are responsible for increasing awareness about new credit facilities among them and helping them in filling out forms and completing other formalities.

The probit model result reveals that access to formal credit is determined by factors such as caste identity, economic indicators, demographic variables and geographic variables. Significant and positive variables such as irrigated land, asset values, household size, age and education of household head also determine the likelihood of access to formal credit. It also says that education in agriculture is most important as it creates awareness of credit. Further, the bivariate probit model says that the negatively significant coefficients of both SCs and STs show that irrespective of credit agencies, these caste groups are discriminated against in access to credit. The non-significant level of the asset values shows that access to credit from cooperatives tends to bias based on caste instead of the net worth of the loan seeker. Irrespective of banks, fewer small landholders get loans than the large landholders. While the marginal land agricultural household's likelihood of access to credit from a commercial bank is 31% less than that of the large farmers, from the cooperatives, the number is around 70%. This shows that still, large farmers' influence is greater in cooperative banks. The significance of education level is different between commercial and cooperative banks. If the education level of the household head is graduate, then he will be more dependent on the commercial bank than the cooperative. The region dummies in cooperatives reflect that the number of cooperatives is more in the western region. Hence, access to cooperative credit is more in the western region than in the other regions. In the case of commercial bank access to credit, except the northeastern region, in all other regions, the agricultural household's access to credit is more than in the western region.

We also urge the government, as in other sectors, to control the caste-based inequalities and differences in agricultural credit. To elevate the capacity of access to credit among agricultural households of the socially marginalised castes (SCs and STs), programmes like caste-wise allocation of the funds are necessary for the agricultural sector in the country. Present schemes like the Special Component Plan for SCs and the Tribal Sub-Plan for STs should include, along with other schemes, the credit facility options to these groups. Also, it should give more attention to selecting rightful agricultural households to avail credit from the formal credit sources to avoid the wilful defaulters. In order to ensure that all these policies are properly followed, a special department should be set up for monitoring the flow of credit to SC/ST beneficiaries. Though there are differences in landholdings and wealth possession, certainly it is not the non-repayment of earlier loans that denies the access to credit, but caste. Hence, we need proper evaluation and implementation of the programmes and policies on credit to ensure social justice in the agricultural sector of the country.

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Appendix I: Details of the States Region Classification

Sl. No.	Region Name	State Names
1	North	Jammu & Kashmir, Himachal Pradesh, Delhi, Rajasthan, Punjab, Haryana, and Chandigarh
2	Central	Chhattisgarh, Uttarakhand, Uttar Pradesh, and Madhya Pradesh
3	West	Goa, Gujarat, Maharashtra, and the Union Territories of Daman & Diu, and Dadra & Nagar Haveli
4	East	Bihar, Jharkhand, Orissa, Sikkim, West Bengal, and Andaman & Nicobar Islands
5	North East	Assam, Arunachal Pradesh, Meghalaya, Manipur, Nagaland, Tripura, and Mizoram
6	South	Andhra Pradesh, Telangana, Karnataka, Kerala, Tamil Nadu, and the Union Territory of Puducherry.

Source: RBI-Basic Statistical Returns of Scheduled Commercial Banks.

Appendix II: Descriptive Statistics of Variables Used in the Probit and Bivariate Probit Model

Variables name	Description of the Variables	Mean	
Dependent var	If households' access to credit from formal sources =1, otherwise=0	0.317	(0.465)
Dependent var	If households' access to credit from commercial sources =1, otherwise=0	0.146	(0.353)
Dependent var	If households' access to credit from cooperative sources =1, otherwise=0	0.155	(0.362)
FC	If household's social group is Hindu forward caste=1, otherwise=0	0.233	(0.423)
OBC	If household's social group is Hindu OBC=1, otherwise=0	0.433	(0.496)
SC	If household's social group is Hindu SC=1, otherwise=0	0.158	(0.365)
ST	If household's social group is Hindu ST=1, otherwise=0	0.176	(0.381)
Marginal	If household's land size is <2.47ac =1, otherwise=0	0.707	(0.455)
Small	If household's land size is >2.47ac and <4.94ac=1, otherwise=0	0.170	(0.376)
Semi-medium	If household's land size is >4.94ac and <9.88ac=1, otherwise=0	0.085	(0.279)
Large	If household's land size is >9.88ac =1, otherwise=0	0.038	(0.190)
Irri area	Irrigated land of household (acre)	1.174	(2.602)
Ln Asset	Log of asset values of land, machineries and implements, financial assets, livestock's, ornaments and buildings (Rs)	16.071	(2.152)
HH size	Family members (No.)	5.088	(2.440)
Age	Age of household head (years)	49.034	(13.274)
Illiterate	If household head is illiterate =1, otherwise=0	0.526	(0.499)
Primary	If household head is educated 1^{st} to 5^{th} class =1, otherwise=0	0.121	(0.326)
Middle	If household head is educated 6^{th} to 8^{th} class =1, otherwise=0	0.157	(0.364)
Secondary	If household head is educated 9^{th} to 12^{th} class and/or certificate courses =1, otherwise=0	0.159	(0.366)
Graduate	If household head is graduated =1, otherwise=0	0.037	(0.188)
North	If household's state belongs to northern region =1, otherwise=0	0.125	(0.331)
Central	If household's state belongs to central =1, otherwise=0	0.301	(0.459)
East	If household's state belongs to eastern =1, otherwise=0	0.209	(0.407)
West	If household's state belongs to western =1, otherwise=0	0.143	(0.350)
North-east	If household's state belongs to north-eastern =1, otherwise=0	0.071	(0.257)
South	If household's state belongs to southern =1, otherwise=0	0.150	(0.357)
	Number of observations	31162	

Note: Figures in parentheses are standard deviations.

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