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**Institutional versus Noninstitutional Credit to
Agricultural Households in India**

Evidence on Impact from a National Farmers' Survey

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ABSTRACT

A goal of agricultural policy in India has been to reduce farmers' dependence on informal credit. To that end, recent initiatives have been focused explicitly on rural areas and have had a positive impact on the flow of agricultural credit. But despite the significance of these initiatives in enhancing the flow of institutional credit to agriculture, the links between institutional credit and net farm income and consumption expenditures in India are not very well documented. Using a large national farm household-level dataset and instrumental variables two-stage least squares estimation methods, we investigate the impact of institutional farm credit on farm income and farm household consumption expenditures. Our findings show that in India, formal credit is indeed playing a critical role in increasing both the net farm income and per capita monthly household expenditures of Indian farm families. We also find that, in the presence of formal credit, social safety net programs such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) may have unintended consequences. In particular, MGNREGA reduces both net farm income and per capita monthly household consumption expenditures. In contrast, in the presence of formal credit, the Public Distribution System may increase both net farm income and per capita monthly household consumption expenditures.

Keywords: institutional credit, instrumental variable, 2SLS, net farm income, consumption expenditures, social safety net

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ABBREVIATIONS

2SLS	two-stage least squares
AgGDP	agricultural gross domestic product
GDP	gross domestic product
IV	instrumental variables
KVK	Krishi Vigyan Kendra
MCE	monthly consumption expenditures
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MSP	minimum support price
NFI	net farm income
NGO	nongovernmental organization
NRF	net returns from farming
OBC	Other Backward Class
OLS	ordinary least squares
PDS	Public Distribution System
PSL	Priority Sector Lending
SAU	State Agricultural University
SC	Scheduled Caste
ST	Scheduled Tribe

1. INTRODUCTION

Since India's independence, the main objective of the nation's agricultural policy has been to improve farmers' access to institutional credit and reduce their dependence on informal credit. Informal credit is often usurious. In pursuit of this goal, the government of India has undertaken several initiatives. For example, major milestones in improving access to rural farm credit include acceptance of the Rural Credit Survey Committee report (1954), nationalization of the large commercial banks (1969 and 1980), establishment of Regional Rural Banks (1975) and the National Bank for Agriculture and Rural Development (1982), and the 1991 financial sector reforms. Since the passage of the historic 1991 financial reforms in India, the government has also launched farm credit programs including the Special Agricultural Credit Plan (1994–1995), Kisan Credit Cards (1998–1999), the Doubling Agricultural Credit program (2004), the Agricultural Debt Waiver and Debt Relief Scheme (2008), the Interest Subvention Scheme (2010–2011), and, more recently, the 2014 Pradhan Mantri Jan Dhan Yojana¹ (Kumar et al. 2015).

Simultaneously, several other measures have been taken to strengthen formal credit programs in India. Examples include the establishment of the Lead Bank Scheme, direct lending for priority sectors, and the banking sector's linkage with government-sponsored programs targeted at the poor. Other programs such as the Differential Rate of Interest Scheme, the Service Area Approach, the Self Help Group–Banks Linkage Program, Special Agricultural Credit Plans, and the Rural Infrastructure Development Fund were introduced to enhance the flow of credit to the rural sector. These initiatives with an explicit rural focus have had a positive impact on the flow of agricultural credit (Ghosh 2005; Golait 2007; Kumar, Singh, and Sinha 2010; Mohan 2006; Hoda and Terway 2015; Kumar et al. 2015). Since the launch of Doubling Agricultural Credit in 2004, the actual credit flow has consistently exceeded the target, and the ratio of agricultural credit to agricultural gross domestic product (AgGDP) has increased from 10 percent in 1999–2000 to about 38 percent in 2012–2013 (India, Ministry of Finance 2015–2016). About 85 percent of agricultural credit is used to secure inputs in the agriculture and allied sectors (Narayanan 2016).

A number of studies have estimated the benefits of formal credit in developing countries (Binswanger and Khandker 1995; Carter 1989; Carter and Weibe 1990; Feder et al. 1990; Pitt and Khandker 1996, 1998; Khandker and Farooqui 2003; Awotide et al. 2015; Narayanan 2016). These studies show that access to formal credit contributes to an increase in agricultural productivity and household income. However, despite the significance of the above-mentioned initiatives in enhancing the flow of institutional credit² to agriculture, the links between institutional credit and agricultural productivity or household income in India are not very well documented. The literature on the effects of credit on farmers' income and economic development is sparse. The best-known study of the impact of formal rural credit in the context of India is by Binswanger and Khandker (1995); in this study, the authors estimated the impact of formal credit using district-level panel data and found that formal credit increases rural income and productivity.

Other studies (Burgess and Pande 2005; Das, Senapati, and John 2009) have suggested that the effect on agricultural output is either nonexistent or negligible. They also point out the importance of financial inclusion in enhancing agricultural production. In one study, Subbarao (2012) found the elasticity of real AgGDP with respect to institutional credit to be 0.22. More recently, the productivity of agricultural credit in India was examined by Narayanan (2016), who notes that credit is performing the twin roles of (1) preserving productivity by supporting mechanization and (2) contributing to the growth of AgGDP by enabling the purchase of variable inputs. However, none of the above studies is based on information provided by actual users of credit, and very little is known about the impact of formal institutional credit on returns to farming. This study aims, with the help of a nationally representative

¹ In English it is called Prime Minister's People Money Scheme. It is India's National Mission for Financial Inclusion to ensure access to financial services

² In this study, institutional credit is also referred to as formal credit; noninstitutional credit is referred as informal credit.

agricultural household survey, to understand the role of institutional farm credit on farm income and farm household consumption expenditures. Thus, the contribution of the present study lies in assessing the impact of formal, institutional credit on farm households' welfare (including net farm income and household consumption expenditures) based on a unique farm- and household-level dataset.

The paper is organized as follows. Section 2 describes the sample data used for the study. Section 3 explains the approach and econometric models used to assess the determinants and impact of institutional credit. Section 4 provides the characteristics of the agricultural credit market in India. Section 5 discusses the characteristics of institutional and noninstitutional borrowers. Section 6 discusses the determinants of access to formal credit, and Section 7 discusses the impact of institutional credit on farm income and household expenditures. Finally, Section 8 concludes and discusses policy implications.

2. DATA

The study uses farm-level data from a nationally representative survey conducted by the National Sample Survey Office in 2013. The survey's purpose was to assess the status of farmers and farming in India (National Sample Survey Office 2014). The survey covered 4,529 villages spread across the country and elicited information from 35,200 farming households. The information was collected primarily for the agricultural year 2012–2013. The same households were visited twice during the survey period. The first visit was in January–July 2013, and the second visit was in August–December 2013. For crops, information on *expenses* and *receipts of cultivation* were collected for the period July–December 2012 on the first visit and for January–June 2013 on the second visit. The survey made sure that all the crops, whether principal or not, harvested during the agricultural year 2012–2013 were considered in the first or second visit. The same reference period was used for collecting information on *productive assets*. For other information, different reference periods were used. For instance, information on land possession and indebtedness was “as on the date of survey”; information on farming of animals was collected as in “last 30 days”; and information on nonfarm business, consumer expenditures, and principal source of income was collected on a “last 365 days” basis. In other words, the survey collected comprehensive information on the socioeconomic well-being of agricultural households; consumption expenditures; income from productive assets; borrowing, lending, and indebtedness; farming practices and preferences; resource availability; receipts and expenses of households' farm and nonfarm businesses; awareness of technological developments; and access to modern technology.

3. EMPIRICAL FRAMEWORK

To investigate the effect of formal credit on farmers' well-being, we use two specific research objectives. First, we assess the characteristics of farms and households associated with their access to institutional credit—a participation equation. Note that we put forward the issue as one of involvement and not of selection, because some characteristics that we observe now would have been different at the time of selection. Second, we assess the impact of formal credit on the economic welfare (farm income and household consumption expenditures) of farm operator households.

One of the significant problems in the literature is identifying the causal impact of formal credit on farm income. It is clear that several observed and unobserved characteristics that result in positive or negative selection in participation in the formal credit market are also likely to have an effect on farm income (such as skills in farming or social connectedness). Alternatively, access to credit usually is not random but is based on specific socioeconomic and geographical characteristics. The possibility of omitted variables implies that simple linear estimates of the effects of formal credit on farm income can be biased. To remedy this, we use the instrumental variables (IV) method (Khandekar and Faruquee 2003). We use a two-step procedure with IV to address the issue of endogeneity. In the first stage, the dependent variable is binary (access to formal credit = 1, otherwise = 0), and the independent variables are a mix of qualitative and quantitative variables. We use a logit model to examine the impact of factors associated with a farmer's access to formal credit. Specifically, the logistic regression is given by

$$Y_i = \ln \left[\frac{p}{1-p} \right] = \beta_0 + \sum \beta_i X_i, \quad (1)$$

where p represents the probability that the farmer takes formal credit, and β_{is} are regression coefficients to be estimated by the maximum likelihood method. X_i represents a vector of characteristics of farmer i , including socioeconomic and demographic characteristics.

In the second stage, to assess the impact of formal credit on farm income, the farm income function can be represented as

$$\pi_i = \alpha + \delta d_i + \gamma X_i + \varepsilon_i, \quad (2)$$

where π_i is net farm income per hectare received from farming, d_i is a dummy variable (= 1 if the farmer takes formal credit, otherwise = 0), X_i is a vector of observable farm and operator characteristics, and ε_i is an error term. In the case of per capita consumption expenditures, the dependent variable (left-hand side) in equation (2) is replaced with C_i . Specifically,

$$C_i = \alpha + \delta d_i + \gamma X_i + \varepsilon_i. \quad (3)$$

As discussed above, estimation of equations (2) and (3) using a simple ordinary least squares (OLS) regression may result in biased estimates. This is because farmers are not randomly chosen in receiving credit. Farmers are either selected for credit by the financial agency, or they decide on their own to avail themselves of credit. Both of these possibilities signify nonrandom selection. Hence, unobserved factors could be guiding farmers' decisions to access formal credit. Thus, d_i is likely to be endogenous and could be correlated with the error term, ε_i . We conducted a Hausman test for endogeneity and failed to reject the null hypothesis. The value of \hat{E} shows significant values (see Table A.1 in the appendix) at the 1 percent level for net farm income (12 percent) and household consumption expenditures (9 percent), indicating nonrandomness in the selection of farmers for formal credit. Without the benefit of a randomized assignment of farmers' access to formal credit, and given that unobserved characteristics such as hidden skills and entrepreneurial ability can play a role in the decision to access formal credit, we rely on IV

techniques. An ideal instrumental variable should not be correlated with the dependent variable in equation (2); however, it should be correlated with d_i , the variable representing access to formal credit. Additionally, the variable should not be from the vector of farm and operator characteristics, X_i . It is indeed difficult to find an ideal instrument in this setting. Finding a convincing instrumental variable is therefore crucial.

According to demand theory, price can be a useful instrument in predicting the need for a good. The price of an institutional loan is its interest rate, which hardly varies. Hence, the interest rate cannot be a good predictor of the demand for credit. We identify the “proportion of farmers using institutional credit in a village” as the instrumental variable. We hypothesize that as the share of farmers choosing formal credit in a given geographical and social neighborhood increases, the likelihood of a farmer participating in the formal credit market in that location also will increase. We call this variable the network variable. We check for the strength of the instrument in the first stage by including it in the regression of access to formal credit on its determinants. If the network variable is strongly correlated with d_i , that is, use of formal credit, and if it is not systematically related to income in farming, then it meets the required conditions for an instrumental variable.

4. CHARACTERISTICS OF AGRICULTURAL CREDIT MARKETS IN INDIA

India has a vast network of financial institutions, with the co-existence of dual (formal and informal) financial systems that both operate in the rural credit market. A large number of formal and informal agencies lend money to farmers for their short- and long-term needs. The formal agencies include cooperatives, Regional Rural Banks, Scheduled Commercial Banks, nonbanking financial institutions, self-help groups, microfinance institutions, and other government agencies. The informal sources comprise moneylenders, friends, relatives, traders/shopkeepers, employers, and others (see Table 4.1).

After the major banks were nationalized in 1969, commercial banks were mandated to open branches in rural areas. As a result, the number of rural branches³ increased from 1,833 in 1969 to about 47,000 in 2016. Further, considerable efforts were made to enhance the flow of institutional credit to agriculture. Since India's independence from Britain, the share of formal credit in India has increased from 9 percent in 1951 to about 61 percent in 2013 (Kumar, Singh, and Kumar 2007; Kumar et al. 2015). Nonetheless, the existence of an informal credit market alongside a formal, institutional credit market has been a key feature of the rural credit market in developing countries and has attracted continuous attention in development economics (Guirking 2008; Conning and Udry 2007; Hoff and Stieglitz 1990).

Table 4.1 Distribution of loans by sources

Share of formal sources		Share of informal sources	
Type	%	Type	%
Government	3.61	Employer or landlord	2.34
Cooperative society	25.37	Agricultural professional or moneylender	64.05
Bank	71.02	Shopkeeper	4.93
		Relatives or friends	24.03
		Others	4.65
Total	100.00	Total	100.00
Formal sources as share of total loans	63.56	Informal sources as share of total loans	36.44

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013. National Sample Survey Office (NSSO), Government of India.

Table 4.1 reveals that informal sources of rural credit account for about 36.4 percent of the loan volume for agricultural households, and professional moneylenders (64 percent) are the largest source of informal credit. Friends and relatives, who usually do not charge interest, provide 24 percent of informal loans. Shopkeepers account for 4.9 percent of informal loans to the agricultural sector, and the share of employers or landlords providing informal credit to agricultural households is negligible. Nearly 64 percent of the credit is from formal sources (Table 4.1). Banks have been the dominant force (71 percent) in issuing formal credit, followed by cooperative societies (25.4 percent) and government sources (3.6 percent).

The pattern of borrowing by agricultural households is shown in Tables 4.2 and 4.3. Agricultural households are grouped into four categories: nonborrowers, borrowers in the informal sector, borrowers in the formal sector, and borrowers in both the formal and informal sectors. It is worth mentioning that almost half of agricultural households (48 percent) do not borrow any money and thus are not participants in the financial markets. (Table 4.2). However, nonborrowing by agricultural households may not be voluntary, because many of them do not meet the requirements for borrowing money. Further, a positive relationship between the incidence of borrowing and land size indicates the involuntary exclusion of agricultural households from the rural credit market. Nonetheless, 23 percent of agricultural households reported having borrowed money from formal sources, 16 percent borrowed from informal sources, and 13 percent borrowed from both formal and informal sources.

³ Includes rural branches of Scheduled Commercial Banks and Regional Rural Banks, as well as branches of cooperative banks and primary cooperative societies.

Table 4.2 Farmers' access to credit from formal and informal sectors, 2012–2013

Land class	Distribution of households by borrowing (%)				Share of formal and informal credit in borrowing of households (%)	
	Non-borrower	Formal sources only	Informal sources only	Both simultaneously	Formal credit	Informal credit
Marginal	54.67	14.77	21.68	8.88	54.95	45.05
Small	48.32	24.23	14.17	13.27	64.26	35.74
Medium	41.47	29.98	11.57	16.98	67.13	32.87
Large	28.45	39.06	8.92	23.58	74.89	25.11
All	47.94	22.78	16.21	13.07	63.56	36.44

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013. NSSO, Government of India.

Access to institutional and noninstitutional credit differs in the context of land size. Access to formal credit is not scale-neutral, despite several measures to promote financial inclusion in India. Large segments of agricultural households still remain outside the formal credit system. Poor families often are excluded from formal credit markets because they lack collateral or guarantors (Ray 1998; Shoji et al. 2012). The relationship between land size and access to formal credit is positive. Agricultural households with better resources find easier access to formal credit systems compared to households with fewer resources. Data in Table 4.3 reveal that large farms, which total about 7 percent of agricultural households, account for about 12 percent of agricultural households that borrow exclusively from formal sources, and they account for 24 percent of the total formal credit issued to agricultural households. In contrast, marginal households, which are 40 percent of farm households, account for 26 percent of borrowing from formal sources, and their share of total formal credit is about 17 percent.

Table 4.3 Distribution of borrower households by operational holding (%)

Land class	Share of households	Non-borrower	Source of borrowing			Share in credit	
			Formal credit	Informal credit	Both simultaneously	Formal credit	Informal credit
Marginal	39.87	45.47	25.85	53.31	27.08	17.08	24.33
Small	30.54	30.78	32.48	26.68	31.02	25.31	28.07
Medium	22.77	19.69	29.96	16.25	29.58	33.27	29.61
Large	6.83	4.05	11.71	3.76	12.33	24.34	18.00
All	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013. NSSO, Government of India.

A contrasting scenario is found when it comes to informal credit. For instance, marginal farmers comprise 53 percent of agricultural households that borrow from informal sources, and their share of total informal credit is about 24 percent. Large farms, in contrast, account for only about 4 percent of households borrowing informally, and their share of total informal credit is about 18 percent. Access to institutional credit increases as land size increases, while credit from noninstitutional sources decreases as land size increases.

5. CHARACTERISTICS OF INSTITUTIONAL AND NONINSTITUTIONAL BORROWERS

Features of formal and informal borrowers are shown in Table 5.1. Interestingly, the average land size (owned) by formal borrowers in India is significantly larger (about 1.7 hectares) than the average land size of informal borrowers (about 0.8 hectare). Among formal borrowers, the average age of the household head is 51 years, the household has slightly more than five family members, and only 4 percent of such households have received formal training in agriculture. Among informal borrowers, the average age of the household head is about 47 years, the household has slightly more than five family members, and only 2 percent of these households have received formal training in agriculture. When comparing other variables between formal, institutional borrowers and informal, noninstitutional borrowers, we see significant differences (at the 1 percent level of significance) in Table 5.1. For instance, about 9 percent of Scheduled Tribe (ST) and 13 percent of Scheduled Caste (SCs)⁴ farming households receive loans from formal sources. The percentages of formal borrowers in Other Backward Class (OBC)⁵ and general caste farm households were higher, at 46 percent and 32 percent, respectively. In the case of religion, Hindus comprise 88 percent of farm households that used formal credit and account for 87 percent of informal borrowers. Farming was the principal source of income for both categories of households (79 percent and 75 percent, respectively).

Table 5.1 General characteristics of institutional and noninstitutional borrowers

Variables	Institutional	Noninstitutional	Difference in means/proportions (t-test)
<i>Sociodemographic variables</i>			
Age (years)	51.1	46.9	19.56***
Family size (no.)	5.2	5.2	2.61**
Land size (ha)	1.7	0.8	28.22***
Per capita monthly expenditures (Rs.)	1,603.7	1,298.3	3.25***
Male-headed household (%)	93.8	91.0	5.54***
Received formal training in agriculture (%)	3.7	1.9	6.75***
<i>Social structure by caste (%)</i>			
Scheduled Tribe	8.6	13.1	10.94
Scheduled Caste	12.8	19.1	13.90
OBC	46.1	47.2	5.03***
General caste	32.2	20.7	13.23***
<i>Social structure by religion (%)</i>			
Hindu	88.4	87.2	3.69**
Muslim	6.1	9.7	7.16
Christian	1.8	1.1	1.06
Other	3.3	1.8	13.23***
<i>Education level of head of household (%)</i>			
Illiterate	30.1	49.4	25.06***
Primary	27.9	24.8	1.54
Middle school	17.3	13.6	6.26***
Secondary	12.2	7.6	12.26***
Higher secondary and above	12.4	4.7	16.12***

⁴ SCs and STs are backward, uneducated, poor, and officially regarded as socially disadvantaged people in India.

⁵ Other Backward Class (OBC) is a collective term used by the government of India to classify castes that are socially and educationally disadvantaged. It is one of several official classifications of the population of India, along with Scheduled Castes and Scheduled Tribes (SCs and STs).

Table 5.1 Continued

Variables	Institutional	Noninstitutional	Difference in means/proportions (t-test)
Structure of households by farm category (%)			
Marginal	25.9	41.6	21.42***
Small	32.5	28.6	5.37***
Medium	30.0	22.2	11.41***
Large	11.7	7.6	9.07***
Principal source of household income (%)			
Agricultural income	79.2	74.8	6.79***
Nonagricultural income	17.4	22.4	7.99***
Pension	1.3	0.5	5.94***
Remittance	1.7	2.0	1.49***
Awareness and access to social safety nets (%)			
MSP awareness	30.6	22.3	12.22***
Have MGNREGA job card	93.1	90.7	5.48***
Have ration card	37.4	51.6	18.40***
Source of technical advice			
Extension agent	19.2	17.3	3.16***
KVK or SAU	8.5	5.0	9.21***
Private commercial agent	8.1	8.2	0.36***
Progressive farmer	20.7	22.3	2.45***
Radio/TV/newspaper/Internet	28.8	22.7	8.99***
NGO	1.3	0.8	3.1234***

Source: Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013. NSSO, Government of India.

Note: KVK = Krishi Vigyan Kendra; MGNREGA = Mahatma Gandhi National Rural Employment Guarantee Act; MSP = minimum support price; NGO = nongovernmental organization; OBC = Other Backward Class; SAU = State Agricultural University. *** p<0.01; ** p<0.05; * p<0.1.

There appears to be gender bias in access to institutional credit; the share of male-headed households receiving credit from institutional sources was higher than the share of female-headed households. Access to formal credit also reveals a direct relationship with education. The difference between farmers who borrowed from formal sources and those who borrowed from informal sources is more pronounced at higher levels of education. Agricultural households that are aware of the government's fixed minimum support prices (MSP) for agricultural commodities have a greater tendency than households unaware of the MSP to obtain credit from formal sources. For instance, about 31 percent of the households receiving formal credit were aware of the MSP, significantly higher than the share of informal borrowers (22 percent). About 93 percent of institutional borrowers received Mahatma Gandhi National Rural Employment Guarantee Act⁶ (MGNREGA) cards, compared to 91 percent of noninstitutional borrowers. Further, 37 percent of institutional borrowers and 52 percent of noninstitutional borrowers reported having Public Distribution System (PDS) ration cards.⁷

⁶ This Act guarantees 100 days of wage employment to a rural household in a calendar year.

⁷ PDS is based on the ration card, which is used to establish identity, eligibility, and entitlement and is primarily used when purchasing subsidized foodstuffs (wheat and rice) and fuel (liquefied petroleum gas and kerosene).

Approximately 41 percent of agricultural households in India access information about modern agricultural technologies and practices from at least one source (National Sample Survey Office 2014). The mass media (radio, television, newspapers, and the Internet) as a whole appears to be the most important source of information and is accessed by nearly 29 percent and 23 percent of formal and informal borrowers, respectively (Table 5.1). Government information sources together (extension agents, Krishi Vigyan Kendras, and State Agricultural Universities) provide information to 28 percent and 22 percent of institutional and noninstitutional borrowers, respectively. Finally, about 21 percent and 22 percent of institutional and noninstitutional borrowers, respectively, rely on fellow progressive farmers for their technical advice (Table 5.1).

6. DETERMINANTS OF ACCESS TO FORMAL CREDIT

Table 6.1 presents the parameter estimates for the factors affecting Indian agricultural households' access to formal credit. The results reveal that access to formal, institutional credit is significantly influenced by the operator's age, educational attainment, caste, and occupation, and by land size and access to social safety nets. The coefficient on the age of a household head (a proxy for experience) is positive and statistically significant at the 1 percent level. The results suggest that an additional year of age increases access to formal credit by about 20 percent. Recall that experience in farming helps improve decision making with regard to farm financing (Mishra et al. 2002). Level of education has been found to positively influence access to formal credit. For instance, farmers with middle school education are 9 percent (marginal effect) more likely to access formal credit than are uneducated peasants. Similarly, compared to the uneducated peasants accessing formal credit, the probability of accessing formal credit by farmers with higher secondary and graduate or above levels of education increases by 14 percent and 20 percent, respectively. A plausible explanation is that educated households are more aware of credit opportunities and of the formalities required to obtain formal credit. Lending institutions also may have more confidence in educated households, as they are likely to have better employment opportunities in the nonfarm sector and thus have additional income to repay loans. Our results are consistent with the findings in the literature (Kumar, Singh, and Kumar 2007; Pal and Laha 2015; Kumar et al. 2015).

Table 6.1 Determinants of access to institutional credit

Dependent variable: Access to institutional credit (Yes = 1, otherwise = 0)	Logit model		Marginal effect	
	Coefficient	Standard error	dy/dx	Standard error
Sociodemographic variables				
Log of age of household head	0.855***	(0.0600)	0.192***	(0.013)
Log of household size	0.078	(0.0497)	0.017	(0.011)
Gender (Male = 1, otherwise = 0)	-0.009	(0.0748)	-0.0021	(0.016)
Education level (illiterate as base)				
Primary (Yes = 1, otherwise = 0)	0.146	(0.217)	0.0317	(0.048)
Middle school (Yes = 1, otherwise = 0)	0.393***	(0.0560)	0.088***	(0.012)
Higher secondary (Yes = 1, otherwise = 0)	0.610***	(0.0436)	0.138***	(0.009)
Graduate and above (Yes = 1, otherwise = 0)	0.870***	(0.0971)	0.199***	(0.022)
Caste (Scheduled Caste as base)				
Scheduled Tribe (Yes = 1, otherwise = 0)	0.153*	(0.0842)	0.034*	(0.018)
OBC (Yes = 1, otherwise = 0)	0.144**	(0.0699)	0.032**	(0.015)
Other caste (Yes = 1, otherwise = 0)	0.124*	(0.0676)	0.028*	(0.015)
Religion (Hindu as base)				
Muslim (Yes = 1, otherwise = 0)	-0.110	(0.115)	-0.024	(0.025)
Christian (Yes = 1, otherwise = 0)	-0.0160	(0.201)	-0.003	(0.044)
Other religion (Yes = 1, otherwise = 0)	-0.259	(0.169)	-0.057	(0.036)
Economic variables				
Agricultural income (Yes = 1, otherwise = 0)	-0.207	(0.291)	-0.046	(0.065)
Nonagricultural income (Yes = 1, otherwise = 0)	-0.322	(0.292)	-0.072	(0.065)
Pension (Yes = 1, otherwise = 0)	0.152	(0.382)	0.034	(0.085)
Remittance (Yes = 1, otherwise = 0)	-0.254	(0.265)	-0.056	(0.059)
Log of per capita monthly expenditures (Rs.)	0.298***	(0.0567)	0.067***	(0.012)
Land size (marginal as base)				
Small (Yes = 1, otherwise = 0)	0.445***	(0.0499)	0.100***	(0.011)
Medium (Yes = 1, otherwise = 0)	0.555***	(0.0613)	0.126***	(0.013)
Large (Yes = 1, otherwise = 0)	0.543***	(0.0893)	0.123***	(0.020)

Table 6.1 Continued

Dependent variable: Access to institutional credit (Yes = 1, otherwise = 0)	Logit model		Marginal effect	
	Coefficient	Standard error	dy/dx	Standard error
Social safety nets				
Have MGNREGA job card (Yes = 1, otherwise = 0)	-0.347***	(0.0599)	-0.078***	(0.013)
Have ration card (Yes = 1, otherwise = 0)	0.248***	(0.0802)	0.056***	(0.017)
Source of technical advice				
Extension agent (Yes = 1, otherwise = 0)	-0.174**	(0.0793)	-0.039**	(0.017)
KVK or SAU (Yes = 1, otherwise = 0)	0.251***	(0.0780)	0.056***	(0.017)
Private commercial agent (Yes = 1, otherwise = 0)	-0.127	(0.109)	-0.028	(0.024)
Progressive farmer (Yes = 1, otherwise = 0)	-0.198***	(0.0630)	-0.044***	(0.014)
Radio/TV/newspaper/Internet (Yes = 1, otherwise = 0)	0.047	(0.0604)	0.010	(0.013)
NGO (Yes = 1, otherwise = 0)	0.307*	(0.174)	0.069*	(0.038)
Other variables				
Formal training (Yes = 1, otherwise = 0)	-0.007	(0.0689)	-0.002	(0.015)
MSP awareness (Yes =1, otherwise = 0)	0.114*	(0.0629)	0.025*	(0.014)
Constant	-6.534***	(0.536)		
Observations	16,583		16,583	
District fixed effect	Yes		Yes	
Log pseudo-likelihood	-10588.192			

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013, NSSO, Government of India.

Note: Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.1. KVK = Krishi Vigyan Kendra; MGNREGA = Mahatma Gandhi National Rural Employment Guarantee Act; MSP = minimum support price; NGO = nongovernmental organization; OBC = Other Backward Class; SAU = State Agricultural University.

With regard to the relationship between social groups (STs and OBC) and access to formal credit, the results show that farmers belonging to STs and OBC are more likely to have access to formal credit than those belonging to SCs. For instance, the marginal effects in Table 6.1 indicate that the probability of accessing formal credit by STs, OBCs, and other castes increases by 3 percent in each case compared SC households. Our result is consistent with earlier studies. For example, Kumar (2013) found that banks discriminate between borrowers on the basis of their caste in the provision of agricultural credit. Our results reveal that concerted efforts are still required to increase SCs' access to institutional credit.

Households receiving MGNREGA payments are less likely to avail themselves of credit from formal sources than households without such payments. This could be because MGNREGA reduces the households' need for credit. Households with ration cards have a higher probability of accessing formal credit than households without cards.

The results presented in Table 6.1 indicate that a 1 percent increase in per capita monthly expenditures increases access to formal credit by about 7 percent. This finding may reveal that farmers are using the credit for consumption purposes as well—bridging the gap between income and consumption. In other words, borrowing from institutions may be helpful in relieving the credit constraints of Indian farm households.

Table 6.1 shows that the farm household's religion does not make any difference in the household's ability to access formal credit. In contrast, land size plays a crucial role in enhancing agricultural households' access to formal credit. Compared to marginal landowners accessing formal credit, the probability of medium and large farm owners accessing formal credit increases by 13 percent and 12 percent, respectively. The source of farmers' technical information has a mixed effect on agricultural households' access to formal credit. For example, farmers receiving information on production agriculture from extension agents and progressive farmers are less likely to borrow from formal sources than from informal sources. However, farmers who receive information on production

agriculture from government officials (Krishi Vigyan Kendra [KVK], and State Agricultural Universities [SAUs]) or nongovernmental organizations (NGOs) are more likely to access credit through formal sources than informal sources. Finally, farm households that are aware of minimum support prices (government assistance programs) are more likely to access credit through formal sources than informal sources—the probability increases by 3 percent (Table 6.1).

7. IMPACT OF INSTITUTIONAL CREDIT ON FARM INCOME AND HOUSEHOLD CONSUMPTION EXPENDITURES

We now turn our attention to assessing the impact of access to formal credit on farm income and farm household expenditures. In other words, does access to institutional, or formal, credit improve farm income and household consumption expenditures? Table 7.1 compares average net returns per unit of cropped area—that is, net returns from farming⁸ (NRF)—for formal and informal borrowers by farm size. Some important points stand out in the summary comparison of net farm income (NFI) across formal and informal borrowers. First, access to institutional credit is associated with higher NFI. The NFI of formal borrowers (Rs. 43,740 per hectare) is significantly greater than that of informal sector borrowers (Rs. 33,734 per hectare). Second, the relationship between farm size and NFI per hectare is negative. The inverse relationship between farm size and productivity in India has been observed in some recent studies (for example, Chand, Prasanna, and Singh 2011; Birthal et al. 2013). Finally, the difference in NFI—statistically significant at the 1 percent level—between formal and informal borrowers increases with farm size (Table 7.1).

Table 7.1 Institutional credit, net farm income, and household consumption expenditures

Farm category	Net farm income (Rs./ha)		Difference in means (t-statistic)	Consumption expenditures (Rs./month/person)		Difference in means (t-statistic)
	Formal borrower	Informal borrower		Formal borrower	Informal borrower	
Marginal	49,118	41,862	-0.7306 ^{ns}	1,695	1,279	6.5833 ^{***}
Small	45,044	32,389	5.0369 ^{***}	1,629	1,424	4.6708 ^{***}
Medium	44,848	29,802	6.1876 ^{***}	1,750	1,789	-0.1350
Large	40,840	23,847	4.9189 ^{***}	2,158	1,931	1.6224
All	43,740	33,734	-0.9450 ^{ns}	1,744	1,483	3.2587 ^{***}

Source: Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013, NSSO, GoI.

Note: *** p<0.01, ** p<0.05, * p<0.1.

Table 7.1 also compares average per capita monthly consumption expenditures (MCE) for formal and informal borrowers by farm size. First, access to institutional credit is associated with higher per capita MCE. The per capita MCE of formal borrowers (Rs. 1,744) is significantly greater than that of informal sector borrowers (Rs. 1,483). Second, the relationship between farm size and per capita MCE is negative. Finally, the difference between formal and informal borrowers' per capita MCE—statistically significant at the 1 percent level—decreases with farm size (Table 7.1). This finding underscores the importance of formal credit in assisting marginal and poor farm households.

Impact of Institutional Credit on Farm Income

Table 7.2 reports estimates for both the two-stage least squares (2SLS) and OLS regressions. The second column reports parameter estimates of the first stage similar to the coefficients reported in Table 6.1, except for the inclusion of the instrumental variable as a regressor. Note that all estimates include district fixed effects, and the standard errors are clustered at the district level. Column 4 of Table 7.2 reports parameter estimates, in addition to the variable in the first stage, of the second-stage of IV regression. The coefficient of access to institutional credit is positive and statistically significant at the 1 percent level. The findings reveal that access to formal credit has a significant positive impact on NFI. Specifically, the results show that, compared to noninstitutional borrowers, institutional borrowers earn a 17 percent higher

⁸ NRF is calculated as gross returns from different crops *minus* production expenses.

return to farming (or NFI). The estimates from the IV estimation show that simple OLS estimates are probably downward biased (Column 6 of Table 7.2). Indeed, access to formal, institutional credit can enhance farmers' risk-bearing ability⁹ and may induce them to engage in risky ventures that could yield potentially higher returns (Diagne, Zeller, and Sharma 2000).

Table 7.2 Impact of institutional credit on net farm income

Variables	Dependent variable: log of NFI (Rs./ha)					
	2SLS				OLS	
	First stage		Second stage		Coefficient	Standard error
	Coefficient	Standard error	Coefficient	Standard error		
Institutional credit (Yes = 1, otherwise = 0)			0.171***	(0.0456)	0.0995***	(0.0247)
Sociodemographic variables						
Log of age of household head	0.0836***	(0.0108)	0.00215	(0.0324)	0.0157	(0.0317)
Log of household size	-0.0105*	(0.0063)	0.387***	(0.0307)	0.388***	(0.0310)
Gender (Male = 1, otherwise = 0)	0.0232*	(0.0121)	0.112***	(0.0361)	0.112***	(0.0364)
<i>Education level (illiterate as base)</i>						
Primary (Yes = 1, otherwise = 0)	0.0460	(0.0310)	-0.0162	(0.0601)	-0.0142	(0.0613)
Middle school (Yes = 1, otherwise = 0)	0.0158*	(0.0086)	0.00939	(0.0262)	0.0154	(0.0268)
Higher secondary (Yes = 1, otherwise = 0)	0.0493***	(0.0066)	0.0336	(0.0208)	0.0433**	(0.0209)
Graduate and above (Yes = 1, otherwise = 0)	0.0910***	(0.0101)	0.121***	(0.0371)	0.135***	(0.0363)
<i>Caste (Scheduled Caste as base)</i>						
Scheduled Tribe (Yes = 1, otherwise = 0)	0.0353***	(0.0088)	-0.0594	(0.0490)	-0.0570	(0.0492)
OBC (Yes = 1, otherwise = 0)	0.0108	(0.0081)	0.0814**	(0.0369)	0.0836**	(0.0371)
Other caste (Yes = 1, otherwise = 0)	0.0193**	(0.0086)	0.132***	(0.0379)	0.134***	(0.0382)
<i>Religion (Hindu as base)</i>						
Muslim (Yes = 1, otherwise = 0)	0.00449	(0.0074)	-0.0540	(0.0521)	-0.0561	(0.0523)
Christian (Yes = 1, otherwise = 0)	-0.0204	(0.0126)	0.0648	(0.0857)	0.0632	(0.0846)
Other religion (Yes = 1, otherwise = 0)	-0.0464***	(0.0087)	0.446***	(0.0567)	0.442***	(0.0574)
Economic variables						
Agricultural income (Yes = 1, otherwise = 0)	-0.00587	(0.0481)	0.785***	(0.1420)	0.782***	(0.1430)
Nonagricultural income (Yes = 1, otherwise = 0)	-0.0162	(0.0482)	0.136	(0.1480)	0.132	(0.1500)
Pension (Yes = 1, otherwise = 0)	0.0407	(0.0544)	0.0883	(0.1960)	0.0914	(0.1960)
Remittance (Yes = 1, otherwise = 0)	0.0350	(0.0513)	0.00794	(0.1570)	0.00435	(0.1580)
Log of per capita monthly expenditures (Rs.)	0.0124**	(0.0053)	0.378***	(0.0368)	0.383***	(0.0366)

⁹ Recall that Robison and Barry (1987) show that risk-bearing capacity increases with farm income. Increased farm income may translate into higher wealth (more land and machinery). And wealthy farmers are known to accept more risk.

Table 7.2 Continued

Dependent variable: log of NFI (Rs./ha)						
Variables	2SLS				OLS	
	First stage		Second stage		Coefficient	Standard error
	Coefficient	Standard error	Coefficient	Standard error		
Land size (marginal as base)						
Small (Yes = 1, otherwise = 0)	0.0578***	(0.0071)	0.707***	(0.0253)	0.714***	(0.0255)
Medium (Yes = 1, otherwise = 0)	0.0845***	(0.0076)	1.084***	(0.0295)	1.093***	(0.0296)
Large (Yes = 1, otherwise = 0)	0.0993***	(0.0111)	1.623***	(0.0480)	1.632***	(0.0487)
Social safety nets						
Have MGNREGA job card (Yes = 1, otherwise = 0)	-0.0238***	(0.0050)	-0.0784***	(0.0290)	-0.0840***	(0.0300)
Have ration card (Yes = 1, otherwise = 0)	0.0129	(0.0094)	0.00403	(0.0303)	0.00782	(0.0309)
Source of technical advice						
Extension agent (Yes = 1, otherwise = 0)	-0.0150*	(0.0084)	-0.00971	(0.0492)	-0.0126	(0.0499)
KVK or SAU (Yes = 1, otherwise = 0)	0.00671	(0.0109)	0.00173	(0.0430)	0.00546	(0.0434)
Private commercial agent (Yes = 1, otherwise = 0)	-0.0106	(0.0093)	0.178***	(0.0607)	0.176***	(0.0610)
Progressive farmer (Yes = 1, otherwise = 0)	-0.0199***	(0.0061)	0.0192	(0.0315)	0.0161	(0.0320)
Radio/TV/newspaper/Internet (Yes = 1, otherwise = 0)	-0.00414	(0.0062)	0.0662*	(0.0350)	0.0666*	(0.0351)
NGO (Yes = 1, otherwise = 0)	0.0337	(0.0246)	0.258**	(0.1120)	0.262**	(0.112)
Other key variables						
Formal training (Yes = 1, otherwise = 0)	-0.00325	(0.0126)	0.00363	(0.0593)	0.00344	(0.0602)
MSP awareness (Yes = 1, otherwise = 0)	0.00650	(0.0056)	0.246***	(0.0241)	0.248***	(0.0246)
Share of food crop	0.0106*	(0.0055)	0.570***	(0.0320)	0.569***	(0.0323)
Share of high-value crops	0.00135	(0.0078)	0.897***	(0.0338)	0.901***	(0.0349)
Share of oilseeds	-0.00243	(0.0066)	0.383***	(0.0524)	0.385***	(0.0524)
Share of other crops (nonfood)	-0.00314	(0.0068)	0.348***	(0.0443)	0.348***	(0.0440)
Instrumental variable						
Proportion of households availed institutional credit by village wise	0.956***	(0.0030)				
Constant	-0.487***	(0.0758)	5.366***	(0.3760)	5.299***	(0.3650)
Observations	16,583		16,583		16,583	
District fixed effect	Yes		Yes		Yes	
R-squared	0.473		0.528		0.528	

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013, NSSO, Government of India.

Note: Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.1. KVK = Krishi Vigyan Kendra; MGNREGA = Mahatma Gandhi National Rural Employment Guarantee Act; MSP = minimum support price; NFI = net farm income; NGO = nongovernmental organization; OBC = Other Backward Class; SAU = State Agricultural University.

Other variables that show a significant relationship with NFI include household size, the gender of the operator, farming occupation, caste, religion, the source of information, awareness of MSP programs, training in agriculture, and so forth. Household size—a proxy for labor availability—has a significant positive impact on NFI. Households with larger family sizes and households headed by males are likely to earn higher NFI in the presence of institutional or formal credit than in the presence of noninstitutional, informal credit.

Similarly, compared to illiterate and low-education households, households with higher education (higher secondary and more) tend to reap larger benefits by accessing institutional credit. Again, compared to SCs and STs, households belonging to OBC and general caste are likely to earn higher NFI in the presence of institutional, formal credit. Households belonging to other religions earn higher NFI than those belonging to the Hindu, Muslim, and Christian religions. The households for which agriculture is the principal source of income are likely to have higher NFI in the presence of institutional credit than in the presence of noninstitutional credit. Also, the households that allocate a larger area to high-value crops¹⁰ are likely to derive higher profits as compared to allocation to other crops. The results presented in Table 7.2 show that formal borrowers who solicit technical advice from private commercial sources, the mass media, and NGOs have a higher NFI in the presence of institutional credit than in the presence of noninstitutional credit. The awareness of MSP programs, in the presence of institutional credit, improves farmers' ability to increase their NFI. In fact, awareness of MSP helps farmers plan production activities, allocate resources, explore and bargain, and market their produce more effectively.

Impact of Farm Credit on Household Consumption Expenditures

Table 7.3 reports estimates for both the 2SLS and OLS regressions. Note that all estimates include district fixed effects, and the standard errors are clustered at the district level. Column 4 of Table 7.3 reports parameter estimates, in addition to the variable in the first stage, of the second-stage of IV regression. The coefficient on the institutional, formal credit variable is positive and statistically significant at the 1 percent level. The results indicate that access to institutional credit increases per capita MCE by 10 percent compared to those without access to such credit. Recall that per capita MCE is a proxy of household income, and thus an increase in household expenditures reflects a decline in poverty. These results are consistent with other studies in the literature (Coleman 1999; Khandker and Faruquee 2003; Awotide et al. 2015) that argue that access to credit could reduce poverty in rural areas.

Table 7.3 Impact of institutional credit on household consumption expenditures

Variables	Dependent variable: log of MCE (Rs./person/month)					
	2SLS				OLS	
	First stage		Second stage		Coefficient	Standard error
Coefficient	Standard error	Coefficient	Standard error			
Institutional credit (Yes = 1, otherwise = 0)			0.107***	(0.0239)	0.0562***	(0.0114)
Sociodemographic variables						
Log of age of household head	0.0861***	(0.0107)	0.195***	(0.0152)	0.205***	(0.0160)
Log of household size	-0.0165***	(0.0056)	-0.482***	(0.0111)	-0.483***	(0.0110)
Gender (Male = 1, otherwise = 0)	0.0227*	(0.0121)	-0.0463***	(0.0162)	-0.0466***	(0.0164)
Education level (illiterate as base)						
Primary (Yes = 1, otherwise = 0)	0.0461	(0.0310)	-0.000423	(0.0419)	0.00100	(0.0416)
Middle school (Yes = 1, otherwise = 0)	0.0162*	(0.0086)	0.0315***	(0.0120)	0.0359***	(0.0122)

¹⁰ High-value crops include fruits, vegetables, and spices.

Table 7.3 Continued

Dependent variable: log of MCE (Rs./person/month)						
Variables	2SLS				OLS	
	First stage		Second stage		Coefficient	Standard error
	Coefficient	Standard error	Coefficient	Standard error		
Higher secondary (Yes = 1, otherwise = 0)	0.0509***	(0.0066)	0.124***	(0.0131)	0.132***	(0.0139)
Graduate and above (Yes = 1, otherwise = 0)	0.0940***	(0.0100)	0.233***	(0.0217)	0.244***	(0.0227)
<i>Caste (Scheduled Caste as base)</i>						
Scheduled Tribe (Yes = 1, otherwise = 0)	0.0343***	(0.0088)	-0.0857***	(0.0285)	-0.0842***	(0.0287)
OBC (Yes = 1, otherwise = 0)	0.0115	(0.0081)	0.0584***	(0.0161)	0.0602***	(0.0162)
Other caste (Yes = 1, otherwise = 0)	0.0205**	(0.0086)	0.0939***	(0.0161)	0.0957***	(0.0161)
<i>Religion (Hindu as base)</i>						
Muslim (Yes = 1, otherwise = 0)	0.00619	(0.0073)	0.137***	(0.0226)	0.135***	(0.0231)
Christian (Yes = 1, otherwise = 0)	-0.0171	(0.0124)	0.269***	(0.0396)	0.269***	(0.0403)
Other religion (Yes = 1, otherwise = 0)	-0.0409***	(0.0081)	0.450***	(0.0389)	0.449***	(0.0388)
<i>Economic variables</i>						
Agricultural income (Yes = 1, otherwise = 0)	-0.00543	(0.0482)	0.0362	(0.0799)	0.0343	(0.0811)
Nonagricultural income (Yes = 1, otherwise = 0)	-0.0144	(0.0484)	0.143*	(0.0790)	0.140*	(0.0800)
Pension (Yes = 1, otherwise = 0)	0.0438	(0.0546)	0.249**	(0.1110)	0.252**	(0.1130)
Remittance (Yes = 1, otherwise = 0)	0.0377	(0.0515)	0.212***	(0.0805)	0.211**	(0.0814)
<i>Land size (marginal as base)</i>						
Small (Yes = 1, otherwise = 0)	0.0589***	(0.0071)	0.0801***	(0.0123)	0.0855***	(0.0126)
Medium (Yes = 1, otherwise = 0)	0.0867***	(0.0075)	0.173***	(0.0148)	0.181***	(0.0147)
Large (Yes = 1, otherwise = 0)	0.103***	(0.0110)	0.311***	(0.0202)	0.318***	(0.0200)
<i>Social safety nets</i>						
Have MGNREGA job card (Yes = 1, otherwise = 0)	-0.0247***	(0.0050)	-0.0640***	(0.0132)	-0.0682***	(0.0137)
Have ration card (Yes = 1, otherwise = 0)	0.0146	(0.0093)	0.137***	(0.0151)	0.140***	(0.0156)
<i>Source of technical advice</i>						
Extension agent (Yes = 1, otherwise = 0)	-0.0153*	(0.0084)	-0.0227	(0.0224)	-0.0248	(0.0229)
KVK or SAU (Yes = 1, otherwise = 0)	0.00809	(0.0109)	0.111***	(0.0246)	0.114***	(0.0248)
Private commercial agent (Yes = 1, otherwise = 0)	-0.00995	(0.0093)	0.0503*	(0.0266)	0.0491*	(0.0269)
Progressive farmer (Yes = 1, otherwise = 0)	-0.0199***	(0.0060)	-0.000428	(0.0150)	-0.00266	(0.0151)
Radio/TV/newspaper/Internet (Yes = 1, otherwise = 0)	-0.00324	(0.0061)	0.0735***	(0.0092)	0.0740***	(0.0091)
NGO (Yes = 1, otherwise = 0)	0.0336	(0.0246)	-0.00708	(0.0505)	-0.00394	(0.0510)

Table 7.3 Continued

Dependent variable: log of MCE (Rs./person/month)						
Variables	2SLS				OLS	
	First stage		Second stage		Coefficient	Standard error
	Coefficient	Standard error	Coefficient	Standard error		
Other key variables						
Formal training (Yes = 1, otherwise = 0)	-0.00301	(0.0126)	0.0202	(0.0206)	0.0201	(0.0211)
MSP awareness (Yes = 1, otherwise = 0)	0.00754	(0.0056)	0.0832***	(0.0146)	0.0850***	(0.0149)
Share of food crop	0.00996*	(0.00551)	-0.0505***	(0.0122)	-0.0519***	(0.0121)
Share of high-value crops	0.00300	(0.0077)	0.133***	(0.0173)	0.136***	(0.0178)
Share of oilseeds	-0.00282	(0.0066)	-0.0317	(0.0200)	-0.0303	(0.0203)
Share of other crops (nonfood)	-0.00288	(0.0069)	0.0218	(0.0271)	0.0222	(0.0274)
Instrumental variable						
Proportion of households availed institutional credit by village wise	0.957***	(0.0030)				
Constant	-0.405***	(0.0665)	6.694***	(0.0968)	6.667***	(0.1000)
Observations		16,583		16,583		16,583
District fixed effect		Yes		Yes		Yes
R-squared		0.473		0.360		0.362

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013, NSSO, Government of India.

Note: Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.1. KVK = Krishi Vigyan Kendra; MCE = monthly consumption expenditures; MGNREGA = Mahatma Gandhi National Rural Employment Guarantee Act; MSP = minimum support price; NGO = nongovernmental organization; OBC = Other Backward Class; SAU = State Agricultural University.

The other variables associated with increasing per capita MCE include the age and educational attainment of the household head. For instance, an additional year of age increases per capita MCE by about 20 percent (Column 4, Table 7.3). Compared to uneducated farmers, farmers with middle school or above education (middle school, higher secondary, and graduate) are likely to increase per capita MCE in the presence of institutional, formal credit. The impact of this increase in per capita MCE is growing in magnitude (3 percent for middle school, 12 percent for higher secondary, and 23 percent for graduate and above). In contrast, household size and female headed households have a negative effect on per capita MCE in the presence of institutional credit. For example, in the presence of formal credit, an additional household member decreases per capita MCE by about 48 percent, and a male-headed household has lower per capita MCE than a female-headed household.

Most of the factors affecting per capita MCE in general are similar to those influencing NFI. However, a few exceptions are discernible. For instance, households relying on pensions and remittances as their principal sources of revenue are in a better position than other families to increase their per capita MCE. The results presented in Table 7.3 show that borrowers soliciting technical advice from KVKs and SAUs, private commercial agents, radio, TV, newspaper, and Internet sources have a greater chance of increasing their per capita MCE in the presence of institutional credit than borrowers obtaining their advice elsewhere. Awareness of MSP programs, in the presence of institutional credit, increases farmers' ability to improve their per capita MCE. Perhaps with the help of MSP, farmers stabilize their income and maintain or increase their consumption expenditures. Finally, the results outlined in Table 7.3 show that in the presence of formal credit, access to social safety net programs like MGNREGA and ration cards have a negative effect on per capita MCE. For instance, farm households participating in programs like MGNREGA, in the presence of formal credit, decrease per capita MCE by about 6 percent compared to households not participating in such programs. In contrast, farm households involved in PDS or ration cards, in the presence of formal credit, increase their per capita MCE by about 14 percent compared to households not receiving ration cards.

8. CONCLUSION AND POLICY IMPLICATIONS

This study investigated the relationship between institutional credit and the economic well-being of farm households in India. Net farm income and per capita household consumption expenditures were taken as proxies for measuring the economic welfare of agricultural households. Using a large nationally representative sample and instrumental variables, we find statistically significant effects of institutional credit not only on net farm income but also on per capita household consumption expenditures. Our results suggest that perceptions of the ineffectiveness of credit, often expressed in policy discourse, may be misplaced. Formal credit is indeed playing a critical role in increasing both the net farm incomes and per capita monthly household expenditures of Indian farm families.

However, our results provide evidence of poor access to formal credit by small landowners. Formal lenders are explicitly biased toward families with large farms, and as a consequence, marginal and small farmers are left out. The estimated impact of institutional credit depicts a positive relationship with land size, and agricultural households with greater land size seem to receive more benefits. This trend must be arrested, and efforts should be made to improve smallholders' access to formal credit.

Finally, our study finds that social safety net programs may have unintended consequences. In particular, MGNREGA reduces both net farm income and per capita monthly household consumption expenditures. Perhaps such programs, in the presence of formal credit, reduce the recipients' incentive to work. However, social safety net programs such as the Public Distribution System (ration cards), in the presence of formal credit, may induce farmers and their families to increase their per capita monthly consumption expenditures. These households may be allocating extra income—savings—to consuming other items, such as higher-quality food items, like meats and proteins, or to purchasing consumer durables.

This study has important policy implications. Our analysis supports the strong push being made to expand the reach of formal credit institutions and to improve farmers' access to formal financing. The results of this study will contribute significantly to some of the ongoing policy discussions in India. Historically, the policy thrust for financial inclusion has come from Priority Sector Lending (PSL), which mandates that 18 percent of all credit be made available to agriculture, with 11.5 percent dedicated to direct financing. The norms for PSL are in transition, and the latest notification of the Reserve Bank of India on PSL has abolished the differentiation between direct and indirect financing to agriculture (RBI 2015). Further, a target of 8 percent of PSL has been prescribed for small and marginal farmers within agriculture to promote financial inclusion. The changing norms are expected to expand financial inclusion and improve small and marginal farmers' access to formal credit.

APPENDIX: SUPPLEMENTARY TABLE

Table A.1 Hausman test for endogeneity for net farm income and household consumption expenditures

Variables	Net farm income		Household consumption expenditures	
	Coefficient	Standard error	Coefficient	Standard error
Institutional credit (Yes = 1, otherwise = 0)	0.166***	(0.0441)	0.103***	(0.0231)
Sociodemographic variables				
Log of age of household head	0.0125	(0.0318)	0.202***	(0.0156)
Log of household size	0.385***	(0.0312)	-0.483***	(0.0110)
Gender (Male = 1, otherwise = 0)	0.115***	(0.0362)	-0.0444***	(0.0162)
<i>Education level (illiterate as base)</i>				
Primary (Yes = 1, otherwise = 0)	-0.0105	(0.0627)	0.00363	(0.0407)
Middle school (Yes = 1, otherwise = 0)	0.0113	(0.0265)	0.0330***	(0.0122)
Higher secondary (Yes = 1, otherwise = 0)	0.0397*	(0.0206)	0.129***	(0.0137)
Graduate and above (Yes = 1, otherwise = 0)	0.132***	(0.0366)	0.241***	(0.0225)
<i>Caste (Scheduled Caste as base)</i>				
Scheduled Tribe (Yes = 1, otherwise = 0)	-0.0551	(0.0494)	-0.0827***	(0.0288)
OBC (Yes = 1, otherwise = 0)	0.0827**	(0.0371)	0.0595***	(0.0161)
Other caste (Yes = 1, otherwise = 0)	0.134***	(0.0381)	0.0957***	(0.0160)
<i>Religion (Hindu as a base)</i>				
Muslim (Yes = 1, otherwise = 0)	-0.0535	(0.0525)	0.137***	(0.0227)
Christian (Yes = 1, otherwise = 0)	0.0623	(0.0866)	0.268***	(0.0399)
Other religion (Yes = 1, otherwise = 0)	0.440***	(0.0566)	0.447***	(0.0392)
Economic variables				
Agricultural income (Yes = 1, otherwise = 0)	0.784***	(0.1430)	0.0357	(0.0813)
Nonagricultural income (Yes = 1, otherwise = 0)	0.134	(0.1490)	0.141*	(0.0802)
Pension (Yes = 1, otherwise = 0)	0.0933	(0.1950)	0.253**	(0.1130)
Remittance (Yes = 1, otherwise = 0)	0.0123	(0.1560)	0.216**	(0.0819)
Log of per capita monthly expenditures (Rs.)	0.380***	(0.0369)		
Land size (marginal as base)				
Small (Yes = 1, otherwise = 0)	0.714***	(0.0253)	0.0853***	(0.0124)
Medium (Yes = 1, otherwise = 0)	1.095***	(0.0295)	0.181***	(0.0147)
Large (Yes = 1, otherwise = 0)	1.636***	(0.0481)	0.320***	(0.0200)
Social safety nets				
Have MGNREGA job card (Yes = 1, otherwise = 0)	-0.0814***	(0.0296)	-0.0662***	(0.0134)
Have ration card (Yes = 1, otherwise = 0)	0.00563	(0.0308)	0.138***	(0.0153)
Source of technical advice				
Extension agent (Yes = 1, otherwise = 0)	-0.0116	(0.0497)	-0.0240	(0.0226)
KVK or SAU (Yes = 1, otherwise = 0)	0.00256	(0.0436)	0.112***	(0.0248)
Private commercial agent (Yes = 1, otherwise = 0)	0.177***	(0.0612)	0.0495*	(0.0267)
Progressive farmer (Yes = 1, otherwise = 0)	0.0168	(0.0318)	-0.00218	(0.0151)
Radio/TV/newspaper/Internet (Yes = 1, otherwise = 0)	0.0656*	(0.0354)	0.0732***	(0.0092)
NGO (Yes = 1, otherwise = 0)	0.262**	(0.1130)	-0.00412	(0.0507)

Table A.1 Continued

Variables	Net farm income		Household consumption expenditures	
	Coefficient	Standard error	Coefficient	Standard error
Other key variables				
Formal training (Yes = 1, otherwise = 0)	0.00323	(0.0600)	0.0199	(0.0208)
MSP awareness (Yes = 1, otherwise = 0)	0.247***	(0.0242)	0.0838***	(0.0147)
Share of food crop	0.572***	(0.0323)	-0.0497***	(0.0124)
Share of high-value crops	0.897***	(0.0339)	0.133***	(0.0174)
Share of oilseeds	0.383***	(0.0529)	-0.0320	(0.0201)
Share of other crops (nonfood)	0.347***	(0.0447)	0.0216	(0.0275)
\hat{E} (Ehat)	-0.118**	(0.0464)	-0.0843***	(0.0249)
Constant	5.305***	(0.3660)	6.658***	(0.1000)
Observations	16,583		16,583	
R-squared	0.528		0.364	

Source: Authors' calculations based on unit level data from Situation Assessment Survey of Agricultural Households, 2013, NSSO, Government of India.

Note: Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.1. KVK = Krishi Vigyan Kendra; MGNREGA = Mahatma Gandhi National Rural Employment Guarantee Act; MSP = minimum support price; NGO = nongovernmental organization; OBC = Other Backward Class; SAU = State Agricultural University.

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