Scale Neutrality in Indian Agriculture

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Abstract

This study looks into four broad questions on smallholder agriculture, that is, the marginal and small farm sizes that constitute more than 85 per cent of the operational holdings in India. Are returns to smallholder agriculture sustainable? Is the smallholder agriculture efficient? Does the smallholder have access to formal sources of credit? Is credit provided by formal sources scale neutral? Our observation suggests the following. The returns to the smallholder are woefully low to address livelihood sustainability. The contention that the smallholders are inefficient is rejected. Further, the smallholders are the ones who have to rely more on non-institutional sources for their credit requirement and at many a times with a greater interest burden. In addition, the credit provided by formal sources is not scale neutral. This puts us in a difficult policy praxis, as the ones who are efficient cannot sustain themselves and are also subjected to greater burden for their credit requirement.

Key words: Agriculture, credit, efficient, farm size, India, scale neutrality, smallholder, sustainable.

JEL Codes: O13, Q12, Q14

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1. Introduction

There is a persistence of crisis in Indian Agriculture.[4] The crisis can be analytically separated between the agrarian and the agricultural. Some aspects of the agrarian crisis are declining share of the pie for those dependent on agriculture for their livelihood, relatively lower farm incomes such that in 2012-13 the farm sizes representing nearly 70 per cent of farmer households have an income that is lower than their expenditure, high incidence of food and nutritional insecurity with India ranking 100 out of 119 countries in the 2017 global hunger index as well as continuing farmers' suicides. At the same time, some aspects identified as agricultural crisis are lower or plateauing of growth in agricultural production, widening gap between agricultural and non-agricultural sector, increasing risk and vulnerability, and credit or debt related issues.

A thin line separates credit and debt. Credit is important for an enterprise, as it would facilitate its functioning. Credit, at times, may be required for day-to-day activities (working capital), but a necessary requirement for expansion - both vertical (taking up more and more activities in the value chain), and horizontal (setting up of the activity in more and more locations). Hence, for any enterprise, it is important that credit provided is adequate, timely, and serviceable. In fact, inadequate and untimely credit would make the credit non-serviceable, but there could be other reasons also. Once credit is non-serviceable, it becomes a matter of concern, a debt. A debt that is a burden for the debtor and adds to the non-performing asset of the creditor.

The concern for credit-related or indebtedness-aspects of farmers has lead to important policy documents that, inter alia, include the *Report of the Working Group to Suggest Measures to Assist Distressed Farmers* (Reserve Bank of India (RBI), 2006), the *Report of the Expert Group on Agricultural Indebtedness* (Government of India (GOI), 2007), and the *Report of the Task Force on Credit Related Issues of Farmers* (GOI, 2009). These reports do reiterate the age old adage that agriculture has become unviable because credit provided is increasingly becoming inadequate, untimely, and hence, non-serviceable. To add to the woe, these reports also point out in an explicit sense that agricultural credit is provided for doing the same things again and again and not for horizontal or vertical expansions. The enterprising farmer who is exposed to the vagaries of weather (including climate change) and market shocks (both for input and output) is perhaps without a viable business model.

Concomitant to the unviable nature of agriculture has been the concern, in recent times, of the recurring requirement of debt waiver. In fact, the RBI had a day-long deliberation in August 2017 on "Agricultural Debt Waiver - Efficiency and Limitations." Some of the questions that these raise are as follows.

- What is the proportion of population dependent on agriculture for their livelihood? Is livelihood of those dependent on agriculture (particularly, that of the smallholders) sustainable?

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[4] For discussion on the crisis in Indian Agriculture, see Reddy and Mishra (2009), Deshpande and Arora (2010), Mishra and Reddy (2011), Mishra (2012, 2015, 20117), and Vasavi (2012) among others.

- Is the smallholder farmer inefficient? In other words, are the smallholders (or, marginal and small farm size households who constitute more than 80 per cent of farm households in India) inefficient?[5] Or, is Indian agriculture scale neutral?
- What are the sources of credit for agriculture and their interest burden? Is credit provided to agriculture scale neutral?

To address the above-mentioned questions the objectives of the study are as follows:

- To examine whether returns to cultivation provides for sustenance of the smallholders
- To revisit the relationship between farm size and productivity using recent data
- To evaluate access to credit by the smallholders over time and across regions

The issue of sustenance of smallholders is discussed in section 2, the relationship between farm size and productivity are taken up in section 3, the access to credit by farm households is elucidated in section 4. Concluding remarks are in section 5.

2. Sustenance of the smallholder[6]

In 2011, as per census of India, about two fifths of the population were total workers engaged in some economic activities (not including household work), Table 1. From these, close to one-fourth are cultivators and three-tenth are agricultural labourers. In other words, 55 per cent are dependent on agriculture for their livelihood. What is more, when compared with 2001, the proportion of cultivators has reduced by 7.1 percentage points and that of agricultural labourers has increased by 3.5 percentage points. Between 2001 and 2011, there is perhaps a shift of those who were cultivators to being agricultural labourers.

<table>
<tr><td colspan="7">Table 1
Share of Cultivators and Agricultural labourers among Total workers in India,
2001 and 2011</td></tr>
<tr><td>Indicators</td><td colspan="3">2001</td><td colspan="3">2011</td></tr>
<tr><td></td><td>R</td><td>U</td><td>T</td><td>R</td><td>U</td><td>T</td></tr>
<tr><td>Population (crore)</td><td>74.2</td><td>28.6</td><td>102.9</td><td>83.4</td><td>37.7</td><td>121.1</td></tr>
<tr><td>Proportion of total workers (%)</td><td>41.7</td><td>32.3</td><td>39.1</td><td>41.8</td><td>35.3</td><td>39.8</td></tr>
<tr><td>Main workers/total workers (%)</td><td>73.9</td><td>90.8</td><td>77.8</td><td>70.5</td><td>87.5</td><td>75.2</td></tr>
<tr><td>Marginal workers/total workers (%)</td><td>26.1</td><td>9.2</td><td>22.2</td><td>29.5</td><td>12.4</td><td>24.8</td></tr>
<tr><td>Cultivators/total workers (%)</td><td>40.2</td><td>2.8</td><td>31.7</td><td>33.0</td><td>2.8</td><td>24.6</td></tr>
<tr><td>Agricultural Labourers/total workers (%)</td><td>33.0</td><td>4.7</td><td>26.5</td><td>39.3</td><td>5.5</td><td>30.0</td></tr>
<tr><td colspan="7">Note: R=rural, U=urban, and T=total
Source: Census of India 2001 and 2011</td></tr>
</table>

As per agricultural census, one observes that in 2010-11 the operational holdings distribution is as follows: 67 per cent marginal (less than 1 hectare), 18 per cent small (1 to 2 hectares), 10 per cent semi-medium (2 to 4 hectares), 4 per cent medium (4 to 10 hectares), and large

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[5] A marginal farmer household is one with farm size less than 1 hectare (or 2.5 acres) and small farmer household is one with farm size between 1 and 2 hectares (or, between 2.5 to 5 acres).
[6] Some of the aspects discussed here have also been discussed in Mishra (2015, 2017).

(10 hectares and above), Table 2. Compared to 2000-01, there has been an increase in the share of operational holding of only the marginal farm sizes (by 4.2 percentage points) and a decrease in all other farm sizes.

Table 2
Share of Operational Holdings, Share of Area Operated, and Average Area Operated, 2000-01 and 2010-11

Indicators	2000-01*			2010-11		
	SOH	SAO	AAO	SOH	SAO	AAO
Marginal (below 1 hectare)	62.9	18.7	0.4	67.1	22.5	0.4
Small (1-2 hectares)	18.9	20.2	1.4	17.9	22.1	1.4
Semi-medium (2-4 hectares)	11.7	24.0	2.7	10.0	23.6	2.7
Medium (4-10 hectares)	5.5	24.0	5.8	4.2	21.2	5.8
Large (10 hectares and above)	1.0	13.2	17.1	0.7	10.6	17.4
All	100.0	100.0	1.3	100.0	100.0	1.2

Note: * 2000-01 data excludes Jharkhand. However, it may also be mentioned that in 2010-11 distribution of Jharkhand data is similar to rest of India. SOH=Share of operational holdings, SAO=Share of operated area, and AAO=Average operated area. Total operational holdings is 11,99,31,000 in 2000-01 and 13,43,48,000 in 2010-11, total area operated is 15,94,36,000 hectares in 2000-01 and 15,95,92,000 hectares in 2010-11. The increase in area operated may be attributed to Jharkhand.
Source: Agricultural Census of India, 2000-01 and 2010-11.

Table 3
Share of Agriculture & Allied Activities in GDP and Employment

Period	Share of Agriculture & Allied in GDP, 2004–05 prices, (%age change)	Share of Agriculture & Allied in Employment, UPSS, (%age change)
1999–00	23.2 (5.0)*	60.2 (3.7)*
2004–05	19.0 (4.2)	56.5 (3.7)
2009–10	14.6 (4.4)	53.2 (3.3)
2011–12	14.4 (0.2)	48.9 (4.3)

Note: GDP denotes Gross Domestic Product and UPSS denote usual principal and subsidiary status. * the percentage change is with respect to 1993-94.
Source: Mishra (2015)

Another anomaly in agriculture is that the sector contributes a relatively lower share to national income while employing a relatively larger share of the workers (Table 3). It is tautological that the returns to the population dependent on agriculture would be relatively lower. One also observes that the fall in the share of income has been relatively higher than the fall in the share of employment till 2009-10. It is between 2009-10 and 2011-12 that one observes the fall in share of employment to be higher than the fall in the share of income. The persistence of a crisis in Indian agriculture along with changing demographics and aspiration provides the backdrop for an increase in the fall in share of employment in agriculture. This perhaps is a tipping point and one expects that the relatively higher fall in the share of employment will continue.

Between 2002-03 and 2012-13, one could make use of estimates using National Sample Survey (NSS) to infer some additional changes. However, one should be cautious as the

reference category surveyed has changed. In 2012-13, the need for possession of land to be identified to be surveyed was not a requisite, but a minimum requirement of ₹3,000 in agricultural production was included. A distribution of households by farm sizes in the two NSS rounds in Table 3 indicates that the number of households has reduced for near landless, lower marginal and large farm sizes (Table 4). A reduction in large farm sizes corroborates the observation from operational holdings (Table 2), while the reduction in near landless and lower marginal may be linked to such categories having production less than ₹3,000 and such household members may be shifting away from being cultivators (Table 1) or may be moving away from agriculture (Table 3). The exclusion of the latter households in recent times could overestimate growth. Further, the growth could be an overestimate because 2002-03 was a drought year making the values in the base year lower.

Table 4 Number of Farmer Households and their share across Farm Sizes in 2002-03 and 2012-13						
Farm size (hectares, ha)	2002-03			2012-13		
	Farmer House-holds (lakh)	Share (%)	Cumu-lative Share (%)	Farmer House-holds (lakh)	Share (%)	Cumu-lative Share (%)
Near landless (<0.01)	103.9	11.6	11.6	23.9	2.6	2.6
Lower marginal (0.01-0.4)	303.5	34.0	45.6	287.4	31.9	34.5
Upper marginal (0.41-1.0)	246.5	27.6	73.2	315.0	34.9	69.4
Small (1.01-2.0)	134.8	15.1	88.3	154.8	17.2	86.6
Semi-medium (2.01-4.0)	70.3	7.9	96.1	84.0	9.3	95.9
Medium (4.01-10.0)	29.8	3.3	99.4	33.5	3.7	99.6
Large (10+)	4.9	0.6	100.0	3.5	0.4	100.0
All sizes	893.7	100.0		902.0	100.0	
Source: NSSO (2005a, 2014b)						

Nevertheless, one estimates the growth of income, consumption and productive investment between 2002-03 and 2012-13 in Table 5. In spite of a possible overestimate, the growth of income is 3.5 per cent for annum, growth for consumption is 0.5 per cent for annum, and that for investment is 6.8 per cent per annum. The lower consumption growth (including it being negative in some categories) should be a matter of concern for the larger economy, but it also points to a difficulty in sustenance for the farmer. To add to it, productive investment is also negative among the near landless and the semi-medium farm sizes and seems to be relatively higher among the marginal and the large farm sizes. The relatively higher investment among the marginal would itself be a strategy to address sustenance.

Across sources of income for the farmer household, the growth rate of 1.7 per cent from wages and salaries in Table 5 suggests that it is not linked to the larger growth story of the economy (a growth of about 8 per cent per annum for the same period). The growth of 4 per cent for crop production is in line with agriculture at the macroeconomic level for the same period. A growth of 14.6 per cent per annum from animal farming is in sync with the relatively better returns from the livestock sector for that period. The poor performance of the

non-farm business also somewhat reiterates the fact that consumption is not increasing among farmer households.

Farm size	Income					Consu-mption	Prod-uctive Invest-ment
	Wages/ Salaries	Crop Prod-uction	Animal Farming	Non-Farm Business	Total Income		
Near landless	2.3	2.4	24.0	-1.0	4.4	0.4	-4.4
Lower marginal	1.3	0.8	11.9	-2.3	1.7	0.5	12.2
Upper marginal	2.7	2.5	10.1	1.1	3.1	0.5	10.1
Small	2.4	2.2	14.1	4.5	3.2	-0.4	2.7
Semi-medium	1.9	2.5	25.2	2.1	3.4	-0.2	-1.1
Medium	6.9	4.3	50.2	-2.3	4.9	0.2	3.0
Large	0.9	7.2	26.9	2.0	7.2	0.5	16.0
All sizes	1.7	4.0	14.6	0.1	3.5	0.5	6.8

Table 5
Compound Annual Growth Rate of Income, Consumption and Productive Investment of Farmer Households across Farm Sizes, 2012-13 over 2002-03

Notes: Farm size categories are as in Table 4. There have been differences in the reference category surveyed in 2002-03 and 2012-13, and hence, they may not be strictly comparable. Consumer Price Index of Agricultural Labourers (CPI-AL), particularly weighted averages from month wise data for the relevant period for 2002-03 and 2012-13, have been used to convert 2002-03 figures to 2012-13 prices. With 2002-03 being a drought year, the base year values would be lower and that will inflate the growth rates.
Source: Labour Bureau (2017), NSSO (2005a, 2016a).

Table 6
Monthly Income, Consumption and Productive Investment of Farmer Households across Farm Sizes, 2012-13

Farm size	Income					Consu-mption	Prod-uctive Invest-ment
	Wages/ Salaries	Crop Prod-uction	Animal Farming	Non-Farm Business	Total Income		
Near landless	2902	30	1181	447	4561	5108	55
Lower marginal	2386	687	621	459	4152	5401	251
Upper marginal	2011	2145	629	462	5247	6020	540
Small	1728	4209	818	593	7348	6457	422
Semi-medium	1657	7359	1161	554	10730	7786	746
Medium	2031	15243	1501	861	19637	10104	1975
Large	1311	35685	2622	1770	41388	14447	6987
All sizes	2071	3081	763	512	6426	6223	513

Note: Farm size categories are as in Table 4.
Source: NSSO (2016a)

The income, consumption and productive investment in 2012-13 to farmer household is indicated in Table 6. The average income of the farmer household at ₹6,426 for an average family size of 5.26 turns out to ₹1,222 per person per month in 2012-13. Income, falls short of the consumption requirement for the near landless and both the marginal farm size categories. This takes us back to the fact that productive investments among them is a

sustenance effort. For instance, investments in petty business and livestock rearing that could largely include poultry and small ruminants.

Further, the income of ₹41,388 in 2012-13 for a large farm size is not substantial. As conveyed elsewhere (Mishra 2017), it is lower than the January 2013 salary of a government employee in pay band II with grade pay of ₹4,600, which itself is much lower in the official hierarchy. The income to the medium farmer maybe somewhere closer to the minimum salary paid to a government employee in 2013. For the remaining 95 per cent of the farmer households, sustenance is at threat. This raises question about their efficiency. If they are not sustainable, can they be efficient. This is addressed in the next section.

3. Farm size and Productivity

3.1 The Debate

The relationship between farm size and productivity has been much debated. On the one hand, it is articulated that economies of scale would favour the large farm sizes while others believe in the Schumacherian adage that small is beautiful. In fact, the father-son duo of James and John Stuart Mill had argued in favour of revenue being collected from the peasant directly under Ryotwari because they envisaged greater productivity from the smallholder. It was Amartya Sen (1962) who set the ball rolling for the classic debate on farm size and inverse relationship.

The debate had many nuances and multiple levels and has been elaborated in Gaurav and Mishra (2015). Borrowing from them, we elucidate some of their main points. It is argued by some proponents that the advantages to smallholder were on account of effort (family labour is not a perfect substitute for hired labour), the prevalent technique (prior to green revolution there was no benefit on account of economies of scale), fertility (the decline in rent from marginal land based on the argument that larger land sizes would be spread across areas with different levels of fertility). Some critiques have pointed out that the observation of inverse relationship had more to do with the methods of analysis (pooling of farm sizes into some specific groups that does not have a rational basis), non standardisation in pooling data across villages, treating data from multiple villages as if they have no substantive differences in land quality and socio-economic characteristics, the statistical techniques used did not have adequate controls. Some of the papers espousing the two sides of the debate are indicated in Table 7.

It was also argued that with the coming of green revolution technology there would be advantages of economies of scale and large farm sizes would have greater productivity. However, proponents of the green revolution technology would argue that the technology per se is scale neutral and if the large farm sizes showed higher yield, it was more to do with their first mover advantage and other factors. This also means that as the technology gets disseminated there should neither be any scale advantage nor any disadvantage. Gaurav and Mishra (2015) tried to examine this using a nationally representative data (59th round National Sample Survey conducted in 2003 with data for the agricultural season 2002-03)

collected 40 years after the onset of green revolution. We will refer to some of their results and also extend their work partially, in a limited way, to the 70th round National Sample Survey conducted in 2013 with data for the agricultural season 2012-13.

Table 7
Literature On Relationship between Farm Size and Productivity

Supports inverse relationship	Supports no inverse relationship
Khusro (1964, 1973); Sen (1964, 1975); Mazumdar (1965); Rao, (1966, 2005); Saini (1969); Bardhan (1973); Berry & Cline, (1979); Sen (1981); Carter (1984); Rosenzweig & Binswanger (1993); Krishna (1995); Chattopadhyay & Sengupta (1997); Dyer (1998), among others.	Rao (1967); Rudra (1968a, 1968b, 1973); Chattopadhyay & Rudra (1976); Bliss & Stern (1982); Barbier (1984); Mahesh, (2000), among others.

3.2 Empirical evidence

The results from Gaurav and Mishra (2015) suggest the existence of inverse relationship even after controlling for main occupation of household, caste of household, agro-climatic zone and agricultural season and the results were also robust to selection bias. They also point out that the efficiency of the smallholder is of little consolation because the lower returns bring into focus the question of their livelihood sustainability, which was further exacerbated because of higher costs for lower farm sizes.

Table 8
Returns across Farm size for Kharif in 2002-03 and 2012-13

Farm Size	2002-03					2012-13				
	N	Avg	NR/Avg	NR/Ha	FmSz	N	Avg	NR/Avg	NR/Ha	FmSz
NearLL	4127	0.05	1440	26593	4.94	1500	0.05	4111	74760	4.68
Marg	26228	0.45	6746	15010	5.35	14245	0.46	20407	44689	4.99
Small	7785	1.34	17799	13275	6.01	8091	1.37	60566	44345	5.39
SMed	4064	2.58	33109	12825	6.40	4714	2.55	105433	41290	5.74
Medium	1773	5.40	72868	13502	7.01	1206	5.52	255553	46320	6.17
Large	243	30.14	163730	5432	8.64	131	14.36	664749	46307	7.49
All	44220	1.13	14134	15471	5.61	30118	1.27	55766	45642	5.26

Note: Under farm size NearLL is near landless (<0.01 hectare, ha), Marg is marginal (0.01-1 ha), Small (1-2 ha), SMed is Semi-medium (2-4 ha), Medium (4-10 ha), Large (10+ ha). N denotes number of observations, Avg is average farm size (ha), NR/Avg is net returns per average farm size (₹/Avg ha), NR/Ha is net returns per hectare (₹/ha), FmSz is Family size.
Source: Authors' calculation using relevant unit level data from National Sample Survey.

One shows across farm sizes the returns per average farm size and returns per hectare for 2002-03 and 2012-13 in Kharif (Table 8) and Rabi (Table 9). The results reiterate the point indicated in Gaurav and Mishra (2015) that returns per hectare are higher for lower farm sizes, but returns per average hectare for these farm sizes are woefully low. In fact, as indicated in Table 6, these households have a relatively higher share of their income from wages and salaries or other sources.

Table 9
Returns across Farm size for Rabi in 2002-03 and 2012-13

Farm Size	2002-03					2012-13				
	N	Avg	NR/Avg	NR/Ha	FmSz	N	Avg	NR/Avg	NR/Ha	FmSz
NearLL	4767	0.05	1575	29696	4.94	2484	0.05	3394	65950	4.68
Marg	19515	0.42	7699	18348	5.35	13365	0.43	21050	49444	4.99
Small	4620	1.34	22161	16498	6.01	5627	1.36	66229	48860	5.39
SMed	2286	2.56	44965	17532	6.40	2861	2.59	117763	45477	5.74
Medium	913	5.48	95074	17344	7.01	827	5.35	250416	46763	6.17
Large	118	17.01	203970	11990	8.64	95	13.67	642521	46992	7.49
All	32219	0.85	14705	19652	5.61	25259	1.05	50180	50391	5.26

Notes and Source: As in Table 8.

As conveyed earlier, the seemingly inverse relationship for farm size and returns to cultivation may not convey things appropriately because of grouping individual to farm size groups. In order to test whether there exists an inverse relationship between net returns per hectare and farm size, the following two simple specifications are estimated using ordinary least squares (OLS):

$$Y_{it} = \alpha_1 + \beta_1 L_{ij} + \varepsilon_{ij} ; \qquad (1)$$

$$ln\, Y_{it} = \alpha_2 + \beta_2\, ln\, L_{ij} + \mu_{ij} ; \qquad (2)$$

In equations (1) and (2), i pertains to households; $j = 1,2$ pertains to agricultural season indicating kharif and rabi, respectively; Y is net returns per hectare; $ln\,Y$ is natural log of Y; L indicates land cultivated in hectares; and ε and μ are i.i.d. error terms. The β parameters are important for the discussion on inverse relationship and the α parameters are intercepts. In the double-log (natural log) formulation in equation (2), β_2 indicates the elasticity of productivity (net returns per hectare) with respect to land. It is important to note that equation (2) will exclude any observation where Y is not positive.

Table 10
Estimation of Relationship between Farm Size and Returns in India:
2002-03 and 2012-13

Season and Year	Linear relationship	Double log relationship
Kharif 2002-03	-2640.24 ***	-0.225 ***
Rabi 2003	-3020.06 ***	-0.212 ***
Pooled 2002-03	-2982.29 ***	-0.290 ***
Kharif 2012-13	-4.50E+08 ***	-0.298 ***
Rabi 2013	-9.15E+08 ***	-0.137 ***
Pooled 2012-13	-2.54E+08 ***	-0.323 ***

Note: ***:p<0.01, **:p<0.05, *:p<0.10
Source: Gaurav and Mishra (2015) for 2002-03 and authors' calculation for 2012-13.

States	Kharif		Rabi	
Andaman and Nicobar	-0.577	***	-0.593	***
Andhra Pradesh	-0.181	***	0.012	
Arunachal Pradesh	-0.628	***	-0.570	***
Assam	-0.332	***	-0.251	***
Bihar	-0.080	**	0.060	***
Chandigarh	0.194		0.163	
Chhattisgarh	-0.019		-0.0997	
Dadra & Nagar Haveli	-0.102		-0.446	***
Daman and Diu	-0.124		-0.519	**
Delhi	-0.035		-0.268	*
Goa	-0.408	***	-0.175	*
Gujarat	-0.139	***	-0.069	*
Haryana	0.232	***	-0.077	**
Himachal Pradesh	0.136	*	-0.106	**
Jammu & Kashmir	-0.165	***	-0.214	***
Jharkhand	-0.322	***	-0.429	***
Karnataka	-0.045		-0.071	
Kerala	-0.084		-0.102	***
Lakshadweep	-0.084		-0.318	**
Madhya Pradesh	-0.032		0.007	
Maharashtra	-0.170	***	-0.277	***
Manipur	-0.077	*	-0.303	***
Meghalaya	-0.365	***	-0.343	***
Mizoram	-0.546	***	-0.594	***
Nagaland	-0.672	***	-0.622	***
Odisha	-0.186	***	-0.373	***
Puducherry	-0.162		-0.198	*
Punjab	0.016		-0.079	***
Rajasthan	0.393		0.046	*
Sikkim	-0.009		-0.355	***
Tamil Nadu	-0.228	***	-0.250	***
Telangana	-0.226	***	-0.261	***
Tripura	-0.193	***	-0.164	***
Uttar Pradesh	0.122	***	0.052	***
Uttaranchal	0.054		-0.038	
West Bengal	-0.163	***	-0.127	***

Table 11
Estimation of Relationship between Farm Size and Returns across States in India by using Double log Method, 2012-13

Notes and Source: As in table 10.

Equations (1) and (2) are parsimonious specifications including only one independent variable (regressor) and helps in indicating the correlation between returns to cultivation and land-holding by testing for rejection of the null hypothesis of no relationship, i.e. $H_0: \beta = 0$ as against the alternative hypothesis that there may exist an association, that is, $H_1: \beta \neq 0$; which may be either an inverse association, $\beta < 0$; or, a positive association, $\beta > 0$. The

regression results for equations (1) and (2) at the all India level are given in Table 10. All the results reject the null hypothesis of no relationship against the alternative hypothesis that there may exist a relationship that signifies an inverse association.

The results of regression analysis across states of India is given in Table 11. It shows that the null hypothesis of no relationship was rejected in 22 of the 36 states and union territories in Kharif 2012-13 and 30 of the 36 states and union territories in Rabi 2013. From these, 19 of the 22 conveyed in Kharif 2012-13 and 27 of the 30 in Rabi 2013 indicated that there may exist an inverse relationship. The states and union territories that may have an inverse relationship in both the seasons are Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Goa, Gujarat, Jammu and Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Tamil Nadu, Telengana, Tripura and West Bengal; those states with an inverse relationship in Kharif only are Andhra Pradesh, and Bihar, and those states with an inverse relationship in Rabi only are Dadra and Nagar Haveli, Daman and Diu, Delhi, Haryana, Himachal Pradesh, Kerala, Lakshadweep, and Puducherry. The states and union territories that may have a positive association are Uttar Pradesh in both the seasons, Haryana and Himachal Pradesh in Kharif only, and Bihar and Rajasthan in Rabi only.

Our estimates as per Equation (1) and (2), however, are likely to suffer from the problem of omitted variables bias. To address this, we estimate less restrictive models by controlling for some theoretically motivated regressors which are available in our data-set. These fuller specifications, while extending Equation (2), can be presented as

$$ln\, Y_{it} = \alpha_3 + \beta_3\, ln\, L_{ij} + \gamma_3\, X_{ij} + \upsilon_{ij}\,; \qquad (3)$$

where, the parameter γ_3 explains the association between productivity and a vector of household-specific controls X, while υ is an i.i.d. error term. Some of the farm and farmer-related characteristics which could have a bearing on the agricultural outcomes that we control for are extent of irrigation, agricultural household, outstanding household debt, whether there is crop insurance, source of seed, age of household head and agricultural training.

In addition, drawing on Barrett *et al.* (2010), we also introduce fixed effects in the form of some variables such as household type (occupation), social group (caste), agro-climatic zone (region) and agricultural season (the latter for combined data only)-all together. The corresponding specification becomes:

$$ln\, Y_{it} = \alpha_4 + \beta_4\, ln\, L_{ij} + \gamma_4\, X_{ij} + \eta F + \omega_{ij}\,; \qquad (4)$$

where, the parameter γ_4 explains the association between the set of household-specific characteristics we have controlled for and returns to cultivation; ηF denotes the fixed effects and ω_{ij} is an i.i.d. error term.

Table 12: Estimation results with controls for Kharif, Rabi and combined seasons						
	2002-03			**2012-13**		
Variable	**Kharif**	**Rabi**	**Combined**	**Kharif**	**Rabi**	**Combined**
Lnland	-0.301***	-0.421***	-0.355***	-0.164***	-0.158***	-0.162***
	(0.007)	(0.008)	(0.005)	(0.009)	(0.008)	(0.006)
Irrigation	0.007***	0.011***	0.01***	0.0004***	0.0003***	0.0004***
	(0.002)	(0.004)	(0.002)	(0.000)	(0.000)	(0.000)
Family labour	0.049***	0.035***	0.042***	-	-	-
	(0.004)	(0.005)	(0.004)			
Age	0.001**	0.003***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Training	0.065***	-0.277	0.082***	0.110**	0.215***	0.158***
	(0.018)	(0.209)	(0.018)	(0.048)	(0.046)	(0.033)
Outstanding Debt				2.64e-07***	2.01e-07***	2.33e-07***
				(2.98e-08)	(2.75e-08)	(2.03e-08)
Crop insurance	0.131***	0.107***	0.118***	0.094**	-0.028	-0.072**
	(0.030)	(0.043)	(0.026)	(0.033)	(0.041)	(0.026)
Purchased seed	0.022	0.108***	0.061***	0.014	-0.350***	-0.117*
	(0.028)	(0.032)	(0.022)	(0.077)	(0.091)	(0.058)
Exchanged Seed	-0.027**	0.067***	0.018*			
	(0.013)	(0.015)	(0.010)			
Group membership	0.13***	0.165***	0.144***	-	-	-
	(0.035)	(0.047)	(0.029)			
Like farming	0.108***	0.156***	0.136***	-	-	-
	(0.011)	(0.015)	(0.009)			
Agricultural labour	-0.092***	-0.114***	0.105***	0.248***	0.137***	0.198***
	(0.023)	(0.029)	(0.019)	(0.000)	(0.024)	(0.018)
SC	0.007	-0.015	-0.018	0.031***	-0.082***	-0.054***
	(0.023)	(0.032)	(0.019)	(0.025)	(0.025)	(0.018)
OBC	0.115***	0.066***	0.075***	-	-	-
	(0.019)	(0.029)	(0.017)			
Other groups	0.139***	0.146***	0.124***	0.165***	0.093***	0.134***
	(0.020)	(0.029)	(0.017)	(0.023)	(0.023)	(0.016)
Season	-	-	0.203***	-	-	0.013
			(0.009)			(0.014)
Region	-	-	-	0.0008***	-0.0002	0.0003***
				(0.0001)	(0.000)	(0.000)
Intercept	8.641***	8.135***	8.516***	14.867***	15.59***	15.17***
	(0.072)	(0.072)	(0.051)	(0.120)	(0.129)	(0.087)
N	37475	27951	65426	13588	11835	25423
R-squared	0.281	0.317	0.231	0.069	0.051	0.062

Note: The coefficients are estimated without using weights. Standard errors are in parentheses and are robust.
The dependent variable in columns 1–4 is the natural log of net returns per hectare (LnNRha ***:p<0.01,
**:p<0.05, *:p<0.10.
Source: Gaurav and Mishra (2015) for 2002-03 and authors' calculation for 2012-13.

In Equations (3) and (4), we test for the rejection of the null of no relationship between per hectare returns to cultivation and size-class of land as in Equation (1). However, if the addition of controls results in weakening, strengthening or reversal of the relationship, we

will see corresponding changes in the magnitude, significance and sign of the estimates. Following Barrett et al. (2010), if the inclusion of additional controls results in such changes, it can be argued that the theory underlying those specific variables explains the reasons for the empirical findings. The regression results for equations (3) and (4) at the all India level are given in Table 12 and Table 13, respectively. All the results reject the null hypothesis of no relationship against the alternative hypothesis that there may exist a relationship that signifies an inverse association.

Table 13: Fixed-effects estimates for Kharif, Rabi and combined seasons						
	2002-03			**2012-13**		
Variable	**Kharif**	**Rabi**	**Combined**	**Kharif**	**Rabi**	**Combined**
Lnland	-0.299***	-0.424***	-0.352***	-0.138***	-0.156***	-0.147***
	(0.006)	(0.007)	(0.004)	(0.010)	(0.009)	(0.007)
Irrigation	0.007***	0.011***	0.01***	0.0005***	0.0005***	0.0005***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Family labour	0.048***	0.038***	0.044***	-	-	-
	(0.004)	(0.005)	(0.003)			
Age	0.001**	0.003***	0.002***	0.0002	0.001	0.0006
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Training	0.068***	-0.238	0.071***	0.038	0.105**	0.069**
	(0.018)	(0.499)	(0.018)	(0.045)	(0.044)	(0.032)
Outstanding Debt				1.20e-07***	4.11e-08	8.10e-08***
				(2.89e-08)	(2.67e-08)	(1.97e-08)
Crop insurance	0.095***	0.135***	0.112***	0.046	0.053	0.048**
	(0.030)	(0.041)	(0.024)	(0.034)	(0.042)	(0.026)
Purchased seed	0.014	0.110***	0.058***	-0.010	-0.369***	-0.140**
	(0.027)	(0.033)	(0.021)	(0.072)	(0.088)	(0.056)
Exchanged Seed	-0.035***	0.055***	0.004***			
	(0.013)	(0.016)	(0.010)			
Group membership	0.101***	0.16***	0.126***	-	-	-
	(0.034)	(0.043)	(0.027)			
Like farming	0.11***	0.158***	0.13***	-	-	-
	(0.012)	(0.015)	(0.009)			
Agricultural labour	-	-	-	0.085	0.245***	0.160***
				(0.061)	(0.058)	(0.042)
Intercept	8.483***	8.131***	8.334***	15.46***	15.53***	15.45***
	(0.024)	(0.030)	(0.019)	(0.125)	(0.134)	(0.091)
N	37570	28032	65602	13588	11835	25423
R-squared	0.32	0.36	0.34	0.054	0.040	0.052

Note: The coefficients are estimated without using weights. Standard errors are in parentheses and are robust. The dependent variable in columns 1–4 is the natural log of net returns per hectare (LnNRha ***:p<0.01, **:p<0.05, *:p<0.10.
Source: Gaurav and Mishra (2015) for 2002-03 and authors' calculation for 2012-13.

Finally, as mentioned earlier, the dropping of observations with non-positive net returns on account of the logarithmic conversion may be associated with sample selection bias. We address this through Heckman's (1979) two-step procedure. In the first step, to meet the exclusion restriction for identification in the selection equation (probit), we have included a

binary variable indicating outstanding household debt. The inverse mills ratio (lambda) is insignificant and thus, suggests absence of selection bias (Tables 14 and 15).

Table 14: Heckman estimates for Kharif and Rabi, 2002-03				
Variable	**Kharif**		**Rabi**	
Outcome Model				
Lnland	-0.271***	(0.007)	-0.216***	(0.007)
Irrigation	0.006***	(0.001)	0.043***	(0.004)
Family labour	0.040***	(0.005)	0.038***	(0.005)
Age	0.001**	(0.001)	0.001**	(0.001)
Training	0.058**	(0.021)	-0.520	(0.464)
Outstanding Debt				
Crop insurance	0.032	(0.041)	0.216***	(0.045)
Purchased seed	0.057	(0.035)	0.083**	(0.033)
Exchanged seed	0.026	(0.028)	0.020**	(0.018)
Group membership	0.107**	(0.045)	0.081*	(0.048)
Intercept	8.616***	(0.707)	9.344***	(0.647)
Selection Model				
Lnland	-0.009*	(0.268)	-0.014	(0.010)
Irrigation	0.010*	(0.154)	0.062***	(0.019)
Family labour	-0.003*	(0.709)	-0.006	(0.009)
Age	0.002*	(0.022)	0.001	(0.001)
Training	0.086**	(0.018)		
Crop insurance	-0.062	(0.227)	-0.164*	(0.063)
Purchased seed	-0.227***	(0.000)	-0.110*	(0.059)
Exchanged seed	-0.467***	(0.000)	-0.140***	(0.026)
Group membership	0.248***	(0.068)	-0.204**	(0.070)
Intercept	1.444***	(0.042)	1.598***	(0.055)
Lambda	-0.482**	(0.149)	-1.022***	(0.283)
Rho	-0.470		-0.998	
Sigma	1.026		1.024	
Number of Observations	26782		24235	
Censored observations	3594		1664	

Note: The coefficients are estimated without using weights. Standard errors are in parentheses and are robust. The dependent variable in columns 1–4 is the natural log of net returns per hectare (LnNRha ***:p<0.01, **:p<0.05, *:p<0.10.
Source: Gaurav and Mishra (2015).

Table 15: Heckman estimates for Kharif and Rabi, 2012-13				
Variable	Kharif		Rabi	
Outcome Model				
Lnland	-0.892***	(0.073)	-0.741***	(0.175)
Irrigation	0.0006**	(0.000)	0.0008	(0.001)
Age	0.040***	(0.007)	0.037**	(0.019)
Training	0.268	(0.497)	0.180	(1.233)
Crop insurance	0.305	(0.341)	0.371	(1.098)
Seed	6.174	(0.604)	7.742***	(1.684)
Agricultural labour	1.364***	(0.247)	1.021**	(0.615)
SC	0.254	(0.260)	0.421	(0.806)
Other	0.441*	(0.242)	0.400	(0.611)
Region	0.004**	(0.001)	0.002	(0.003)
Selection Model				
Lnland	-0.075	(0.102)	0.070	(0.071)
Irrigation	-0.0002	(0.000)	0.0006**	(0.000)
Age	-0.006	(0.009)	-0.014*	(0.008)
Crop insurance	-0.054	(0.371)	-0.395	(0.342)
Seed	-3.728**	(1.347)	-4.297***	(0.900)
Agricultural labour	0.318	(0.259)	-0.166	(0.233)
Outstanding Debt	2.26e-08	(2.59e-07)	-5.53e-08	(1.58e-07)
Intercept	9.310		8.621	
Lambda	-11.838	(26.964)	-28.163	(47.96)
Rho	-1.000		-1.000	
Sigma	11.838		28.163	
Number of Observations	13597		11848	
Censored observations	9		13	

Note: The coefficients are estimated without using weights. Standard errors are in parentheses and are robust. The dependent variable in columns 1–4 is the natural log of net returns per hectare (LnNRha ***:p<0.01, **:p<0.05, *:p<0.10.
Source: Authors' calculation.

It is observed that the absence of no relationship (or, scale neutrality) has been rejected at the all India level and in most of the states in favour of an alternative that there may exist an inverse relationship. This is also evident for a recent exercise restricted to paddy, wheat and cotton using unit level data of 2012-13 (Gaurav amd Mishra, 2019). In this context, it may be worthwhile to examine scale neutrality in agricultural credit.

4. Scale neutrality of agricultural credit[7]

4.1 Indebtedness among agricultural households
In 2002-03 and 2012-13, half of the farmer/agricultural households were indebted, which is much higher than the incidence of indebtedness for rural and urban India (Table 16). From

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[7] For related issues linked to the crisis in agriculture see GOI (2007, 2009) and Shetty (2009) among others.

those among the farmer/agricultural households indebted, nearly three-fifths of the loans outstanding are from institutional sources (Table 17). Across farm size, the distribution of outstanding loans was higher for non-institutional sources for lower farm sizes (Table 18).

Table 16
Incidence of Indebtedness in 2002-03 and 2012-13

Source	59th round (around 2002-03)	70th round (around 2012-13)
Farmer/Agricultural Households	48.6	51.9
Rural India	26.5	17.8
Urban India	31.4	22.4
Source: NSSO (2005a, b, 2016a, b)		

Table 17
Source wise Distribution of Outstanding Loans among Farmers/Agricultural Households in 2002-03 and 2012-13

Source	2002-03	2012-13
Institutional	57.7	59.8
Bank	35.6	42.9
Cooperative Societies	19.6	14.8
Government	2.5	2.1
Non-Institutional	42.4	40.2
Moneylender	25.7	25.8
Relatives and friends	8.5	9.1
Trader/Shopkeeper	5.2	2.9
Employer/Landlord	0.9	0.8
Others	2.1	1.6
All	100	100
Source: NSSO (2005a, 2016a)		

Table 18
Source wise Distribution of Outstanding Loans by Farm Size in 2002-03 and 2012-13

Farm size	2002-03		2012-13	
	Institutional	Non-Institutional	Institutional	Non-Institutional
Near landless	22.6	77.4	14.9	85.0
Lower marginal	43.3	56.7	46.9	53.0
Upper marginal	52.8	47.2	53.2	46.8
Small	57.6	42.3	64.8	35.1
Semi-medium	65.1	35.0	67.5	32.5
Medium	68.8	31.1	71.5	28.5
Large	67.6	32.4	78.9	21.0
All sizes	57.7	42.4	59.8	40.2

Note: Farm size as in Table 4.
Source: NSSO (2005a, 2016a)

The interest burden from non-institutional sources in rural India have a greater interest burden (Table 19). It so seems that the smallholder has a greater reliance on non-institutional sources of loan and also has a greater interest burden. Now, we look up credit data provided by the banks to examine scale neutrality across farm sizes and across regions.

Table 19 Distribution of Interest Burden of Debt by Source of Loan in Rural India in 2002 and 2012				
	2002		2012	
Interest rate	Institutional	Non-Institutional	Institutional	Non-Institutional
Nil	1.0	18.0	0.8	18.3
<6	2.0	2.0	7.1	2.3
6-10	4.0	1.0	26.0	0.4
10-12	9.0	1.0	12.9	0.7
12-15	48.0	1.0	42.6	4.1
15-20	34.0	3.0	7.3	5.6
20-25	1.0	33.0	2.1	33.9
>25	0.0	40.0	1.1	34.7
Source: NSSO (2005b, 2016b)				

4.2 Bank credit and borrowal accounts by farm sizes

To examine scale neutrality across farm sizes, we use two ratios:

$$R_{ca,k} = {s_{c,k}}/{s_{a,k}} \qquad (3)$$

$$R_{bo,k} = {s_{b,k}}/{s_{o,k}} \qquad (4)$$

Equation (3) normalise the share of credit amount, s_{ck}, with the share of area operated, s_{ak}, (hereafter, credit-to-area ratio, or, C2A) and equation (4) normalise the share of the number of borrowal accounts, s_{bk}, with the number of operational holdings, s_{ok}, (hereafter, borrowal-to-operational ratio, or, B2O) for k^{th} group ($k = 1,2,\dots,K$) such that $\sum_k s_{lk} = 1 \; \forall \; l; l = c, a, b, o$.

The ratios indicated in equations (3) and (4) are relative values across the k groups. The ratios can either be less than unity, or be equal to unity, or be greater than unity. In equation (3) it implies that the credit-to-area ratio is either less, or equal to, or greater, respectively. Similarly, in equation (4) it implies that the borrowal-to-operational ratio is either less, or equal to, or greater, respectively. The relationship between credit and farm size for the ratios, $R_{\bullet,k}$, are posited in Table 20.

Table 20	
Relationship between Credit and Farm Size based on Credit-to-Area Ratio and Borrowal-to-Operational Ratio	
Scale neutrality	$R_{\bullet,small} = R_{\bullet,marginal} = R_{\bullet,other}$
Inverse relationship	$R_{\bullet,small} > R_{\bullet,marginal} > R_{\bullet,other}$
Positive relationship	$R_{\bullet,small} < R_{\bullet,marginal} < R_{\bullet,other}$
V-shaped relationship	$R_{\bullet,small} > R_{\bullet,marginal} < R_{\bullet,other}$
Λ-shaped relationship	$R_{\bullet,small} < R_{\bullet,marginal} > R_{\bullet,other}$

In Table 21, the ratios are computed for different types of credit (short term credit disbursed, long term credit disbursed, combined [short term + long term] credit disbursed) where the k groups refer to agricultural farm sizes of marginal (below 1 hectare or below 2.5 acres), small (1-2 hectares or 2.5-5 acres) and others (2 and above hectares or 5 and above acres).

Table 21							
Ratios of Credit-to-Area and Borrowal-to-Operational across Farm Size by Credit Type in 2000-01, 2005-06 and 2010-11							
Year		Credit-to-Area, $R_{ca,k}$			Borrowal-to-Operational, $R_{bo,k}$		
Credit Type	Year	Marginal	Small	Others	Marginal	Small	Others
Short term disbursal	2000-01	1.51	1.35	0.73	0.66	1.70	1.44
	2005-06	1.59	1.57	0.59	0.63	1.97	1.37
	2010-11	1.12	1.41	0.79	0.57	2.17	1.55
Long term disbursal	2000-01	0.99	0.95	1.02	0.55	1.55	1.99
	2005-06	0.77	0.97	1.09	0.51	1.49	2.36
	2010-11	0.95	1.27	0.91	0.47	2.13	2.03
Comb-ined disbursal	2000-01	1.38	1.24	0.80	0.65	1.68	1.50
	2005-06	1.05	1.17	0.92	0.59	1.82	1.69
	2010-11	1.08	1.38	0.82	0.55	2.17	1.61

Note: Marginal, small and others+ refer to <1 hectare, 1-2 hectares and >2 hectares for area operated and operational holdings and are superimposed on <2.5 acres, 2.5-5.0 acres and >5 acres for credit amount and borrowal accounts. Land data for Jharkhand was not collected for 2000-01 and 2005-06 and it has been estimated by assuming that the proportion of Jharkhand to the rest (India excluding jharkhand) is as in 2010-11 and for the distribution across farm sizes the distribution for Himachal Pradesh plus Northern states together are taken as a proxy, as that distribution was similar to the distribution for Jharkhand in 2010-11.
Source: Land based data are from Agricultural Census of India, and processed credit data

Short term credit disbursed: This category also includes crop loans for cultivation purposes. The ratio of share of credit amount to share of area operated (hereafter, credit-to-area ratio, or, C2A) indicates an inverse relationship for 2000-01 and 2005-06 and a Λ-shaped relationship for 2010-11. Over the years, the value of the ratio of shares of credit-to-area for both marginal and small farmers have remained greater than unity, but with different trends - it has been decreasing for marginal farmers and increasing for small farmers. The ratio of share of number of borrowal accounts to share of number of operational holdings (hereafter, borrowal-to-operational ratio, or, B2O) indicate a Λ-shaped relationship for all the three years. The borrowal-to-operational ratios for marginal farmers have not only remained below

unity but also declined over the years. Juxtaposing the credit-to-area ratio with the borrowal-to-operational ratio, it can be mentioned that the relatively higher credit share is distributed across fewer farmers in this category.

Long term credit disbursed: The credit-to-area ratios indicate a Λ-shaped relationship for 2000-01 and 2010-11 and a positive relationship for 2005-06. The values of the ratios in 2000-01 is close to scale neutrality. The borrowal-to-operational ratios show a positive relationship in 2000-01 and 2005-06 and Λ-shaped relationship in 2010-11. What is worrying is that for marginal farm size the value of the borrowal-to-operational ratios not only remain below unity but have been decreasing over the years. The two ratios together suggest that the credit disbursed among marginal farmers is distributed among fewer of these farmers.

Table 22
Ratios of the Credit-to-Area and Borrowal-to-Operational across Regions by Farm Size for Combined (Short term + Long term) Credit Disbursed in 2000-01, 2005-06 and 2010-11

Year	Farm Size	Ratio	East	South	North East	North	Central	West
2000-01	Marginal	C2A	0.29	2.66	0.16	1.03	0.33	0.81
		B2O	0.35	2.25	0.17	1.58	0.49	0.48
	Small	C2A	0.83	1.87	0.09	0.88	0.72	0.85
		B2O	0.26	2.47	0.15	0.89	0.36	0.73
	Others	C2A	0.26	2.59	0.21	0.67	0.28	0.64
		B2O	0.35	2.59	0.15	0.90	0.38	0.50
	All	C2A	0.30	2.58	0.03	0.71	0.53	0.69
		B2O	0.51	2.28	0.12	0.87	0.56	0.71
2005-06	Marginal	C2A	0.73	5.32	0.75	5.72	1.14	2.10
		B2O	0.83	4.18	0.45	4.04	1.55	1.22
	Small	C2A	1.62	3.95	0.41	1.46	1.16	1.53
		B2O	0.73	6.68	0.48	2.42	1.14	1.55
	Others	C2A	0.74	7.21	0.78	2.24	1.05	1.89
		B2O	0.93	6.03	0.39	2.32	1.11	0.88
	All	C2A	1.43	8.03	0.18	1.61	1.43	1.29
		B2O	1.07	4.39	0.49	2.02	1.26	1.51
2010-11	Marginal	C2A	0.33	2.17	0.54	2.05	0.40	1.03
		B2O	0.40	2.04	0.19	1.95	0.55	0.38
	Small	C2A	1.03	1.97	0.14	0.74	0.65	0.99
		B2O	0.28	2.40	0.35	1.25	0.40	0.65
	Others	C2A	0.29	2.39	0.68	1.44	0.32	0.88
		B2O	0.43	2.33	0.22	1.41	0.43	0.38
	All	C2A	0.48	2.94	0.08	0.51	0.51	0.47
		B2O	0.55	2.11	0.24	0.96	0.56	0.77

Notes and Source: As in Table 21. C2A denotes credit-to-area and B2O denotes borrowal-to-operational.

Combined (short term + long term) credit disbursed: The credit-to-area ratios show an inverse relationship in 2000-01 and a Λ-shaped relationship for the remaining two years. The value

of the credit-to-area ratio has remained above unity for marginal and small farmers and has remained below unity for other farmers. The borrowal-to-operational ratios show Λ-shaped relationship for all the years. The values are less than unity for marginl farmers and greater than unity for large farmers. It also reiterates that the credit disbursed among marginal farmers is distributed among relatively fewer farmers among them.

Region-wise and state-wise ratios (credit-to-area and borrowal-to-operational) across farm sizes are given in Appendix (Tables A1 to A9), which point to variation across states/regions. There are some states (particularly, in Eastern and Southern regions) where credit-to-area ratios are also less than unity for marginal farm sizes, but even in those states where the credit-to-area ratio is greater than unity for marginal farm sizes, the borrowal-to-operational ratio for marginal farm sizes is below unity indicating that fewer farmers from these farm sizes have access to the credit.

The Appendix Tables A1 to A9, like Table 21, help us understand differences across farm sizes within a region or state. To understand the differences between regions, we use the ratios given in equations (3) and (4) with the k groups being regions.

The value of the ratios with regions as groups for the combined (short term + long term) credit disbursed is given in Table 22 while that for short term credit disbursed and long term credit disbursed are given in Appendix Table A10. These indicate that the Southern region has a proportionally larger credit share for all farm sizes for all the three years. The Northern, Central and Western region also had a particularly larger share in 2005-06, which seems to have somewhat persisted for the Northern region in 2010-11 also. In Eastern region the credit-to-area ratio for the small farmers is also greater than unity in 2005-06 and 2010-11, but then the borrowal-to-operational ratios are lower than unity suggesting that the credit has been disbursed among a smaller set of farmers. In short, there are differences within regions or states across farm sizes and also between regions.

It might be worthwhile to have an estimate of credit per borrowal account per hectare across farm sizes. The is obtained by using credit per borrowal account from the processed data and superimposing it on average area operated obtained from agricultural censuses (Table 23).

Table 23 Credit per Borrowal account per Hectare across Farm Sizes in 2000-01, 2005-06 and 2010-11									
Farm Size	2000-01			2005-06			2010-11		
	Credit per Bor-rowal, ₹	Average land Size, Ha	Credit per Ha, ₹/Ha	Credit per Bor-rowal, ₹	Average land Size, Ha	Credit per Ha, ₹/Ha	Credit per Bor-rowal, ₹	Average land Size, Ha	Credit per Ha, ₹/Ha
Marginal	15697	0.38	40985	38578	0.39	99728	49734	0.39	128567
Small	19573	1.38	14183	50225	1.42	35312	59268	1.42	41670
Others	44627	4.32	10336	133706	4.26	31360	141395	4.26	33164
All	24849	1.23	20276	69325	1.15	60098	75602	1.15	65538
Notes and sources: As in Table 21. Average land size data indicated are proxies from agricultural census as appropriate data are not available for borrowal accounts.									

The credit per hectare at the all India level in Table 23 indicates an inverse relationship for all the three years. Further, Table A11 also indicates that this inverse relationship holds for both short term and long term credit at the all India level for all the three years, it holds for Southern, Northern and Central regions for both the credit types for all the three years. The deviations are largely in the form of a V-shaped relationship for short term credit in Eastern, North Eastern and Western region in 2000-01 and 2010-11, and for long term credit for Eastern region in 2000-01 and 2005-06 and for North Western region in 2000-01. It is only in the latter case (long term credit for North Eastern region in 2000-01) that credit per hectare for other farm size is more than that for marginal farm size. In all other cases (including for combined), credit per hectare for marginal farm size is higher than that for other farm size. This along with our earlier understanding of ratios (credit-to-area and borrowal-to-operational) reiterate that across farm sizes, not only is the share of marginal farmers for credit greater than the share of borrowal accounts but credit per hectare is also higher for marginal farmers. This adds furter credence to our earlier observation that fewer marginal farmers get a larger share of credit. These raise some further questions Are the loans to marginal farm sizes for agricultural purposes or they happen to be for individuals with agricultural land? Are the short term loans largely for crops or are there other purposes? Is the inverse relationship in credit per hectare on account of the economies of scale for larger farm sizes or is it because the smaller farm sizes are efficient? All these questions are important, but beyond the scope of the current exercise and data available. These questions require additional information on purpose of credit, area under operation, crops grown, whether the area operated is irrigated or not, and other socio-economic characteristics.

5. Concluding remarks

The persistence of crisis in Indian agriculture has been a matter of concern. This has raised important questions on the sustenance of the smallholder (the marginal and the small farmers) that constitute more than 85 per cent of the operational holdings in India. It raises a concomitant doubt on the efficiency of the smallholder. At the same time, another important dimension is the scale neutrality of Indian agriculture, including from the perspective of credit availability.

Our analysis, including our understanding of available literature, does suggest the difficulty in the sustenance of the smallholder. In fact, the Situational Assessment of Agricultural Households, 2012-13, points out that the near landless, the lower marginal and the upper marginal farm size agricultural households have consumption requirement that is higher than their income from all sources.

To look into efficiency of the farmer/agricultural household, one examined the relationship between farm size and productivity. In doing this, we extended an earlier exercise that used 2002-03 data on farmer households, to the above-mentioned 2012-13 agricultural households data and observe the existence of an inverse relationship, and thereby, rejecting the contention that smallholders are not efficient.

Rather, the Indian farmer is saddled with a system of production where she has to take loans year after year to continue with the same activity. The loans have limited impact either for vertical or for horizontal growth. An analysis of the credit-to-area ratio and borrowal-to-operational ratio point out that for marginal farm size relatively more short term loan amounts are disbursed, and for both short term and long term loans the credit is disbursed among fewer proportion of farmers. In addition to the differences within regions or states (that is across farm sizes) one also observes differences between regions. An inverse relationship across farm sizes for credit per borrowal account per hectare raise further questions that are beyond the scope of the current exercise and data available.

For further understanding of the differences, data on credit disbursal along with credit outstanding for farmer households should be collected. Further, efforts should be made to collect and access unit level data while maintaining anonymity and privacy. These unit level data should also have additional information on purpose of credit, area operated, crops grown, irrigation status of area operated, and other socio-economic characteristics. In this regard, the role and responsibility of NABARD, which is actually in the field and has network could also be explored.

What is perplexing is the fact that the smallholder who is efficient is the one whose sustenance is in question. This calls for an analysis that takes us beyond credit and, as discussed elsewhere (Mishra 2015, 2017; Mishra and Reddy 2011; Reddy and Mishra 2009), bring in the need for interventions that are risk-reducing and cost-saving.

Appendix

Table A1 Ratio of Credit-to-Area and Borrowal-to-Operational, Short Term Credit Disbursed, 2000-01						
Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.82	0.91	1.22	0.68	2.30	1.59
A & N Islands	0.36	4.36	0.35	0.10	3.34	0.40
Bihar	1.06	2.07	0.49	0.53	3.84	1.66
Jharkhand	NA	NA	NA	NA	NA	NA
Odisha	1.20	1.24	0.75	0.73	1.33	1.37
Sikkim	4.61	1.35	0.06	1.20	1.43	0.07
West Bengal	0.55	0.42	2.83	0.80	1.80	1.89
SOUTHERN	1.69	1.25	0.62	0.69	1.76	1.54
Andhra Pradesh	1.62	1.30	0.61	0.66	1.66	1.37
Karnataka	1.54	1.17	0.84	0.76	1.14	1.26
Kerala	1.08	1.14	0.71	0.79	4.98	5.76
Lakshadweep	1.01	0.00	1.72	0.75	0.00	21.65
Puducherry	1.88	0.87	0.37	0.63	2.83	2.48
Tamil Nadu	1.27	1.29	0.65	0.62	2.03	2.23
NORTH EASTERN	0.82	0.31	1.26	1.15	1.08	0.45
Arunachal Pradesh	0.00	5.10	0.72	0.00	2.46	0.80
Assam	0.52	0.19	1.53	1.16	0.85	0.58
Manipur	1.62	0.95	0.68	0.94	1.34	0.53
Meghalaya	3.37	0.74	0.02	1.44	0.78	0.10
Mizoram	4.34	0.00	0.00	2.24	0.00	0.00
Nagaland	174.32	15.21	0.44	16.52	3.83	0.23
Tripura	0.76	1.46	0.93	0.54	4.10	1.98
NORTHERN	1.83	2.76	0.74	0.46	1.82	1.18
Chandigarh	0.22	0.84	1.24	0.35	2.63	1.24
Delhi	1.64	0.98	0.85	0.33	1.25	2.45
Haryana	1.03	1.81	0.88	0.32	1.65	1.55
Himachal Pradesh	2.55	0.98	0.21	0.96	1.29	0.79
Jammu & Kashmir	1.48	0.75	0.50	0.67	2.21	2.98
Punjab	4.06	4.72	0.69	1.18	2.17	0.68
Rajasthan	4.33	3.01	0.65	0.89	1.41	0.89
CENTRAL	1.00	1.50	0.81	0.52	1.94	1.92
Chattisgarh	NA	NA	NA	NA	NA	NA
Madhya Pradesh	0.74	1.06	1.02	0.32	1.00	1.93
Uttar Pradesh	0.75	1.46	0.95	0.50	2.54	2.81
Uttaranchal	NA	NA	NA	NA	NA	NA
WESTERN	1.27	0.79	1.03	0.53	1.17	1.48
D & N Haveli	0.85	0.41	1.31	0.80	0.89	1.69
Daman & Diu	NA	NA	NA	NA	NA	NA
Goa	1.96	0.34	0.63	0.91	1.05	1.83
Gujarat	1.52	1.39	0.85	0.50	1.19	1.24
Maharashtra	1.57	0.53	1.07	0.62	1.14	1.46
INDIA	1.51	1.35	0.73	0.66	1.70	1.44
Note and Source: As in Table 21.						

Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.69	0.77	1.42	0.60	2.25	2.34
A & N Islands	0.07	3.62	0.52	0.03	3.16	0.55
Bihar	0.42	0.80	1.53	0.54	2.76	2.96
Jharkhand	NA	NA	NA	NA	NA	NA
Odisha	1.44	1.12	0.71	0.76	1.42	1.14
Sikkim	3.72	2.16	0.01	1.02	1.87	0.05
West Bengal	0.57	0.53	2.64	0.66	1.99	3.64
SOUTHERN	1.12	1.11	0.90	0.56	1.78	2.08
Andhra Pradesh	1.23	0.98	0.92	0.57	1.38	2.03
Karnataka	1.21	1.13	0.92	0.66	1.11	1.47
Kerala	0.68	1.43	1.40	0.63	8.03	8.96
Lakshadweep	1.52	0.00	0.00	1.05	0.00	0.00
Puducherry	1.12	0.80	1.00	0.45	3.00	4.26
Tamil Nadu	1.03	1.24	0.85	0.53	2.33	2.45
NORTH EASTERN	2.39	2.54	0.16	0.85	2.12	0.31
Arunachal Pradesh	10.53	11.27	0.04	2.71	3.28	0.01
Assam	2.30	1.65	0.22	0.91	1.67	0.50
Manipur	1.20	1.11	0.78	0.72	1.60	0.70
Meghalaya	2.89	1.02	0.08	1.52	0.68	0.02
Mizoram	2.59	0.49	0.56	1.66	0.64	0.14
Nagaland	71.53	20.74	0.63	5.98	6.06	0.47
Tripura	0.18	2.15	1.25	0.36	4.11	5.65
NORTHERN	1.26	1.33	0.94	0.62	1.26	1.28
Chandigarh	2.81	0.18	0.81	0.21	0.53	3.50
Delhi	0.48	0.16	1.37	1.30	0.22	0.98
Haryana	0.49	0.97	1.06	0.35	1.17	1.77
Himachal Pradesh	1.62	0.95	0.70	0.92	1.26	1.04
Jammu & Kashmir	0.71	1.27	1.20	0.52	2.35	4.63
Punjab	2.20	1.63	0.93	1.67	1.15	0.85
Rajasthan	2.87	2.14	0.80	0.97	1.39	0.85
CENTRAL	0.64	0.70	1.25	0.43	1.31	2.98
Chattisgarh	NA	NA	NA	NA	NA	NA
Madhya Pradesh	2.05	0.64	0.94	0.56	1.09	1.53
Uttar Pradesh	0.28	0.69	1.87	0.39	1.52	5.38
Uttaranchal	NA	NA	NA	NA	NA	NA
WESTERN	2.43	0.98	0.76	0.77	1.09	1.22
D & N Haveli	2.18	2.39	0.00	0.75	2.16	0.00
Daman & Diu	NA	NA	NA	NA	NA	NA
Goa	1.06	2.15	0.63	0.89	1.58	1.37
Gujarat	1.94	1.10	0.89	1.02	1.23	0.81
Maharashtra	2.42	0.92	0.73	0.71	1.05	1.42
INDIA	0.99	0.95	1.02	0.55	1.55	1.99

Table A2
Ratio of Credit-to-Area and Borrowal-to-Operational, Long Term Credit Disbursed, 2000-01

Note and Source: As in Table 21.

Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.77	0.86	1.30	0.66	2.29	1.75
A & N Islands	0.20	3.94	0.45	0.07	3.26	0.47
Bihar	0.72	1.38	1.05	0.53	3.55	2.01
Jharkhand	NA	NA	NA	NA	NA	NA
Odisha	1.30	1.19	0.73	0.74	1.35	1.31
Sikkim	4.12	1.80	0.03	1.11	1.65	0.06
West Bengal	0.56	0.46	2.76	0.78	1.82	2.13
SOUTHERN	1.61	1.23	0.66	0.68	1.76	1.57
Andhra Pradesh	1.58	1.27	0.65	0.65	1.64	1.41
Karnataka	1.46	1.16	0.86	0.75	1.14	1.29
Kerala	1.04	1.17	0.78	0.78	5.16	5.95
Lakshadweep	1.10	0.00	1.40	0.85	0.00	14.13
Puducherry	1.75	0.86	0.47	0.59	2.87	2.91
Tamil Nadu	1.24	1.28	0.67	0.61	2.04	2.24
NORTH EASTERN	1.80	1.71	0.57	0.94	1.79	0.36
Arunachal Pradesh	10.42	11.21	0.05	2.68	3.27	0.02
Assam	1.50	0.99	0.81	1.00	1.38	0.53
Manipur	1.31	1.07	0.76	0.91	1.38	0.55
Meghalaya	3.10	0.90	0.06	1.48	0.73	0.06
Mizoram	2.69	0.46	0.53	1.93	0.34	0.07
Nagaland	104.37	18.97	0.57	11.12	4.97	0.35
Tripura	0.53	1.74	1.06	0.43	4.11	4.26
NORTHERN	1.63	2.25	0.81	0.49	1.71	1.20
Chandigarh	1.72	0.46	0.99	0.32	2.23	1.67
Delhi	1.10	0.60	1.09	0.44	1.13	2.28
Haryana	0.80	1.45	0.96	0.33	1.53	1.60
Himachal Pradesh	2.16	0.96	0.41	0.95	1.28	0.87
Jammu & Kashmir	1.37	0.82	0.60	0.60	2.27	3.74
Punjab	3.57	3.91	0.76	1.23	2.05	0.70
Rajasthan	3.60	2.58	0.73	0.92	1.40	0.88
CENTRAL	0.82	1.09	1.04	0.49	1.78	2.20
Chattisgarh	NA	NA	NA	NA	NA	NA
Madhya Pradesh	1.56	0.80	0.97	0.41	1.03	1.78
Uttar Pradesh	0.54	1.11	1.37	0.47	2.30	3.43
Uttaranchal	NA	NA	NA	NA	NA	NA
WESTERN	1.56	0.84	0.96	0.57	1.15	1.43
D & N Haveli	1.42	1.26	0.75	0.76	1.95	0.28
Daman & Diu	NA	NA	NA	NA	NA	NA
Goa	1.76	0.74	0.63	0.91	1.12	1.76
Gujarat	1.61	1.33	0.86	0.55	1.19	1.20
Maharashtra	1.80	0.63	0.98	0.65	1.12	1.45
INDIA	1.38	1.24	0.80	0.65	1.68	1.50

Table A3
Ratio of Credit-to-Area and Borrowal-to-Operational, Combined Credit Disbursed, 2000-01

Note and Source: As in Table 21.

Region/State	Credit-to-Area			Borrowal-to-Operational		
Table A4 **Ratio of Credit-to-Area and Borrowal-to-Operational, Short Term Credit Disbursed, 2005-06**						
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	1.02	1.19	0.84	0.62	2.44	2.76
A & N Islands	3.48	4.16	0.07	1.43	1.91	0.14
Bihar	0.72	1.84	0.94	0.48	5.63	5.22
Jharkhand	2.02	1.79	0.39	0.84	1.67	0.82
Odisha	1.13	0.83	1.05	0.71	1.30	1.69
Sikkim	5.44	1.16	0.04	1.41	0.89	0.14
West Bengal	0.93	1.00	1.17	0.74	1.74	3.35
SOUTHERN	1.45	1.19	0.72	0.64	1.63	2.00
Andhra Pradesh	1.33	1.33	0.69	0.63	1.73	1.41
Karnataka	1.48	1.26	0.81	0.86	1.08	1.19
Kerala	0.96	1.41	0.78	0.68	5.68	13.63
Lakshadweep	1.60	0.00	0.00	1.04	0.00	0.00
Puducherry	1.19	1.23	0.77	0.54	1.93	3.83
Tamil Nadu	0.98	1.04	0.99	0.55	1.72	3.63
NORTH EASTERN	2.43	1.99	0.25	0.90	1.65	0.61
Arunachal Pradesh	31.61	0.06	0.00	4.89	0.02	0.00
Assam	1.74	1.71	0.31	0.90	1.54	0.64
Manipur	2.35	0.81	0.39	1.08	0.93	0.89
Meghalaya	2.07	1.11	0.41	0.94	1.46	0.47
Mizoram	1.69	0.87	0.69	0.87	0.95	1.48
Nagaland	189.25	1.53	0.04	13.37	0.18	0.01
Tripura	0.69	1.85	0.69	0.40	5.14	4.28
NORTHERN	3.77	2.81	0.54	0.57	1.86	1.05
Chandigarh	3.29	0.12	0.25	1.10	0.24	1.46
Delhi	5.10	0.20	0.24	1.05	0.24	1.66
Haryana	2.07	2.29	0.66	0.40	1.70	1.45
Himachal Pradesh	2.57	0.86	0.20	0.57	2.95	0.42
Jammu & Kashmir	0.64	1.67	0.96	0.23	4.26	4.61
Punjab	5.53	5.33	0.59	1.11	1.86	0.75
Rajasthan	4.32	3.75	0.52	1.00	1.66	0.69
CENTRAL	1.11	1.50	0.75	0.58	1.81	1.92
Chattisgarh	2.46	1.29	0.53	0.88	1.28	1.01
Madhya Pradesh	1.16	0.81	1.03	0.40	0.74	1.97
Uttar Pradesh	0.85	1.67	0.72	0.59	2.61	2.22
Uttaranchal	0.70	1.13	1.13	0.45	2.00	2.96
WESTERN	1.46	1.06	0.89	0.76	1.09	1.27
D & N Haveli	1.09	0.66	1.12	0.73	1.06	1.66
Daman & Diu	0.50	0.73	1.93	0.51	3.40	7.36
Goa	3.12	1.86	0.21	0.94	1.40	1.01
Gujarat	1.47	0.97	0.96	0.68	1.19	1.15
Maharashtra	1.59	1.19	0.78	0.91	1.02	1.14
INDIA	1.59	1.57	0.59	0.63	1.97	1.37
Note and Source: As in Table 21.						

Table A5 Ratio of Credit-to-Area and Borrowal-to-Operational, Long Term Credit Disbursed, 2005-06						
Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.44	0.66	1.90	0.54	2.03	4.57
A & N Islands	2.54	1.17	0.77	0.81	1.06	1.17
Bihar	0.48	1.50	1.66	0.48	4.33	7.57
Jharkhand	1.04	2.06	0.63	0.60	2.00	1.32
Odisha	0.81	0.68	1.37	0.58	1.12	2.58
Sikkim	4.43	1.50	0.15	1.22	1.29	0.20
West Bengal	0.27	0.30	3.79	0.61	1.32	7.04
SOUTHERN	0.75	0.90	1.16	0.55	1.73	2.35
Andhra Pradesh	0.53	0.60	1.41	0.50	1.57	2.12
Karnataka	0.59	0.90	1.12	0.56	1.31	1.51
Kerala	0.73	1.27	1.45	0.68	8.11	7.98
Lakshadweep	1.60	0.00	0.00	1.04	0.00	0.00
Puducherry	0.61	1.71	0.92	0.38	1.73	5.53
Tamil Nadu	0.75	1.15	1.11	0.49	1.83	3.94
NORTH EASTERN	1.23	0.68	1.03	1.03	1.18	0.67
Arunachal Pradesh	31.37	0.14	0.00	4.73	0.11	0.02
Assam	0.79	0.47	1.34	0.98	1.10	0.96
Manipur	2.35	0.88	0.33	1.30	0.81	0.45
Meghalaya	2.49	0.89	0.35	1.07	1.06	0.70
Mizoram	1.46	1.04	0.68	0.77	1.14	1.36
Nagaland	191.61	3.19	0.01	12.89	0.61	0.01
Tripura	1.06	1.32	0.51	0.75	2.99	1.70
NORTHERN	1.40	1.43	0.91	0.46	1.31	1.45
Chandigarh	0.08	0.04	1.87	0.77	1.59	1.40
Delhi	3.61	0.09	0.65	0.13	0.20	4.01
Haryana	0.96	1.39	0.94	0.42	1.30	1.67
Himachal Pradesh	2.05	0.68	0.58	0.92	1.27	1.02
Jammu & Kashmir	0.60	1.30	1.32	0.30	3.44	5.37
Punjab	2.44	2.31	0.87	0.89	1.23	0.96
Rajasthan	1.76	2.23	0.83	0.59	1.38	1.13
CENTRAL	0.63	1.34	1.03	0.37	1.55	3.15
Chattisgarh	0.84	1.01	1.04	0.43	1.25	2.15
Madhya Pradesh	1.13	1.13	0.95	0.36	0.69	2.06
Uttar Pradesh	0.45	1.44	1.29	0.40	2.38	4.37
Uttaranchal	0.64	1.21	1.13	0.43	2.05	3.05
WESTERN	1.46	0.73	1.01	0.55	0.79	1.90
D & N Haveli	0.27	0.27	1.59	0.39	0.83	2.96
Daman & Diu	0.30	0.77	2.21	0.47	5.58	3.72
Goa	0.55	1.36	1.07	0.35	4.42	2.83
Gujarat	1.12	0.83	1.03	0.48	0.86	1.58
Maharashtra	1.57	0.70	1.00	0.65	0.72	1.96
INDIA	0.77	0.97	1.09	0.51	1.49	2.36
Note and Source: As in Table 21.						

Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.72	0.91	1.40	0.60	2.32	3.31
A & N Islands	2.89	2.30	0.50	1.02	1.35	0.82
Bihar	0.58	1.65	1.34	0.48	5.06	6.25
Jharkhand	1.60	1.90	0.49	0.78	1.75	0.94
Odisha	0.98	0.76	1.20	0.68	1.27	1.87
Sikkim	5.20	1.24	0.06	1.37	0.97	0.15
West Bengal	0.57	0.62	2.60	0.70	1.61	4.45
SOUTHERN	1.27	1.11	0.83	0.63	1.64	2.03
Andhra Pradesh	1.12	1.13	0.88	0.62	1.72	1.46
Karnataka	1.12	1.11	0.93	0.80	1.12	1.26
Kerala	0.92	1.39	0.89	0.68	5.87	13.18
Lakshadweep	1.60	0.00	0.00	1.04	0.00	0.00
Puducherry	1.09	1.31	0.80	0.53	1.92	3.91
Tamil Nadu	0.93	1.06	1.02	0.54	1.73	3.65
NORTH EASTERN	1.61	1.09	0.78	0.94	1.49	0.63
Arunachal Pradesh	31.56	0.08	0.00	4.87	0.03	0.01
Assam	1.00	0.74	1.12	0.93	1.37	0.77
Manipur	2.35	0.83	0.37	1.13	0.90	0.79
Meghalaya	2.26	1.01	0.38	0.97	1.36	0.53
Mizoram	1.63	0.92	0.68	0.85	0.99	1.45
Nagaland	190.00	2.05	0.03	13.22	0.31	0.01
Tripura	0.81	1.68	0.64	0.52	4.45	3.45
NORTHERN	2.97	2.35	0.67	0.55	1.75	1.13
Chandigarh	1.00	0.06	1.41	0.98	0.72	1.44
Delhi	4.86	0.18	0.30	0.64	0.22	2.70
Haryana	1.76	2.03	0.74	0.40	1.62	1.50
Himachal Pradesh	2.39	0.79	0.34	0.62	2.74	0.49
Jammu & Kashmir	0.63	1.56	1.07	0.25	4.09	4.77
Punjab	4.51	4.34	0.68	1.07	1.73	0.79
Rajasthan	3.33	3.16	0.64	0.92	1.60	0.78
CENTRAL	0.94	1.44	0.85	0.54	1.77	2.11
Chattisgarh	1.79	1.18	0.74	0.80	1.27	1.23
Madhya Pradesh	1.15	0.95	0.99	0.39	0.73	1.99
Uttar Pradesh	0.73	1.60	0.90	0.56	2.58	2.48
Uttaranchal	0.69	1.15	1.13	0.45	2.01	2.97
WESTERN	1.46	0.94	0.94	0.72	1.03	1.40
D & N Haveli	0.81	0.53	1.28	0.68	1.03	1.85
Daman & Diu	0.46	0.74	1.99	0.50	3.59	7.06
Goa	2.13	1.67	0.54	0.85	1.91	1.31
Gujarat	1.37	0.93	0.98	0.65	1.13	1.22
Maharashtra	1.58	0.99	0.87	0.85	0.95	1.32
INDIA	1.05	1.17	0.92	0.59	1.82	1.69

Table A6
Ratio of Credit-to-Area and Borrowal-to-Operational, Combined Credit Disbursed, 2005-06

Note and Source: As in Table 21.

Table A7 Ratio of Credit-to-Area and Borrowal-to-Operational, Short Term Credit Disbursed, 2010-11						
Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.65	0.94	1.60	0.59	3.49	2.48
A & N Islands	7.74	0.02	0.38	0.87	0.06	1.60
Bihar	0.70	2.09	0.88	0.50	7.70	3.18
Jharkhand	1.35	1.73	0.61	0.60	2.44	1.26
Odisha	0.86	0.99	1.20	0.60	2.03	2.03
Sikkim	4.52	0.62	0.38	1.43	0.49	0.51
West Bengal	0.43	0.37	3.48	0.83	1.61	2.46
SOUTHERN	1.19	1.33	0.72	0.57	2.06	1.91
Andhra Pradesh	0.97	1.32	0.81	0.54	1.88	1.73
Karnataka	1.79	1.04	0.78	0.72	1.27	1.28
Kerala	0.72	1.43	1.37	0.53	12.51	15.05
Lakshadweep	1.14	1.55	0.36	0.75	7.66	5.44
Puducherry	0.56	2.21	0.93	0.38	4.61	4.90
Tamil Nadu	0.86	1.50	0.80	0.53	2.40	2.89
NORTH EASTERN	2.95	1.22	0.31	1.10	1.41	0.23
Arunachal Pradesh	23.09	3.31	0.07	3.74	1.31	0.06
Assam	2.17	1.04	0.39	1.02	1.48	0.30
Manipur	2.79	0.52	0.40	1.66	0.36	0.22
Meghalaya	4.49	0.86	0.08	1.52	0.85	0.09
Mizoram	2.66	0.59	0.07	1.39	0.66	0.20
Nagaland	237.81	11.34	0.02	20.42	2.19	0.01
Tripura	1.07	0.57	1.33	0.89	1.89	1.16
NORTHERN	2.38	3.02	0.59	0.63	2.51	0.62
Chandigarh	0.25	0.28	1.56	0.67	1.62	1.53
Delhi	0.70	0.02	1.39	0.06	0.11	4.14
Haryana	1.91	2.56	0.63	0.56	2.40	0.82
Himachal Pradesh	2.22	0.82	0.33	1.03	1.23	0.48
Jammu & Kashmir	1.45	0.81	0.42	0.83	1.93	1.64
Punjab	5.36	5.00	0.58	1.82	1.89	0.55
Rajasthan	3.88	4.32	0.39	0.72	2.64	0.38
CENTRAL	0.74	1.46	0.92	0.45	2.43	1.93
Chattisgarh	0.57	0.65	1.28	0.36	1.20	2.67
Madhya Pradesh	0.93	0.97	1.02	0.47	1.20	1.61
Uttar Pradesh	0.67	2.00	0.70	0.46	3.81	1.82
Uttaranchal	0.71	1.15	1.18	0.55	2.72	1.42
WESTERN	1.46	0.63	1.06	0.75	1.30	1.10
D & N Haveli	0.26	0.07	1.74	1.08	0.27	1.83
Daman & Diu	0.12	0.11	3.87	0.41	3.04	21.16
Goa	1.25	1.09	0.80	0.76	1.46	2.15
Gujarat	2.91	1.16	0.71	0.89	1.21	0.94
Maharashtra	1.02	0.41	1.31	0.71	1.37	1.16
INDIA	1.12	1.41	0.79	0.57	2.17	1.55
Note and Source: As in Table 21.						

Table A8 Ratio of Credit-to-Area and Borrowal-to-Operational, Long Term Credit Disbursed, 2010-11						
Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.66	1.19	1.38	0.56	2.89	4.23
A & N Islands	8.09	1.14	0.10	2.06	0.55	0.20
Bihar	0.41	2.55	1.21	0.41	6.92	7.32
Jharkhand	1.63	1.72	0.50	0.74	1.93	1.20
Odisha	0.77	0.92	1.40	0.59	1.44	3.52
Sikkim	1.35	2.31	0.55	0.86	1.98	0.37
West Bengal	0.61	0.70	2.52	0.72	1.77	3.96
SOUTHERN	0.84	1.32	0.91	0.42	2.32	2.37
Andhra Pradesh	0.83	1.35	0.88	0.47	2.03	1.77
Karnataka	2.10	0.94	0.75	0.64	1.19	1.53
Kerala	0.33	0.95	2.77	0.44	6.79	38.11
Lakshadweep	1.15	1.49	0.34	0.74	7.99	5.32
Puducherry	0.12	1.44	1.87	0.13	4.09	9.24
Tamil Nadu	0.44	1.62	1.11	0.29	3.58	3.06
NORTH EASTERN	1.62	0.88	0.84	0.84	1.08	1.51
Arunachal Pradesh	12.56	4.99	0.30	3.18	1.13	0.28
Assam	1.74	0.98	0.64	0.83	1.26	1.46
Manipur	0.03	0.02	2.46	0.10	0.07	5.57
Meghalaya	3.25	0.90	0.42	1.64	0.48	0.27
Mizoram	1.93	0.77	0.48	1.20	0.64	1.07
Nagaland	182.20	16.43	0.09	18.35	2.59	0.05
Tripura	1.13	0.81	0.95	0.87	1.83	1.77
NORTHERN	2.08	2.02	0.76	0.65	2.02	0.87
Chandigarh	0.34	0.27	1.52	0.62	1.69	1.62
Delhi	0.32	0.10	1.46	0.18	0.29	3.67
Haryana	1.99	2.30	0.66	0.59	1.75	1.17
Himachal Pradesh	2.15	0.80	0.39	1.13	0.85	0.49
Jammu & Kashmir	1.05	1.06	0.86	0.73	2.11	2.90
Punjab	5.09	3.50	0.70	1.14	1.61	0.80
Rajasthan	3.13	2.76	0.64	0.71	2.29	0.57
CENTRAL	0.90	0.95	1.07	0.43	1.83	2.79
Chattisgarh	2.22	0.41	0.84	0.18	1.22	3.19
Madhya Pradesh	0.61	0.56	1.22	0.54	1.05	1.66
Uttar Pradesh	0.65	1.41	1.12	0.50	2.79	3.22
Uttaranchal	0.59	0.93	1.47	0.40	2.14	3.71
WESTERN	1.40	0.82	0.99	0.70	1.03	1.52
D & N Haveli	0.08	0.32	1.69	0.23	0.33	4.36
Daman & Diu	0.00	0.49	3.85	0.00	3.04	38.47
Goa	1.13	1.27	0.81	0.82	1.73	1.45
Gujarat	2.34	0.99	0.83	0.75	0.86	1.40
Maharashtra	1.15	0.75	1.09	0.69	1.12	1.54
INDIA	0.95	1.27	0.91	0.47	2.13	2.03
Note and Source: As in Table 21.						

Region/State	Credit-to-Area			Borrowal-to-Operational		
	Marginal	Small	Others	Marginal	Small	Others
EASTERN	0.65	1.01	1.54	0.58	3.39	2.80
A & N Islands	7.80	0.19	0.33	0.95	0.09	1.51
Bihar	0.63	2.21	0.96	0.48	7.59	3.73
Jharkhand	1.45	1.72	0.57	0.64	2.30	1.25
Odisha	0.82	0.97	1.28	0.60	1.92	2.32
Sikkim	3.99	0.90	0.41	1.35	0.70	0.49
West Bengal	0.48	0.46	3.22	0.81	1.64	2.72
SOUTHERN	1.11	1.33	0.76	0.55	2.10	1.97
Andhra Pradesh	0.93	1.33	0.83	0.53	1.91	1.73
Karnataka	1.89	1.01	0.77	0.70	1.25	1.34
Kerala	0.66	1.36	1.57	0.53	12.15	16.53
Lakshadweep	1.14	1.53	0.35	0.74	7.78	5.40
Puducherry	0.41	1.95	1.24	0.33	4.52	5.68
Tamil Nadu	0.80	1.52	0.85	0.51	2.49	2.91
NORTH EASTERN	2.47	1.10	0.50	1.07	1.37	0.36
Arunachal Pradesh	17.98	4.13	0.18	3.55	1.25	0.13
Assam	2.04	1.03	0.46	1.00	1.46	0.40
Manipur	0.22	0.05	2.32	0.97	0.23	2.60
Meghalaya	4.27	0.87	0.14	1.53	0.82	0.11
Mizoram	2.56	0.61	0.12	1.38	0.66	0.27
Nagaland	226.65	12.36	0.03	20.17	2.24	0.01
Tripura	1.09	0.65	1.21	0.89	1.89	1.22
NORTHERN	2.31	2.79	0.63	0.64	2.45	0.66
Chandigarh	0.31	0.27	1.54	0.66	1.64	1.55
Delhi	0.66	0.03	1.39	0.08	0.14	4.05
Haryana	1.93	2.50	0.63	0.56	2.30	0.87
Himachal Pradesh	2.20	0.82	0.35	1.05	1.14	0.48
Jammu & Kashmir	1.32	0.89	0.56	0.79	2.00	2.15
Punjab	5.31	4.68	0.60	1.74	1.86	0.58
Rajasthan	3.74	4.03	0.44	0.72	2.60	0.40
CENTRAL	0.77	1.36	0.95	0.44	2.35	2.04
Chattisgarh	1.36	0.53	1.07	0.32	1.21	2.79
Madhya Pradesh	0.88	0.91	1.05	0.49	1.18	1.62
Uttar Pradesh	0.67	1.89	0.78	0.47	3.71	1.96
Uttaranchal	0.69	1.11	1.23	0.53	2.67	1.63
WESTERN	1.45	0.67	1.04	0.74	1.26	1.16
D & N Haveli	0.20	0.15	1.73	0.71	0.30	2.92
Daman & Diu	0.05	0.33	3.86	0.09	3.04	34.62
Goa	1.24	1.11	0.80	0.77	1.50	2.07
Gujarat	2.78	1.13	0.74	0.87	1.16	1.00
Maharashtra	1.05	0.50	1.25	0.71	1.33	1.22
INDIA	1.08	1.38	0.82	0.55	2.17	1.61

Table A9
Ratio of Credit-to-Area and Borrowal-to-Operational, Combined Credit Disbursed, 2010-11

Note and Source: As in Table 21.

Table A10									
Ratios of Credit-to-Area and Borrowal-to-Operational across Regions									
Credit Type	Year	Farm Size	Ratio	East	South	North East	North	Central	West
Short Term Credit Disbursed	2000-01	Marginal	C2A	0.22	2.96	0.03	0.93	0.24	0.60
			B2O	0.28	2.45	0.01	1.57	0.41	0.42
		Small	C2A	0.68	2.26	0.11	0.78	0.41	1.02
			B2O	0.23	2.62	0.05	0.81	0.30	0.67
		Others	C2A	0.23	2.71	0.09	0.56	0.24	0.53
			B2O	0.31	2.71	0.03	0.87	0.35	0.46
		All	C2A	0.25	2.79	0.02	0.66	0.40	0.69
			B2O	0.41	2.65	0.06	0.77	0.37	0.72
	2005-06	Marginal	C2A	0.97	8.89	0.70	9.48	1.72	2.66
			B2O	1.15	7.42	0.59	7.19	2.36	1.97
		Small	C2A	2.15	11.80	0.20	3.68	3.12	4.38
			B2O	0.74	9.03	0.46	2.83	1.41	1.82
		Others	C2A	0.74	9.26	0.66	2.57	1.30	2.20
			B2O	0.92	7.49	0.38	2.67	1.29	1.00
		All	C2A	1.49	13.14	0.21	2.15	1.97	1.69
			B20	1.52	9.79	0.46	4.01	2.47	2.91
	2010-11	Marginal	C2A	0.29	2.25	0.51	2.05	0.39	0.99
			B2O	0.33	2.02	0.17	2.07	0.60	0.34
		Small	C2A	1.01	1.95	0.08	0.73	0.68	1.02
			B2O	0.26	2.41	0.36	1.26	0.40	0.64
		Others	C2A	0.27	2.42	0.70	1.42	0.32	0.85
			B2O	0.42	2.29	0.23	1.46	0.45	0.39
		All	C2A	0.42	2.98	0.05	0.51	0.50	0.46
			B2O	0.50	2.13	0.19	0.97	0.58	0.76
Long Term Credit Disbursed	2000-01	Marginal	C2A	0.56	1.39	0.70	1.48	0.70	1.69
			B2O	0.66	1.45	0.78	1.63	0.80	0.72
		Small	C2A	1.13	1.10	0.05	1.08	1.34	0.52
			B2O	0.47	1.36	0.86	1.49	0.82	1.15
		Others	C2A	0.51	1.40	1.33	1.69	0.65	1.62
			B2O	0.68	1.57	1.17	1.21	0.70	0.81
		All	C2A	0.55	1.43	0.13	0.96	1.23	0.71
			B2O	0.81	1.24	0.29	1.17	1.09	0.69
	2005-06	Marginal	C2A	0.48	1.65	0.79	1.84	0.53	1.53
			B2O	0.57	1.56	0.35	1.51	0.91	0.61
		Small	C2A	1.47	1.81	0.47	0.86	0.62	0.76
			B2O	0.70	1.60	0.53	1.52	0.55	0.97
		Others	C2A	0.75	1.73	1.08	1.38	0.40	1.06
			B2O	0.95	1.86	0.42	1.34	0.57	0.51
		All	C2A	1.35	1.59	0.15	0.93	0.74	0.78
			B20	0.84	1.70	0.50	1.02	0.66	0.81
	2010-11	Marginal	C2A	0.49	1.83	0.65	2.05	0.46	1.21
			B2O	0.65	2.13	0.26	1.49	0.36	0.53
		Small	C2A	1.07	2.06	0.35	0.78	0.57	0.89
			B2O	0.37	2.35	0.27	1.17	0.37	0.73
		Others	C2A	0.44	2.12	0.49	1.63	0.34	1.10
			B2O	0.50	2.55	0.14	1.11	0.32	0.35
		All	C2A	0.77	2.73	0.20	0.50	0.51	0.55
			B2O	0.70	2.06	0.38	0.94	0.49	0.82

Note and Source: As in Table 22. C2A denotes credit-to-area and B2O denotes borrowal-to-operational.

Table A11
Credit per Borrowal account per Hectare across Farm Sizes by Credit Type for Regions in 2000-01, 2005-06 and 2010-11

Year	Credit Type	Farm Size	East	South	North East	North	Central	West	India
2000-01	Short term	Marginal	36687	39015	12747	58617	36939	43959	36836
		Small	11064	11221	5790	22485	14902	12434	12704
		Others	20344	6559	50570	9600	8453	12500	8154
		All	30530	16586	19602	15604	20249	18704	16922
	Long term	Marginal	92768	75706	38353	65967	83104	86751	79003
		Small	25379	23961	18230	35013	30180	25089	26504
		Others	42751	17028	7226	25194	24485	16881	22316
		All	80893	40057	14876	34775	59113	28215	45734
	Com-bined	Marginal	47430	40977	28605	60439	47529	54631	40985
		Small	14032	12049	15897	24279	17871	14643	14183
		Others	26679	7451	24433	12847	14177	13190	10336
		All	41163	18094	16352	19347	30505	20460	20276
2005-06	Short term	Marginal	89609	65653	76466	258196	94192	82749	69457
		Small	25823	21686	30524	59080	40130	39404	21251
		Others	16615	11151	11830	20934	19695	29901	12056
		All	57174	31626	28072	41756	51961	45412	29240
	Long term	Marginal	113973	169492	136709	243541	248232	256605	180679
		Small	44309	65458	58561	87414	123797	86086	75599
		Others	58039	65320	179343	52032	48404	52001	55673
		All	145892	134431	113841	85792	153032	103496	126993
	Com-bined	Marginal	96275	72425	99365	255747	110004	109272	99728
		Small	30708	25179	38270	63316	51363	46437	35312
		Others	33902	15891	73282	28907	26260	35811	31360
		All	84004	39393	57861	50527	67432	56857	60098
2010-11	Short term	Marginal	120809	107967	85044	168271	140310	134149	116094
		Small	30187	33399	27540	53828	50578	33406	37931
		Others	69729	19478	42727	42500	40317	66319	29812
		All	104680	51709	31694	44739	84294	69130	58515
	Long term	Marginal	245774	195482	299705	286083	308210	248710	226325
		Small	86866	55348	125636	89215	75312	98370	66242
		Others	66726	37374	86077	77218	55788	80748	49645
		All	197536	97539	154593	89190	145144	124333	110931
	Com-bined	Marginal	142259	116756	102579	183312	160357	150366	128567
		Small	38900	36580	35600	57495	52972	41354	41670
		Others	68912	22293	61631	48306	42951	69144	33164
		All	121390	57705	44569	50310	91865	77407	65538

Note and Source: As in Table 23. As average land size data indicated are proxies from agricultural census, they are not available separately for short term and long term credit.

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