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SUBJECT I
AGRICULTURAL CREDIT AND INDEBTEDNESS

Indebtedness of Farmer Households Across States: Recent Trends, Status and Determinants

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INTRODUCTION

One of the serious and unrelenting problems faced by the Indian farmers households has been indebtedness. Despite substantial improvement in agricultural output as well as distribution of credit through institutional sources since the introduction of the new agricultural technology,[1] indebtedness among the farmers' households is found to be widespread even today. While studying the Punjab's peasants, Darling (1925) wrote "the Indian peasant is born in debt, lives in debt and dies in debt". Though this was written about eight decades back, the problem of indebtedness not only remains true today but it has been aggravated further in recent years. There are many reasons for the persistence of indebtedness among the farmers' households in India. First, since the agricultural activities are typically seasonal and heavily dependent upon monsoon rainfall, the return from the crop cultivation is not assured most of the time which ultimately affects the repaying capacity of the farmers. Second, though the distribution of institutional credit for agricultural purpose has increased manifold in India since the nationalisation of banks, substantial number of farmers still rely on non-institutional sources (money lenders and others),[2] where the rate of interest is not only exorbitant but the terms and conditions of the loan are often exploitative (see, Ramachandran and Swaminathan, 2001; NABARD, 2001; Athreya *et al.*, 1990). Third, the domination of middlemen in agricultural produce market, which prevents the farmers from getting remunerative prices for their produce, is also considered to be one of the main reasons for the indebtedness. Four, majority of the farmers also take loans for consumption as well as for a variety of social obligations, which are unproductive and do not help to generate income. As the surplus income generated through crop cultivation is not assured and often are inadequate, the farmers are unable to repay the loan in time and thus the burden of debt goes on increasing.

Several studies have been carried out focusing on the agricultural credit including indebtedness of rural as well as farmers' households in India (for details see, Shivamaggi, 1986; Gadgil, 1986; Desai, 1987; Desai, 1988; Mujumdar, 1988 and

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1999; Singh and Sagar, 2004). Some studies have analysed the interlinkage of land, labour and credit (Bardhan and Rudra, 1978; Bardhan, 1980; Sarap, 1991; Pant, 1980; Binswanger and Rosenzweig, 1986), while others have analysed the intensity of indebtedness among the rural households (Gothaskar, 1988; Tandon, 1988; Narayanamoorthy, 2001). Quite a few studies have been carried out on the indebtedness of rural and urban households using the data available from the decadal All-India Debt and Investment Surveys (AIDIS). Studies based on the decennial surveys show that the proportion of rural as well as cultivator households reporting indebtedness declined over the decades, but the extent of indebtedness (i.e., average debt per household) has increased at current prices (Rao, *et al.*, 1997; Rao and Tripathi, 2001; RBI, 1999 and 2000).

Although quite a few studies have dealt with the indebtedness of rural households including farmers' households using the data of AIDIS up to 1991-92, studies are not available focusing on the indebtedness of farmers' households across the states particularly utilising recent data, i.e., using data pertaining to post-economic reform period. Over the last ten years or so, the Indian agriculture has witnessed a few unprecedented shocks and changes. While the control on imports of many agricultural products have been gradually removed due to obligations of World Trade Organisation (see, Datta and Deodhar, 2001), the growth of agricultural credit also slowed down during the nineties (1991-99) as compared to the eighties (1981-1991) (Chavan, 2001).[3] Due to sharp decline in the prices of many agricultural commodities, some farmers have also committed suicide in many states including rich states like Punjab (see, Deshpande, 2002). As a result of these unprecedented transformations, some changes may have taken place in the indebtedness profile of the farmers households. In view of this, an attempt is made in this paper to study the recent trends and determinants of indebtedness of farmers' households across the states, using the state-wise data on indebtedness of farmer households available from the NSSO report on *Indebtedness of Farmer Households* pertaining to the period January-December 2003. Specifically the paper attempts to study (a) the incidence as well as extent of indebtedness across the states, (b) the socio-economic characteristics of the states having low and high incidence and extent of indebtedness, and (c) the determinants of incidence and extent of indebtedness of farmer households.

EMPIRICAL SETTING

This study considers 17 major states of India, which cover over 94 per cent of India's gross cropped area during 2000-01. Since the main objective of the study is to find out the trends and determinants of incidence (proportion of households reporting debt to either institutional or non-institutional agencies) as well as extent of indebtedness (average amount of debt in Rs. per household), data pertaining to incidence as well as the extent of indebtedness of farmers households and other associated variables have been collected from the published NSSO report (No. 498, 59th Round, January-December, 2003) on *Indebtedness of Farmer Households*.[4] In

order to find out the changes that have taken place in respect of the incidence of indebtedness (IOI) and the extent of indebtedness (EOI) over the last one decade, all the relevant data have been collected from the All-India Debt and Investment Survey (AIDIS) of 1991-92. Besides, since the incidence and extent of indebtedness is determined by many socio-economic factors, statewise data on share of irrigated area to cropped area (GIA), share of foodgrains/non-foodgrains area to GCA, value of agricultural output per ha (VAO), average size of land holding (ASH), availability of institutional credit per hectare of net sown area (ACA), average recovery rate of agricultural loan (ARAL), etc., have been compiled from various sources published by different agencies. While descriptive analysis has been followed to study the trends in IOI and EOI across the states, multiple regression analysis has been used to study the determinants of these factors.

It is obvious that the incidence as well as extent of indebtedness is determined by a variety of different socio-economic factors, as the issue of indebtedness of farmer households is very complex. It is difficult to accommodate all the factors that determine the indebtedness of farmer households while carrying out a study using only secondary sources. In this study, therefore, we have considered thirteen variables (excluding three dependent variables) to relate with the indebtedness of

TABLE 1. DEFINITION OF THE VARIABLES USED IN THE STUDY

Variable	Definition	Unit	National average	17 States' Average	17 States' SD
(1)	(2)	(3)	(4)	(5)	(6)
ARAL	Average recovery rate of agricultural loan (1999-2000)	Per cent	63.00	60.60	20.85
ACA	Average credit availability per hectare of net sown area (1999-2000)	Rs.	5,340.00	3,665.41	3,464.87
ASH	Average size of landholding (1995-96)	Ha.	1.41	1.65	1.05
EOI_{hh}*	Extent of indebtedness per household (in 1986-87 prices)	Rs.	12,585.00	15,764.00	11,484.00
EOI_{ha}*	Extent of indebtedness per hectare of gross cropped area (in 1986-87 prices)	Rs.	6,013.00	7,135.00	5,727.00
FGA	Share of foodgrains area to GCA (2001-02)	Per cent	64.73	63.30	18.98
GIA	Share of irrigated to GCA (2001-02)	Per cent	40.18	40.24	25.84
IOI*	Incidence of indebtedness	Per cent	48.60	50.91	16.29
MSFTH	Share of marginal and small farmers to total indebted farmer households	Per cent	79.90	80.69	13.22
NFGA	Share of non-foodgrains area to GCA (2001-02)	Per cent	35.27	36.70	18.98
RPBP	Rural population below poverty line (2000-01)	Per cent	27.09	21.65	14.39
PIHCI	Per cent of indebted farmers households having cultivation as main income	Rs.	56.90	53.35	12.55
PLTL	Share of productive loan to total outstanding loan	Per cent	58.40	51.05	18.30
SCSTH	Share of SC/ST indebted households to total indebted farmer households	Per cent	28.00	25.81	8.58
SILTL	Share of institutional loan to total outstanding loan	Per cent	67.70	58.89	16.01
VOA	Value of agricultural output per hectare (2001-02)	Rs.	22,569.00	27,283.00	11,370.00

Note: SD – Standard deviation; GCA – Gross cropped area.

Sources: Government of India (2005); CMIE (2004 and 2005); FAI (2004) and NABARD (2001).

* Dependent Variables.

farmer households (see, Table 1). The reasons for considering these variables are self-explanatory; these thirteen variables influence the indebtedness of farmer households one way or the other.

Statewise Trends in Incidence and Extent of Indebtedness

One of the objectives of the study is to find out the trends in IOI and EOI of the farmer households across the states in India. Besides studying the statewise status with respect to IOI and EOI based on recently published data of 2003, we have also compared the same with AIDIS data pertaining to the year 1991-92 to find out the changes that have taken place over the last one decade on this. Since IOI and EOI are totally different by definition, let us first discuss about IOI. Data presented in Table 2 clearly show a considerable variation in the incidence of indebtedness in 2003 across 17 states considered for the analysis. Though the national average of IOI was only 48.60 per cent in 2003, the same was found to be much higher than the national average in most of the states (except states like Andhra Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir and Uttar Pradesh). In fact, the level of IOI was found to be over 60 per cent in states like Andhra Pradesh, Karnataka, Kerala, Punjab and Tamil Nadu; all these states are relatively developed in terms of agriculture. While the highest IOI was found to be 82 per cent in Andhra Pradesh, the lowest one was found to be in Assam, with 18.10 per cent.

While comparing the position of 2003 with the earlier period (1991-92), one could notice many interesting changes in the indebtedness of cultivator households across 17 major states. At the all India level, the proportion of households reporting indebtedness has increased from 25.90 per cent in 1991-92 to 48.60 per cent in 2003, an increase of about 87 percentage points. This gets further worsened when one looks at individual states. During 1991-92, the highest IOI was 39.90 per cent (in Andhra Pradesh) and the lowest was just 6.50 per cent (in Assam). But this scenario has totally changed during the year 2003, where the highest IOI was found to be 82 per cent (Andhra Pradesh) and the lowest one was found to be 18.10 per cent in Assam. While IOI has increased substantially across the states between the two time points, the same has increased over 100 to 178 percentage points in states like Andhra Pradesh, Assam, Gujarat, Jammu & Kashmir, Madhya Pradesh, Punjab and Uttar Pradesh. One common similarity seen at both the time points is that Andhra Pradesh and Assam respectively occupy the highest IOI and the lowest position in IOI. Does this mean that the trends (ranks) in IOI are the same at both time points? The ranking of the states have slightly changed between the two time points, though there was no change with respect to the states having highest and lowest IOI. Interestingly, however, the data reveal that IOI of the agriculturally advanced states (Andhra Pradesh, Haryana, Punjab and Tamil Nadu) is relatively higher than that of the less developed states (Assam, Bihar, Jammu & Kashmir and Orissa).

TABLE 2. STATEWISE TRENDS IN INCIDENCE AS WELL AS EXTENT OF INDEBTEDNESS: 1991-92 AND 2003

States	IOI (Per cent)			EOI/hh (Rs. in current prices)			EOI/hh (Rs. at 1986-87 prices)		EOI/ha (2003)		
	1991-92*	2003	Per cent change over 1991-92	1991-92*	2003	Per cent change over 1991-92	1991-92*	2003	Per cent change over 1991-92	Current prices	At 1986-87 prices
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Andhra Pradesh	39.90	82.00	105.51	3,287	23,965	629.08	1,796	7,397	312	10,676	3,295
Assam	6.50	18.10	178.46	248	813	227.82	136	251	85	501	155
Bihar	17.20	33.00	91.86	712	4476	528.65	389	1,381	255	3,154	973
Gujarat	21.40	51.90	142.52	2,460	15,526	531.14	1,344	4,792	256	5,497	1,696
Haryana	28.40	53.10	86.97	5,486	26,007	374.06	2,998	8,027	168	8,270	2,552
Himachal Pradesh	21.80	33.40	53.21	1,212	9,618	693.56	662	2,969	348	9,193	2,837
Jammu & Kashmir	14.80	31.80	114.86	1,151	1,903	65.33	629	587	-7	1,610	497
Karnataka	33.10	61.60	86.10	3,244	18,135	459.03	1,773	5,597	216	5,966	1,841
Kerala	32.80	64.40	96.34	3,857	33,907	779.10	2,108	10,465	397	24,624	7,600
Madhya Pradesh	22.20	50.80	128.83	1,961	14,218	625.04	1,072	4,388	310	5,029	1,552
Maharashtra	29.00	54.80	88.97	2,890	16,973	487.30	1,579	5,239	232	5,098	1,574
Orissa	27.90	47.80	71.33	1,367	5,871	329.48	747	1,812	143	3,155	974
Punjab	30.00	65.40	118.00	7,125	41,576	483.52	3,893	12,832	230	9,663	2,982
Rajasthan	31.30	52.40	67.41	3,797	18,372	383.86	2,075	5,670	173	5,071	1,565
Tamil Nadu	38.80	74.50	92.01	3,785	23,963	533.10	2,068	7,396	258	14,700	4,537
Uttar Pradesh	19.20	40.30	109.90	1,654	7,425	348.91	904	2,292	154	5,116	1,579
West Bengal	30.70	50.10	63.19	1,543	5,237	239.40	843	1,616	92	3,976	1,227
All India	25.90	48.60	87.64	2,294	12,585	448.61	1,254	3,884	210	6,013	1,856

Sources: NSSO (2005); RBI (1999);
Note: * refers to cultivators households.

The incidence of indebtedness explains only the proportion of households indebted during the time of survey, but it does not explain the extent (average amount of debt per household) of indebtedness (EOI) of the farmers' households. Therefore, one needs to study the extent of indebtedness to understand the density of indebtedness across the states. Data presented in Table 2 clearly depict that EOI has increased substantially in 2003 as compared to that prevailed at 1991-92 across the states, both at current and constant prices. At the national level, the average debt per household at constant prices has increased from Rs. 1,254 in 1991-92 to Rs. 3,884 in 2003, an increase of 210 per cent. While the debt per household has increased

phenomenally across all the states considered for the analysis, it is found to be higher among the agriculturally developed states. Since the repaying capacity of the farmers belonging to agriculturally less developed states is lower, one normally expects a very high EOI in these states. But, unfortunately, this does not turn out to be correct in our analysis. The important issues that arise are: why does EOI of the poor states relatively lower? Is it because of relatively less development of agriculture? Or is it due to non-availability of credit? Data pertaining to agriculturally poor states (Assam, Bihar, Jammu & Kashmir, Madhya Pradesh, Orissa and Rajasthan) show that the availability of agricultural credit per hectare of net sown area is very low in these states as compared to the national average (see, Table 3).

TABLE 3. STATEWISE GROSS VALUE OF AGRICULTURAL OUTPUT AND AVAILABILITY OF CREDIT

States	GVO (Rs./ha) (at 1993-94 prices)		Growth rate of GVO		ARAL	ACA
	1990-91	1999-2000	TE 1983-84 to 1990-91	TE 1990-91 to 1999-2000		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Andhra Pradesh	11,413	11,391	3.97	1.51	66.0	5,253
Assam	6,948	7,789	0.65	2.57	10.0	276
Bihar	8,496	9,696	0.96	-0.35	26.0	572
Gujarat	10,759	6,052	1.45	-0.79	74.0	2,887
Haryana	13,063	15,028	3.90	1.49	80.0	8,611
Himachal Pradesh	N.A.	N.A.	N.A.	N.A.	62.0	2,839
Jammu & Kashmir	N.A.	N.A.	N.A.	N.A.	32.0	438
Karnataka	7,957	9,033	0.10	0.74	62.0	3,253
Kerala	N.A.	N.A.	N.A.	N.A.	83.0	9,948
Madhya Pradesh	7,146	7,735	2.99	1.49	61.0	1,104
Maharashtra	7,349	7,103	3.79	0.18	61.0	2,363
Orissa	8,241	8,375	5.91	0.45	45.0	1,269
Punjab	14.149	17,818	6.60	1.16	88.0	10,786
Rajasthan	7,728	7,837	3.18	1.36	74.0	1,167
Tamil Nadu	12,979	16,131	2.95	2.63	70.0	7,640
Uttar Pradesh	11,426	13,071	0.99	1.21	66.0	2,172
West Bengal	10,391	13,649	2.41	3.06	61.0	1,734
All India	9,491*	10,344*	2.55	1.13	63.0	5,340

Sources: Data on value of agricultural output are from Sen and Bhatia (2004) and others are from NABARD (2001).

Notes: GVO – gross value of agricultural output; ARAL – average recovery rate of agricultural loans; ACA - agricultural credit availability per hectare of net sown area; * - refers to average of 14 states.

The repayment capacity of a farmer household heavily depends upon the land holding size as well as its income generating capability. It is not always prudent to judge the extent of indebtedness only on the basis of household, which has been traditionally followed. Therefore, after having studied the extent of indebtedness per household, we have studied EOI per hectare of gross cropped area across the states for the year 2003. In order to estimate EOI per hectare, first we multiplied per household debt of each state with the total number of farmer households and then the

same was divided with the gross cropped area of each state. As can be seen from Table 2, there are lots of variations between EOI estimated based on number of households (EOI_{hh}) and the one based on gross cropped area (EOI_{ha}). First of all, the average debt of all the states is reduced substantially when we compute debt based on gross cropped area. For instance, at the all India level, the average debt at constant prices is reduced from Rs. 3,884 to Rs. 1,856. Second, the highest amount of debt was noticed in Punjab (Rs. 12,832) when the same was estimated on the basis of number of households. But, it changes completely while estimating debt on the basis of gross cropped area, where Kerala (Rs. 7,600) stands first followed by Tamil Nadu (Rs. 4,537), Andhra Pradesh (Rs. 3,295) and Punjab (Rs. 2,982). Although the average amount of debt has declined sharply across the states when one estimates the same on the basis of statewise gross cropped area, the intensity of debt is found to be still higher among those states, which are relatively advanced in terms of agriculture.

Characteristics of States with Different Levels of Indebtedness

After having studied the trends in IOI and EOI, let us study the characteristics of the states having low and high incidence of indebtedness. For this purpose, we divided the states into two, namely, states having above the national average (hereafter ANA states) and below the national average (hereafter BNA states) in terms of IOI and EOI. The main objective of this analysis is to find out whether or not any differences exist with respect to economic and other determining factors between the ANA and BNA states.

Let us first study the characteristics of the ANA and BNA states classified in terms of IOI. The results presented in Table 4 show that despite having relatively lower value of agricultural output per hectare, ANA states are better placed in terms of average size land holding (ASH), irrigated area (GIA) and the share of foodgrains area in gross cropped area (NFGA). While the differences between ANA and BNA states with respect to SCSTH and PIHCI are found to be small, the percentage of rural population below poverty line (RPBP) is found to be substantially less among those states having incidence of indebtedness above the national average. We expected that the states having better socio-economic conditions would have lower incidence of indebtedness, but our expectation turned out to be incorrect.

States are also classified into two as ANA and BNA in terms of EOI_{hh} to know their socio-economic characteristics (see, Table 4). Though EOI is totally different from IOI, we do not find any substantial differences in the characteristics of ANA and BNA states, from that of the same classified on the basis of IOI. For instance, the values of parameters such as ASH, NFGA, GIA and RPBP belonging to ANA states are considerably higher than that of BNA states when the states are classified based on EOI_{hh}. The same kind of trend was also noticed while classifying the states based on IOI. It means that the characteristics of ANA and BNA states by and large are the

TABLE 4. STATES HAVING ANA AND BNA IN TERMS OF IOI AND EOI AND THEIR CHARACTERISTICS.

		Name of the States	Average of the Variables														
			IOI	EOI/hh	EOI/ha	NFGA	GIA	VOA	ASH	RPBP	PIHC	IMSFTH	PLTL	SILTL	SCSTH	ARAL	ACA
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Based on IOI	ANA	AP; TN; PUJ; KAR; MAH; HAR RAJ; GUJ; MP; WB	60.09	21625	8961	44.05	42.86	25044	2.00	17.50	54.15	75.10	58.39	59.45	25.76	70.91	4977
	BNA	ORI; UP; HP; BIH; JK; ASS	34.07	5018	3788	23.23	35.44	31388	1.00	29.25	51.88	90.93	37.60	57.87	25.90	40.17	1261
Based on EOIhh	ANA	PUJ; KER; HAR; AP; TN; RAJ; KAR; MAH; GUJ MP	61.09	23264	9459	45.24	43.45	22973	2.12	16.07	54.01	72.89	59.66	59.59	24.81	71.90	5301
	BNA	HP; UP; ORI; WB; BIH; JK; ASS	36.36	5049	3815	24.49	35.65	33441	0.98	29.62	52.40	91.83	38.76	57.89	27.24	43.14	1329
Based on EOIha	ANA	KER; TN; AP; PUJ; HP; HAR	62.13	26506	12854	38.41	53.30	30707	1.60	10.59	45.53	82.32	46.07	57.98	23.82	74.83	7512
	BNA	KAR; GUJ; UP; MAH; RAJ; MP; WB; ORI; BIH; JK; ASS	44.78	9904	4016	35.77	33.12	25416	1.67	27.68	57.61	79.80	53.77	59.38	26.90	52.00	1567

Sources: NSSO (2005); CMIE (2004 & 2005); FAI (2004) and NABARD (2001).
Notes: ANA – above national average; BNA – below national average.

same when we classify the states either based on IOI or EOI. This is mainly because of close correlation between IOI and EOI_{hh} across different states. However, as expected, the characteristics of the states belonging to ANA and BNA group significantly vary when we classify the states based on EOI_{ha}. For example, the values of the parameters such as ASH and RPBP are found to be higher among ANA states while classifying the states based on EOI_{hh}. But, this is not true when we classify the states based on EOI_{ha}. Importantly, the value of agricultural output per hectare is found to be higher with those states falling under the category of ANA group when we classify the states based on EOI_{ha}, but the same trend is not seen when the states are classified based on IOI and EOI_{hh}. Similarly, variation is also seen in the values of MSFTH, PLTL and SILTL while classifying the states based on EOI_{ha}. Although there are variations with respect to certain socio-economic characteristics of the states belonging to ANA and BNA groups, states like Kerala, Tamil Nadu, Andhra Pradesh, Punjab and Haryana consistently fall under the category of ANA states in all the three classifications presented in Table 4.

Determinants of Incidence and Extent of Indebtedness

There is no need to reiterate the fact that a number of different factors determine the indebtedness of farmer households. The factors that determine the indebtedness are also expected to vary across the states because of the differences that exist in the development of agriculture and other associated factors. It may not be possible to include all the factors/variables that determine the indebtedness of farmer households when we study the same using secondary level data, used for this study. Keeping this in view, we have constructed the following regression model to study the incidence as well as the extent of indebtedness:

$$IOI/EOI_{hh}/EOI_{ha} = a + b_1ASH + b_2NFGA + b_3GIA + b_4ACA + b_5RPBP + b_6MSFTH + b_7PIHCI + b_8PLTL + b_9SCSTH + b_{10}SILTL \quad ....(1)$$

TABLE 5. FACTORS DETERMINING INDEBTEDNESS – REGRESSION RESULTS

Independent variables (1)	Dependent Variable IOI (2)	EOI_{hh} (3)	EOI_{ha} (4)
ASH	-4.81 (-2.29)[c]	2372.38 (2.52)[b]	-1963.69 (-1.39)
NFGA	-0.12 (-1.38)	-40.06 (-1.07)	54.33 (0.96)
GIA	-0.36 (-4.68)[a]	-84.21 (-2.47)[b]	-54.47 (-1.07)
ACA	0.0034 (6.48)[a]	2.79 (11.77)[a]	1.38 (3.85)[a]
RPBP	-0.25 (-2.36)	24.78 (0.53)	-2.76 (-0.18)
MSFTH	0.36 (1.55)[d]	-72.86 (-0.71)	-58.66 (0.72)
PIHCI	-0.87 (-4.64)[a]	-350.92 (-4.17)[a]	-164.77 (-1.30)
PLTL	1.33 (8.50)[a]	262.73 (3.73)[a]	40.97 (0.39)
SCSTH	0.41 (2.68)[b]	-73.50 (-1.08)	117.29 (1.14)
SILTL	-0.50 (-6.58)[a]	-124.96 (-3.65)[a]	-50.70 (-0.99)
Constant	38.83 (1.57)[d]	26388.56 (2.37)[a]	17194.48 (1.03)
R^2	0.98	0.99	0.93
Adjusted R^2	0.95	0.98	0.81
F Value	29.80[a]	74.42[a]	7.64[a]
D-W Value	2.19	2.24	2.03

Sources: Computed using NSSO (2005); CMIE (2004 & 2005); FAI (2004) and NABARD (2001).
Notes: a, b, c and d are significant rate at 1, 5, 10 and 20 per cent respectively; Figures in brackets are 't' values.

While the explanation of the variables included in equation (1) is already provided in Table 1, we understand from the correlation analysis that all the ten variables included in the equation would influence the incidence as well as the extent of indebtedness one way or the other.[5] Three regressions are estimated separately treating three different dependent variables, namely, IOI, EOI_{hh} and EOI_{ha}. The value of adjusted R^2 arrived from three models (reported in Table 5) varies from 0.81 to 0.98, suggesting that the variables included in the models are appropriate in explaining the variation of the indebtedness of the farmer households.

Out of the ten variables included in the model to study the determinants of IOI, the coefficients of four (ACA, MSFTH, PLTL and SCSTH) variables have positively and significantly influenced IOI and another five variables (ASH, GIA, RPBP, PIHCI and SILTL) have negatively influenced the same. The coefficient of NFGA (share of

non-foodgrains area to cropped area), which is included to show the nature of commercialisation of agriculture in the state, turned out to be insignificant. Among the four variables that influence IOI positively and significantly, the coefficient of ACA (i.e., availability of agricultural credit per hectare of net sown area) turned out to be very significant, explaining a positive nexus between the availability of credit and IOI.This suggests that the state that gets higher agricultural credit also has relatively higher IOI. Similarly, the state which has relatively more number of marginal and small indebted farmer households to total indebted households (MSFTH) as well as more number of SCST indebted farmers also has higher incidence of indebtedness. This is obviously expected. The positive coefficient of PLTL explains that wherever the share of productive loan to total outstanding loan is higher, IOI is also higher. This is something unexpected as we have expected that PLTL would negatively influence IOI.

As expected, the coefficients of variables such as ASH, GIA, RPBP, SILTL and PIHCI turned out to be negative in determining the incidence of indebtedness. Since all the five variables are growth related variables, they have negatively and significantly influenced IOI. The negative coefficient of ASH explains that an unit increase in the average size of landholding would reduce IOI to the extent of 4.81 per cent. This is possible because the production capacity of the farmers tends to increase along with ASH, which ultimately helps the farmers to repay the loan in time. Similarly, since the increased coverage of irrigation helps to augment the production of agricultural commodities by increasing cropping intensity as well as by changing the cropping pattern from low to high value crops, it (GIA) has negatively influenced the incidence of indebtedness. The negative coefficient of the variable RPBP (per cent of rural population below poverty line) explains that an unit increase in rural poverty reduces the incidence of indebtedness by 0.25 per cent. Though this is not generally expected, this has happened mainly because of the fact that some of the states have relatively less IOI despite having higher rural poverty (example, Bihar, Orissa, Uttar Pradesh and Madhya Pradesh). On the whole, it appears from the regression analysis that the factors like availability of credit, PLTL and SCSTH have positively influenced IOI, while ASH, GIA, RPBP, SILTL and PIHCI have negatively influenced the same.

Regression equation is separately estimated to find out the determinants of the extent of indebtedness as well. The results of regression estimated treating EOI_{hh} as dependent variable are somewhat different from the same estimated treating IOI as dependent variable, though the independent variables used for both the models are the same (see, Table 5). Against our expectation, the coefficients of the variables such as ASH, ACA and PLTL have positively and significantly influenced EOI_{hh}. It was expected that the extent of indebtedness would be less in those region/states where the average size of landholding is relatively larger as the same is expected to increase income of the farmers. Similarly, when the availability of institutional credit (ACA) is higher, the farmers would be able to repay the loan in time because of low rate of

interest given for institutional credit. But, unfortunately, both the variables have positively influenced EOI_{hh}. This is possibly because of the fact that states like Punjab, Haryana, Andhra Pradesh and Tamil Nadu have higher EOI, despite having relatively higher availability of institutional credit.

As we expected, the coefficients of variables such as GIA, PIHCI and SILTL have negatively and significantly influenced the extent of indebtedness per household. Higher proportion of irrigation to cropped area (GIA) is essential to increase the returns from crop cultivation and therefore, higher GIA must have helped to reduce the extent of indebtedness. The negative coefficient of PIHCI suggests that when the percentage of households having cultivation as the main income increases, the extent of indebtedness decreases. It means that those farmer households that have major income from crop cultivation are able to repay the loan in time. As expected, the extent of indebtedness decreases when the share of institutional loan to the total outstanding loan (SILTL) increases. This indirectly suggests that the extent of indebtedness is less in those states where the institutional credit network is stronger.

However, we get totally different results from the above when we estimate regression treating EOI_{ha} as dependent variable along with same number of independent variables (see, last column of Table 5). Except the coefficient of ACA, which positively and significantly influences EOI_{ha}, all other variables turned to be insignificant. This means that the factors which determine EOI (per household) and EOI (per ha cropped area) are not the same. Whatever are the differences, one thing which clearly emerges out from the analysis is that the states, which have improved availability of credit, appear to be severely indebted as compared to those states which have less accessibility to institutional credit.

CONCLUSION

In spite of significant increase in crop output per hectare of land as well as increased availability of institutional credit to agriculture since the introduction of green revolution, the problem of indebtedness has been continuing among the farmer households in India. Though a number of studies have been carried out focusing on the indebtedness of rural as well as farmer households, not many studies are available on this subject covering different states particularly using data from recent period, i.e., relating to the post-economic reform period. Keeping in view the unprecedented changes that have taken place during the nineties in Indian agriculture, an attempt is made in this paper to study the trends and determinants of the incidence as well as extent of indebtedness among the farmer households mainly using the data available from the NSSO report (No. 498, 59th Round, January-December, 2003) on *Indebtedness of Farmers Households*. The study shows that the incidence of indebtedness (proportion of households reporting debt) ranges from about 18 per cent in Assam to 82 per cent in Andhra Pradesh during the year 2003. While the incidence of indebtedness is found to be higher among the agriculturally advanced states like Andhra Pradesh, Punjab, Tamil Nadu, Karnataka and Haryana during

2003, the same has increased substantially across the states in 2003 as compared to the situation prevailed at 1991-92. The extent of indebtedness (debt in rupees per household) has also increased substantially across the states between 1991-92 and 2003. While the average debt (at constant prices) per household increased from Rs. 1,254 in 1991-92 to Rs. 3,884 in 2003, it is found to be very high in states like Punjab (Rs. 12,832), Kerala (Rs. 10,465), Haryana (Rs. 8,027), Andhra Pradesh (Rs. 7,397) and Tamil Nadu (Rs. 7,396) during the year 2003. However, the average debt of all the states is reduced substantially when we estimate the debt on the basis of gross cropped area, where Kerala (Rs. 7,600) stands first followed by Tamil Nadu (Rs. 4,537), Andhra Pradesh (Rs. 3,295) and Punjab (Rs. 2,982). The analysis carried out to understand the economic and other characteristics of the states having above national average (ANA) and below national average (BNA) in terms of incidence of indebtedness and extent of indebtedness shows that ANA states are better placed in terms of economic and other characteristics as compared to their counterparts. The regression analysis carried out to find out the determinants of the indebtedness of the farmer households suggests that wherever the availability credit per hectare of net sown area is higher, the extent of indebtedness is also higher. The study, on the whole, shows that (a) the incidence as well as extent of indebtedness has considerably increased among the farmer households over the last one decade across the states and (b) both the incidence as well as the extent of indebtedness is found to be relatively higher among those states that are relatively developed in terms of agriculture.

NOTES

1. Owing to various policy initiatives taken by the government over the years, an impressive development has taken place both in production of agricultural commodities and flow of institutional credit to agriculture. While the production of foodgrains has increased from about 72 million tonnes (mt) in 1965-66 to about 212 mt in 2001-02 (Government of India, 2004), the distribution of institutional credit to agriculture has increased from about Rs. 214 crore in 1960-61 to about Rs. 1,15,242 crore at the end of March 2005 (see, Mohan, 2004; www.nabard.org).

2. According to the All India Debt and Investment Surveys (AIDIS), the share of non-institutional debt to the total debt of rural households has declined from 92.9 percent in 1951 to 39.6 percent in 1991. For more details on this see, Mohan (2004), Rao and Tripathi (2001) and Rao *et al.*, (1997).

3. There has been a significant reduction in the growth of institutional credit to agriculture during the post-reforms period. For instance, during the period of 1981-1991, the growth of institutional credit to agriculture was about 6.64 per cent, but the same declined to 2.16 per cent during 1991 to 1999. More details on this can be seen from Chavan (2001).

4. The survey was carried out covering a total sample of 51,770 farmers households of different states as a part of the *Situation Assessment Survey of Farmers* during the period January-December 2003 by the NSSO. This survey was originally initiated by the Ministry of Agriculture to assess the situation of the farmers in the country.

5. Correlation matrix has been computed for all the variables included in this study to understand their interrelationship. But, due to space constraint, we have not presented the same in the paper.

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