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ARTICLES

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## **Land Distribution Structure, Marginalisation of Holdings and Dimensions of Viability Crisis in Indian Agriculture: A State Level Analysis**

**H.R. Sharma and S.H. Malik\***

ABSTRACT

The paper analyses the changes in the land distribution structure and marginalisation of holdings between 1982 and 2013 and their implications towards viability of agriculture in sixteen major states of India using NSS data. The three important findings are: first, over the period land distribution has become less skewed in most of the states in terms of decrease in the values of Gini ratio and increase in the concentration of land at the bottom 50 per cent. Second, there is a huge proliferation of holdings up to half an hectare, up to one hectare and up to two hectares resulting into extremely low average size of such holdings. Third, even holdings above two hectares are becoming increasingly non-viable in terms of decrease in the proportion of operated area accounted for by them which, in 2013, was less than 50 per cent in half of the major states. These findings have far reaching implications towards viability of Indian agriculture.

**Keywords:** Holdings, Marginalisation, Proportion, Number, Average size of holdings and Viability

**JEL:** Q1, Q15

I

INTRODUCTION

Indian agriculture has undergone numerous changes since the early 1980s having important implications for land distribution structure and economic viability. Some of these are: widespread adoption of new agricultural technology across crops and regions, ongoing demand driven diversification in cropping pattern and commercialisation of agriculture, migration of rural households to urban areas as a consequence of increase in rural non-farm employment opportunities thereby lessening the burden on the agriculture sector, increase in the disparities between wage earnings in the agricultural and non-agricultural sectors and also increase in the ratio of income per non-agricultural worker to farm income per cultivator (Chand *et al.*, 2017; Papola, 2014). Again, in more recent times, Indian agriculture is also witnessing increasing uncertainty due to erratic weather conditions and climate change coupled with depleting ground water level and growing agrarian distress manifested in rising cost of production, falling output prices, falling incomes, increasing indebtedness among farmers, and ultimately, increasing farmers' suicides

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(Sharma and Malik, 2019). However, one of the most important structural changes in the Indian agriculture is the huge proliferation of holdings at varying levels across states with serious implications for their economic viability and sustainability. The increase in the number of sub-marginal, marginal and small holdings has far reaching implications for production and productivity, capital formation, inputs use and accessibility of such holdings to modern inputs, information, credit, markets and extension facilities (Nadkarni, 2018; Joshi, 2015; Rao and Hanumappa, 1999). The increase in the number of marginal and small holdings is a worldwide phenomenon as these holdings account for nearly 85 per cent of all holdings. As has been established in the farm size productivity debate, these holdings are more efficient and productive as compared to their large counterparts. It is, however, argued that superior efficiency and productivity advantage enjoyed by these holdings is fast disappearing thanks to rising rural wages, increase in per capita income, migration of workers from rural areas, cheap capital compared to land and above all growing mechanisation and commercialisation of agriculture (Hazell and Rehman, 2014 cited in Joshi, 2014). A glance at the literature shows that there are not many state level empirical studies that have looked into more recent changes in land distribution structure, extent of proliferation of holdings particularly of lower size categories, average size of holdings and their implications for livelihoods of the population depending on agriculture. It is against this background that we study the changes in the distribution of operational holdings in terms of the extent of marginalisation and proliferation of holdings at the bottom of the pyramid, area operated accounted for these holdings, average size of holdings and viability implications of such holdings in generating adequate amount of income to meet consumption requirements of their holders in sixteen major states between 1982 and 2013. The paper is structured in six sections. Section II describes the data and methods used in the study. Section III discusses changes in the extent of inequalities in the distribution of landholdings and concentration of operated land at different levels of hierarchy across major states. Section IV discusses the proliferation of holdings of different size categories in terms of their numerical proportion and area operated and number of holdings and amount of area operated by them. Dimensions of viability crisis in terms of changes in the number of different size categories of holdings and their average sizes have been discussed in Section V. Section VI presents the main conclusions of the study and offer some policy options.

## II

### DATA AND METHODS

Two major sources of data on landholdings and tenancy are the national sample survey reports and the quinquennial agricultural censuses reports. The data emanating from these two sources has been examined in terms of its temporal comparability and other methodological limitations by different scholars (Chadha and Sharma, 1992;

Kumar, 2016). The studies have shown that NSS data is based on scientific methodology and allows us to build a temporal profile of the distribution of holdings including tenancy relations in comparison to data available in census reports which is a mere re-tabulation of land revenue records. The concepts and definitions of holdings used in different NSS rounds since 1982 (37th Round) have remained largely unchanged allowing temporal comparability of the data. Therefore, we have used data available in NSS reports on operational holdings for the 37th Round; the 48th Round, the 59th Round and the 70th Round.

Gini ratio has been calculated to measure the extent of inequality in the distribution of operational holdings. However, Gini ratio is a summary measure and does not reveal as at what levels in the hierarchy, land concentration has tended to increase or diminish. We, therefore, computed concentration of operated land at different levels of hierarchy say at the top twenty per cent, at the middle thirty per cent and the bottom fifty per cent using Lagrangian interpolation method. The land concentration at these levels has been computed using the following form of Lagrange’s interpolating polynomial (Carnham *et al.*, 1969, p. 27):

$$P_n(x) = \sum_{i=0}^n L_i(x) f(x_i) \quad \dots (1)$$

$$\bar{y}(\bar{x}) = \sum_{i=min}^{min+d} L_i(\bar{x}) y_i \quad \dots (2)$$

where  $L_i(\bar{x}) = \prod_{j=0, j \neq i}^n \frac{\bar{x} - x_j}{x_i - x_j}$ ,  $i=0, 1, 2, \dots, n$

$$i=min, min+1, \dots, min+d.$$

To study the changes in different size categories of holdings and their implications for economic viability, we have specifically focused on the changes in the number and proportion of holdings at the bottom of the pyramid, namely, sub-marginal, marginal and small holdings. Therefore, we have categorised all holdings into four broad groups, namely, sub-marginal, marginal, small and holdings above two hectares. The size classes of these holdings have been respectively defined as those below half a hectare, between one-half and one hectare, between one to two hectares and above two hectares. The structural changes in landholdings and their implications for viability have been studied in terms of changes in the proportion of different size categories of holdings and area operated by them, changes in the number of these holdings and the amount of area operated by them and changes in their average sizes between 1982 and 2013.

## III

## LAND DISTRIBUTION STRUCTURE

Table 1 gives an overview of the inequalities in the distribution of operational holdings, measured by Gini ratio. The table shows that despite periodic fluctuations in the values of Gini ratio between 1982 and 2013, their distribution became less skewed in most of the states with the notable exceptions of Haryana and Rajasthan; the values of Gini ratio decreased by varying degree in as many as eleven states (Andhra Pradesh, Assam, Bihar, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu and West Bengal). In three states (Gujarat, Madhya Pradesh and Uttar Pradesh), there was no change in the extent of inequalities as was evident from nearly unchanged values of Gini ratio.

TABLE 1. CHANGING CONCENTRATION (GINI RATIO) OF OPERATIONAL HOLDINGS  
IN RURAL INDIA: MAJOR STATES, 1982 TO 2013

State (1)	1982 (2)	1992 (3)	2003 (4)	2013 (5)
Andhra Pradesh	0.60	0.58	0.60	0.49
Assam	0.52	0.49	0.49	0.44
Bihar	0.61	0.64	0.58	0.56
Gujarat	0.57	0.60	0.65	0.57
Haryana	0.60	0.68	0.72	0.65
Jammu & Kashmir	0.46	0.46	0.59	0.41
Karnataka	0.58	0.61	0.59	0.55
Kerala	0.65	0.64	0.52	0.60
Madhya Pradesh	0.54	0.56	0.57	0.54
Maharashtra	0.59	0.60	0.56	0.50
Odisha	0.54	0.51	0.50	0.49
Punjab	0.72	0.73	0.75	0.71
Rajasthan	0.58	0.61	0.64	0.61
Tamil Nadu	0.64	0.65	0.63	0.61
Uttar Pradesh	0.57	0.57	0.56	0.57
West Bengal	0.60	0.58	0.52	0.49
All-India	0.63	0.64	0.63	0.60

*Sources:* (1) Report on Land Holdings-2, Some Aspects of Operational Holdings; 37th Round 1982, NSS Report No. 331. (2) Report on Operational Land Holdings in India; 48th Round 1992, NSS Report No. 407. (3) Report on Some Aspects of Operational Land Holdings in India; 59th Round 2003, NSS Report No. 492. (4) Report on Household Ownership and Operational Holdings in India; 70th Round 2013, NSS Report No. 571.

*Note:* The results for Bihar, Madhya Pradesh and Uttar Pradesh for 2003 and 2013 are inclusive of Jharkhand, Chhattisgarh and Uttarakhand.

Table 2 presents the changes in the concentration of operated land at the bottom 50 per cent, the middle 30 per cent and the top 20 per cent, the number of holdings and the amount of area operated at these three different levels and average size of holdings that are at the bottom 50 per cent, middle 30 per cent and the top 20 per cent between 1982 and 2013 across major states. A perusal of the table brings out the following broad patterns. First, changes in the concentration of operated land at different levels of hierarchy show that in Andhra Pradesh, Bihar, Kerala, Karnataka and West Bengal decrease in the concentration of land at the top and the middle

TABLE 2. CONCENTRATION OF OPERATED LAND AT DIFFERENT LEVELS OF HIERARCHY, NUMBER OF HOLDINGS AND AREA OPERATED AT DIFFERENT LEVELS AND AVERAGE SIZE OF HOLDINGS AT DIFFERENT, 1982 TO 2013; MAJOR STATES (NO. OF HOLDINGS IN MILLION AND AREA OPERATED IN MILLION HA)

States (1)	Year (2)	Bottom 50 per cent			Middle 30 per cent			Top 20 per cent			Average size of holdings of the:		
		Per cent share in land (3)	No. of holdings (4)	Area operated (5)	Per cent share in land (6)	No. of holdings (7)	Area operated (8)	Per cent share in land (9)	No. Of holdings (10)	Area operated (11)	Bottom 50 per cent (12)	Middle 30 per cent (13)	Top 20 per cent (14)
Andhra Pradesh	1982	11.03	2.57	1.14	25.75	1.54	2.66	63.22	1.03	6.54	0.44	1.73	6.35
	1992	11.28	3.57	1.04	28.88	2.14	2.66	59.84	1.43	5.51	0.29	1.24	3.85
	2003	10.93	3.05	0.93	25.77	1.83	2.19	53.30	1.20	5.38	0.30	1.20	4.41
Assam	1982	15.87	2.54	1.00	23.93	1.52	1.50	60.20	1.01	3.78	0.39	0.99	3.74
	1992	14.28	1.00	0.30	30.14	0.60	0.63	55.58	0.40	1.17	0.30	1.05	2.93
	2003	15.61	1.50	0.41	33.03	0.90	0.87	51.36	0.60	1.35	0.27	0.97	2.25
Bihar	1982	14.41	1.69	0.33	41.84	1.01	0.96	43.75	0.68	1.00	0.20	0.95	1.47
	1992	17.19	2.08	0.52	39.60	1.25	1.20	43.21	0.83	1.31	0.25	0.96	1.58
	2003	8.82	4.71	0.83	27.41	2.82	2.57	63.27	1.88	5.94	0.18	0.91	3.16
Gujarat	1982	7.50	5.06	0.57	27.45	3.04	2.10	65.05	2.02	4.97	0.11	0.69	2.46
	1992	12.91	4.17	0.61	25.72	2.50	1.21	61.37	1.67	2.90	0.15	0.48	1.74
	2003	14.02	4.11	0.55	26.70	2.46	1.05	59.28	1.64	2.33	0.13	0.43	1.42
Haryana	1982	12.85	1.28	0.85	26.94	0.77	1.79	60.21	0.51	4.00	0.66	2.32	7.84
	1992	10.16	1.86	0.75	28.09	1.11	2.08	61.75	0.74	4.57	0.40	1.87	6.18
	2003	7.33	1.94	0.45	23.88	1.16	1.47	68.79	0.77	4.24	0.23	1.27	5.51
J&K	1982	11.63	2.03	0.57	27.71	1.22	1.36	60.66	0.81	2.99	0.28	1.11	3.69
	1992	7.74	0.54	0.21	32.24	0.33	0.87	60.02	0.22	1.63	0.39	2.64	7.41
	2003	5.02	1.04	0.23	26.99	0.62	1.23	67.99	0.42	3.10	0.22	1.98	7.38
Karnataka	1982	2.40	1.06	0.06	23.28	0.63	0.61	74.32	0.42	1.94	0.06	0.97	4.62
	1992	4.82	0.98	0.10	29.62	0.59	0.64	65.56	0.39	1.41	0.10	1.08	3.62
	2003	18.96	0.36	0.15	32.06	0.22	0.25	48.98	0.15	0.38	0.42	1.14	2.53
Kerala	1982	16.03	0.24	0.08	32.73	0.14	0.17	51.24	0.09	0.26	0.33	1.21	2.89
	1992	13.43	0.49	0.13	19.83	0.29	0.19	66.74	0.19	0.64	0.27	0.66	3.37
	2003	24.57	0.62	0.14	35.59	0.37	0.20	39.84	0.25	0.22	0.23	0.54	0.88
Madhya Pradesh	1982	11.85	1.76	1.03	26.81	1.06	2.34	61.34	0.70	5.35	0.59	2.21	7.64
	1992	9.73	2.29	0.83	27.93	1.37	2.37	62.34	0.91	5.29	0.36	1.73	5.81
	2003	11.21	2.24	0.71	27.04	1.34	1.71	61.75	0.89	3.91	0.32	1.28	4.39
Madhya Pradesh	1982	13.64	2.59	0.87	27.82	1.55	1.78	58.54	1.03	3.75	0.34	1.15	3.64
	1992	9.95	1.88	0.13	21.16	1.13	0.28	68.89	0.75	0.90	0.07	0.29	1.52
	2003	20.45	1.56	0.23	15.93	0.94	0.18	63.62	0.63	0.73	0.15	0.19	1.16
Madhya Pradesh	1982	15.19	2.00	0.16	15.43	1.20	0.16	69.38	0.80	0.71	0.08	0.13	0.89
	1992	13.89	3.90	2.43	27.63	2.34	4.83	58.48	1.56	10.21	0.62	2.06	6.54
	2003	11.70	3.45	1.41	28.31	2.07	3.41	59.66	1.38	7.19	0.41	1.65	5.21

Contd.

TABLE 2. CONCLD.

States (1)	Year (2)	Bottom 50 per cent				Middle 30 per cent				Top 20 per cent				Average size of holdings of the:			
		Per cent in land (3)	No. of holdings (4)	Area operated (5)	Per cent share in land (6)	No. of holdings (7)	Area operated (8)	Per cent in land (9)	No. Of holdings (10)	Area operated (11)	Bottom 50 per cent (12)	Middle 30 per cent (13)	Top 20 per cent (14)				
Maharashtra	2013	15.45	3.07	1.49	26.26	1.84	2.54	58.29	1.23	5.63	0.49	1.38	4.58				
	1982	10.70	2.37	1.50	28.01	1.42	3.94	61.29	0.95	8.61	0.63	2.77	9.06				
	1992	9.96	3.39	1.52	28.70	2.03	4.38	61.34	1.35	9.36	0.45	2.16	6.93				
	2003	11.93	3.36	1.35	30.61	2.37	3.46	57.46	1.34	6.49	0.40	1.71	4.84				
Odisha	2013	15.55	3.95	1.74	30.53	2.02	3.42	53.92	1.58	6.03	0.44	1.44	3.82				
	1982	14.69	1.46	0.68	28.23	0.87	1.25	57.08	0.58	2.31	0.47	1.44	3.98				
	1992	14.64	2.11	0.70	31.21	1.27	1.34	54.15	0.85	2.72	0.33	1.06	3.20				
	2003	14.01	2.21	0.45	31.59	1.33	1.03	54.40	0.89	1.77	0.20	0.77	1.99				
Punjab	2013	13.60	3.08	0.45	32.36	1.85	1.07	54.04	1.23	1.78	0.15	0.58	1.45				
	1982	8.80	0.91	0.68	27.23	0.54	1.04	71.97	0.36	1.56	0.75	1.93	4.33				
	1992	0.80	0.79	0.02	24.82	0.47	0.57	74.38	0.31	1.70	0.03	1.21	5.48				
	2003	1.19	1.02	0.03	22.19	0.61	0.59	76.62	0.41	2.05	0.03	0.97	5.00				
Rajasthan	2013	2.04	0.77	0.04	26.36	0.46	0.52	71.60	0.31	1.43	0.05	1.13	4.61				
	1982	11.65	1.90	1.66	28.83	1.14	4.10	59.52	0.76	8.47	0.87	3.60	11.14				
	1992	10.59	2.57	1.68	24.90	1.54	3.94	64.51	1.03	10.21	0.65	2.56	9.91				
	2003	9.07	2.92	1.28	23.87	1.75	3.37	67.06	1.17	9.46	0.44	1.93	8.09				
Tamil Nadu	2013	11.20	3.60	1.28	24.46	2.16	2.80	64.34	1.44	7.37	0.36	1.30	5.12				
	1982	6.19	2.24	0.24	26.41	1.34	1.03	67.40	0.89	2.64	0.11	0.77	2.97				
	1992	6.06	2.91	0.25	26.16	1.74	1.07	67.78	1.16	2.78	0.09	0.61	2.40				
	2003	9.52	2.25	0.32	26.11	1.35	0.89	64.37	0.90	2.19	0.14	0.66	2.43				
Uttar Pradesh	2013	10.07	2.34	0.33	29.27	1.40	0.95	60.66	0.93	1.98	0.14	0.68	2.13				
	1982	11.22	6.56	1.89	29.01	3.94	4.88	59.77	2.62	10.04	0.29	1.24	3.83				
	1992	11.16	8.51	1.91	30.83	5.10	5.27	58.01	3.40	9.92	0.22	1.03	2.92				
	2003	12.39	9.17	1.75	26.00	5.50	3.66	61.61	3.67	8.68	0.19	0.67	2.37				
West Bengal	2013	13.89	9.64	1.66	24.11	5.78	2.87	62.00	3.85	7.39	0.17	0.50	1.92				
	1982	8.51	3.04	0.40	31.02	1.83	1.46	60.47	1.22	2.84	0.13	0.80	2.33				
	1992	9.48	4.08	0.46	29.66	2.45	1.45	60.86	1.63	2.97	0.11	0.59	1.82				
	2003	17.15	4.18	0.63	26.93	2.51	0.99	55.92	1.67	2.05	0.15	0.39	1.23				
All-India	2013	21.84	4.55	0.53	20.95	2.73	0.51	57.21	1.82	1.39	0.12	0.19	0.76				
	1982	8.85	35.52	10.49	26.07	21.31	30.91	65.08	14.21	77.16	0.30	1.45	5.43				
	1992	7.92	46.73	9.91	25.76	28.04	32.23	66.32	18.69	82.97	0.21	1.15	4.44				
	2003	8.53	49.24	8.96	26.64	29.54	27.98	64.83	19.70	68.10	0.18	0.95	3.46				
2013	10.24	54.39	9.67	27.90	32.64	26.36	61.86	21.76	58.45	0.18	0.81	2.69					

Source: Computed by authors using data from sources mentioned in Table 1

Note: The results for Bihar, Madhya Pradesh and Uttar Pradesh for 2003 and 2013 are inclusive of Jharkhand, Chhattisgarh and Uttrakhand.

levels were accompanied by a significant increase in the concentration of land at the bottom 50 per cent. Second, in Assam, Jammu & Kashmir, Maharashtra, Odisha and Tamil Nadu decrease in the concentration of land at the top was associated with increase in the concentration by varying degree at the bottom 50 per cent and middle 30 per cent. Third, in Haryana, Madhya Pradesh and Rajasthan decrease in the concentration of land at the bottom and the middle levels was accompanied by a significant increase in the concentration at the top. Four, in Punjab and Gujarat there was not much change in the concentration of land at different levels while in Uttar Pradesh it increased at the top and also at the bottom 50 per cent.

Table 2 also gives states wise changes in the number of holdings at these three different levels and the amount of area operated by them along with changes in their average size between 1982 and 2013. The perusal of the table shows that as many as thirteen states, namely, Assam, Jammu & Kashmir, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal recorded increase in the holdings at all the three levels, i.e., at the bottom 50 per cent, the middle 30 per cent and the top 20 per cent. In the remaining three states (Andhra Pradesh, Bihar and Punjab), the number of holdings decreased at all the three levels. In so far as the changes in the amount of area operated by holdings at these three different levels are concerned, the table shows that there was a decrease in the amount of area operated at all levels in as many as eleven states like Andhra Pradesh, Bihar, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Madhya Pradesh, Odisha, Punjab, Rajasthan and Uttar Pradesh. In the five remaining states (Assam, Kerala, Maharashtra, Tamil Nadu and West Bengal), the increase in amount of area operated by the holdings at the bottom 50 per cent was accompanied by a decrease in the amount of area operated by holdings at the middle 30 per cent and the top 20 per cent.

Consequent to these changes in the number of holdings and the amount of area operated by holdings at different levels of hierarchy, there was a continuous decrease in the average size of holdings at these levels. Resultantly, in 2013 across states, the average size of holdings at the bottom 50 per cent varied from as low as 0.05 ha in Punjab and 0.08 ha in Kerala to 0.39 ha in Maharashtra while the size of holdings at the middle 30 per cent varied from 0.13 ha in Kerala to 1.44 ha in Maharashtra. Similarly, the average size of holdings at the top 20 per cent ranged from 0.88 ha in Jammu & Kashmir to 5.12 ha in Rajasthan.

#### IV

##### MARGINALISATION OF HOLDINGS

Table 3 presents state wise changes in the proportion of different categories of holdings and area operated by them along with changes in total number of holdings in each size category and the amount area operated by them between 1982 and 2013. A perusal of the table brings out the following broad trends: First, in all the states a



TABLE 3. PROPORTION OF OPERATIONAL HOLDINGS AND AREA OPERATED, NUMBER OF OPERATIONAL HOLDINGS AND AREA OPERATED : 1982 TO 2013

States (1)	Year (2)	Proportion of operational holdings and area operated										Number of operational holdings (Million) and area operated (million ha)									
		Upto 0.50 ha					0.51 to 1.00 ha					1.01 to 2.00 ha					Above 2.01 ha				
		H (3)	A (4)	H (5)	A (6)	H (7)	A (8)	H (9)	A (10)	H (11)	A (12)	H (13)	A (14)	H (15)	A (16)	H (17)	A (18)	H (19)	A (20)		
Andhra Pradesh	1982	30.21	3.38	18.33	6.88	22.18	15.36	29.29	74.37	1.56	0.35	0.94	0.71	1.14	1.59	1.51	7.69	5.15	10.34		
	1992	49.27	6.35	19.00	11.19	21.38	23.33	19.35	59.13	2.88	0.59	1.36	1.03	1.53	2.15	1.38	5.45	7.15	9.22		
	2003	39.53	5.91	20.43	11.24	20.60	20.10	19.45	62.76	2.41	0.50	1.25	0.95	1.26	1.71	1.19	8.49	6.11	11.65		
Assam	1982	33.67	6.23	17.03	10.06	27.08	28.07	22.22	55.64	1.71	0.39	0.86	0.63	1.37	1.76	1.13	3.50	5.07	6.28		
	1992	37.50	5.81	24.06	16.31	24.32	33.51	14.11	44.37	0.75	0.12	0.48	0.34	0.49	0.70	0.28	0.93	2.00	2.09		
	2003	40.92	9.97	29.86	24.26	19.98	33.22	9.24	34.55	1.23	0.26	0.90	0.64	0.60	0.82	0.28	0.91	3.01	2.63		
Bihar	1982	51.21	14.86	25.92	27.78	17.69	35.31	5.18	22.04	1.73	0.34	0.88	0.63	0.60	0.81	0.18	0.50	3.39	2.28		
	1992	38.38	9.19	34.52	31.03	20.39	36.53	6.70	23.25	1.60	0.28	1.44	0.94	0.85	1.11	0.28	0.71	4.17	3.04		
	2003	49.69	8.66	19.00	13.75	17.62	25.85	13.69	51.75	4.68	0.81	1.79	1.29	1.66	2.43	1.29	4.86	9.42	9.39		
Gujarat	1982	59.30	12.39	17.47	16.63	13.68	25.13	9.56	45.85	6.00	0.95	1.77	1.27	1.38	1.92	0.97	3.50	10.12	7.64		
	1992	64.56	19.01	18.95	24.08	11.48	26.93	5.02	29.97	5.39	0.90	1.58	1.14	0.96	1.27	0.42	1.42	8.35	4.73		
	2003	66.31	20.06	20.18	30.45	9.82	25.11	3.69	24.38	5.45	0.79	1.66	1.20	0.81	0.99	0.30	0.96	8.22	3.94		
Haryana	1982	22.73	1.91	15.89	4.61	20.38	11.32	41.01	82.16	0.58	0.13	0.41	0.31	0.52	0.75	1.05	5.45	2.56	6.64		
	1992	32.43	2.55	15.57	5.94	19.85	13.80	32.23	77.72	1.20	0.19	0.58	0.44	0.74	1.02	1.20	5.75	3.72	7.40		
	2003	43.43	4.66	16.67	8.07	17.14	14.77	22.75	72.49	1.68	0.29	0.65	0.50	0.66	0.91	0.88	4.47	3.87	6.17		
J&K	1982	42.96	7.99	19.70	11.86	18.49	21.17	18.85	58.98	1.74	0.39	0.80	0.58	0.75	1.04	0.77	2.90	4.06	4.91		
	1992	39.36	1.46	11.37	3.87	13.50	8.81	35.77	85.86	0.82	0.07	0.24	0.18	0.28	0.40	0.74	3.91	2.08	4.56		
	2003	55.47	4.05	11.80	7.33	12.24	13.53	20.49	75.09	1.17	0.11	0.25	0.19	0.26	0.35	0.43	1.96	2.11	2.61		
Karnataka	1982	33.02	7.33	27.92	19.13	24.82	32.00	14.24	41.56	0.24	0.06	0.20	0.15	0.18	0.25	0.10	0.32	0.72	0.78		
	1992	31.20	6.63	27.80	18.28	26.69	34.66	14.31	40.43	0.15	0.03	0.13	0.09	0.13	0.18	0.07	0.21	0.48	0.51		
	2003	54.12	14.61	22.27	16.30	15.58	21.52	8.03	47.57	0.53	0.14	0.22	0.16	0.15	0.21	0.08	0.46	0.98	0.97		
Kerala	1982	77.41	26.05	11.54	19.39	7.28	24.10	3.77	30.46	2.46	0.35	0.37	0.26	0.23	0.33	0.12	0.41	3.18	1.35		
	1992	79.25	28.32	12.33	24.96	5.94	23.36	2.47	23.38	2.98	0.37	0.46	0.33	0.22	0.31	0.09	0.31	3.75	1.32		
	2003	81.12	36.97	10.57	20.28	6.33	24.10	1.98	18.66	2.54	0.42	0.33	0.23	0.20	0.28	0.06	0.21	3.13	1.14		
Madhya Pradesh	1982	82.77	32.04	11.33	28.27	4.58	23.74	1.31	15.96	3.32	0.33	0.45	0.29	0.18	0.24	0.05	0.16	4.00	1.02		
	1992	19.72	1.20	13.21	3.47	22.52	12.31	44.54	83.01	1.00	0.17	0.67	0.48	1.15	1.70	2.27	11.43	5.09	13.78		
	2003	22.87	1.41	15.85	5.29	24.43	15.57	36.84	77.74	1.78	0.25	1.24	0.92	1.90	2.72	2.87	13.57	7.79	17.46		
Total	1982	30.10	3.00	18.33	7.76	23.91	19.04	27.65	70.20	2.08	0.36	1.26	0.94	1.65	2.29	1.91	8.46	6.90	12.05		
	1992	24.05	3.52	28.83	13.25	25.04	22.00	22.09	61.23	1.48	0.34	1.77	1.28	1.54	2.13	1.36	5.92	6.15	9.67		
	2003	24.05	3.52	28.83	13.25	25.04	22.00	22.09	61.23	1.48	0.34	1.77	1.28	1.54	2.13	1.36	5.92	6.15	9.67		

Contd.

TABLE 3. CONCLD.

States (1)	Year (2)	Proportion of operational holdings and area operated										Number of operational holdings (Million) and area operated (million ha)									
		Upto 0.50 ha		0.51 to 1.00 ha		1.01 to 2.00 ha		Above 2.01 ha		Upto 0.50 ha		0.51 to 1.00 ha		1.01 to 2.00 ha		Above 2.01 ha		All holdings			
		H	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A		
Maharashtra	1982	25.03	1.08	10.23	2.55	19.47	9.35	45.27	87.02	1.19	0.15	0.48	0.36	0.92	1.31	2.14	12.23	4.73	14.05		
	1992	28.26	1.58	15.32	5.07	18.93	11.77	37.49	81.58	1.91	0.24	1.04	0.77	1.28	1.79	2.54	12.45	6.77	15.25		
	2003	29.96	2.73	18.86	8.45	21.04	17.21	30.14	71.61	2.01	0.31	1.27	0.95	1.41	1.94	2.03	8.09	6.72	11.29		
	2013	27.42	4.10	22.10	11.11	26.70	24.83	23.79	59.96	2.17	0.56	1.75	1.24	2.11	2.78	1.88	6.71	7.91	11.29		
	1982	31.54	5.05	22.92	11.98	26.11	26.48	19.43	56.50	0.92	0.21	0.67	0.51	0.76	1.12	0.57	2.40	2.92	4.24		
Odisha	1992	37.88	7.66	22.12	14.44	24.34	30.15	15.67	47.76	1.60	0.36	0.94	0.69	1.03	1.43	0.66	2.27	4.23	4.75		
	2003	53.20	16.90	23.88	24.27	16.28	30.01	6.64	28.81	2.35	0.55	1.06	0.79	0.72	0.97	0.29	0.94	4.42	3.25		
	2013	61.42	23.18	24.83	32.69	10.28	24.98	3.46	19.14	3.78	0.76	1.53	1.08	0.63	0.82	0.21	0.63	6.15	3.29		
	1982	53.05	1.39	5.98	2.52	10.39	8.92	30.58	87.17	0.96	0.05	0.11	0.08	0.19	0.29	0.55	2.86	1.81	3.28		
	1992	53.94	1.72	9.28	4.47	11.41	10.74	25.36	83.06	0.85	0.04	0.15	0.10	0.18	0.25	0.40	1.90	1.58	2.29		
Punjab	2003	57.18	2.43	9.38	5.05	11.02	11.47	22.42	81.06	1.17	0.07	0.19	0.14	0.23	0.31	0.46	2.17	2.05	2.69		
	2013	52.73	2.28	10.93	5.53	12.49	13.61	23.84	78.57	0.81	0.05	0.17	0.11	0.19	0.27	0.37	1.56	1.54	1.99		
	1982	16.38	0.61	14.15	2.92	17.48	6.98	51.99	89.49	0.62	0.09	0.54	0.42	0.66	0.99	1.98	12.74	3.80	14.24		
	1992	21.73	1.31	17.61	4.25	19.88	9.35	40.78	85.08	1.11	0.21	0.90	0.67	1.02	1.48	2.09	13.46	5.12	15.82		
	2003	28.29	2.38	21.08	6.40	18.00	10.50	32.63	80.73	1.65	0.33	1.23	0.90	1.05	1.48	1.91	11.38	5.84	14.09		
Tamil Nadu	1992	35.18	4.89	22.05	9.39	19.97	17.14	22.79	68.59	2.53	0.56	1.59	1.07	1.44	1.96	1.64	7.85	7.20	11.44		
	1982	54.80	8.61	16.59	13.77	16.72	26.72	11.90	50.90	2.45	0.34	0.74	0.54	0.75	1.05	0.53	1.99	4.47	3.92		
	1992	61.20	12.12	15.97	16.81	14.14	28.07	8.69	43.01	3.56	0.50	0.93	0.69	0.82	1.15	0.50	1.76	5.81	4.10		
	2003	59.64	13.34	17.73	17.50	13.32	24.31	9.30	44.85	2.69	0.45	0.80	0.59	0.60	0.83	0.42	1.52	4.51	3.39		
	2013	57.66	12.73	21.44	22.07	11.00	20.59	9.89	44.60	2.69	0.42	1.00	0.72	0.51	0.67	0.46	1.45	4.66	3.26		
Uttar Pradesh	1982	38.75	6.08	20.87	12.01	21.59	23.76	18.79	58.15	5.08	1.02	2.74	2.02	2.83	3.99	2.47	9.77	13.12	16.80		
	1992	45.84	8.85	22.18	16.12	18.52	26.30	13.47	48.73	7.80	1.51	3.77	2.76	3.15	4.50	2.29	8.33	17.01	17.10		
	2003	54.05	13.77	21.87	20.53	16.14	28.89	7.94	36.81	9.91	1.94	4.01	2.89	2.96	4.07	1.45	5.19	18.33	14.09		
	2013	62.74	18.51	19.83	22.39	10.87	23.76	6.55	35.33	12.09	2.21	3.82	2.67	2.10	2.83	1.26	4.21	19.27	11.92		
	1982	56.52	12.22	17.74	17.05	15.90	28.77	9.84	41.96	3.44	0.57	1.08	0.80	0.97	1.35	0.60	1.97	6.09	4.69		
West Bengal	1992	62.64	17.77	18.04	22.22	13.43	30.68	5.89	29.33	5.11	0.87	1.47	1.08	1.10	1.50	0.48	1.43	8.16	4.88		
	2003	69.74	27.36	19.23	31.32	8.67	26.35	2.37	14.97	5.83	1.00	1.61	1.15	0.72	0.97	0.20	0.55	8.36	3.67		
	2013	83.22	45.04	11.95	28.01	4.05	18.79	0.78	8.15	7.57	1.10	1.09	0.68	0.37	0.46	0.07	0.20	9.10	2.44		
	1982	38.87	3.94	17.13	7.56	19.32	16.59	24.68	71.91	27.62	4.67	12.17	8.96	13.72	19.67	17.53	85.26	71.04	118.56		
	1992	44.43	5.50	18.37	10.10	17.79	18.70	19.41	65.71	41.52	6.88	17.17	12.64	16.62	23.39	18.14	82.20	93.45	125.11		
All-India	2003	50.08	8.57	19.78	13.60	16.08	20.61	14.05	57.22	49.32	9.00	19.48	14.29	15.84	21.65	13.85	60.11	98.49	105.05		
	2013	52.18	10.81	21.01	16.90	15.30	23.44	11.51	48.85	56.76	10.21	22.86	15.97	16.64	22.15	12.52	46.15	108.78	94.48		

Source: Computed by authors using data from sources mentioned in Table 1.

Note: The results for Bihar, Madhya Pradesh and Uttar Pradesh for 2003 and 2013 are inclusive of Jharkhand, Chhattisgarh and Uttarakhand.

huge increase in the proportion of sub-marginal holdings operating up to half a hectare of land was accompanied by an increase in the proportion of area operated by them though increase in the proportion of area operated by them was much less as compared to increase in the numerical proportion of such holdings. It is further important to note that in 2013 in nine states (Bihar, Haryana, Jammu & Kashmir, Kerala, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal) the proportion of such tiny holdings was more than 50 per cent and varied from around 53 per cent in Punjab and Haryana to around 83 per cent in Kerala and West Bengal. Second, increase in the proportion of marginal holdings operating between 0.51 and 1 ha by varying degree in eleven states (Assam, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Odisha, Rajasthan and Tamil Nadu) was accompanied by an increase in the proportion of area operated by such holdings. However, in five of these states (Assam, Bihar, Gujarat, Karnataka and Odisha) increase in the proportion of area operated by such holdings was significantly higher in comparison to increase in their numerical proportions. In the remaining five states, namely, Andhra Pradesh, Jammu & Kashmir, Kerala, Uttar Pradesh and West Bengal a small decrease/practically no change in the proportion of such holdings was associated with an increase in the proportion of area operated by them. Third, changes in the proportion of small holdings operating between 1 to 2 ha and area operated by them show that in six states (Andhra Pradesh, Haryana, Madhya Pradesh, Maharashtra, Punjab and Rajasthan) there was an increase in the proportion of holdings and also in area operated by them while in three states (Assam, Gujarat and Karnataka) decrease in the proportion of holdings was associated with an increase in the proportion of area operated. Among the remaining states, there was a decrease in the proportions of both holdings and area operated in five states (Jammu & Kashmir, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal) whereas in Bihar decrease in the proportion of such holdings was accompanied by practically no change in the proportion of area operated by them and in Kerala proportions of such holdings and area operated by them remained almost unchanged. Fourth, all states recorded decrease of varying degree both in the numerical proportions of holdings operating above 2 hectares and proportion of area operated by them. And in most of the states, the extent of decrease both in proportion of such holdings and area operated by them was huge with the notable exceptions of Punjab and Tamil Nadu where the extent of decline both in proportions of holdings and area operated was small.

Table 3 also presents the changes in the absolute number of holdings of different size categories and the amount of area operated by them between 1982 and 2013. A perusal of the table throws up the following patterns: First, in thirteen out of sixteen major states the number of sub-marginal holdings and area operated by them increased during the period. Among the remaining three states, while Bihar and Kerala registered increase in the number of holdings but decrease in the amount of area operated, Punjab recorded decrease in the absolute number of such holdings but practically no change in area operated by them. Second, the number of marginal

holdings and the amount of area operated by them also increased in most of the states. The notable exceptions were Andhra Pradesh and Bihar which recorded decrease both in the number of holdings and area operated and West Bengal where an increase in the number of such holdings was associated with decrease in the amount of area operated by them. Third, changes in the number of small holdings operating between 1 to 2 hectares and the amount of area operated by them reveal that while in half of the major states (Andhra Pradesh, Assam, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra and Rajasthan) there was an increase both in the number and the amount of area operated by them, in seven other states (Bihar, Jammu & Kashmir, Kerala, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal) there was a decrease in the number of such holdings and area operated by them. In Punjab, there was no change in the number of such holdings but the amount of area operated by them decreased. Four, practically in all the states holdings operating above 2 hectares recorded decrease both in their absolute numbers and the amount of area operated by them with the notable exception of Assam where no change in the number of such holdings was accompanied by a decrease in the amount of operated area by them.

#### V

#### DIMENSIONS OF VIABILITY CRISIS

The changes in the proportion and number of different size categories of holdings along with changes in the proportion and amount of area operated by them between 1982 and 2013 across the states show that there has been a huge proliferation of holdings at the bottom of the pyramid in comparison to increase in the proportion and amount of area operated by them implying decrease in their average size. We have re-worked the data on holdings and area operated presented in Table 3 to bring out the dimensions of viability crisis in Indian agriculture across states more clearly. For this purpose, we categorised the holdings as up to half a hectare, up to one hectare including those operating half hectare, up to two hectares including those operating up to one hectare and those above two hectares and the proportion of operated area accounted for by each category of these holdings. Accordingly, Table 4 presents changes in the number and proportions of holdings up to 0.5 hectare, up to 1 hectare and up to 2 hectares and their average size between 1982 and 2013. The salient features emanating from the table are summarised below.

First, as mentioned above, there was a huge increase in the number of and proportions of holdings up to half a hectare between 1982 and 2013 in ten states, namely, Bihar, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Kerala, Odisha, Rajasthan, Uttar Pradesh and West Bengal. However, in four states (Andhra Pradesh, Assam, Madhya Pradesh and Punjab), the number and proportion of such holdings increased between 1982 and 2003 but decreased thereafter during 2003 and 2013. Among the remaining two states, namely, Maharashtra and Tamil Nadu while

TABLE 4. CHANGING NUMBER OF OPERATIONAL HOLDINGS AND THEIR AVERAGE SIZE, MAJOR STATES: 1982 TO 2013 (NO. HOLDINGS IN MILLION; AVERAGE SIZE IN HECTARE)

States (1)	Year (2)	Size categories of holdings (ha)										Average size of holdings (ha)														
		Up to 0.50		Up to 1.00		Up to 2.00		Above 2.01		Up to 0.50		Up to 1.00		Up to 2.00		Above 2.01		All holdings								
		No. (3)	Per cent (4)	No. (5)	Per cent (6)	No. (7)	Per cent (8)	No. (9)	Per cent (10)	No. (11)	Per cent (12)	No. (13)	Per cent (14)	No. (15)	Per cent (16)	No. (17)	Per cent (18)	No. (19)	Per cent (20)							
Andhra Pradesh	1982	1.56	30.21	2.50	48.54	3.64	70.72	1.51	0.22	0.42	0.73	5.09	2.01	2.88	40.27	4.24	59.27	5.77	80.65	1.38	0.20	0.38	0.65	3.95	1.29	
	1992	2.41	39.53	3.66	59.96	4.92	80.56	1.19	0.21	0.40	0.64	4.49	1.39	2.003	33.67	2.57	50.70	3.94	77.78	1.13	0.23	0.40	0.71	3.10	1.24	
	2013	1.71	33.67	2.57	50.70	3.94	77.78	1.13	0.23	0.40	0.64	4.49	1.39	1982	0.75	1.72	85.88	1.72	85.88	0.28	0.16	0.38	0.68	3.32	1.05	
Assam	1982	1.23	40.92	2.13	70.78	2.73	90.76	0.28	0.21	0.42	0.63	3.25	0.88	2003	1.73	51.21	2.61	77.13	3.21	94.82	0.18	0.20	0.37	0.56	2.78	0.67
	1992	1.60	38.38	3.04	72.90	3.89	93.29	0.28	0.18	0.40	0.60	2.54	0.73	2013	1.60	38.38	3.04	72.90	3.89	93.29	0.28	0.18	0.40	0.60	2.54	0.73
	2013	1.60	38.38	3.04	72.90	3.89	93.29	0.28	0.18	0.40	0.60	2.54	0.73	1982	4.68	49.69	6.47	68.69	8.13	86.31	1.29	0.17	0.33	0.56	3.77	1.00
Bihar	1982	6.00	59.30	7.77	76.77	9.15	90.45	0.97	0.16	0.29	0.45	3.61	0.75	2003	5.39	64.56	6.97	83.51	7.93	94.99	0.42	0.17	0.29	0.42	3.38	0.57
	1992	5.45	66.31	7.11	86.49	7.92	96.31	0.30	0.14	0.28	0.38	3.20	0.48	2013	5.45	66.31	7.11	86.49	7.92	96.31	0.30	0.14	0.28	0.38	3.20	0.48
	2013	5.45	66.31	7.11	86.49	7.92	96.31	0.30	0.14	0.28	0.38	3.20	0.48	1982	0.58	22.73	0.99	38.62	1.51	59.00	1.05	0.22	0.44	0.78	5.19	2.59
Gujarat	1982	1.20	32.34	1.78	47.91	2.52	67.76	1.20	0.16	0.35	0.66	4.79	1.99	1992	1.20	32.34	1.78	47.91	2.52	67.76	1.20	0.16	0.35	0.66	4.79	1.99
	1992	1.68	43.43	2.33	60.10	2.99	77.24	0.88	0.17	0.34	0.57	5.08	1.59	2003	1.68	43.43	2.33	60.10	2.99	77.24	0.88	0.17	0.34	0.57	5.08	1.59
	2013	1.74	42.96	2.54	62.66	3.29	81.15	0.77	0.22	0.38	0.61	3.77	1.21	1982	0.35	32.43	0.46	42.22	0.60	54.96	0.49	0.06	0.22	0.50	4.92	2.51
Haryana	1982	0.82	39.36	1.06	50.73	1.34	64.23	0.74	0.09	0.23	0.48	5.28	2.19	1992	0.82	39.36	1.06	50.73	1.34	64.23	0.74	0.09	0.23	0.48	5.28	2.19
	1992	1.17	55.47	1.42	67.27	1.68	79.51	0.43	0.09	0.21	0.39	4.56	1.23	2003	1.17	55.47	1.42	67.27	1.68	79.51	0.43	0.09	0.21	0.39	4.56	1.23
	2013	1.04	53.23	1.24	63.45	1.52	77.76	0.44	0.13	0.22	0.43	3.39	1.10	1982	0.24	33.02	0.44	60.94	0.62	85.76	0.10	0.25	0.46	0.72	3.20	1.07
J&K	1982	0.15	31.20	0.28	59.00	0.41	85.69	0.07	0.20	0.46	0.75	3.00	1.09	1992	0.15	31.20	0.28	59.00	0.41	85.69	0.07	0.20	0.46	0.75	3.00	1.09
	1992	0.53	54.12	0.75	76.39	0.90	91.97	0.08	0.26	0.40	0.56	5.75	0.99	2003	0.53	54.12	0.75	76.39	0.90	91.97	0.08	0.26	0.40	0.56	5.75	0.99
	2013	0.88	70.71	1.15	92.29	1.22	97.90	0.03	0.23	0.33	0.39	2.67	0.44	1982	0.83	23.50	1.36	38.41	2.15	60.94	1.38	0.14	0.37	0.77	5.12	2.47
Karnataka	1982	1.50	32.70	2.28	49.71	3.21	69.96	1.37	0.15	0.36	0.66	4.65	1.86	1992	1.50	32.70	2.28	49.71	3.21	69.96	1.37	0.15	0.36	0.66	4.65	1.86
	1992	1.71	38.22	2.57	57.52	3.48	77.90	0.99	0.18	0.37	0.63	4.17	1.42	2003	1.71	38.22	2.57	57.52	3.48	77.90	0.99	0.18	0.37	0.63	4.17	1.42
	2013	2.08	40.15	3.15	60.83	4.24	81.93	0.93	0.26	0.42	0.66	3.88	1.24	1982	2.46	77.41	2.83	88.95	3.66	96.23	0.12	0.14	0.22	0.31	3.42	0.43
Kerala	1982	2.98	79.25	3.44	91.58	3.66	97.52	0.09	0.12	0.20	0.27	3.44	0.35	1992	2.98	79.25	3.44	91.58	3.66	97.52	0.09	0.12	0.20	0.27	3.44	0.35
	1992	2.54	81.12	2.87	91.69	3.07	98.02	0.06	0.17	0.23	0.30	3.50	0.36	2003	2.54	81.12	2.87	91.69	3.07	98.02	0.06	0.17	0.23	0.30	3.50	0.36
	2013	3.32	82.77	3.77	94.10	3.95	98.68	0.05	0.10	0.16	0.22	3.20	0.25	1982	1.00	19.72	1.67	32.93	2.82	55.45	2.27	0.17	0.38	0.83	5.04	2.70
Madhya Pradesh	1982	1.78	22.87	3.02	38.72	4.92	63.15	2.87	0.14	0.39	0.79	4.73	2.24	1992	1.78	22.87	3.02	38.72	4.92	63.15	2.87	0.14	0.39	0.79	4.73	2.24
	1992	2.08	30.10	3.34	48.43	4.99	72.34	1.91	0.17	0.39	0.72	4.43	1.75	2003	2.08	30.10	3.34	48.43	4.99	72.34	1.91	0.17	0.39	0.72	4.43	1.75
	2013	1.48	24.05	3.25	52.88	4.79	77.92	1.36	0.23	0.50	0.78	4.35	1.57	1982	0.35	32.43	0.46	42.22	0.60	54.96	0.49	0.06	0.22	0.50	4.92	2.51

Contd.

TABLE 4. CONCLD.

States (I)	Year (2)	Size categories of holdings (ha)															
		Up to 0.50		Up to 1.00		Up to 2.00		Above 2.01		Up to 1.00		Up to 2.00		Above 2.01		All holdings	
		No. (3)	Per cent (4)	No. (5)	Per cent (6)	No. (7)	Per cent (8)	No. (9)	Per cent (10)	No. (11)	Per cent (12)	No. (13)	Per cent (14)	No.	Per cent	No.	Per cent
Maharashtra	1982	1.19	25.03	1.67	35.26	2.59	54.73	2.14	0.13	0.31	0.70	5.71	2.96				
	1992	1.91	28.26	2.95	43.58	4.23	62.51	2.54	0.13	0.34	0.66	4.90	2.25				
	2003	2.01	29.96	3.28	48.82	4.69	69.86	2.03	0.15	0.38	0.68	3.99	1.68				
Odisha	2013	2.17	27.42	3.92	49.52	6.03	76.22	1.88	0.26	0.43	0.74	3.57	1.41				
	1982	0.92	31.54	1.59	54.46	2.35	80.57	0.57	0.23	0.45	0.79	4.21	1.45				
	1992	1.60	37.88	2.54	60.00	3.57	84.34	0.66	0.23	0.41	0.70	3.44	1.13				
Punjab	2003	2.35	53.20	3.41	77.08	4.13	93.36	0.29	0.23	0.39	0.56	3.24	0.73				
	2013	3.78	61.42	5.31	86.25	5.94	96.55	0.21	0.20	0.35	0.45	3.00	0.54				
	1982	0.85	53.05	1.07	59.03	1.26	69.42	0.55	0.05	0.12	0.34	5.20	1.81				
Rajasthan	1992	0.85	53.94	1.00	63.22	1.18	74.63	0.40	0.05	0.14	0.33	4.75	1.46				
	2003	1.17	57.18	1.36	66.56	1.59	77.58	0.46	0.06	0.15	0.32	4.72	1.31				
	2013	0.81	52.73	0.98	63.66	1.17	76.15	0.37	0.06	0.16	0.37	4.22	1.30				
Tamil Nadu	1982	0.62	16.38	1.16	30.53	1.82	48.01	1.98	0.15	0.43	0.78	6.43	3.75				
	1992	1.11	21.73	2.01	39.34	3.03	59.22	2.09	0.19	0.44	0.78	6.44	3.09				
	2003	1.65	28.29	2.88	49.37	3.93	67.37	1.91	0.20	0.43	0.69	5.96	2.41				
Uttar Pradesh	2013	2.53	35.18	4.12	57.23	5.56	77.20	1.64	0.22	0.40	0.65	4.79	1.59				
	1982	2.45	54.80	3.19	71.39	3.94	88.11	0.53	0.14	0.27	0.49	3.75	0.87				
	1992	3.56	61.20	4.49	77.17	5.31	91.31	0.50	0.14	0.26	0.44	3.52	0.71				
West Bengal	2003	2.69	59.64	3.49	77.37	4.09	90.69	0.42	0.17	0.30	0.46	3.62	0.75				
	1982	2.69	57.66	3.69	79.10	4.20	90.10	0.46	0.16	0.31	0.43	3.15	0.70				
	1992	5.08	38.75	7.82	59.62	10.65	81.21	2.47	0.20	0.39	0.66	3.96	1.28				
All-India	2003	7.80	45.84	11.57	68.02	14.72	86.54	2.29	0.19	0.37	0.60	3.64	1.01				
	1982	9.91	54.05	13.92	75.92	16.88	92.06	1.45	0.20	0.35	0.53	3.58	0.77				
	1992	12.09	62.74	15.91	82.57	18.01	93.44	1.26	0.18	0.31	0.43	3.34	0.62				
All-India	2013	3.44	56.52	4.52	74.26	5.49	90.16	0.60	0.17	0.30	0.50	3.28	0.77				
	1982	5.11	62.64	6.58	80.68	7.68	94.11	0.48	0.17	0.30	0.45	2.98	0.60				
	1992	5.83	69.74	7.44	88.97	8.16	97.64	0.20	0.17	0.29	0.38	2.75	0.44				
All-India	2013	7.57	83.22	8.66	95.17	9.03	99.22	0.07	0.15	0.21	0.25	2.86	0.27				
	1982	27.62	38.87	39.79	56.00	53.51	75.32	17.53	0.17	0.34	0.62	4.86	1.67				
	1992	41.52	44.43	58.69	62.80	75.31	80.59	18.14	0.17	0.33	0.57	4.53	1.34				
All-India	2003	49.32	50.08	68.8	69.86	84.64	85.94	13.85	0.18	0.34	0.53	4.34	1.07				
	2013	56.76	52.18	79.62	73.19	96.26	88.49	12.52	0.18	0.33	0.50	3.69	0.87				

Source: Computed by the authors using data from sources mentioned in Table 1.  
Note: The results for Bihar, Madhya Pradesh and Uttar Pradesh for 2003 and 2013 are inclusive of Jharkhand, Chhattisgarh and Uttarakhand.

increase in the number of these holdings over the period was associated with decrease in their proportion between 2003 and 2013 in the former, in the latter no change in the number of such holdings during this period was associated with decrease in their proportion.

Second, changes in the number and proportion of holdings up to one hectare including those up to half a hectare across states show that in as many as eleven states (Bihar, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Odisha, Rajasthan, Uttar Pradesh, Tamil Nadu, West Bengal) the number and proportion of such holdings increased continuously between 1982 and 2013. In three states (Andhra Pradesh, Haryana and Punjab) the number and proportion of such holdings increased between 1982 and 2003 but decreased thereafter, i.e., between 2003 and 2013. And among the remaining two states, namely, Assam and Madhya Pradesh, while in the former the number and proportion of such holdings increased continuously between 1982 and 2003 and declined subsequently, a reverse pattern was observed in the latter.

Third, changes in all holdings up to 2 hectares across states during the period reveal that in as many as twelve states (Bihar, Assam, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal) their number and proportion to all holdings increased continuously between 1982 and 2013. In two states (Haryana and Punjab), the number and proportion of such holding increased between 1982 and 2003 but decreased thereafter. There was no neat pattern in the remaining two states. For example, in Andhra Pradesh, the number and proportion of such holdings increased between 1982 and 1992 but declined during the later period and in Madhya Pradesh, while the number of such holdings increased between 1982 and 2003 and decreased thereafter, their proportion to all holdings increased continuously.

Four, the number of holdings above two hectares decreased continuously between 1982 and 2013 in all states with the notable exception of Tamil Nadu where it increased between 2003 and 2013. As presented in Table 3, the proportion of area accounted for by these holdings also declined during the period practically in all the states and varied hugely across states from as low as 8.15 per cent in West Bengal to as high as 78.57 in Punjab.

Five, average size of holdings up to half hectare decreased continuously between 1982 and 2013 in seven states (Assam, Bihar, Jammu & Kashmir, Kerala, Odisha, Uttar Pradesh and West Bengal). Among the remaining states, it either remained nearly unchanged or registered a negligible increase, especially during 2003 and 2013. However, the average size of these holdings in all the states was extremely low and in 2013 it varied from 0.06 ha in Punjab to 0.26 ha in Karnataka and Maharashtra. Likewise, the average size of the holdings up to one hectare also decreased continuously during the period in Andhra Pradesh, Bihar, Jammu & Kashmir, Kerala, Odisha, Rajasthan, Uttar Pradesh and West Bengal while in the remaining states it either remained unchanged or increased marginally between 2003

and 2013. However, across all states except Madhya Pradesh, the average size of such holdings in 2013 was less than half a hectare and varied from 0.16 ha in Kerala and Punjab to 0.43 ha in Maharashtra. The average size of holdings up to 2 hectares also decreased continuously during the period in most of the states except in Maharashtra and Punjab where it recorded a marginal increase, especially between 2003 and 2013. And in 2013 in as many as nine states (Bihar, Haryana, Jammu & Kashmir, Kerala, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal), the average size of holdings up to 2 hectares was less than half a hectare and varied from 0.22 ha in Kerala to 0.45 ha in Odisha. The average size of holdings above 2 hectares also declined by varying degree across all major states with the notable exception of Gujarat where it registered a marginal increase. Across states, the average size of such holdings varied from 2.54 ha in Assam to 4.79 ha in Punjab.

The data presented in Table 4 clearly brings out the extent of viability crisis in Indian agriculture in terms of huge proliferation of holdings of lower size categories and decrease in their average size. It may, however, be mentioned here that viability of a size class of holdings in terms of generating adequate amount of income to their holders to meet their consumption and other requirements in a particular state/region depends on several factors, most notably on the availability of irrigation facilities, availability and use of latest technology, commercialization/diversification of agriculture and access to market infrastructure. For example, a holding of a particular size which was not viable in the eighties and the nineties may have become viable now because of increased access to irrigation, modern technology, market infrastructure and consequent commercialisation/demand driven diversification of cropping pattern. In view of these changes, economically viable size of holdings may change over time and vary from one region to region. However, given the present state of art, holdings say up to half a hectare and even up to one hectare may continue to be non-viable for a long time to come. Therefore, keeping in view the number and proportion of holdings say up to one hectare or even up to two hectares and the proportion of area accounted for by them Indian agriculture faces a huge crisis of viability. The observation of Prof. Dantwala that “Indian agriculture might be dominated by the small farmers but not by small farms, since the proportion of large and medium farms together, that is all those holdings above the size of two hectares which were expected to be viable, accounted for over 78 per cent of the total land in 1970-71 (cited in Nadkarni, 2018, p. 31)” is not true in today’s context. As seen above, in 2013, holdings above two hectares across states accounted for a much smaller proportion of the total operated land. For example, out of sixteen major states, only in eight states (Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab and Rajasthan), holdings above two hectares accounted for more than 50 per cent of the total operated land. Further, among these states, the share of such holdings in total operated land in four states (Andhra Pradesh, Gujarat, Karnataka and Maharashtra) varied between 55.64 per cent and 59.96 per cent, in three states (Haryana, Madhya and Rajasthan) it varied from 61.23 per cent to 69.48



per cent and in Punjab they accounted for 78.57 per cent of the total land. Among the remaining states, the share of such holdings in Tamil Nadu and Uttar Pradesh was 44.6 per cent and 35.33 per cent, respectively, in Assam and Bihar it was 23.25 per cent and 24.48 per cent, respectively, in Jammu & Kashmir, Kerala and Odisha it was 14.15 per cent, 15.96 per cent and 19.14 per cent, respectively. In West Bengal it was as low as 8.15 per cent. Therefore, even if one assumes that size of viable holdings has decreased over time because of the factors mentioned above, a preponderant majority of holdings in Indian agriculture are non-viable. And among major states, the magnitude of viability crisis is much more acute in eight states, namely, Tamil Nadu, Uttar Pradesh, Assam, Bihar, Jammu & Kashmir, Kerala, Odisha, and West Bengal.

## VI

## CONCLUSIONS AND POLICY OPTIONS

The distribution of operational holdings became less skewed in most of the states as was evident from a varying degree of decrease in the values of Gini ratio. In terms of changes in the concentration of operated land at different levels of hierarchy between 1982 and 2013, the data shows that in most of the states decrease in the concentration of operated land by varying degree at the top was accompanied by an increase in the concentration at the bottom 50 per cent and also at the middle 30 per cent with the exceptions of Haryana, Madhya Pradesh and Rajasthan where there was an increase in the concentration of operated land at the top. Among different size categories, there was a huge increase in the numerical proportion of holdings up to half a hectare, up to one hectare and up to two hectares in comparison to an increase in the proportion of area operated accounted for by them. Consequently, there was a continuous decline in the average size of holdings of different size categories. A state by state analysis shows that the viability crisis of agriculture was more acute in nine states, namely, Bihar, Haryana, Jammu & Kashmir, Kerala, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal where the average size of all holdings up to 2 hectares was less than half a hectare and varied from 0.22 ha in Kerala to 0.45 ha in Odisha. The viability crisis of agriculture across different states is also manifested in extremely low average size of those holdings which are at the bottom 50 per cent. Not only that even holdings above two hectares of land are also not viable in about half of the major states (Assam, Bihar, Jammu & Kashmir, Kerala, Odisha, Tamil Nadu and Uttar Pradesh) where their share in the total operated land was less than 50 per cent.

The problems of preponderance of extremely small size holdings and overcrowding of Indian agriculture in terms of disproportionately large proportion of workforce depending on it have long been recognised and pointed out by scholars writing on Indian agriculture. Development experience of already developed countries is also a testimony to the fact that transferring of surplus workforce from

agriculture to non-agricultural sector is a *sine qua non* for its development. Naturally, therefore, the most commonly suggested text book long term solution to overcome scale infirmities and viability crisis for Indian agriculture is to reduce the proportion of population/workforce depending on it by increasing alternative employment opportunities in the non-farm sector including industries and rural non-farm enterprises like agro-processing and related enterprises such as dairy, bee keeping, rabbitary, poultry, sericulture, fishery, etc. The other solutions which are commonly offered, *inter alia*, include increasing production and productivity of these holdings, promoting co-operative farming on the lines of dairy, sugar and water co-operatives and self-help groups with philosophy of together we produce together we market, consolidation of holdings, imposing a ban on the sub-division of holdings below a certain size, contract farming and legalising leasing and leasing out land. Among all these possible solutions, legalising leasing in and leasing out land and making right to use and cultivate land freely tradable in the land lease market and ownership right inalienable appears to be one of the most practical and feasible solutions. Given the existing socio-economic realities of the country side, legalising leasing in and leasing out land will encourage all sections of rural population to participate in the lease market depending upon their resource endowment, availability of alternative employment opportunities, degree of risk in cultivation, and so on. Since land markets in India have remained sluggish as the farmers are not willing to sell their land because of their attachment to land and lack of social security, legalising lease market would go a long way not only to activate the land market and allocate scarce land resources to more productive uses but also to impart much needed flexibility to the rural economy. The Centre should, therefore, persuade state governments to legalise leasing in and leasing out land without further delay, of course with adequate safeguards to protect the ownership rights of smallholders. Further, given the fact that these extremely small holdings in today's context face three major challenges, namely, access to modern technical knowhow, access to market and remunerative prices to commercialise/diversify to high-value cash crops including fruits, vegetable and floriculture, contract farming with adequate safeguards to protect the interests of small holders could be the other possible solutions to increase production and productivity of these holdings and overcome their viability crisis.

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#### REFERENCES

- Carnham Bruce; H.A. Luther and James O. Wilkes (1969), *Applied Numerical Methods*, S John Wiley and Sons.
- Chand, Ramesh; Shivendra Kumar Srivastava and Jaspal Singh (2017), *Changing Structure of Rural Economy of India: Implications for Employment and Growth*, Discussion Paper, NITI Aayog, New Delhi.

- Chadha, G.K. and H.R. Sharma (1992), "Agrarian Relations in India: Comments on Quality of Available Data", in G.V.S.N. Murty and G.K. Kadekodi, (Eds.) (1992), *Poverty in India: Data Base Issues*, Vikas Publishing House Pvt. Ltd., New Delhi.
- Hazell, P. and A. Rahman (2014), *New Directions for Smallholders Agriculture*, Oxford University, Press, United Kingdom.
- Joshi, P.K. (2015), "Has Indian Agriculture Become Crowded and Risky? Status, Implications and the Way Forward", *Indian Journal of Agricultural Economics*, Vol.70, No.1, January-March.
- Kumar, D. (2016), "Discrepancies in Data on Landholdings in Rural India: Aggregate and Distributional Implications", *Review of Agrarian Studies*, Vol., No.1, pp.39-62. Retrieved from <http://ras.org.in/0d79fb7ec609764cc65809eecd96f6a0>.
- Nadkarni, M.V. (2018), "Crisis in Indian Agriculture: Can It be Overcome?", *Economic and Political Weekly*, Vol.53, No.17, 28 April.
- Papola, T.S. (2014), *Economic Diversification and Labour Market Dynamics in Rural India*, Research Centre, Sardar Patel University Vallabh Vidyanagar, Anand, Gujarat.
- Rao, V.M. and H.G. Hanumappa (1999), "Marginalisation Process in Agriculture: Indicators, Outlook, and Policy," *Economic & Political Weekly*, Vol.34, No.52, 25 December.
- Sharma, H.R. and Shakir Hussain Malik (2019). "Changing Agrarian Structure in Rural India, 1953-54 to 2012-13: Evidence from NSS Data", *Indian Journal of Agricultural Economics*, Vol. 74, No. 4, October-December, pp. 506-526.