Nexus in Income, Saving and Investment among Agricultural Households: A State and Farm Level Analysis!

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ABSTRACT

The paper estimates the income, saving and saving gap among agricultural households to understand their investment behaviour based on a comprehensive All India Financial Inclusion Survey (NAFIS) 2016-17 of NABARD, Mumbai. The descriptive and empirical analysis shows saving and investment of cultivators are determined by income, among several other factors. It further reveals a weak association between household's saving rate and investment in agriculture and allied activities. This may imply households' dependence on borrowings for investment finance. The paper suggests state and farm size specific interventions along with increase in public investments, suitably tailored to augment household income and capital formation in agriculture.

Keywords: income, saving, investment, capital formation in agriculture

JEL: O11, O16, Q14

I

INTRODUCTION

Agriculture sector has a low propensity to save. The estimated saving ratio[1] is much higher in the non-agricultural sector as compared to that in the agriculture sector (Friend, 1966; Krishnamurty and Saibaba, 1981; Mody, 1983). Bhalla (1978) attributed low savings among agricultural households (HHs) to income, age structure, presence of financial intermediaries, and real interest rate. His analysis was based on the NCAER survey data for the year 1970-71. He further observed that the capital market conditions bore an important effect on savings behaviour in rural India, with relatively richer HHs saving less than the poorer HHs in response to an increase in the investment opportunities. The investment opportunities increased savings, ceteris paribus, for subsistence group of HHs (with no capital market) and had a negative effect for non-subsistence group (having relatively perfect capital market). A low saving ratio at 0.10 was again estimated in rural India by Bhatty and Vashishtha (1990) during 1981-82 followed by a slight upturn in it during 1986-87.

At the disaggregate level, Dhawan (1998), Dhawan and Yadav (1995) reported higher saving ratio at 0.277 (saving rate 27.7 per cent) with an average saving of Rs. 2573 per agricultural HH in Punjab. Using another primary survey done in the Ghataprabha Canal Command in Karnataka, Dhawan (1996) found almost a same level of saving ratio (0.25).[2] In both the regions, HHs savings were found to have increased with an increase in the farm size because earnings (income) of large

farmers were relatively higher than that of small farmers. Access to public canal irrigation and input use were other important factors that influenced farmers' savings, primarily because these determine agriculture investment and output and hence income. However, a weak relationship of investment with saving was perceptible across all the three regions surveyed in Punjab. A low marginal propensity to invest out of rising savings was explained by dis-savings by the small and marginal farmers, as their source of investment was borrowed funds.

According to Bautista and Lamberte (1990), the ability, willingness and opportunity of HHs to save can significantly influence the rate of capital accumulation and economic growth in the developing countries. However, the investment behaviour of farmers is influenced more by the value of agriculture output than by the total income earned. According to Mishra and Goodwin (1997), agriculture is susceptible to climatic variations and fluctuations in the commodity prices. Such risks and uncertainties and a dominance of rainfed agriculture tend to be the primary source of fluctuations in rural income in many regions. This may impart sensitivity to savings, especially when there is an uncertainty relating to weather conditions. As per the NCAER survey report (2010), saving rate of agriculture dependent HHs remained considerably lower (20 per cent of income) than those of self-employed belonging to non-agriculture HHs (32 per cent of income). This may be an important factor that makes agricultural HHs highly dependent on borrowings from the institutional and non-institutional sources. Borrowings help in capital formation, scale up farm mechanisation and meet consumption expenditure during natural calamity and unforeseen exigency.

In sum, the extant literature highlights a lower marginal propensity to save in rural India in comparison to that in urban India. As per Pandit (1985), savings of urban HHs were more responsive to variations in the level of income than the rural savings. Among various factors, the real rate of return on deposits affected HHs savings in time deposits favourably. Literature is scant on the effect of meagre savings of rural HHs on capital formation (investment) in agriculture. According to Dhawan (1998), farmers allocated a very small proportion of their savings (own funds) towards capital formation. The regression analysis based on the NSS AIDIS (1981-82) showed farmers' investment decision depended mainly on investment in public canals (irrigation), availability of credit, growth in agriculture, rate of technical progress and allocative preference for purchase of land, house, durables and non-farm business. Without considering the role of savings, Bisaliah *et al.* (2013) analysed the factors that determine HHs investment decision. The analysis based on the cost of cultivation data from 1994-95 and 2007-08 showed a perceptible change in the size as well as composition of HHs investment in both farm and non-farm businesses. A decline in capital stock per hectare (ha) was reported. However, the share of irrigation capital and farm machinery went up only in the case of marginal and small farms. Among various items of capital expenditure, the animal capital, machinery, land, and labour turned out to be the important determinants of gross value of output. Literacy

level and borrowings (credit) also assumed importance in influencing the output. Bathla and Kumari (2017) endorsed these findings using the NSS-AIDIS data for 2002-03 and 2012-13. The study found that rural HHs spent a high share of total income on residential land and buildings (68 per cent), followed by farm business (including livestock) (23.3 per cent) and non-farm business (8.7 per cent) respectively.[3] A change in their investment preference was explained by low returns from crop cultivation, growing urbanisation, and expansion in the industrial activities. The institutional credit availed by HHs was increasingly used for investment finance, having a positive and significant impact on their investment behaviour.

In this backdrop, the paper estimates the saving rate and saving gap among agricultural HHs to understand their investment behaviour based on the All India Financial Inclusion Survey (NAFIS) 2016-17. The survey undertaken by the NABARD, Mumbai has many salient features to apprise about HHs income from various sources, expenditure on food and non-food items, amount deposited (saved) in bank, capital expenditure (investments) in financial and physical assets, types of assets, their share in total capital formation and credit taken for investments.[4] It may act as a pointer for the government to have location-specific and farmer-specific interventions, suitably tailored to meet the challenges thrown by the disaggregate data.

The remainder of this paper is structured as follows. Section II provides estimates on income, expenditure and saving rate of agricultural HHs during the reference year at nominal prices along with an empirical analysis on the factors that influence their saving. Section III examines the investment ratios and saving gap, delves into the composition of investment in agriculture and examines its relationship with saving and income using a multivariate regression model. Section IV draws policy imperatives to accelerate investment for higher agricultural growth.

II

INCOME, EXPENDITURE AND SAVING RATE OF AGRICULTURA HHS

Table 1 provides estimates on income, expenditure and saving of agricultural HHs during 2015-16. At all India, out of total income of Rs 107326, HHs incurred an expenditure of Rs. 85330 and saved Rs. 21,996 per annum.[5] The states having higher saving than the national average include Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Punjab, Tamil Nadu and West Bengal and NE states. The dis-savings are reported in Bihar, Jharkhand, Manipur, Uttar Pradesh, Uttarakhand and Tripura. These are the states that have dominance of small holdings (less than 2 ha) and a very low share of agriculture income in total income. The survey also reveals that only 55.2 per cent of agricultural HHs saved money in the reference year.

TABLE 1. INCOME, EXPENDITURE, AND SAVINGS OF AGRICULTURAL HHS DURING 2015-16

				(*INR/HH*)
States	Household income	Per cent share of farm income in household income	Food and non-food expenditure	Saving (Income-Expenditure)
(1)	(2)	(3)	(4)	(5=2-4)
Andhra Pradesh	108613	67.59	73831	34782
Arunachal Pradesh	111032	48.29	93547	17485
Assam	120232	27.56	85894	34338
Bihar	66061	14.93	79727	-13666
Chhattisgarh	147288	65.57	69993	77294
Goa	172056	46.44	128437	43619
Gujarat	152040	62.69	92850	59190
Haryana	134060	42.64	114728	19332
Himachal Pradesh	152218	36.88	104088	48130
Jammu & Kashmir	117474	21.34	105384	12090
Jharkhand	59158	35.59	72598	-13441
Karnataka	127572	56.45	99170	28402
Kerala	239778	56.96	205650	34128
Madhya Pradesh	83304	54.63	75732	7572
Maharashtra	124519	56.64	90980	33539
Manipur	104735	27.74	115264	-10529
Meghalaya	133055	51.38	100892	32163
Mizoram	159313	48.88	101231	58081
Nagaland	158669	58.03	97753	60916
Odisha	105780	55.78	70944	34836
Punjab	306168	69.40	182160	124008
Rajasthan	97193	32.14	87140	10053
Sikkim	137921	48.81	96843	41077
Tamil Nadu	204861	67.35	95830	109031
Telangana	119885	54.59	87837	32048
Tripura	87880	20.58	88094	-214
Uttar Pradesh	71228	27.13	75475	-4247
Uttarakhand	109068	14.87	110032	-964
West Bengal	114840	53.41	66094	48746
All India	107326	48.18	85330	21996

Source: NABARD, NAFIS 2016-17.

The amount saved by different categories of agricultural HHs[6] varied from Rs. 15,016 for marginal HHs to Rs. 93,309 for large HHs per year. Barring Arunachal Pradesh, Jharkhand, Himachal Pradesh, Jammu & Kashmir, HHs saving increased with an increase in the farm size, which in turn is related to income earned. As shown in Table 2, on an average, farmers save 15.3 per cent of their income. The marginal farmers save 12.6 per cent; small and medium farmers around 17 per cent each; and the large farmers 23.8 per cent. Saving rate of large farmers is almost double in comparison to the marginal farmers in several states. Among the states, agricultural HHs in Punjab, Chhattisgarh and Gujarat, Goa, Himachal Pradesh, Karnataka, Kerala, Odisha, Tamil Nadu, Telangana, and West Bengal reported more savings, almost double the average national saving rate of 15.3 per cent. A lower saving rate (<8 per cent) is observed in Haryana, Jammu & Kashmir and Madhya Pradesh and the negative rate in Bihar, Jharkhand, Manipur, Tripura, Uttar Pradesh and Uttarakhand.

At the aggregate level, we find that the saving rate of agricultural HHs has not improved much over the years. The dis-savings reported during the seventies persist in many states. Taking a case of one agriculturally advanced state viz. Punjab, Dhawan (1998) reported an average saving of a cultivator at Rs.2573 during 1974-75. This has increased to almost Rs. 1.24 lakh during 2015-16. However, as percentage of income, this has amounted to a little over one fourth of average income of a HH, indicating a same level of saving ratio over the period. In most of the states, the small and marginal land sized HHs are not able to save much as income earned from agriculture barely meets their expenses. It is the income earned from non-farm activities/sources that help them in sustenance.

TABLE 2: SAVING RATE* AMONG DIFFERENT CATEGORIES OF AGRICULTURAL HHS

(*per cent*)

	Marginal (<1 ha) [N=15217]	Small (1-2 ha) [N=3786]	Medium (2-4 ha) [N=1639]	Large (>4 ha) [N=818]	All [N=21460]
Andhra Pradesh	9.3	31.7	-1.3	27.2	18.8
Arunachal Pradesh	12.3	8.1	20.7	-9.7	13.0
Assam	19.9	35.3	37.4	39.4	24.8
Bihar	-15.1	-25.1	0.4	-41.3	-15.1
Chhattisgarh	47.6	37.8	33.8	23.7	39.6
Goa	2.8	36.8	23.9	29.8	21.9
Gujarat	28.9	26.0	40.9	26.9	30.1
Haryana	4.1	3.7	17.6	18.6	8.6
Himachal Pradesh	26.0	30.6	38.3	-86.1	26.1
Jammu & Kashmir	8.7	-0.7	1.1	-55.0	7.6
Jharkhand	-13.7	-25.7	-33.3	-114.3	-16.4
Karnataka	18.3	23.3	4.4	17.7	19.1
Kerala	-20.9	43.7	30.0	-	12.1
Madhya Pradesh	5.7	-1.2	12.8	18.6	7.3
Maharashtra	5.2	27.3	18.7	31.6	20.2
Manipur	-13.1	9.1	5.8	10.0	-8.9
Meghalaya	17.4	34.3	48.3	35.1	20.9
Mizoram	31.8	34.4	17.4	23.2	31.7
Nagaland	11.4	30.2	35.4	39.8	26.4
Odisha	18.1	44.0	-4.5	27.2	21.0
Punjab	16.4	24.7	40.8	33.0	28.1
Rajasthan	21.0	-20.7	-8.0	14.6	8.0
Sikkim	25.2	12.3	33.0	30.8	25.3
Tamil Nadu	32.6	38.0	45.1	55.4	38.3
Telangana	21.5	9.5	13.3	31.3	19.4
Tripura	-0.3	19.6	-	-	-0.2
Uttar Pradesh	-2.6	-19.4	5.9	4.9	-4.4
Uttarakhand	1.2	0.0	-41.6	51.6	-0.7
West Bengal	26.3	43.2	54.2	-	28.0
All India	12.6	17.8	17.5	23.8	15.3

Source: NABARD, NAFIS 2016-17.
Note: Total gross income includes wages, remittances, crop cultivation, livestock and non-farm activities.
*Saving rate equals saving/household income*100.

The analysis shows that majority of farm HHs (74.86 per cent) deposited a major portion of their saving in bank followed by 20.6 per cent in self-help groups (SHGs) , in home (4.06 per cent HHs); 0.74 per cent in post office and 0.31 per cent in chit

fund (0.31 per cent). Farmers in Madhya Pradesh, Himachal Pradesh, Odisha and Punjab have shown preference for home savings but slightly lesser than the banks. Savings with SHGs are more popular in Andhra Pradesh, Bihar, Jharkhand, Kerala, Maharashtra, Tamil Nadu, Telangana and some of the NE states. The question next to the place of savings is the purpose of savings. Saving money is the sole purpose of 82.2 per cent HHs followed by a desire to receive benefits (cash) from government schemes (36.5 per cent HHs), and also get interest on the deposited amount (34.2 per cent HHs). We find that less than 10 per cent HHs saved just to receive/transfer money from/to their family members, and for investment, medical and education purposes.

To identify the factors that influence the saving behaviour of agricultural households, we have employed ordinary least square (OLS) regression method in double log form with state fixed effects. The estimated coefficients, given in Table 3, represent elasticity of each explanatory variable with respect to the amount saved per HH. The value of R^2 is 0.27. Among various factors considered, savings are positively and significantly influenced by the age of HH head, education, land size, possession of durable assets, income from livestock and crop cultivation, gross income from all sources, and public investment in infrastructure. The latter is captured through houses with electric connection and quantity of output sold in the market.

The estimated elasticity of education (with base illiterate) goes up with level of education upto primary (0.25), and secondary (0.29) to senior secondary and above (0.89), implying more awareness/knowledge enables HHs to save more. Similar is the case with farm size. Saving depicted a positive relationship farm size. However, there is no significant difference in saving behaviour of the marginal and small farmers. This may be attributed to the fact that majority of the marginal and small farmers may not have surplus income to save due to lower income and higher expenditure.

HHs savings are determined by total income, a major source being agriculture and allied activities. The elasticity of income with respect to saving turns out to be positive and significant at, i.e., 0.682. This may imply that a 10 per cent increase in income or output have a significant effect in augmenting saving by 6.82 per cent. The level of input use or input intensification is also an important determinant as it bears a positive relationship with output. We further find that quantity of output sold in market has capacity to increase saving with elasticity of 0.23 and 0.053 respectively for crop and livestock products. The HHs having a pucca house with electricity connection tend to save more, the estimated elasticity being 0.51. The variable caste of HHs has a negligible impact on saving.

TABLE 3.DETERMINANTS OF SAVINGS OF AGRICULTURAL HOUSEHOLDS

DEPENDENT VARIABLE → SAVINGS (INR)/HH	COEFFICIENTS
VARIABLES	
GENDER (1=MALE; 0=OTHERWISE)	-0.603***
	(0.128)
AGE OF HEAD OF HOUSEHOLDS	0.023***
	(0.003)
EDUCATION CATEGORY (BASE: ILLITERATE):	
UPTO PRIMARY	0.247**
	(0.100)
SECONDARY	0.290***
	(0.105)
SR SEC & ABOVE	0.887***
	(0.158)
CASTE (BASE: SC):	
ST	0.170
	(0.173)
OBC	-0.003
	(0.123)
GENERAL	0.122
	(0.149)
LAND CATEGORY (BASE: MARGINAL) (HA):	
SMALL	0.616***
	(0.123)
MEDIUM	1.058***
	(0.200)
LARGE	1.629***
	(0.302)
INTERACTION OF HH TYPE WITH ELECTRIC CONNECTION (EC) (BASE KATCHA HOUSE WITHOUT EC):	
SEMI-PUCCA W/O EC	0.356**
	(0.171)
PUCCA W/O EC	0.358*
	(0.194)
KATCHA WITH EC	0.190
	(0.142)
SEMI-PUCCA WITH EC	0.049
	(0.162)
PUCCA WITH EC	0.510***
	(0.153)
LIVESTOCK HHS (1=YES;0=NO)	-0.078
	(0.091)
QUANTITY SOLD IN MARKET - CROPS (SHARE %)	0.23***
	(0.031)
QUANTITY SOLD IN MARKET - LIVESTOCK (SHARE %)	0.053*
	(0.029)
ANNUAL TOTAL INCOME (INR)	0.682***
	(0.036)
ACCESS TO CREDIT (1=YES;0=NO)	-0.271*
	(0.140)
HAVE DURABLE ASSETS (1=YES;0=NO)	-4.743***
	(0.585)
CONSTANT	0.356**
	(0.171)
STATE FIXED EFFECT	YES
OBSERVATIONS	21,460
R-SQUARED	0.27
ROBUST STANDARD ERRORS IN PARENTHESES, *** P<0.01, ** P<0.05, * P<0.1.	

<center>III</center>

<center>INVESTMENT RATE, SAVING GAP AND SOURCE OF INVESTMENT FINANCE</center>

Have household savings (own funds) resulted in an increase in capital formation in agriculture? Whether capital formation in agriculture is affected more by saving or borrowing? What effect does public investment in agriculture and rural infrastructure have on HHs investment behaviour?

A detailed analysis on these issues shows that hardly 10 per cent of agricultural HHs made investments in agriculture and possessed high value farm assets during 2015-16.[7] Only 3 percent of marginal farmers had high value farm assets as compared to 14 per cent small; 24 per cent medium and 35 per cent large category of farmers (Annexure Table 1). Given a handful of HHs who made investments, we expect investment rate in agriculture to be low with large variations across the states and farm size. This needs to be taken with circumspection as data is only for one year and farmers might not have purchased assets in the reference year. Generally, the average life of tractors, farm implements, livestock is beyond five years and may be included in the HHs durable assets at the time of survey.

3.1: *Captial Formation in Agriculture and Allied Activities*

Table 4 shows the magnitude of capital formation in agriculture (farm investment), which comprises expenditure on repairs and maintenance, livestock, farm implements, machinery, tractor and irrigation. As elicited above, expenditure on most of these assets is not incurred on regular basis. However, in the reference year, investments made by the large farmers were nine times higher than that by the marginal farmers. The marginal farmers invested Rs. 1592 as compared to Rs. 13522 by the large farmers, average being Rs. 2923 per household. Across states, data shows that in every state farmer belonging to the marginal land size category made some investments. Nonetheless, the amount spent by the former on asset formation was much smaller than that spent by the latter. A higher percentage of HHs (more than 10 per cent) in Kerala, Karnataka, Punjab and Rajasthan, J&K and Himachal Pradesh made farm investments. Overall, there is a marked difference between expenditure on assets by the marginal and the large farmers. The investment farm size relationship appears direct but not in a smooth and systematic manner.

Furthermore, the share of farm investment in total physical investment (housing, non-farm business, other assets) is almost 61 per cent, with a much lesser difference between the share of marginal farmers at 56.2 per cent and large farmers at 67.2 per cent. This may imply that all categories of farmers devoted some expenditure on livestock, machinery, irrigation and other assets. Among key expenditure items as part of capital formation, HHs spent higher on livestock (Rs. 11,728) followed by irrigation, and machinery at Rs. 7119. Nevertheless, as shown in Annexure Table 2,

farmers in high per capita income states invested more in physical assets (housing, and non-farm business) as compared to farm assets. HHs also incurred expenditure on financial assets (bank deposits, shares etc.). The total average amount spent on financial and physical assets was Rs. 6423 with a much higher share of physical investment at Rs. 4796. Across all the states, investment in financial assets is much lower than that in the physical assets.

TABLE 4: CAPITAL FORMATION IN AGRICULTURE ACROSS DIFFERENT
CATEGORIES OF AGRICULTURAL HHS

(inr/hh)

(1)	Marginal (<1 ha) [N=15217] (2)	Small (1-2 ha) [N=3786] (3)	Medium (2-4 ha) [N=1639] (4)	Large (>4 ha) [N=818] (5)	All [N=21460] (6)
Andhra Pradesh	3852	1465	812	831	2800
Arunachal Pradesh	334	228	25	1556	312
Assam	1254	4939	1090	80024	2050
Bihar	1577	748	84	661	1464
Chhattisgarh	6220	42	-	216	4291
Gujarat	17	291	5125	7723	1089
Haryana	2621	1190	11492	7626	3903
Himachal Pradesh	2338	8176	1180	8667	2606
Jammu & Kashmir	3127	9374	22612	20626	3731
Jharkhand	1055	3261	600	-	1254
Karnataka	101	290	1267	138	224
Kerala	7001	3,36,246	34032	0	90436
Madhya Pradesh	4733	27	1163	15524	3235
Maharashtra	295	1186	-	20280	2010
Manipur	255	102	-	-	233
Meghalaya	1015	1059	168	-	1015
Mizoram	208	2404	653	-	578
Nagaland	5952	1609	2643	5773	5159
Odisha	812	9292	-	-	1692
Punjab	2749	25852	9543	66728	13762
Rajasthan	1438	1404	8069	16054	4441
Sikkim	1341	-	-	-	1309
Tamil Nadu	1464	-	-	-	900
Telangana	1666	3189	4410	54	2238
Tripura	2484	-	0	-	2407
Uttar Pradesh	1582	2035	9445	13914	2019
Uttarakhand	1964	1343	4042	64087	2418
West Bengal	893	8474	-	-	1216
All India	1592	5467	4178	13522	2923

Source: NABARD, NAFIS 2016-17.

Farmers' preference to invest in physical assets as compared to farm assets implies a low magnitude of investment in agriculture, which is also reflected in a low investment rate (capital formation in agriculture/ net income from all sources *100). Table 5 shows that investment rate in agriculture among marginal farmers is only 1.7 per cent; small farmers 4.4 per cent; medium farmers 2.9 per cent; and large farmers 5.6 per cent, averaged 2.7 per cent. Only exception is Kerala where investment rate is very high at almost 38 per cent as per farm size it exceeded 10 per cent for large farmers in Himachal Pradesh, J&K, Rajasthan and Uttarakhand. In case of small and marginal farmers, it is relatively higher but less than 10 per cent in Andhra Pradesh,

Madhya Pradesh, Kerala, Jharkhand and Punjab. Akin to saving rate, investment rate reflects a direct relationship with farm size in a majority of states. The only difference is that in every state the marginal farmers spent on asset formation though a smaller amount. In contrast, the medium and large farmers spent a much larger amount.

TABLE 5: FARM INVESTMENT RATE OF DIFFERENT CATEGORIES OF AGRICULTURAL HHS

(*per cent*)

(1)	Marginal (<1 ha) (2)	Small (1-2 ha) (3)	Medium (2-4 ha) (4)	Large (>4 ha) (5)	All (6)
Andhra Pradesh	5.0	0.9	0.9	0.3	2.6
Arunachal Pradesh	0.3	0.2	0.0	1.2	0.3
Assam	1.2	3.1	0.6	27.1	1.7
Bihar	2.4	1.2	0.1	0.7	2.2
Chhattisgarh	4.6	-	-	0.1	2.9
Gujarat	-	0.2	2.5	2.6	0.7
Haryana	2.4	1.1	6.5	2.7	2.9
Himachal Pradesh	1.6	2.7	0.3	57.1	1.7
Jammu & Kashmir	2.7	5.9	19.0	27.6	3.2
Jharkhand	1.7	6.8	1.2	0.0	2.1
Karnataka	0.1	0.2	1.0	0.1	0.2
Kerala	4.2	120.6	5.7	-	37.7
Madhya Pradesh	7.2	0.0	1.1	9.3	3.9
Maharashtra	0.4	0.8	-	6.8	1.6
Manipur	0.3	0.1	-	-	0.2
Meghalaya	0.8	0.5	0.1	-	0.8
Mizoram	0.1	1.2	0.3	-	0.4
Nagaland	5.2	0.9	1.5	0.9	3.3
Odisha	0.8	5.4	-	-	1.6
Punjab	1.6	7.9	1.8	7.6	4.5
Rajasthan	1.3	2.2	9.8	11.6	4.6
Sikkim	1.0	-	-	-	0.9
Tamil Nadu	1.1	-	-	-	0.4
Telangana	1.5	2.3	4.1	-	1.9
Tripura	2.9	-	0.0	-	2.7
Uttar Pradesh	2.4	2.7	7.3	7.4	2.8
Uttarakhand	1.9	0.9	3.7	11.1	2.2
West Bengal	0.8	3.1	-	-	1.1
All India	1.7	4.4	2.9	5.6	2.7

Source: NABARD, NAFIS 2016-17

Notably, the scale of capital formation in agriculture is far below the level of savings reported. At the national level, investment in agriculture is much lower than the saving and hence shows a negative value of agriculture saving gap (farm investment – saving) at Rs.19073 per HH. Saving exceeds farm investment in case of marginal farmers HHs by Rs. 13,424, small farmers Rs. 24,130, medium farmers Rs. 31,929 and large farmers Rs. 79,787. The differential or saving gap was noticeable only in select states where medium and large farmers made higher investments. These states include Bihar, J&K, Jharkhand, Kerala, Uttar Pradesh and Uttarakhand and a few NE states.

The upshot of this analysis is that first, as found during the seventies and the eighties, farmers continue to spend less on asset formation in agriculture in comparison with the amount saved. Second, only in a few states large farmers had a

positive agriculture saving gap which may imply that their expenditure on asset purchase exceeds saving. Third, saving and investment tend to have a direct relation with the farm size in most of the states. Fourth, investment preference of HHs is more towards physical assets, mainly housing in Gujarat, Punjab, Himachal Pradesh, Uttar Pradesh and West Bengal. These along with large inter-state and inter-farm differentials in capital formation in agriculture have implications for sustaining investment for higher agricultural growth.

Generally, HHs bridge the gap between investments and savings by borrowing from institutional and non-institutional sources, and sale of assets. Farmers used the maximum amount of Rs. 2507 from savings, closely followed by Rs. 2425 from formal credit institutions and Rs.1357 from informal credit institutions. The pattern is same across the states with a few exceptions viz. Punjab and Rajasthan. They also borrowed for purposes other than purchase of physical assets. From Table 6, it is apparent that 48 per cent of their requirements for capital and current expenditure (assets and inputs) were met through the institutional sources as compared to 25 per cent from the non-institutional sources. For housing and other HHs expenditure, institutional credit is utilised more. The non-institutional borrowings are used mainly for the purposes of medical treatment, housing and other expenditures. Repayment of debt and education expenditure are met through both the sources.

TABLE 6: PURPOSE OF CREDIT AND BY SOURCE AMONG AGRICULTURAL HHS

			(*per cent*)
(1)	Non-Institutional (2)	Institutional (3)	Total (4)
Capital expenditure in farm business	14.0	27.76	23.18
Current expenditure in farm business	11.17	19.21	16.53
Capital expenditure in non-farm business	5.42	6.76	6.31
Current expenditure in non-farm business	6.45	7.96	7.46
Expenditure on litigation	0.79	0.52	0.61
Repayment of debt	2.38	3.79	3.32
Financial investment expenditure	1.49	1.37	1.41
Education	4.61	3.31	3.74
Medical treatment	19.76	6.41	10.85
Housing	10.09	9.05	9.4
Other household expenditures	23.26	13.54	16.78
Others	0.58	0.33	0.41
Total	100	100	100

Source: NABARD, NAFIS 2016-17

Due to lower earnings, HHs resort to borrowings from institutional and non-institutional sources. As shown in Annexure Table 3, in almost every state, borrowings from the institutional sources are more than that from the non-institutional sources. The average amount borrowed from non-institutional sources was Rs. 73,713/HH and the same from institutional sources was Rs. 96,244/HH, average being Rs. 88,743/HH. This amount is close to net income earned from farming and livestock activities. It makes evident that income from farming is unable to meet expenditure and hence HHs have a high dependence on borrowings. Government support is needed to encourage capital formation in agriculture to

achieve higher yield and growth. Studies have also reported a much faster increase in the input costs as compared to an increase in the output price, which makes farmers realize lower net returns (Chand *et al*. 2015; Government of India, 2018).

3.2 *Impact of HHs Saving on Capital Formation in Agriculture*

Investment in agriculture is taken to be determined by HHs characteristics, saving, income, value of output from agriculture and livestock, credit, possession of durable assets and public investment. Public investment is captured through pucca houses with electric connection. One more variable that may influence farmers' investment decision is their preference to invest in agriculture. This is captured through the share of investment other than in farming in total investment. Unlike the above-mentioned variables, this is expected to have a negative impact on farm investment. A multiple regression equation is run with the state effects to capture the unobservable specific effects at the disaggregate level.

The empirical results presented in Table 7 indicates capital formation in agriculture is positively and significantly determined by income of agricultural HHs, literacy upto secondary level, credit and public capital formation (in power captured through pucca HHs with electric connection and in rural infrastructure captured through sale of produce in market). As indicated by R square, these factors together explain 26 per cent of variations in capital formation in agriculture.

The value of coefficient of income is 0.024, implying a positive impact on investment. HHs savings barely influence investment instead it is the credit from the institutional and non-institutional sources that bear a positive and significant impact on investment. The variable credit is represented by the share of institutional credit in total and the elasticity is found to be positive and high at 1.41. Next to credit is public investment which suggests that a 1 per cent increase in investment by the government would raise farm investment by 0.13 per cent. This finding lends support to the '*crowding in*' effect of public investment on private investment at the macro and micro levels found in Dhawan (1998), Bisaliah *et al*. (2013) and Bathla *et al*. (2020). The policy imperative is to continue fund allocation towards irrigation and rural infrastructure in each state. Since data reveals large inter-state disparities in capital expenditure in agriculture, public investment should be relatively more in the less developed agriculturally dependent states to induce HHs to undertake investment.

The results further show that farm investment is negatively and significantly influenced by farmers' preference to invest in housing, land and buildings. The elasticity estimate turns out to be high at 0.18 at 1 per cent level of significance. We find that HHs investment preference are predominantly in housing and non-farm businesses and may not contribute much to capital formation in agriculture. If we exclude expenditure on livestock, the amount of investment in agriculture further goes down. It is understandable that HHs do not purchase assets every year but investment in agriculture is found to be not only low but also has a small share in

total physical investments across all the states, except Kerala. Finally, on investment farm size relationship, results are comparable with the saving behaviour and confirms that bigger the farm, higher is the investment. Keeping marginal farmers as base, the elasticity of farm size variable is significant and increases from 0.05 in case of small farmers to 0.33 in case of large farmers. HHs savings barely impact investment in agriculture.

TABLE 7. DETERMINANTS OF FARM INVESTMENT OF AGRICULTURAL HHS

Outcome Variable → Farm Investment (INR)/HH	Log values
(1)	(2)
Variables	Model
Gender (1=Male; 0=Otherwise)	0.004
	(0.059)
Age of head of households	-0.001
	(0.001)
Education Category (Base: Illiterate):	
Upto Primary	0.098**
	(0.05)
Secondary	0.13***
	(0.045)
Sr Sec & Above	0.013
	(0.062)
Caste (Base: SC):	
ST	0.011
	(0.067)
OBC	0.04
	(0.058)
General	0.008
	(0.06)
Land Category (Base: Marginal):	
Small	0.058
	(0.048)
Medium	0.071
	(0.068)
Large	0.33***
	(0.13)
Interaction of HH Type with Electric Connection (EC) (Base Katcha House without EC):	
Semi-Pucca w/o EC	-0.13*
	(0.08)
Pucca w/o EC	-0.05
	(0.08)
Katcha with EC	0.045
	(0.061)
Semi-Pucca with EC	0.046
	(0.063)
Pucca with EC	0.13**
	(0.06)
Quantity sold in market - Crops (share %)	0.003
	(0.01)
Quantity sold in market - Livestock (share %)	0.033**
	(0.01)
Annual total income (INR)	0.024***
	(0.007)

(Contd.)

TABLE 7 (CONCLD.)

Outcome Variable → Farm Investment (INR)/HH	Log values
(1)	(2)
Variables	Model
Savings (INR)	-0.002
	(0.004)
Investment preference (% share of non-farm investment in total investment)	-0.18***
	(0.047)
HHs having outstanding loan (1=yes=0=No)	0.062
	(0.039)
Share of institutional credit in total credit (%)	1.41***
	(0.067)
HHs own durable assets (1=Yes;0=No)	-0.035
	(0.052)
Constant	-0.37
	(0.30)
State Fixed Effect	Yes
Observations	21,460
R-squared	0.26

Note: Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

IV

SALIENT FINDINGS AND POLICY IMPLICATIONS

The average income earned from all sources (Rs.107326) barely meets agricultural HHs expenditure on food and non-food items and hence result in low level of saving (Rs. 21,997) and capital formation (Rs.2923). The estimated average investment rate of 2.5 per cent is far below the saving rate of 25 per cent. HHs saving is mainly determined by gross income, level of education, pucca house and public investment in rural infrastructure. Saving doesn't bear a positive relationship with investment in agriculture, implying a greater dependence of HHs on borrowings from institutional and non-institutional sources for investment finance.

The marginal and small farmers are way behind the medium and large farmers in terms of income, investment and saving. Though NAFIS survey (2016-17) shows an increase in farmers' income in comparison to the NSS-AIDIS 70th Round (2012-13), but their expenditure has overshot their income. The saving and investment relationship with farm size is found to be direct though an upward tendency in investment is not very smooth in some states. As argued in Chand *et al*. (2011), the small farm may be superior in terms of production performance (efficiency) due to an inverse farm size - output per hectare relationship. But it is considerably weak in terms of generating adequate income and sustaining livelihood. In other words, per capita output is low in the smallholdings despite higher productivity due to lower per capita availability of land, which further put constraint on their savings and investments. Low absolute income (returns) together with high input cost per hectare make small farmers and their family members either migrate to cities or look for alternative employment during the off season. Das (2021) maintained that even if a direct relationship between farm size and productivity is observed in Punjab and Haryana due to capital and irrigation intensive use of land, it is important to increase

access to non-land inputs for economic viability of the marginal and small farms. At the same time, in agriculturally less advanced states having an inverse relationship, growth is possible through land consolidation due to high concentration of small plots.

The agriculturally advanced states situated in the north and south show higher savings and investments in comparison to the less advanced agriculture dependent states in the eastern part of India. These states, viz., Bihar, Jharkhand, Uttar Pradesh and Assam have dominance of small and marginal holdings, mostly rainfed. From the survey, we find no saving gap (farm investment – saving) at all India, which means that on an average a HH saving is higher than the amount spent on capital formation in agriculture with a few exceptional states. In almost every state, HHs resort to borrowing to meet their expenses on asset formation, medical treatment and education.

It is discernible from Annexure Table 4 that the low per capita income states viz. Bihar, Jharkhand, Madhya Pradesh and Uttar Pradesh generally have low saving rate, much lower investment rate and hence dependence on borrowings. The higher income states viz. Gujarat, Himachal Pradesh, Kerala, Punjab and Tamil Nadu have higher saving rate but a not so high investment rate. Only three states, viz., Haryana, Punjab and Kerala show borrowings more than Rs.1,25,000 during 2015-16. This is in conformity with Bathla *et al*. (2020) who on the basis of long-term trends in investment and agriculture income showed the eastern states to be lagging in both private (HHs) and public investments and flow of institutional credit, which have practically affected their agricultural growth. The study also endorsed the findings obtained in Fan *et al.* (1999), Fan *et al*. (2000), Gulati *et al.* (2018) and many others on the importance of increasing agriculture productivity and income through increase in both public and private capital formation.[8]

Public support is clearly needed in agriculture due to a large gap between HHs saving and investment, large inter-farm and inter-state disparities therein. The marginal and small land holders are able to mobilise resources to finance asset formation but expenditure on land/housing, input cost, day to day expenditure on medical and education generally exceed their income. Some expenses are met through informal borrowings and for others such as input cost and capital expenditure, institutional borrowings are used. A sound public policy that focuses on accelerating investments and bringing equality in access to land, technology and credit can encourage private investment and productivity growth.

The results also provide evidence of poor access to formal credit by the small landowners. Formal lenders are explicitly biased towards farmers with large sized farms, and as a consequence, marginal and small farmers are left out (Kumar *et al*. 2020). Kumar *et al.* (2017) showed that access to institutional credit depicts a positive relationship with land size. This anomaly needs to be rectified, and efforts should be made towards greater financial inclusion. Finally, given that poor farmers rely more on non-farm sources of income, continued efforts are needed to increase employment

intensity in the manufacturing and tertiary sectors, especially in the agro and food processing segment having immense potential to absorb people. Strengthening small scale rural enterprises/industries with adequate incentives structure can also be helpful.

NOTES

1. Saving rate is defined as the ratio of saving and income.
2. The analysis was based on a primary survey of 1663 agricultural HHs collected from three regions in Punjab during 1974-75 by Bhalla and Chadha (1983). The primary data of nearly 400 HHs in Ghataprabha canal command was gathered by ISEC, Bangalore during 1975-76. These data set primarily used to assess the impact of canal irrigation on farmers' investment and savings behaviour.
3. The annual expenditure on residential land and buildings grew at a much higher rate at 4.7 per cent compared to that in farm at 2.52 per cent and non-farm businesses 3.31% during this period, signifying a change in the investment preference of HHs. Within agriculture, HHs preferred to spend more on tractors, machinery and livestock than on irrigation, repairs and maintenance and animal sheds/barns.
4. The survey included more than 40,000 households from all the Indian states, of which 55 % were cultivators and the remaining non-cultivators.
5. Saving is measured as the difference between a household's income and expenditure during the reference period.
6. Farm HHs are categorised as per the size of land - marginal (<1 ha), small (1-2ha), medium (2-4 ha) and large (>4 ha).
7. To clarify, investment is the sum total of expenditure on financial and physical assets in both farm and non-farm activities. Investment in agriculture refers to expenditure on physical assets such as land purchase, major repairs, livestock, farm implements, irrigation structures and machinery. When expenditure on purchase of land is excluded from farm investment, it is termed as capital formation in agriculture. During the survey year, HHs did not report any expenditure on purchase of land. Investment in agriculture is, therefore taken to be synonymous with capital formation in agriculture.
8. The authors suggested that due to a persisting regional bias in public investment and uneven agricultural growth, investment in irrigation, research and development, roads-transport should be scaled up in the eastern states. This along with an adequate flow of institutional credit and favourable terms of trade have potential to accelerate private investment and thus contribute to higher income in the laggard states.

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ANNEXURE TABLE 1

PERCENTAGE OF AGRICULTURAL HHS POSSESSED HIGH VALUE FARM ASSETS

(1)	Marginal (<1 ha) (2)	Small (1-2 ha) (3)	Medium (2-4 ha) (4)	Large (>4 ha) (5)	All (6)
Andhra Pradesh	10.2	25.3	49.1	47.7	20.1
Arunachal Pradesh	0.8	0.5	8.2	4.1	2.0
Assam	0.8	7.0	0.7	0.0	1.8
Bihar	1.3	3.8	13.3	22.5	1.9
Chhattisgarh	1.0	1.0	17.3	40.8	3.3
Goa	33.4	3.7	16.7	50.7	19.4
Gujarat	2.0	36.7	12.6	45.1	13.6
Haryana	2.6	4.0	18.7	55.8	9.8
Himachal Pradesh	3.6	0.5	0.0	48.1	3.6
Jammu & Kashmir	1.6	10.1	19.3	45.9	2.4
Jharkhand	0.9	1.2	1.3	3.4	1.0
Karnataka	4.4	11.3	5.5	17.4	6.9
Kerala	-	60.0	-	-	14.7
Madhya Pradesh	4.5	15.2	33.8	35.1	16.0
Maharashtra	1.0	10.0	25.3	27.1	8.1
Manipur	1.5	3.1	-	-	1.6
Meghalaya	1.8	5.4	-	-	2.2
Mizoram	1.4	1.2	1.8	-	1.3
Nagaland	-	-	0.4	-	0.0
Odisha	0.9	0.2	11.5	100.0	1.1

Annexure table (Contd).

ANNEXTURE TABLE 1 (CONCLD.)

(1)	Marginal (<1 ha) (2)	Small (1-2 ha) (3)	Medium (2-4 ha) (4)	Large (>4 ha) (5)	All (6)
Punjab	9.4	46.9	69.9	81.6	31.1
Rajasthan	2.6	11.0	18.0	23.2	9.9
Sikkim	5.2	-	-	-	5.0
Tamil Nadu	3.7	17.1	10.1	52.8	8.6
Telangana	5.1	28.5	20.9	34.6	11.5
Tripura	6.4	-	-	-	6.2
Uttar Pradesh	2.4	14.2	35.6	84.0	5.9
Uttarakhand	6.6	38.8	53.2	6.0	11.2
West Bengal	4.8	8.7	-	-	5.0
All India	2.9	14.3	23.6	35.2	7.7

Source: NABARD, NAFIS 2016-17.

ANNEXURE TABLE 2

INVESTMENTS IN FINANCIAL AND PHYSICAL ASSETS OF AGRICULTURAL HHS

(inr)

States	Financial Investment				Physical Assets					Source of Funds for Physical Assets		
	Bank	Post office	Shares /Bonds	House	Repairs (Assets / Building)	Livestock	Farm Machine / Irrigation equipment	Non-Farm	Others	Own funds (Savings)	Institutional borrowings	Non-Institutional borrowings
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Andhra Pradesh	593	0	13	804	8	2449	4	0	338	2877	370	901
Arunachal Pradesh	2275	257	0	1014	205	43	63	1	0	1909	1000	785
Assam	213	384	0	3125	12	749	239	916	1051	3433	2336	834
Bihar	551	0	0	783	131	558	711	85	64	964	1002	846
Chhattisgarh	717	0	0	518	3701	570	20	629	0	3488	2047	555
Gujarat	86	0	0	5976	530	558	1	97	0	2918	2121	2027
Haryana	65	0	6	7845	1187	428	1915	1080	372	5536	6519	837
Himachal Pradesh	472	1	0	7302	1450	193	339	353	623	3635	4735	2149
Jammu & Kashmir	2451	0	0	3541	1358	1062	1132	658	179	6889	2595	835
Jharkhand	47	30	1	679	197	187	805	268	65	461	880	761
Karnataka	7901	9	0	208	2	184	38	38	0	3808	2724	1613
Kerala	0	105	0	505	946	87244	2247	0	0	34447	39217	16460
Madhya Pradesh	495	1	0	0	3171	19	44	143	0	1750	1201	912
Maharashtra	1639	1	0	29	5	411	1594	0	0	1191	1972	413
Manipur	20	0	0	7076	0	42	0	241	191	7408	13	147
Meghalaya	53	7	0	4993	501	353	161	51	0	3032	2382	592
Mizoram	2559	0	0	234	22	557	0	2238	0	5142	249	62
Nagaland	866	0	0	1177	3267	356	1212	971	323	1732	4337	2085
Odisha	1871	23	0	97	1659	31	2	2	0	2278	756	625
Punjab	9869	0	0	5995	2608	8037	2290	8	826	11774	11946	5744
Rajasthan	200	3	0	3186	147	432	2209	675	1653	2859	3802	1722
Sikkim	1146	19	0	3066	11	763	534	18	0	1980	2982	571
Tamil Nadu	312	24	8	14	6	872	22	0	0	1125	44	8
Telangana	27	0	59	611	391	337	764	171	746	525	447	1974
Tripura	25	0	0	790	338	163	35	420	1872	245	2880	410
Uttar Pradesh	585	61	8	1305	375	201	1125	217	318	1131	1646	1289
Uttarakhand	201	49	0	543	715	849	674	369	179	518	2269	685
West Bengal	219	178	0	4281	194	163	752	326	107	1443	3301	1199
All India	1583	40	4	1647	686	1219	730	225	289	2507	2425	1357

ANNEXURE TABLE 3

AVERAGE AMOUNT BORROWED AND ITS SOURCE DURING 2015-16

(*inr/hh*)

(1)	Non-Institutional (2)	Institutional (3)	Total (4)
Andhra Pradesh	173370	93170	115917
Arunachal Pradesh	25962	32209	28903
Assam	41985	61719	51428
Bihar	47979	51988	49699
Chhattisgarh	52508	71786	62526
Goa	60114	173449	133909
Gujarat	53022	84575	75352
Haryana	105468	226941	176326
Himachal Pradesh	65742	131977	107784
Jammu & Kashmir	72332	103810	89758
Jharkhand	35348	32413	33696
Karnataka	73580	108825	102808
Kerala	34808	282335	281726
Madhya Pradesh	53184	78149	67616
Maharashtra	105325	99789	100624
Manipur	47386	46690	47205
Meghalaya	18628	71250	48140
Mizoram	11568	49675	34587
Nagaland	42889	72023	64473
Odisha	26800	33023	30858
Punjab	219587	317137	296350
Rajasthan	98843	128513	119706
Sikkim	31796	45521	38957
Tamil Nadu	71533	79642	78047
Telangana	100631	86901	91675
Tripura	24844	33341	30011
Uttar Pradesh	59148	82361	69183
Uttarakhand	69438	104760	95333
West Bengal	31934	39640	37342
All India	73713	96244	88743

Source: NABARD, NAFIS 2016-17.

ANNEXURE TABLE 4

MATRIX OF AGRICULTURAL HHS INCOME, SAVING AND INVESTMENT RATES DURING 2015-16

Indicators			
Net income from all sources (INR)	<1,00,000	1,00,000-1,50,000	> 1,50,000
(1)	(2)	(3)	(4)
States	Bihar, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh	Andhra Pradesh Arunachal Pradesh Assam Chhattisgarh Haryana Jammu &Kashmir Karnataka Maharashtra Odisha Telangana Uttarakhand West Bengal India	Goa Gujarat Himachal Pradesh Kerala Punjab Tamil Nadu
Saving Rate (saving/total income *100)	<10 per cent	10 – 15 per cent	>15 per cent

Annexure table (Contd.).

ANNEXURE TABLE 4 (CONCLD.).

Indicators			
Net income from all sources (INR)	<1,00,000	1,00,000-1,50,000	> 1,50,000
(1)	(2)	(3)	(4)
States	Bihar (-), Jharkhand (-), Uttar Pradesh (-), Uttarakhand (-), Haryana, Jammu & Kashmir, Madhya Pradesh, Rajasthan	Arunachal Pradesh Kerala India	Andhra Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Odisha, Punjab, Tamil Nadu, Telangana, West Bengal
Investment Rate (farm investment/total income *100)	<2%	2-4%	>4%
States	Arunachal Pradesh, Assam, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Odisha, Tamil Nadu, Telangana, West Bengal	Andhra Pradesh Bihar Chhattisgarh Haryana Jammu & Kashmir Madhya Pradesh Uttar Pradesh Uttarakhand India	Kerala, Punjab, Rajasthan
Borrowing from all Sources (INR)	<80,000	80,000-1,25,000	>1,25,000
States	Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal	Andhra Pradesh, Goa, Himachal Pradesh, J&K, Karnataka, Maharashtra, Rajasthan, Telangana, Uttarakhand, India	Haryana, Kerala, Punjab

Source: NABARD, NAFIS 2016-17.
Note: Categorisation is on the basis of average all India figures.