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Public and Private Capital Formation and Agricultural Growth in India: State Level Analysis of Inter-linkages during Pre- and Post-reform Periods§

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Abstract

The public and private capital formation in Indian agriculture has expanded manifold during the post-reform period. Yet, agricultural growth continues to hover around three per cent, raising concerns about the future of agriculture. This study has found that public and private investments in agriculture are unevenly spread across the states and so is the farm income. The states that have invested heavily into irrigation and infrastructure, and have pushed market-driven agro-industrial policies have accomplished higher rates of growth in the private investment and also in farm income. High capital intensity in agriculture has been observed to be inversely related to rural poverty. Nevertheless, barring Gujarat and Odisha, none of the states has shown improvement in the efficiency of investment. The study has also shown that private investment in agriculture is propelled by the public spending on agriculture and infrastructure, institutional credit and demand for agricultural raw material for agro-processing industry, whereas public investment is largely governed by the size of government spending and need to sustain agricultural growth. The findings support that the public expenditure on agriculture and food processing industry augments private investment and income, especially in the agriculturally-dominant and poor states. It has also highlighted the need to establish better alliances between farmers and food processing industry for a faster growth in the agricultural sector.

Key words: Public capital formation, private capital formation, agricultural growth, marginal efficiency of investment, food processing industry

JEL Classification: O16, Q14

Introduction

There has been a significant increase in capital formation in Indian agriculture in the post-reform period compared to that in the pre-reform period. Since 2003, the government has been injecting funds into the agricultural sector at an accelerated rate, which to an extent defies the notion of 'neglect of agriculture' built up during the 1990s. The government also intends to accelerate investments in research, extension, education and rural energy during the 12th Five-Year Plan. Nevertheless, capital deepening on both public and private accounts has not yet translated into a higher rate of agricultural growth, raising concerns about the future of agriculture, especially amidst decelerating productivity, growing distress among farmers and persisting poverty. While an overall situation does look pessimistic, the scenario at states level may be affirmative, which has not been analyzed so far. Given that agriculture differs markedly with respect to state-specific policies, initial conditions and resource

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endowments, this paper builds on the hypothesis that public capital formation in agriculture is lopsided, which may influence private capital formation and hence agricultural growth. The states that have increased investments in agriculture and infrastructure and have pushed market-driven policies might have experienced a rapid growth in private farm investment and income.

A number of studies have highlighted the key role of capital in augmenting labour productivity and income in agriculture. The public sector investment has all along held a key place in creating irrigation, roads and power infrastructure. The share of public GCFA (gross capital formation in agriculture) has always been lower than that of private GCFA, at nearly one-fourth of the total investment in agriculture. It reveals periodic ups and downs, a higher rate till the 1970s, a significant decline during the 1980s, marginal recovery during the 1990s and a significant improvement in the 2000s (Gulati and Bathla, 2002).

Generally, the behaviour of public GCFA is explained by the priority of the government towards the agricultural sector. But, several factors have acted as constraints and hence dissuaded the government to allocate funds to agriculture and irrigation during the 1980s and the 1990s. Some of these included growing deficit in the revenue account, input subsidies and other grants that resulted in less resources for investment in agriculture (Mishra and Chand, 1995; Misra and Hazell, 1996; Dev, 2000; 2008). Empirical evidence also confirms that the net market borrowings and funds by the state governments, and the savings on revenue account and input subsidies have influenced the government to undertake investments in agriculture. Compared to these supply side factors, the demand side factors, viz. population density, procurement of foodgrains and share of agricultural workforce have affected public investment (Chand, 2000; Roy and Pal, 2001; Bathla and Thorat, 2006).

A fall in public GCFA is associated with decline in the rate of growth in private GCFA and output. A deceleration in the foodgrains output during the 1980s became a cause for concern due to the well-founded linkages of public spending with agricultural growth and reduction in rural poverty through the increase in productivity and employment, and the decline in prices (Fan *et al*., 1999; Fan, 2008; Bisaliah *et al*., 2013). Substantial evidence exists on the positive impact of investments in irrigation, agriculture, education and infrastructure such as roads and power, on farm productivity. The impact may be direct as well as indirect through the 'crowding in' effect on private investment in agriculture, particularly at the dis-aggregate level (Mitra, 1996; Misra and Hazell, 1996; Dhawan, 1998; Gulati and Bathla, 2002). The private GCFA is positively influenced by the public GCFA, terms of trade, technology and credit and negatively by the rural poverty and incidence of marginal holdings. It is argued that the loss of momentum in capital formation, primarily in the public investment, during the 1980s and the 1990s, resulted in the low rate of growth in agricultural GDP. Furthermore, the marginal efficiency of investment in agriculture, which improved during the early-1990s declined in the subsequent years, perhaps due deceleration in the growth rate of agriculture. The agricultural growth is also stated to be affected by the partial implementation of reforms, inadequate technological upgradations, and lower returns due to high input cost (Landes and Gulati, 2004).

The disaggregate scenario on the public and private GCFA and their relationships and returns to investment are not much known due to lack of time series estimates on the private GCFA. On public investment, a few studies have found varying impact of agriculture and infrastructure expenditure across the rain-fed and irrigated regions, each having a differential impact on productivity growth and poverty reduction (Fan *et al*., 1999). The incremental capital output ratios (ICORs) are much lower in the eastern and rainfed regions compared to northern region, thus requiring more public support. In a recent study, Bisaliah *et al*. (2013) using farm level data of 15 states in India and separately for three states, viz. Punjab, Andhra Pradesh and Odisha for two years, viz. 1994-95 and 2007-08, have found a decline in animal capital stock for every unit of farm machinery and irrigation capital. The gross value of output is positively determined by the animal capital, farm machinery, land, literacy and credit. A direct relationship between capital intensity and productivity of land and labour and their inverse relation with the incidence of poverty have also been observed.

The empirical evidence on the linkages between public spending and investment by farmers makes the implications for government investment policy quite

apparent. A deceleration in public GCFA growth during the 1980s and 1990s seems to have negatively impinged upon the private GCFA and agricultural growth and also on the incidence of rural poverty. Such inter-linkages might have prompted the government to accelerate investment since early-2000s, which possibly explains a spurt in the private investment. Some other factors that may have instigated private GCFA could be additional number of farm holdings, increase in the flow of institutional credit, greater openness to international trade, diversification towards high-value crops coupled with the increase in demand for the processed food (Gulati and Bathla, 2002; Chand and Kumar, 2004; Joshi *et al*., 2004; 2006). Notwithstanding the increase in both public and private GCFA, farm productivity and income have not shown much improvement, which needs to be investigated along with the determinants of investment. A state-level analysis over a longer period of time may provide deeper insights owing to large differences in resource endowments, dependence of people on agriculture and allocation of public funds to agriculture.

Under this backdrop, following key questions have been taken up for study. First, which states have witnessed the increase in capital formation in agriculture on both public and private accounts and from which period it has become significant? Second, has capital-use efficiency in agriculture improved and where? Third, do inter-state disparities exist in the allocation of funds for investment in agriculture? If yes, have disparities reduced or increased over the years? Fourth, to what extent states have realized higher rates of agricultural growth due to an increased quantum of capital invested? And lastly, what factors would explain inter-state differentials in public and private investments and growth, particularly following the economic reforms in the 1990s? In other words, what explains the increase in public and private investments in agriculture during the pre- and post-reform periods?

Data and Methodology

The temporal trends in gross capital formation in agriculture (GCFA) were analysed from 1960-61 to 2007-08. However, the state-wise magnitude of public and private GCFA, disparities therein and trends in efficiency of investment were investigated from 1980-81 to 1990-91 and then from 1999-2000 to 2005-06 due to non-availability of continuous estimates on the private GCFA[1]. It was followed by empirical analyses on inter-state differentials in public and private investments and their impact on the agricultural income. The estimates were obtained using fixed and random effect models, separately for pre- and post-reforms periods.

The main sources of data used were National Accounts Statistics, Statistical Abstract of India, Fertilizer Statistics of India and State Finances. The nominal series on investment and state domestic product in agriculture and allied activities (SDPA) were converted into real prices at base 1999-2000 using GDCF and SDP deflators.

Results and Discussion

The temporal behaviour of real gross fixed capital formation in agriculture (GFCFA) from 1950-51 to 2007-08 shows it to be on a trend upwards till 1970s, downwards during the 1980s and 1990s, followed by a significant acceleration from 2000 onwards. The position with respect to change in stocks remains unaltered. The GCFA as per the type of institution reveals peaking of public GCFA during the late-1970s, followed by a gradual decline from early-1980s to 1990s and then a sharp recovery from 2000 (Figure 1). In contrast, a declining trend in the private GCFA is visible only in some years during the 1980s and 1990s, followed by a steady increase. While the private GCFA has increased from ₹ 54.89 billion to ₹ 188.64 billion during 1960-61 to 1980-81 and to ₹ 309.98 billion in 1990-91 and then to ₹ 594.96 billion in 2007-08, the public GCFA has risen from ₹ 45.62 billion in 1960-61 to ₹ 96.94 billion in 1980-81, remained at the same level for many years and then shot up from 2003-04 and reached ₹ 198.32 billion in 2007-08.

Clearly, acceleration in the private GCFA has been responsible for the recovery in GCFA over time. That is why the share of private GCFA has been increasing

[1] The main source of state-wise estimates on the private investment (by farm households) is quinquennial All India Debt and Investment Survey. But for internal purpose, CSO made an attempt to generate state level estimates on gross fixed capital formation in agriculture proper and overall economy on private account, first from 1980-81 to 1990-91 for eleven states and then from 1999-2000 to 2005-06 for all states and union territories. These estimates were used in the present study.

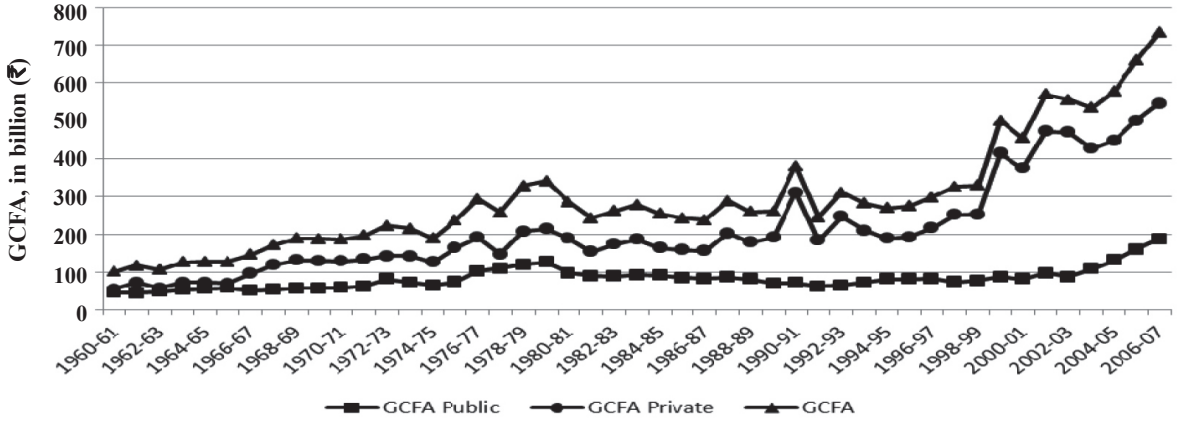

Figure 1. Gross capital formation as per type of institution at 1999-2000 prices: 1960-61 to 2007-08

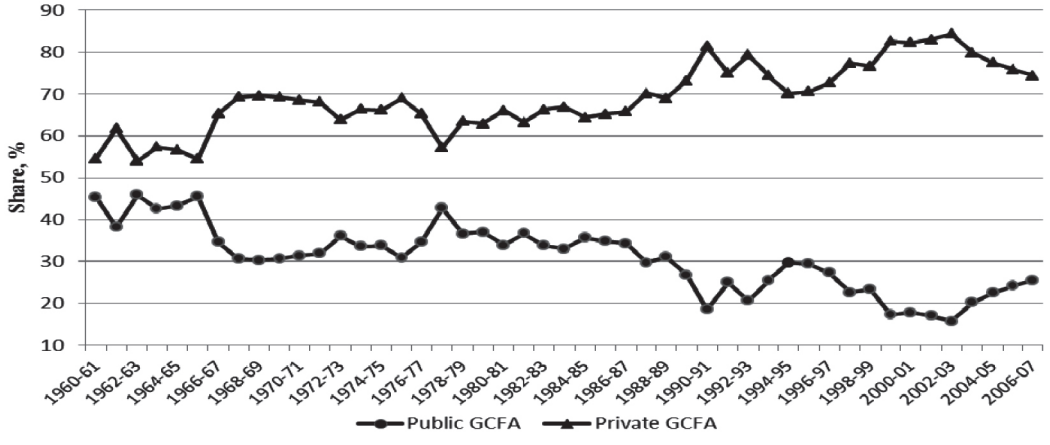

Figure 2. Percentage share of private and public GCFA in total GCFA: 1960-61 to 2007-08

steadily. As depicted in Figure 2, it was 60 per cent during 1960-61 to 1969-70, went up to 67 per cent during 1980-99, and touched a peak of 82 per cent in early-2000, averaging at 79.6 per cent during 2000-08. Since the beginning of 1980s, the GCFA in public sector has started coming down gradually and continued falling till early-2000s and starting increasing from 2003-04, while that under the private sector started looking up and even got accelerated from 1993-94 onwards till early-2000s and then showed a declining trend. Though the share of public sector GCFA in the total GCFA has increased from 18 per cent in 2002-03 to 28 per cent in 2006-07, the private GCFA continues to hold the maximum share in the total GCFA.

Since public GCFA is mainly on account of investment in the major and medium irrigation systems, studies done in the past have highlighted the contribution of investment in agriculture and allied activities, power, research and extension, roads, etc. in the agricultural sector (Gulati and Bathla, 2002; Chand, 2000). The time series on public GCFA was estimated using actual capital expenditure and loans advanced under (a) major and medium irrigation works, (b) agriculture and allied activities, and (c) power in each state[2], given in the State Finances, RBI. If such broader public investments are considered as part of agriculture, as has been done earlier, the magnitude of public GCFA (irrigation+agriculture+power to agriculture) has certainly increased from ₹ 178 billion in 1980-81 to

[2] Expenditure on power that goes into agriculture is based on the share of actual consumption of power in agriculture in the total power consumption in each state.

Table 1. Percentage share of private and public GCFA in total GCFA, GDPA in GDP, GCFA in GDPA and GCFA in GDCF (decadal averages)

Investments	1950-51 to 1959-60	1960-61 to 1969-70	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08
Public GCFA/GDCF	—	14.71	16.85	9.71	6.30	7.18*
Private GCFA/GDCF	—	25.38	25.53	21.09	11.06	9.66*
Total GCFA/GDCF	27.23	19.86	21.57	15.02	9.30	8.64
Public GCFA/GCFA	—	38.72	34.88	32.98	23.96	20.41*
Private GCFA/GCFA	—	61.28	65.12	67.02	76.04	79.59*
GDPA/GDP	53.58	45.61	40.83	35.04	28.40	20.89
GCF/GDP	13.31	18.27	21.06	22.10	25.38	30.53
GCFA/GDPA	6.66	7.98	11.23	9.36	8.29	12.37
GCF agriculture/GCFA	96.47	95.46	96.34	94.15	89.83	84.98
GCF forestry/GCFA	1.05	2.19	1.60	3.21	3.03	1.85
GCF fishing/GCFA	2.48	2.35	2.06	2.64	7.15	13.17
GCF forestry-fishery/GCFA	3.53	4.54	3.66	5.85	10.17	15.02
GDP agriculture/GDPA	88.84	88.56	88.77	91.27	91.57	91.45
GDP forestry-fishing/GDPA	11.16	11.44	11.23	8.73	8.43	8.55

Note: *up to 2006-07

almost ₹ 279 billion in 2007-08. However, one may note that whichever way public GCFA is defined, its share in the total GCFA has plummeted from 63.5 per cent in 1980-81 to 23.8 per cent in 2002-03 and thereafter risen to 35.0 percent.

The share of GCFA in relation to gross domestic capital formation in the whole economy (GDCF) and gross domestic product in agriculture and allied activities (GDPA) has been shown in Table 1 and depicted in Figure 3. The share of GCFA in GDCF was about 14.5 per cent during 1960-61 to 1969-70, touched a peak of 16.8 per cent in the subsequent decade, fell thereafter touching a trough of 6.3 per cent in 1990s and then rose slightly to 7.2 per cent during 2000-01 to 2006-07. The fall in share was relatively more in the private (from 25 to 9 %) than the public (from 14 to 7 %) sector. Similarly, in relation to GDPA, the share of GCFA has almost doubled, from 6 per cent during the 1960s to 12 per cent during 2000s, i.e. the increase in farm income was ploughed back for investment.

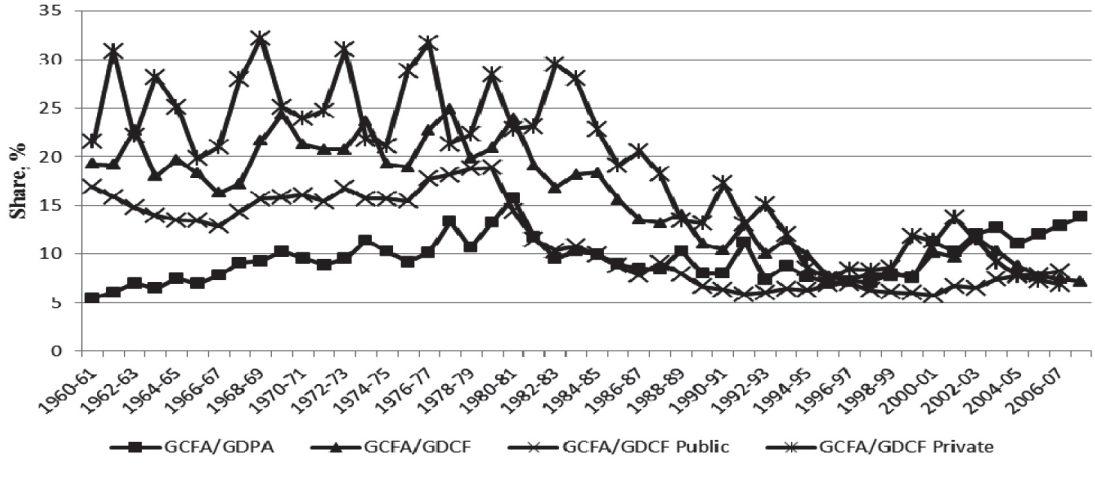

Figure 3. Percentage share of GCFA in GDPA and GCFA in GDCF

An important point to notice is that the share of both GCFA in overall GDCF and GDPA in overall GDP has been falling, implying that agriculture is perpetually losing out to the rest of the economy. However, a fall in the share of GCFA in GDCF from 19.9 per cent to 9.3 per cent, which was much faster than that of GDPA in GDP from 45.6 per cent to 28.4 per cent during 1960 to 1999, had become almost the same during the 2000s. The share of GCFA in GDCF is almost the same during 2000-07, at 8.64 per cent, which is attributed mainly to a perceptible increase in the public GCFA. Another striking aspect is that out of the total farm investment, it is the share of 'agriculture proper' that has declined from 96.57 percent to 84.98 percent, while that of forestry and fishing has risen fast from 3.5 per cent to 15.0 per cent respectively. Possibly, the unchanged shares of GCFA in GDCF and of GCF forestry-fishing in the total GCFA are indicative of alterations in the sources of agricultural growth from crops to allied activities.

As regards the annual rate of growth in GCFA, it is found to be high between 5 and 8 per cent during the 1970s, fell significantly to -2.60 per cent and 0.83 per cent during the 1980s, somewhat recovered to 3 per cent during the 1990s and became significantly higher thereafter at 13.96 per cent and 4.30 per cent, respectively (Table 2). Within the agriculture and allied sector, a relatively higher rate of growth in the private GCFA has been identified in 'agriculture proper' and fisheries compared to that in the forestry. It is for the first time in the past fifty years that the rate of growth in public GCFA in 'agriculture proper', estimated to be 11.48 per cent, is more than that of private GCFA at 9.71 per cent. If the period is bifurcated into pre- and post-liberalization periods, then the rate of growth in the private GCFA has certainly gone up from 1991. However, the same in public GCFA, which has always been lower than that of the private GCFA, has exceeded it only during the 2000s. The rate of growth in income has remained at the same level (between 3.0 and 3.3 % annually) in 'agriculture proper' compared to an impressive increase in it in the forestry-fisheries between 1.79 and 2.99 per cent per annum during the period 1980 to 2008.

Inter-state Trends and Magnitudes of Private and Public GCFA: 1980-81 to 2005-06

The magnitude of GCFA and its bifurcation into private and public sectors across major states in two time periods, viz. 1980-81 to 1990-91 and 1999-00 to 2005-06, have been presented in Table 3. During 1980-91, out of eleven states for which private GCFA estimates are available, the highest average investment was in Maharashtra, Madhya Pradesh, and Punjab, each at around ₹ 11 billion. The lowest average private GFCFA was in Odisha, Kerala and Tamil Nadu each at nearly ₹ 4 billion. The same in public account was the highest in Maharashtra (₹ 10 billion) and Madhya Pradesh (₹ 7 billion) and minimum in Kerala, Punjab and Haryana, each at around ₹ 2 billion. The scenario changed during 1999-2006 as both public and private GCFA increased manifold, from ₹ 50 billion to ₹ 166 billion and from ₹ 125 billion to 340 billion, respectively.

The public GCFA in irrigation (GCFA1) was higher in the states of Maharashtra, Karnataka, Gujarat, Andhra Pradesh and Uttar Pradesh. Even if public investment is broadened to include investment in agriculture (GCFA2) and relevant power (GCFA3), it shows an increase in all the states during 1999-2006, showing it to be the highest in Andhra Pradesh (₹ 18-22 billion), followed by Gujarat (₹ 11 - 15 billion), Bihar (₹. 5 - 8 billion), Madhya Pradesh (₹ 10-15 billion), Maharashtra (₹ 28-42 billion), and Uttar Pradesh (₹ 8-17 billion).

The share of private GFCFA in the total GCFA is much higher (more than 70%) than that of the public GCFA in Gujarat, Maharashtra, Tamil Nadu, Uttar Pradesh, Rajasthan and Haryana. The only exceptional states where public GCFA share was more than the private were Odisha in the 1980s, and Bihar and Karnataka during the 2000s. The states such as Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Kerala, Odisha and West Bengal having low level of public GCFA have also been found to have lesser private GFCFA. Most of these states though agriculturally-dominant, have a larger proportion of people below poverty line. The only exceptions are Punjab, Himachal Pradesh and Haryana where incidence of poverty is relatively less.

The states also differ significantly in terms of capital intensity. The investment intensity on public account (in irrigation) was the highest in Kerala and Odisha, followed by Andhra Pradesh and Haryana during the first period. During the second period, Andhra Pradesh, Gujarat, Karnataka, Maharashtra, and

Table 2. Trend growth rate in capital formation and gross domestic product in agriculture and allied activities at 1999-2000 prices

Agriculture and subsectors	1950-51 to 1959-60	1960-61 to 1969-70	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08
			GFCF			
Agriculture & allied sector	4.38	7.08	4.84	-0.30	2.46	6.53
Agriculture	4.20	7.03	4.83	-0.77	1.55	6.61
Forestry	15.54	4.05	6.79	2.69	0.89	0.98
Fisheries	5.77	11.89	3.47	12.63	14.12	6.88
			Change in stocks			
Agriculture & allied sector	—	12.59	20.20	0.54	15.81	13.07
Agriculture	—	12.59	20.20	0.51	16.08	12.67
			GCFA = GFCF + Change in stocks			
Agriculture & allied sector	4.60	7.14	6.60	-0.26	3.01	6.84
Agriculture	4.44	7.10	6.66	-0.71	2.21	6.95
Forestry	15.54	4.05	6.79	2.76	0.82	1.86
Fisheries	5.77	11.89	3.47	12.63	14.12	6.88
			GCFA Public sector			
Agriculture & allied sector	—	2.46	8.59	-2.60	2.74	13.96*
Agriculture	—	2.38	8.67	-3.11	2.68	11.48
Forestry	—	3.86	7.04	3.95	3.26	-0.53
Fisheries	—	—	—	—	—	—
			GCFA Private sector			
Agriculture & allied sector	—	9.91	5.50	0.83	3.06	4.30*
Agriculture	—	9.85	5.56	0.37	2.08	9.71
Forestry	—	7.45	3.07	-0.52	-11.68	—
Fisheries	—	11.89	3.47	12.68	14.13	6.87
GDP at factor cost	3.62	3.23	3.39	5.04	5.87	7.51
GDPA & allied sector	2.68	1.50	1.72	2.93	3.28	3.10
Only agriculture	2.89	1.26	1.92	3.04	3.31	3.17
Forestry-fisheries	1.03	3.30	0.09	1.79	2.99	2.36

Source: Statistical Abstract of India, RBI and National Accounts Statistics, CSO. * up to 2006-07

'other states' were ahead of other states. The same on private account was the highest in Haryana, Kerala and Punjab at more than ₹ 1000/ha during the 1980s. In the subsequent period, Haryana, Himachal Pradesh, and Kerala showed the highest private GFCFA, at around ₹ 7000/ha, followed by Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Gujarat and other states at ₹ 3000/ha. The total capital intensity has been quite low in Assam, Bihar, Madhya Pradesh, West Bengal, Odisha, Karnataka, Rajasthan and Uttar Pradesh, ranging between ₹ 980/ha and ₹ 3570/ha. These states have higher incidence of rural poverty, which again reinforce an inverse relationship between capital and poverty. The capital intensity on public and private accounts align with those reported in Roy and Pal (2001) from 1987-1999.

The relative position of farm investment vis-à-vis other economic sectors and its share in the total agricultural income in 2004-05 has been presented in Table 4. The picture appears favourable only in a few states. At the national level, out of total GDFCF in the economy only 6.53 per cent was devoted to agriculture. The states that tended to invest in agriculture above the national average included Rajasthan (19%), Andhra Pradesh, Punjab, Uttar Pradesh (10% each), Gujarat, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Odisha (6.5-8.0% each). The states where

Table 3. State-wise magnitude of private & public GCFA (in billion ₹) and capital intensity (₹/ha) at 1999-00 prices

State	Private GFCFA	Public GCFA1	Public GCFA2	Public GCFA3	Total GFCFA	%Share in GFCFA		Capital intensity
						Private	Public	
Average from 1980-81 to 1990-91								
Andhra Pradesh	6.98	6.71	8.16	8.93	13.69	51.00	49.00	1260
Gujarat	6.47	5.57	7.65	8.80	12.04	53.71	46.29	2470
Haryana	6.34	2.48	3.36	4.62	8.83	71.88	28.12	1040
Karnataka	5.97	4.89	5.93	6.99	10.86	55.00	45.00	2760
Kerala	4.09	1.98	2.68	2.70	6.07	67.41	32.59	1000
Madhya Pradesh	11.83	7.33	10.05	10.43	19.16	89.95	38.25	1250
Maharashtra	12.46	10.15	14.87	16.22	22.61	55.10	44.90	1270
Odisha	3.40	4.45	5.50	5.54	7.85	43.28	56.72	2960
Punjab	10.22	2.20	3.13	6.08	12.42	82.28	17.72	680
Rajasthan	6.61	4.00	4.84	5.70	10.62	62.29	37.71	990
Tamil Nadu	4.47	1.09	3.23	4.63	5.55	80.45	19.55	1670
India	166.6	71.08	106.60	126.90	237.60	70.09	29.91	1838
11 states	78.84	50.85	69.40	80.63	129.70	61.00	39.00	—
Average from 1999-00 to 2005-06								
Andhra Pradesh	23.15	18.43	19.35	22.51	41.58	55.68	44.32	4010
Assam	1.59	1.14	1.28	1.31	2.73	58.29	41.71	980
Bihar	3.15	5.07	5.42	8.45	8.22	38.30	61.70	1100
Gujarat	29.54	11.40	12.92	15.21	40.94	72.16	27.84	4220
Haryana	24.76	2.81	1.97	4.02	27.57	89.79	10.21	7820
Himachal Pradesh	4.41	0.54	0.74	0.74	4.95	89.10	10.90	9050
Jammu & Kashmir	2.26	0.73	2.23	2.47	2.98	75.68	24.32	4010
Karnataka	15.78	17.05	17.37	17.77	32.84	48.07	51.93	3220
Kerala	11.60	1.42	2.04	2.08	13.02	89.08	10.92	5940
Madhya Pradesh	12.85	10.14	10.98	15.36	23.00	55.89	44.11	1210
Maharashtra	46.07	28.97	40.08	42.35	75.04	61.39	38.61	4270
Odisha	7.83	4.20	4.73	4.81	12.03	65.08	34.92	2070
Punjab	20.46	2.91	4.42	5.07	23.36	87.55	12.45	5500
Rajasthan	48.72	5.24	6.19	7.86	53.95	90.29	9.71	3450
Tamil Nadu	16.73	2.61	5.18	5.07	19.34	86.51	13.49	3820
Uttar Pradesh	54.52	8.05	14.03	17.20	62.57	87.13	12.87	3570
West Bengal	5.50	1.72	2.06	2.96	7.22	76.13	23.87	1330
Other States	11.73	3.13	4.57	5.37	14.86	78.96	21.04	6620
India	340.6	125.60	156.50	193.10	466.30	73.05	26.95	3936

Note: Total GFCFA is private and public GCFA1 and capital intensity is GCFA1/NSA.
Source : NAS, CSO and State Finances, RBI.

public GCFA share in total public GDFCF was high included Andhra Pradesh (27 %), Karnataka (23%), Madhya Pradesh (14 %) and Rajasthan (13%). The share in Maharashtra, Odisha, Bihar and Gujarat was between 8 and 10 per cent. The states other than these, devoted relatively less funds towards agriculture.

On private account, Rajasthan is the only state where GFCFA share in total capital formation was the highest at 21 per cent. In most of the states, viz. Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Odisha, Punjab and Uttar Pradesh, private GCFA constituted 6-11 per cent share in total capital

Table 4. Percentage share of GFCFA in GFCF, GFCFA in SDPA and GFCF in SDP and marginal efficiency of investment (MEI)

State	GFCFA/GFCF			GFCFA/ SDPA	GFCF/ SDP	MEI 1980-91	MEI 1999-06
	Public	Private	Total				
Andhra Pradesh	27.3	6.58	10.33	10.49	29.51	0.48	0.34
Assam	1.38	3.8	2.29	1.59	22.99	—	0.88
Bihar	8.94	3.95	5.13	4.27	18.57	—	0.34
Gujarat	8.91	7.10	7.30	16.9	45.05	0.36	0.54
Haryana	4.84	9.8	8.97	14.59	43.12	0.60	0.14
Himachal Pradesh	1.88	9.6	6.77	11.12	46.83	—	0.56
Jammu & Kashmir	2.59	8.89	4.87	5.97	43.39	—	0.64
Karnataka	23.13	3.50	6.70	12.84	43.90	0.40	-0.25
Kerala	0.73	3.83	3.48	6.72	39.72	0.33	0.27
Madhya Pradesh	14.5	5.86	8.28	14.14	36.17	0.24	0.20
Maharashtra	9.39	4.85	5.42	14.76	40.40	0.40	0.11
Odisha	10.26	8.55	8.72	8.66	28.89	0.33	0.35
Punjab	4.75	10.88	9.79	7.62	29.5	0.65	0.22
Rajasthan	13.31	21.15	19.42	18.73	32.31	1.14	0.26
Tamil Nadu	2.43	2.37	2.34	8.56	53.08	1.05	-0.25
Uttar Pradesh	5.62	11.79	10.01	10.48	32.65	—	0.11
West Bengal	1.59	1.79	1.69	1.42	23.74	—	1.41
Other states	1.07	0.67	0.73	0.87	15.57	—	-0.45
India	8.58	6.26	6.53	9.49	33.02	0.56	0.46

Note: The percentage share relates to 2004-05. MEI = 1/ICOR and ICOR was estimated using three years moving averages of GCFA (public+private) and SDPA in each period at 1999-2000 prices.

formation. Indeed, these states ploughed back to agriculture the maximum amount of income for investment, as shown by the share of GFCFA in SDPA. The share of agricultural investment in total agriculture income was low, varying between 0.87 per cent and 18.7 per cent compared to a relatively high share of total investment in the state income (GFCF/SDP) between 15 per cent and 50 per cent. At the national level, the share of GFCFA in GDPA stood at 9.5 per cent against the share of total investment in the economy in total income (GDFCF/GDP) at 33.0 per cent.

Another disquieting feature is the low efficiency of investment despite surge in both public and private GCFA during 1999-2006. Only in two states — Gujarat and Odisha — the estimated incremental capital output ratio (ICOR) has decreased, which indicates an increase in the marginal efficiency of investment (MEI). At the aggregate level too, the capital efficiency has declined from 0.56 during 1980-1991 to 0.46 during 1999-2006, which could be due to low growth in GDPA. Among states, capital-use efficiency has been relatively high in Assam, Himachal Pradesh, Jammu & Kashmir and West Bengal.

To sum-up, the state level scenario on the private GCFA is diffused during the 1980s and somewhat clearer during 2000s due to availabilty of data for each state. The percentage increase in GCFA (public and private) is the highest in Rajasthan by 400 per cent during 1999-00 to 2005-06 over 1980-81 to 1990-91, followed by Maharashtra, Tamil Nadu and Gujarat at almost 240 per cent, and then Andhra Pradesh, Haryana and Karnataka at 200 per cent. The inter-state disparities, estimated using coefficient of variation have considerably reduced in private GFCFA (from 13.5% to 8.5%) over time. However, disparities have risen in public GCFA from 7.9 per cent in the pre-reform period to 33.2 per cent in the post-reform period. The differences in public GCFA have decreased only in a few states, viz. Haryana, Himachal Pradesh, Uttar

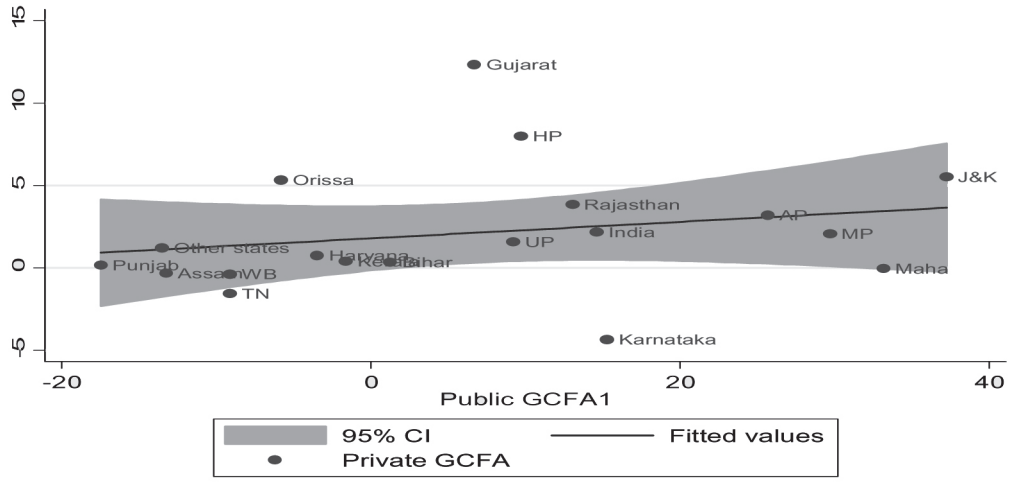

Figure 4. Annual rate of growth in private GCFA and public GCFA1 during 1999-06

Pradesh and Kerala and have remained unchanged in Odisha, Tamil Nadu and West Bengal. This indicates that the allocation of funds to broad economic sectors has varied considerably across the states.

The rate of growth in both public and private GCFA has accelerated in the post-reform period mostly in the middle income states. As shown in Figure 5, the states of Gujarat, Rajasthan, Andhra Pradesh, Himachal Pradesh and Jammu & Kashmir are much ahead of others in the private GCFA. Assam, Odisha, Bihar, West Bengal, Uttar Pradesh and Haryana are lagging behind in the public GCFA growth (irrigation). Bihar and Tamil Nadu have put in more expenditure on agriculture and power compared to irrigation as public GCFA3 shows more than 5 per cent per annum growth. Odisha has witnessed high growth in private GCFA compared to negative growth in public GCFA. However, correlation between public and private investment growth is positive but low in both the periods, which is perceptible as some states, viz. Odisha, Gujarat, Himachal Pradesh and Karnataka, lie outside the confidence interval (CI), as shown in Figure 4.

At the same time, public and private GCFA together are positively correlated with SDPA (r = 0.48) in the post-liberalization period, which confirms that output growth is driven by investment in agriculture. The annual rates of growth in GCFA and SDPA, plotted in Figure 5, depict majority of the states to be clustered inside the confidence interval. In the recent period, Bihar, Kerala, Assam, Karnataka, Uttar Pradesh and West Bengal had the lowest rate of growth in income. The high-growth states included Rajasthan, Madhya Pradesh, Gujarat, Himachal Pradesh, Karnataka and 'other states' that also happened to lie outside the CI. Gujarat and Rajasthan which had observed negative growth in investment and SDPA during the first period, have witnessed remarkable growth in the second period, exceeding 3 per cent and 5 per cent, respectively. It is important to note that an increase in investment has enabled most of these states to maintain a high growth momentum between 4 and 6 per cent till now. Among all states, Gujarat and Chattisgarh are on the top having annual SDP growth at 11.5 per cent and 6.1 per cent, respectively during 2000-2009. Bihar, Odisha and Tamil Nadu have also set an example due to their spectacular performance in the latter half of the preceeding decade compared to that in the first half. Despite such improvement, capital-use efficiency has declined in almost all the states, which needs to be looked into.

Inter-state Differentials in Public and Private GCFA and SDPA

Both public and private GCFA have increased in many states, which in turn, are expected to influence agricultural growth. Accordingly, the following equations were estimated:

Public GCFA = f (Size of government spending, loans from centre, net market borrowings, surplus/deficit on revenue account, input subsidy, foodgrain shortages, growth deficit) …(1)

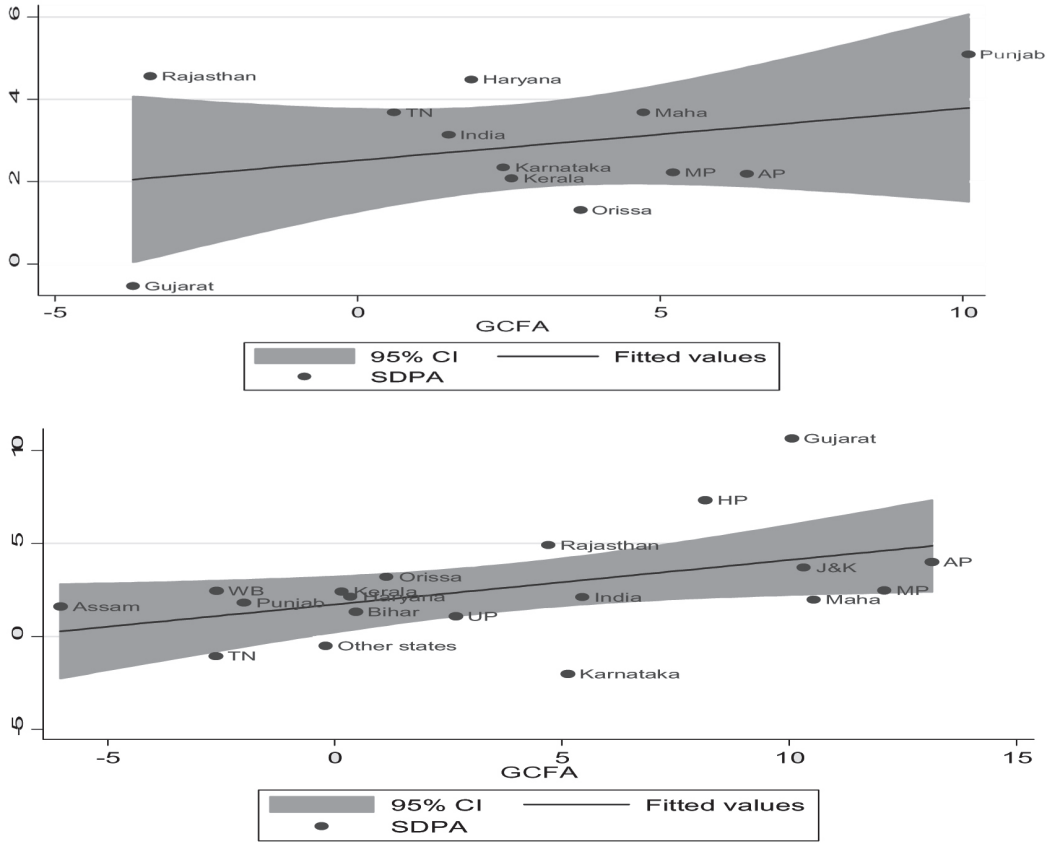

Figure 5. Annual rate of growth in GCFA and SDPA during (a) 1980-91 and (b) 1999-06

Private GCFA = f (Public GCFA, terms of trade, institutional credit, public infrastructure, crop diversification, industrial demand for raw material) …(2)

SDPA = f(GCFA {public+private}, lagged terms of trade, institutional credit, NSA, NIA/NSA) …(3)

Equation (1) suggests that public GCFA is influenced by the factors originating from both supply and demand sides such as savings with the government, food security and other pressing issues that confront agricultural growth. Accordingly, it is taken to depend on the size of public spending, i.e. total revenue and capital expenditure per SDP, input subsidy, availability of funds through loans from the central government and net borrowings from market, savings on revenue account. Demand side factors may include population pressure and food shortages, deceleration in crop and land productivity, etc. These may put pressure on the state government to address growth deficit in agriculture and hence push investment. The proxy variables used are: (a) share of wheat and paddy/rice procurement in total production of these two crops. An increase in the procurement of cereals indicates preference and/or compulsion on the part of the government to allocate more funds towards agriculture, (b) net irrigated area as proportion to net sown area (NIA/NSA), and (c) land productivity (NSDPA/NSA).

Equation (2) exhibits private investment behaviour to be determined by public GCFA, terms of trade (TOT), institutional credit by regional rural banks, commercial banks and primary agricultural cooperative societies, public expenditure on infrastructure — denoted by capital expenditure on roads and bridges, crop diversification taken to be the share of value of non-foodgrains in total value of output, and industrial demand for raw material. The latter variable was proxied by gross value added per food factory and was taken to test the argument that farmers may be diversifying towards high-value crops due to better

returns, growing demand for fruit & vegetables for direct consumption and value addition/processing. These might have incited them to undertake investments.

A closer look at the share of major crops in the total value of agricultural output at all-India level indicates diversification, *albeit* mildly towards fruits & vegetables and livestock activities from 1980s and perceptibly in some states during the previous decade. The state-wise scenario is depicted in Annexure Table 1 based on TE 1993-94 and TE 2007-08. It reveals an increase in the share of fruits & vegetables in the total value of agricultural output in Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal; of cereals in Haryana, Punjab and Rajasthan; of pulses in Madhya Pradesh and other states; of oilseeds in Madhya Pradesh, of sugar in Gujarat, Haryana, Karnataka, Maharashtra, Tamil Nadu, and other states; and of spices in Assam, Gujarat, Himachal Pradesh, Jammu & Kashmir, Karnataka and Tamil Nadu. Many states have witnessed an increase in the share of value of livestock and forestry-fishery in total. But, it has fallen in Assam, Himachal Pradesh, Jammu & Kashmir, Kerala, Maharashtra and West Bengal. Interestingly, states other than the major states are making headway in many crops, especially cereals.

As regards the role of agro-processing in explaining the behaviour of private GCFA, it is based on the fact that land and labour productivity in agriculture are highly correlated with industrial productivity (r = 0.66). Such bidirectional linkages between agriculture and industry for labour and raw materials are expected to stimulate investment and growth in both the sectors (Mitra *et al*., 2002; Banga and Bathla, 2012). The organized food industry is reported to have come up in several agriculturally- dominant and poor states from 1985 to 2009, which may be due location advantage and agglomeration economies. The states of Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Maharashtra, Odisha, Punjab, Rajasthan, and West Bengal have also shown a high rate of growth in the total factor productivity (Bathla, 2012). Finally, Equation (3) shows that SDPA is determined by the investment (public and private GCFA together), lagged TOT, net sown area and institutional farm credit.

Each equation was analysed using fixed and random effect models, separately for two time periods, viz. 1980-81 to 1999-91 and 1999-00 to 2005-06. The choice between the models was based on Hausman test, which verifies the use of random effect. The selected variables were specified at 1999-00 prices. In Equation (2), the subsidy variable was excluded when revenue surplus/deficit was specified. It was because surplus/deficit on revenue account given in the state finances accounts for the expenditure on subsidy. The state-wise terms of trade index (TOT) was constructed using SDP in agriculture at the current and constant prices divided by SDP in non-agriculture at the current and constant prices. The input subsidy was represented by fertilizer, irrigation and power. The central government estimates on fertilizer subsidy were apportioned to states based on per unit cost multiplied by fertilizer consumption. Irrigation subsidy was estimated using data from the Finance Accounts as the difference between the total operation and maintenance (O&M) costs and revenues from irrigation sector. The power subsidy to agriculture was the total electricity consumption in agriculture multiplied by unit subsidy for agriculture.

Panel Data Estimates during Pre- and Post-reform Periods

The empirical results estimated from 1980 to 1991 for 11 states and then from 1999 to 2006 for 18 states (17 major states and 'other states' clubbed together) are furnished for public GCFA and private GCFA in Tables 5 and 6, respectively. Separate equations were specified to address the problem of multicollinearity among the explanatory variables. The results show that public GCFA3 was determined positively by the size of public spending, loans from the centre and negatively by the market borrowings during the pre-reform period. The same became reverse in the post-reform period, perhaps due to lesser advances by the central government to the states. The value of coefficient of net market borrowings during 1999-06 is 0.20, which implies that a one-rupee increase in it by the state governments has increased farm investment by ₹ 0.20. The elasticity calculated at the mean value of net borrowings is also low at 0.25.

The coefficient of saving on revenue account had a negative sign but turned out to be insignificant. In most of the states, data on surplus/deficit on revenue account was negative during the early-1980s, followed

Table 5. Factors explaining inter-state differentials in public GCFA during pre- and post-reform periods based on random effect model

Dependent variable: Public GCFA

Variable	Pre-reform period (1980-1991)		Post-reform period (1999-06)	
	I	II	I	II
Size of government spending	0.076*	0.104*	0.047	0.215
	(0.25)	(0.34)	(0.11)	(0.51)
Net market borrowings	-0.145	-0.22**	0.201*	0.108
	(-0.039)	(-0.06)	(0.25)	(0.14)
Loans from the centre	0.139*	0.081*	-0.085	-0.15***
	(0.16)	(0.095)	(-0.022)	(-0.04)
Saving/Deficit	-0.47	-	-0.07**	-
	(-0.075)		(-0.20)	
Input subsidy/ha	-	-0.0000009	-	-0.00008**
		(-0.003)		(-0.44)
Foodgrains procured/production	0.037***	0.046**	-0.055	-
	(0.055)	(0.069)	(-0.07)	
Net irrigated area/ha	-0.002	-0.0021	-0.013	-0.014
	(-0.01)	(-0.012)	(-0.05)	(0.063)
Constant	3.78	3.88	10.07	8.89
No. of observations	198	198	126	126
R^2	0.10	0.09	0.13	0.20
Sigma_u	1.55	2.44	8.33	7.71
Sigma_e	1.36	1.37	6.25	6.53
Rho	0.56	0.78	0.64	0.58

Notes: Public GCFA is based on three year moving averages and on cumulative basis. The results are same.
* , ** and *** indicate statistical significance at 1 per cent, 5 per cent and 10 per cent levels, respectively.
Figures within the parentheses are average elasticity.

by positive entries in the subsequent period throughout, except in Jammu & Kashmir. A negative sign in the data denotes revenue surplus, i.e. saving, whereas a positive entry indicates revenue deficit, i.e. dissaving, which has increased tremendously in each state during 2000s. Accordingly, the expected sign of this variable was positive, which means a reduction in government deficit (dis-saving) on revenue account would result into an increase in the public GCFA. However, a negative value of the coefficient obtained implies that an increase in the state government deficit on revenue account may not affect public investment. As indicated by Dhawan (1998), a lower coefficient for revenue deficit may also suggest that even if government deficit is reduced via subsidies, salaries, and non-plan and other expenditures, it may contribute little towards increase in financing of irrigation, agriculture and power projects. In a similar vein, a few studies have indicated a negative and significant impact of input subsidy on the public GCFA. The results obtained negate this finding in the pre-reform period, which suggests that an increase in the input subsidy on account of power, irrigation and fertilizer had not resulted into a significant decline in agri-investment by the state governments. However, the same does not hold true in the subsequent period as the value of coefficient is negative and significant (elasticity= 0.44), probably due to increase in the magnitude of subsidy over time.

Finally, the policy variable, viz. cereals procurement as proportion to production appears to have exerted relatively strong influence on variations in agricultural investment only during the pre-reform period. The other variable that was taken to represent growth deficit bore the expected negative sign in influencing public GCFA, but turned out to be statistically insignificant. Foodgrains procurement and NIA/NSA were not fully able to capture the policy factors, may be due to the large regional variations in

these variables. The coefficient of multiple determination R^2 was also low at approximately 0.13.

As regards the behaviour of private GCFA, results tend to be similar during the pre- and post-reform periods. Public GCFA3, institutional credit and raw material demand by food industry have depicted positive and significant impacts on the private GCFA (Table 6). The average elasticity was the highest for credit (0.34), followed by industrial demand (0.16) and public GCFA (0.13 and 0.04). The latter validates the 'crowding in' effect of public GCFA on private GCFA, as argued in the literature. A positive and significant influence of food processing on the private investment in agriculture is in conformity with the economic theory and empirical findings on positive agri-industry linkages mentioned above.

The public investment in road-bridges infrastructure had a positive bearing on the private GCFA during 1980-91, which became insignificant in the subsequent period. As envisaged in the literature, crop diversification did not turn out to be significant and hence was dropped from the equation. The role of market in changing the incentive structure in favour of agriculture, captured through TOT was negative and insignificant. It is possible as agriculture prices showed an upward trend till the early-1990s, which then deteriorated during late-1990s to 2004-05. This might have acted as a deterrent in inducing farmers to invest (Chand and Parappurathu, 2012).

The effect of public and private GCFA on income was positive and significant showing an average elasticity of 0.08 for pre-reforms and 0.24 for post-reforms periods. It suggests that a 10 per cent increase in the capital formation in agriculture led to an increase in income by nearly 1 per cent in the pre-reform period and 2.4 per cent in the post-reform period. Even when GCFA in financial terms was replaced by a variable in physical terms, viz. NIA/NSA, it positively determined

Table 6. Factors explaining inter-state differentials in private GCFA and SDPA during pre- and post-reform periods based on random effect model

Dependent variable: Private GCFA					Dependent variable: SDPA			
Variable	Pre-reform period (1980-1991)		Post-reform period (1999-06)		Variable	Pre-reform period (1980-1991)	Post-reform period (1999-06)	
	I	II	I	II		I	I	II
Public GCFA	0.19**	0.16**	0.022**	-	GCFA	1.71*	2.44*	-
	(0.13)	(0.11)	(0.04)		(public + private)	(0.081)	(0.24)	
Terms of trade	0.03	-0.013	-0.15**	-0.154***	Terms of	0.40**	1.31	0.92
	(0.39)	(-0.17)	(-0.75)	(-0.78)	trade (-1)	(0.21)	(0.47)	(0.33)
Institutional credit	-	0.090*	-	0.021***	Institutional	0.003*	-	0.16***
		(0.34)		(0.11)	credit/NSA	(0.074)		(0.028)
Industrial demand	0.029***	-	0.035**	0.036**	NSA	4.67*	9.8*	15.92*
for raw materials	(0.16)		(0.15)	(0.16)		(0.21)	(0.29)	(0.48)
Public infrastructure	0.51	0.82***	0.58	-	NIA/NSA	-	1.37**	1.86*
	(0.06)	(0.12)	(0.01)				(0.24)	(0.32)
Constant	7.61	3.60	29.55	29.95	Constant	-21.06	-70.71	-52.74
No. of observations	121	121	126	126	No. of observations	110	108	108
R^2	0.38	0.34	0.34	0.34	R^2	0.42	0.55	0.59
Sigma_u	1.46	1.70	13.17	12.5	Sigma_u	23.61	101.8	98.37
Sigma_e	2.25	2.10	3.21	3.21	Sigma_e	12.31	40.86	44.19
Rho	0.25	0.39	0.94	0.93	Rho	0.79	0.80	0.83

Notes: Public infrastructure is based on moving averages.
* , ** and *** indicate statistical significance at 1 per cent, 5 per cent and 10 per cent levels, respectively.
Figures within the parentheses are average elasticity.

SDPA with a high value of average elasticity at 0.32. The terms of trade turned out to be a significant factor in influencing SDPA during the 1980s compared to that during 2000s. The institutional credit and NSA positively and significantly explained the interstate variations in SDPA.

Conclusions and Policy Implications

A perceptible increase in the rate of growth in both public and private capital formation in agriculture during 2000s has not transpired into the desired growth and has become a cause of concern. Given that public and private investments and agricultural growth are positively inter-linked and have strong implications for public policy on resource allocation and reduction in poverty, this study has examined this aspect at the dis-aggregate state level. This has been done by mapping the trends and behaviour of public and private gross capital formation in agriculture (GCFA), estimating efficiency of capital on both accounts and empirically analyzing the factors that explain inter-state differentials in public and private GCFA and their impact on agricultural growth. The analysis has been undertaken from 1980-81 to 2005-06, bifurcating into pre-reform period from 1980 to 1991 pertaining to eleven states and post-reform period from 1999-2006 for seventeen major states and 'other states'.

The study has observed large variations in the magnitude of public and private GCFA across states over the period. The highest private GCFA has been in Uttar Pradesh, Rajasthan and Maharashtra and public GCFA in Maharashtra, Andhra Pradesh and Karnataka during 1999-2006. Taking both investments together, Andhra Pradesh, Maharashtra, Gujarat, Madhya Pradesh, Rajasthan, Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh and Karnataka are the leading states that have witnessed relatively higher and faster rate of growth in farm investment and also SDPA over the period. However, despite an upturn in investment and income, none of the states has shown improvement in the efficiency of investment. Only exceptions are Gujarat and Odisha that have shown higher marginal efficiency of investment over time. Assam, Bihar, Jammu & Kashmir, Kerala, Odisha and West Bengal having low level of public GCFA, have also experienced lesser private GFCFA and larger proportion of people below poverty line. Low capital intensity in these states, along with that in Madhya Pradesh, Karnataka, Rajasthan and Uttar Pradesh, is inversely related to the rural poverty ratio, which indicates a key role of farm capital in raising income level in the rural areas.

As has been observed at the national level, the share of private GCFA in total GCFA has been high (more than 70 %) at the state level too. Only exceptional states where the share of public GCFA is more than that of private include Bihar and Karnataka, holding 62 per cent and 52 per cent share, respectively. It is important to note that along with an increase in private GCFA during the post-reform period, inter-state disparities in it have also reduced. At the same time, disparities in public GCFA have gone up considerably, which again suggests a lopsided pattern in the allocation of funds by the respective state governments. Large differences have been observed in the share of investment in income, between 0.87 and 18.7 per cent across the states. This share has been found to be relatively low in comparison to the high share of GCF in SDP (15 - 50 %), which implies that less income is ploughed back into agriculture compared to that in the non-agricultural sector. Consequently, agriculture is losing out to the rest of economy in all the states.

Lastly, inter-state differentials in public and private GCFA and SDPA, analyzed using random effect model, have revealed slight difference in the nature of relationship among the explanatory variables during the pre- and post-reform periods. Availability of funds with the respective state governments, size of public spending and policy structure to sustain agricultural growth have been found to be the key factors that have influenced public GCFA. Input subsidy has negatively affected public investment during 1999 to 2006, indicating a need to trim its size, perhaps by targeting it in the states that need subsidy the most. Regional variations in private GCFA, in turn, are determined by public GCFA, institutional credit, infrastructure and demand for raw material by the food processing industry. The northern and inward states where investment has increased significantly, have also witnessed a higher rate of growth in the number of organized food processing industries, their output and productivity. This may be one of the factors behind the spurt in private GCFA seen during 2000. As expected, crop diversification has not exerted much influence on the private GCFA, perhaps due to its slow pace across the states. The public and private

investments together along with acreage, institutional credit and terms of trade have positively influenced agricultural income.

The findings have broadly indicated that agriculturally-dominant and relatively poor northern and central states of the country have experienced a rapid growth in agricultural investment that has positively affected income and decline in the rural poverty. Their progress is a reflection of the effective public policy in favour of capital deepening in agriculture and also in the organized food industry, and it can be replicated in other states as well. Strong interconnections identified between agriculture and food processing industry also mandate improvements in technology, irrigation and rural infrastructure and better alliances between farmers and food processing industry for a faster growth in agriculture.

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Annexure Table 1: Percentage share of crops across states: TE 1993-94 and TE 2007-08

State	In value of agriculture								In value of agriculture & allied activities			
	Pulses		Cereals		Fruits & vegetables		Other crops		Agriculture		Livestock	
	1993-94	2007-08	1993-94	2007-08	1993-94	2007-08	1993-94	2007-08	1993-94	2007-08	1993-94	2007-08
Andhra Pradesh	3.48	6.61	28.73	30.87	9.69	23.95	58.10	46.39	78.42	55.83	21.58	28.16
Assam	1.01	1.07	30.41	21.56	24.06	38.33	44.52	41.92	82.02	73.84	17.98	11.27
Bihar	4.21	3.56	28.92	40.67	23.14	39.16	43.73	19.28	67.38	56.46	32.62	30.27
Gujarat	4.03	3.19	12.66	13.01	11.27	18.46	72.04	69.32	76.90	66.31	23.10	20.04
Haryana	3.47	0.92	35.1	55.77	2.88	9.23	58.55	35.59	68.41	67.31	31.59	27.61
Himachal Pradesh	0.73	2.22	29.59	26.82	31.03	57.22	38.65	16.90	68.81	51.59	31.19	19.22
Jammu & Kashmir	0.81	0.72	26.48	24.31	27.92	59.31	44.79	17.04	64.05	49.89	35.95	28.26
Karnataka	2.66	6.54	16.82	25.26	22.09	28.11	58.43	46.40	82.05	68.40	17.95	16.85
Kerala	0.18	0.04	7.51	3.60	19.56	22.96	72.75	79.95	72.50	57.84	27.50	20.55
Madhya Pradesh	12.88	16.95	27.56	25.24	6.87	9.20	52.69	55.26	76.11	67.50	23.89	22.61
Maharashtra	5.98	7.78	16.71	15.05	20.46	27.24	56.85	57.97	76.50	67.03	23.50	17.16
Odisha	5.50	3.99	38.33	32.68	27.54	48.58	28.63	15.75	89.36	70.36	10.64	13.46
Punjab	0.48	0.18	48.73	68.06	4.30	7.38	46.49	26.77	73.20	65.60	26.80	30.45
Rajasthan	6.87	8.43	20.38	31.57	1.55	3.15	71.20	62.47	71.41	55.26	28.59	32.81
Tamil Nadu	1.85	1.81	25.37	20.10	15.83	36.39	56.95	46.39	77.02	58.36	22.98	24.57
Uttar Pradesh	6.06	4.86	33.0	41.69	8.43	16.05	52.51	40.57	76.60	67.05	23.40	24.24
West Bengal	0.84	0.75	33.38	30.44	22.38	44.68	43.40	23.55	73.97	63.55	26.03	18.46
Other states	1.52	5.44	24.56	36.25	41.67	39.49	32.25	21.02	81.39	53.11	40.45	21.69
All-India	4.44	4.97	27.39	31.02	13.90	24.84	54.27	43.42	75.51	62.87	24.49	23.02