



Trends of Public and Private Investment in Agriculture in Uttar Pradesh: An Issue of Complementarity

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Abstract

The agrarian economy of Uttar Pradesh continues to grapple with low productivity and lack of proper infrastructure. poor investment and the emerging regional and sectoral inequalities in Uttar Pradesh was highlighted by many scholars. The present study has prepared a time series of capital expenditure in agriculture of state government of Uttar Pradesh including major heads associated with investment 'in' agriculture or investment 'for' agriculture , examines the compositional shifts in capital formation in state agriculture on public account and deals with complementarity issue between public and private investment in agriculture in Uttar Pradesh.

With perceptible decline in public sector investment in agriculture in the state during the decades of 1980s and 1990s, the agrarian economy of Uttar Pradesh continues to struggle with low productivity and lack of proper infrastructure. A negative compound growth rate of gross capital formation of was observed in the state agriculture in the eighties and the nineties. Ratio of public investment in agriculture to net state domestic product in the agriculture of the state at constant prices also declined till 1995-96. Similarly proportion of gross capital formation in agriculture in Uttar Pradesh to net state domestic product at constant prices declined since 1980-81. Public and private investment in agriculture in Uttar Pradesh however shows a clear positive increase after 2000-01. The decline in plan expenditure in its turn can be traced to the sharp deterioration in the fiscal situation in the state of Uttar Pradesh witnessed since early nineties. Due to mounting pressure

of non-developmental expenditure on salaries, pensions and interest payments, the government budgets have been running into continuous and high revenue deficit. Thus the state government is not in the position to raise its expenditure on development plans and other priority sectors like education, health and infrastructure. This fiscal crisis has negative impact on public investment of economy, particularly in agriculture sector.

Key words: Public Capital Formation, Private Capital Formation, agrarian economy of Uttar Pradesh, time series , Composition of Public Investment, complementarity

Introduction

The agrarian economy of Uttar Pradesh continues to grapple with low productivity and lack of proper infrastructure. A lot has been said and discussed about the disparities across the state by several scholars. The concern on poor investment and the emerging regional and sectoral inequalities in Uttar Pradesh was highlighted by some scholars. They expressed concern over the decline in investment and increasing regional disparity in the state and stated that the 'rediscovery' of Uttar Pradesh is needed to bring out it from the level of BIMARU states (Misra 1979; Subbarao 1980; Singh, 1987, 1996). In this study trends in public investment private investment in agriculture in Uttar Pradesh since 1980-81 at current and constant prices (1993-94 prices) have been analyzed enormously.

The paper is divided in to five sections. Section one deals with data sources and methods adopted by the study to prepare time series of capital formation in agriculture in Uttar Pradesh and presents a time series of public investment, including major heads relevant for agriculture, in Uttar Pradesh since 1980-81, at current and constant prices (1993-94 prices). Section two examines the compositional shifts in capital formation in state agriculture on public account. Ratio of public investment in agriculture to NSDPtotal in Uttar Pradesh has been discussed in section three. Section four presents trends of private investment in agriculture in Uttar Pradesh with complementarity issue and section five summarizes the main findings.

1.0. Trends in Public Capital Formation in Agriculture in Uttar Pradesh

This study has built a time series of public investment in agriculture in Uttar Pradesh since 1980-81 for the first time, based on the Finance Accounts of the U.P. Government for various years. As observed by some scholars (Chand 2000, Roy and Pal 2002 etc.) CSO series on public investment does not include investments in several important heads like rural roads, rural electrification, and market, etc. The present study has prepared a time series of capital expenditure in agriculture of state government of Uttar Pradesh including major heads associated with investment 'in' agriculture or investment 'for' agriculture.

1.1. Data Sources and Method

The CSO series of investment does not provide state level estimates of public and private investments corresponding to national estimates (Chand, 2000; Roy and pal, 2001; Gulati and Bathla 2002). Three major attempts have been made to develop broad investment data series at state level. Chand (2000) has developed investment series called broad series using the data available in Financial Accounts of Union and State Governments for 23 years (1974/75 – 1996/97). These series includes capital expenditure in public sector under 23 heads. Roy and Pal (2001) have also developed broad investment series on public investment by considering capital expenditure under 21 heads and 50% of revenue expenditure on rural development and agricultural research and education. Gulati and Bathla (2002) have evaluated the major issues of declining public investment in 1980's, complementarity hypothesis using three concepts of public investment in agriculture viz., concept-I as used by CSO covering basically Government investment in irrigation schemes, and plantations in the forestry sector; concept-II comprising components of concept I plus part of the investment in power sector that goes to agriculture, as estimated by Central Electricity Authority/Planning Commission, concept III comprising components of concept II plus investment in agriculture and allied sectors under 11 items of expenditure (as per budgetary classification) under centrally sponsored schemes.

Various sources were explored by this study to construct a new investment series at the state level that includes investments in all major heads intended for agriculture. It was found that the data published in Finance Accounts of the state of Uttar Pradesh provides comprehensive information on head wise capital expenditure during each year. Thus, this was used as the source of basic data for investment in agriculture in Uttar Pradesh on public account. The time series has been constructed for the period 1980-81 to 2009-10. The series includes capital expenditure in agriculture under 15 major heads. Yearly data on capital expenditure termed as public investment of Uttar Pradesh have been compiled for this period. The study could not include data of capital expenditure on rural electrification and fertilizer industries because in these heads no data has been available in all the finance accounts of Uttar Pradesh government. The series has also been prepared at constant (1993-94) prices by deflating the current price series by implicit price index of construction sector.

1.2. Public Capital Expenditure in Agriculture of Uttar Pradesh

The time series of capital expenditure of Uttar Pradesh government including major heads relevant for agriculture at a constant price (1993-94 prices) shows declining trend since 1980-81 till 1995-96 with small fluctuations (Chart 1).

After 1995-96 it showed a rising trend, but at a very slow rate. After 2000-01 there was a sharp increase in public capital expenditure in agriculture in Uttar Pradesh with a slight fluctuation in 2002-03, mainly on account of increasing expenditure in rural roads and rural development. A large fluctuation can be seen in 2001-02 in the capital expenditure in agriculture on public account in Uttar Pradesh due to huge investment by state government on plantations in *Vriksharopan*

programmes. But public spending for agriculture shows declining trend in the state after 2006-07 whether a larger no. of flagship programmes has been launched by government for rural development in Uttar Pradesh

Chart 1: Public Capital Expenditure in Agriculture in Uttar Pradesh at 1993-94 Prices

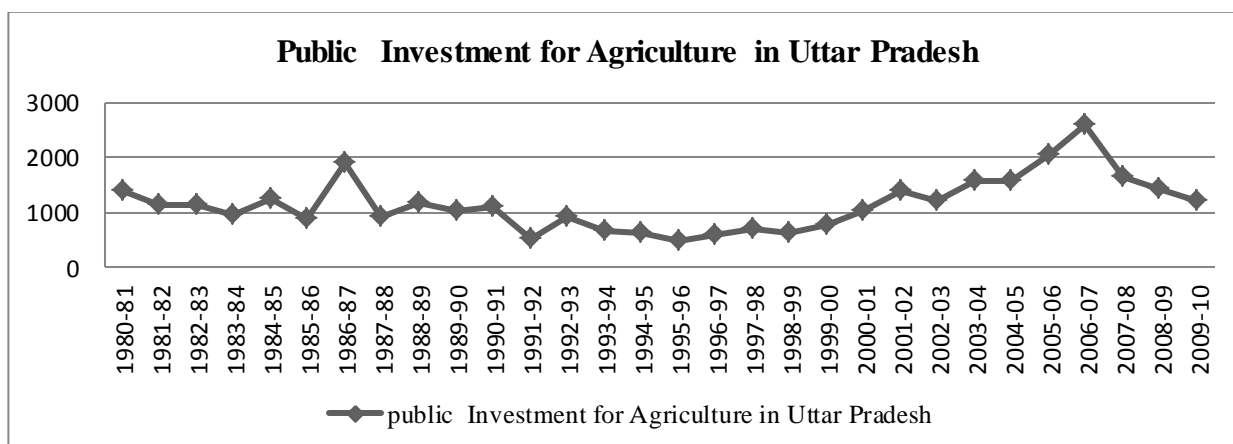


Table .1: Compound Annual Growth Rate of Public Capital Expenditure in Agriculture and NSDPag in Uttar Pradesh at 1993-94 Prices

Periods	GCFup	NSDPag
1980-81 to 1989-90	-1.31	2.50
1990-91 to 1999-00	-3.81	2.36
2000-01 to 2009-10	14.57	1.63
1980-81 to 2009-10	-1.56	2.37

Periods	GCFup
1980-81 to 1998-99	-5.10
1999-00 to 2006-07	15.68
2006-07 to 2009-10	-2.47

A negative compound growth rate of gross capital formation of – 1.31% was observed in the state agriculture in eighties. It further came down to –3.81 % in 1990s persistently. The effect of declining investment is reflected in growth rate of net state domestic product in agriculture of Uttar Pradesh. The annual compound growth rate of net state domestic product in agriculture declined to 2.36% in the nineties from 2.50% in the eighties (Table 1)

There was considerable improvement in the half decade of 2000s. Compound annual growth rate of public capital expenditure in agriculture in Uttar Pradesh at 1993-94 prices was 14.57% during this period. The growth rate of net state domestic product in agriculture further declined to 1.63 % in this period. Declining growth in public capital expenditure in past two decades still has its lag effect on the growth of net state domestic product in agriculture. Compound annual growth rate of public capital expenditure in agriculture in Uttar Pradesh at 1993-94 prices for whole study period was quite low and was only 1.56 %. The growth rate of net state domestic product in agriculture of Uttar Pradesh was 2.37 % during all periods.

2.0 Composition of Public Investment in Agriculture in Uttar Pradesh

Distribution of total capital expenditure on agriculture over important heads at 1993-94 prices is shown in Table.4. Compositional shifts in public investment in agriculture could be examined with the investment series at constant prices developed by the study. For the sake of clarity, data has been grouped in six periods (I-1981-85; II-1986-90; III-1991-95; IV-1996-2000; V-2001-2005 and VI -2006-2010).

The real annual investment in public sector has significantly declined during the I period to IV period. Public investment in irrigation schemes continued to be the most dominant item of capital expenditure in agriculture in the state. Even though there was a decline in annual investment in this item in other periods except the V period. Annual capital expenditure on crop husbandry and agricultural research and education increased and became an important item of capital expenditure during the II period and the V period with Rs. 21.7 crore and Rs. 67.1 crore. Its importance started diminishing subsequently in the other periods. Animal husbandry, dairy development, fishery and forestry & wildlife are found to show declining relative importance till the IV period. Annual expenditure for capital formation in animal husbandry remained below Rs.7.1 crore during all the periods. Annual capital expenditure on rural development and special area programmes increased in all the periods except IV and V respectively. The public investment in special area programme was the third largest item during all the periods.

In I period food storage and ware housing received investment of Rs. 65.1 crore per year at 1993-94 prices. Importance accorded to create infrastructure for this head declined sharply after that period. Annual Public investment in rural roads also continued to increase its importance. Annual public investment in rural roads and turned out to be the second most important item

during all the periods. Agricultural research and education received very little attention but the share is rising in the recent years. In period V annual public investment in all major heads increased significantly except cooperation and dairy development. A substantial amount has been invested in plantation during this period.

Table 2: Head wise Distribution of Annual Capital Expenditure on Agriculture by U.P.Govt. at 1993-94 prices, Rs Crore

Heads	1980-81 to 1984-85	1985-86 to 1989-90	1990-91 to 1994-95	1995-96 to 1999-00	2000-01 to 2005-06	2006-07 to 2009-10
	I	II	III	IV	V	VI
Crop husbandry	2.7	21.7	6.0	5.6	67.1	26.9
Soil and water conservation	0.0	0.8	-2.6	0.0	3.0	2.7
Animal husbandry	3.5	4.3	4.5	2.6	7.1	9.8
Dairy development	10.5	4.7	6.4	4.0	1.4	4.1
Fishery	0.6	-0.3	0.0	0.4	10.1	5.2
Forestry and wildlife	0.0	0.6	0.3	-0.8	21.7	3.7
Plantations	0.0	0.0	0.0	0.0	73.0	52.1
Food storage/warehousing	65.1	-28.2	9.2	-42.3	3.6	6.3
Agricultural research and education	0.0	8.5	2.6	0.0	6.7	2.4
Cooperation	77.5	30.6	25.9	23.1	4.3	1.9
Other Agricultural services	0.0	0.0	0.5	0.0	108.4	0.0
Agriculture and allied activities	159.9	42.7	52.8	-7.4	306.5	115.10
rural development	1.3	16.3	18.3	9.3	162.2	184.2
special area programmes	146.0	149.7	148.4	171.2	123.4	84.3

Irrigation and Flood Control	637.1	555.4	319.6	270.9	563.0	289.5
Rural roads	234.8	238.1	221.9	200.5	483.1	523.1
Total	1179.2	1175.9	761.0	644.6	1638.2	1081.1

Source: compiled and computed from Finance Accounts of Uttar Pradesh Government, Various issues

Likewise, compositional shifts in public investment in agriculture in Uttar Pradesh could also be examined with ratio of different heads to total investment in agriculture at constant prices. During all the periods, irrigation projects with flood control received highest share of total capital expenditure on agriculture. Since 1980-81, irrigation projects with flood control accounted about more than 50% of capital expenditure on agriculture before the reform period. During the reform period this share has declined significantly. The share of rural development programmes increased from a little more than 0.1 % of total public investment to about 1.6 % during 1980s. But during seven years of 2000s it improved considerably. The share of special area programme has also increased continuously till 1999-00. After separation of Uttaranchal from the state, amount spent on this head particularly in hill area programmes became negligible and the ratio has declined. Share of storage and warehousing constituted about 14 % and 11% of total capital expenditure on agriculture during 1980-81 and 1982-83 respectively. It was negative during most of the 1980s and 1990s. In 2000s this ratio was zero and revealed less interest of state government for investment on this head.

Share of rural roads fluctuated during the study period. Ratio of crop husbandry, plantation, animal husbandry, and dairy development to total public capital expenditure in agriculture was very low during the study period. Share of plantation in to the total capital expenditure in agriculture by state government was almost zero till 2000-01. Expenditure on plantation was incurred from revenue account of the government till 2000-01(Finance Accounts of Uttar Pradesh Govt.). After that state government invested a good proportion of capital expenditure under this head.

Table 3: Decadal Compositional Shift of Public Investment in Agriculture (%)

Heads	1980s	1990s	2000s
Crop husbandry	1.15	0.63	4.56
Soil and water conservation	0.04	-0.23	0.19
Animal husbandry	0.38	0.51	0.36
Dairy development	0.68	0.81	0.13
Fisheries	0.02	0.04	0.71
Forestry and wild life	0.02	-0.05	0.97
Plantations	0	0	5.36
Food storage /warehousing	1.17	-5.43	0.24
Agri. research and education	0.41	0.14	0.43
Cooperation	4.78	3.57	0.33
Other Agricultural services	0	0.04	7.46
Agriculture and allied activities	8.64	0.01	20.73
Rural development	0.88	2.07	9.26
Special area prog.	13.77	23.74	6.99
Irrigation and Flood Control	55.01	42.63	34.19
Rural roads	21.71	31.56	28.81
Total	100	100	100

It can also be noticed from the table that the share of public investment in irrigation in Uttar Pradesh was declined after 1992-93. It was again reduced after 2000-01. While the share of capital expenditure into total capital expenditure in agriculture on rural development increased considerably. The most important item of capital expenditure in agriculture is irrigation. Hence, any decline in public investment refers basically to declining public investment in major and medium irrigation schemes. Analysis of compositional shifts in public capital expenditure in agriculture with

investment series suggests that investment in irrigation schemes, and flood control would form around 50% of the total investment in the 1980s. Even though the irrigation schemes continued to enjoy dominant share in public investment, its share came down from more than 55% during eighties to 42.63% during nineties and 34.19% in 2000s (Table 3).

Capital expenditure on rural roads was the next important item. Public investment by state government in rural roads continued to maintain its importance over the years. The rural development programmes have experienced hike in their share in 1990s but special area programmes lost its significance and showed declining trends in its ratio after 2001 due to separation of Uttaranchal from the state. Analysis of compositional shifts in public capital expenditure in agriculture and allied activities showed that direct investment in agriculture was very low in 1980s and 1990s. It has declined in 1990s from 1980s, though the ratio has increased significantly in 2000s. It can also be noticed that agricultural research & education and food storage & warehousing has remained neglected over the years.

3. Ratio of Public Investment in Agriculture to NSDP_{total} in Uttar Pradesh

Proportion of Gross capital formation in agriculture in Uttar Pradesh to Net State Domestic Product of the state at constant prices (1993-94 prices) is demonstrated in Table 8. and chart 4. The ratio continuously declined till 1999-00 with fluctuations. It attained lowest position in 1991-92 with 0.7 % and stagnated below the level of 1% ratio of capital expenditure in agriculture to net state domestic production in agriculture during whole periods of nineties. However, the declining trend in public investment in state agriculture seems to be arrested in the half decade of 2000s. The Table pointed out that after 2000-01 ratio of public investment showed increasing trends.

Table5: Gross Capital Formation In Agriculture in U.P. in Relation to
Net State Domestic Product (At 1993-94 prices) Rs. Crore

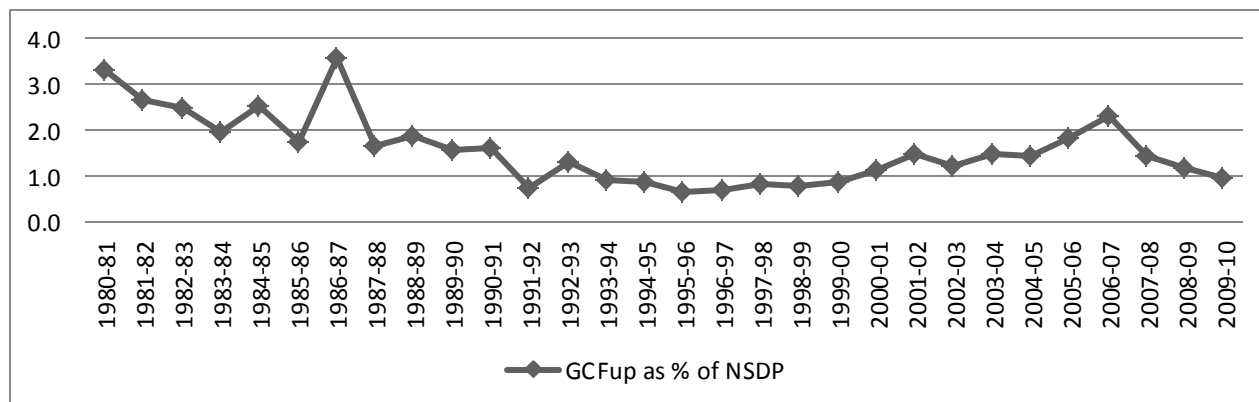
Years	GCFup	NSDPtotal	GCFup as % of NSDP
1980-81	1399	41953	3.3
1981-82	1148	42959	2.7
1982-83	1156	46315	2.5
1983-84	948	48132	2.0
1984-85	1245	48896	2.5

1985-86	884	50812	1.7
1986-87	1907	53013	3.6
1987-88	908	55408	1.6
1988-89	1161	62633	1.9
1989-90	1019	64375	1.6
1990-91	1098	68204	1.6
1991-92	505	68483	0.7
1992-93	908	69219	1.3
1993-94	649	70935	0.9
1994-95	645	74635	0.9
1995-96	503	77046	0.7
1996-97	605	85597	0.7
1997-98	694	84686	0.8
1998-99	646	85310	0.8
1999-00	774	91201	0.8
2000-01	1044	91690	1.1
2001-02	1411	94293	1.5
2002-03	1226	100101	1.2
2003-04	1567	104728	1.5
2004-05	1587	109768	1.4
2005-06	2060	112854	1.8
2006-07	2574	111848	2.3
2007-08	1661	116732	1.4

2008-09	1433	124035	1.2
2009-10	1229	132432	0.9

Source: Reserve bank of India , Hand Book of Statistics, various years

Chart. 3: Public Capital Expenditure in Agriculture in U.P. in Relation to NSDP (At 1993-94 prices)



A glance of chart 3 clearly indicates that ratio of public investment in agriculture with net state domestic product showed declining trend since 1980-81 to 1999-00 with some fluctuations. The ratio of public investment with net state domestic product was below the level of 1% during almost all the nineties. However there was significant improvement in this relation that can be observed in the half decade of 2000s. It showed increasing trend after 2001-02 but declined after 2006-07.

4.0 Private Investment in Agriculture of Uttar Pradesh

As stated earlier that there are no direct data available on annual basis for compilation of capital formation in agriculture in the private sector at state level. The RBI-NSSO have been conducting country-wide survey of debt and investment (AIDIS) at decennial intervals. In order to prepare time series data on private agricultural investment in Uttar Pradesh, state's share was interpolated and extrapolated within the data available for three decadal years, 1981-82, 1991-92 and 2002-03.

Table 6: Private Fixed Capital Formation in Agriculture in Relation to NSDP ag in Uttar Pradesh

Year	GCFagPvt (Current Prices)	GCFagPvt (1993-94 Prices)	GCFag Pvt Per Hectare	GCFagPb as % of NSDPag	GCFag Pvt as % of NSDPag
1980-81	242.63	533	14089	7.04	2.68
1981-82	266.63	534	30546	5.66	2.63
1982-83	293.00	600	34736	5.44	2.82
1983-84	321.98	601	34845	4.28	2.71
1984-85	353.82	595	34491	5.63	2.69
1985-86	388.81	636	36908	3.95	2.85
1986-87	427.27	658	38401	8.32	2.87
1987-88	469.52	689	40037	3.89	2.95
1988-89	515.96	677	39287	4.50	2.62
1989-90	566.99	697	40291	4.02	2.75
1990-91	623.06	693	42179	4.04	2.55
1991-92	684.68	669	40605	1.81	2.40
1992-93	745.44	672	40821	3.33	2.46
1993-94	811.59	812	49203	2.29	2.86
1994-95	883.60	678	40819	2.20	2.31
1995-96	962.01	660	39549	1.68	2.21
1996-97	1047.37	736	43988	1.85	2.25
1997-98	1140.31	795	47319	2.29	2.62
1998-99	1241.50	879	52318	2.10	2.86

1999-00	1351.66	869	51723	2.31	2.59
2000-01	1471.60	943	56091	3.17	2.87
2001-02	1602.18	962	57221	4.22	2.88
2002-03	1744.35	1079	64180	3.46	3.04
2003-04	1899.14	1148	68285	4.34	3.18
2004-05	2067.66	1221	72627	4.64	3.57
2005-06	2251.13	1310	77921	5.78	3.67
2006-07	2399.12	1422	82346	7.7	4.25
2007-08	2523.45	1516	87112	4.4	3.99
2008-09	2711.09	1667	91988	3.7	4.31
2009-10	2893.43	1722	96234	3.4	4.72

Sources: PVTupag= Interpolated and extrapolated from the data at three decadal years provided by-

1. RBI (1988), Household Capital Expenditure during 01.07.1981 to 30.06.1982: All India Debt & Investment Survey 1981-82 Reserve Bank of India, Bombay
2. NSSO (1998), Household Capital Expenditure during 01.07.1991 to 30.06.1992: Debt and Investment Survey, 48th round, Ministry of Planning & Programme Implementation, Govt. of India
3. NSSO (2005), Household Capital Expenditure during 01.07.2002 to 30.06.2003: Debt and Investment Survey, 58th round, Ministry of Planning & Programme Implementation Govt. of India

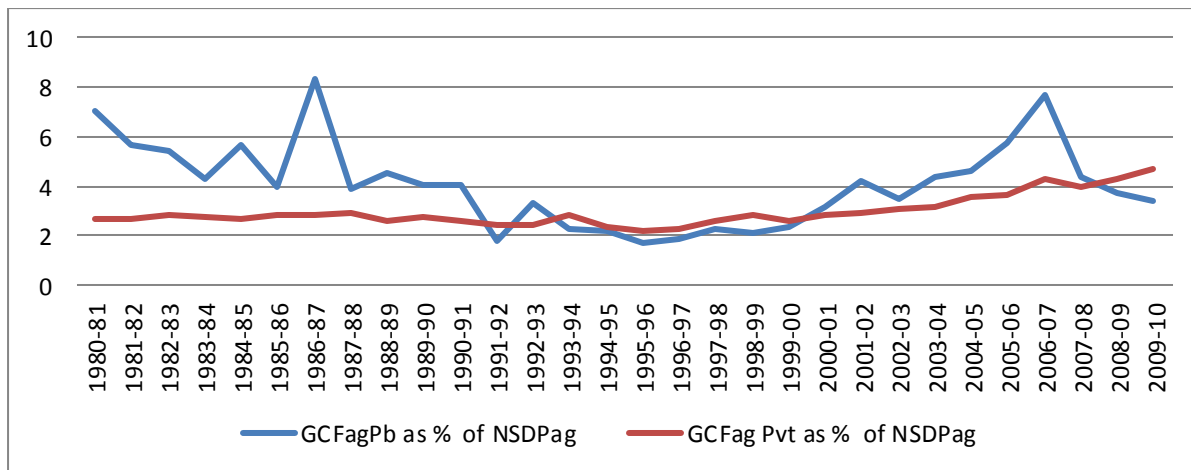
Complementarity Issue:

Though there was paucity of data regarding private investment in agriculture at the state level, this study tried to explain the relationship between private and public investment in agriculture. As shown in the chart-4, the two series are moving in completely opposite direction up to 1991-92. Public investment in real terms shows an absolute decline with some fluctuation in the eighties. Private sector capital formation in agriculture in real terms shows increasing trends continuously, since 1980-81, which continued into the nineties. Private investment shows a spurt since 1996-97.

After 2000-01, public and private sector capital formation at constant prices (1993-94 prices), were moving in upward direction. Private capital formation per hectare of net sown area was also increased throughout the period.

It can be noticed that Public sector and Private sector capital formation in agriculture at constant prices were moving in opposite directions in 1980s and most of the 1990s, but similar to all india trends, pace of rise in capital formation in private account was slower in the 1980s and 1990s. It gained better momentum after 2000-01, when capital formation in public sector also showed increasing trend. This trend again supports the hypothesis of complementarity between private and public investment in agriculture at all India level as well as state level. Ratio of capital formation in private sector to Net State Domestic Product in agriculture in Uttar Pradesh increased, while ratio of gross capital formation in public sector to Net State Domestic Product in agriculture declined in the 1980s and 1990s with some fluctuations. It increased after 1997-98 and stood at 5.78 % in 2005-06.

Chart 4: Private and Public Capital Expenditure in Agriculture in Uttar Pradesh



5.0 Conclusion

With perceptible decline in public sector investment in agriculture in state of Uttar Pradesh during the decades of 1980s and 1990s, the agrarian economy of Uttar Pradesh continues to struggle with low productivity and lack of proper infrastructure. Public investment in agriculture by state government showed diminishing trends at constant prices (1993-94 prices), since 1980-81 to 1995-96. A negative compound growth rate of gross capital formation of was observed in the state agriculture in the eighties and the nineties. Ratio of public investment in agriculture to net state domestic product in the agriculture of the state at constant prices also declined till 1995-96. Similarly proportion of GCF in agriculture in Uttar Pradesh to net state domestic product at

constant prices declined since 1980-81. Public and private investment in agriculture in Uttar Pradesh however shows a clear positive increase after 1999-2000. But after 2006, both series depicts opposite movement. Due to lag impact of increasing public investment, private investment in agriculture is continuously shows increasing trends.

The most important items of capital expenditure were irrigation and rural roads. Investment in irrigation schemes, and flood control would form around 50% of the total investment in the 1980s. Even though the irrigation schemes dominated in public investment, its share came down from more than 55% during eighties to 42.63% during nineties and 34.19% in 2000s. Capital expenditure on rural roads by state government continued to maintain its importance over the years. The rural development programmes have experienced hike in their share in 1990s but special area programmes lost its significance and showed declining trends in its ratio after 2001 due to separation of Uttaranchal from the state. The direct investment in agriculture was very low in 1980s and 1990s. It has declined till 1990s, though the ratio has increased significantly in 2000s. It can also be noticed that agricultural research & education and food storage & warehousing has remained neglected over the years. Private sector capital formation in agriculture in real terms shows increasing trends continuously, since 1980-81, which continued into the nineties. Private investment shows a sharp increase since 1996-97. After 2000-01, public and private sector capital formation at constant prices (1993-94 prices), were moving in upward direction. Private capital formation per hectare of net sown area was also increased throughout the period.

Many scholars have explored the reasons for the declining trend in public investment in agriculture. According to them decline in public investment in agriculture was due to the bias against agriculture in the policy and rising subsidies in agriculture (Alagh,1994 & 1996; Misra,1998; Gulati and Bathla,2001). Hardening resources and increasing pressure on revenue expenditure in payments of salaries and interest have crowded out capital expenditure in public account since 1980s. The deteriorating trend in central tax-GDP ratio started right from the mid 1980s was a major source of fiscal imbalances (Ahluwalia 2000; Rao, 2003). The decline in plan expenditure in its turn can be traced to the sharp deterioration in the fiscal situation in the state of Uttar Pradesh witnessed since early nineties. Due to mounting pressure of non-developmental expenditure on salaries, pensions and interest payments, the government budgets have been running into continuous and high revenue deficit (Singh,2006).

Thus the state government is not in the position to raise its expenditure on development plans and other priority sectors like education, health and infrastructure. This fiscal crisis has negative impact on public investment of economy, particularly in agriculture sector. To rejuvenate agricultural sector and step up its growth rate the following areas will require much higher public investments- irrigation, agricultural research and development and rural infrastructure including roads, cold storages, market infrastructure etc. Success in these areas will stimulate private investment in agriculture and contribute to a revival of growth.

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