

**Report of the Working-Group on Estimation of
Investment, its Composition and Trend for
Twelfth Five-Year Plan
(2012-13 to 2016-17)**

**Planning Commission
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Abbreviations

ADMOH	Public Administration and other services
AGR	Agriculture, Forestry and Fishing
CAGR	Compound Annual Growth Rate
CIS	Change in Stock
CONST	Construction
CSO	Central Statistical Office
DES	Directorate of Economics and Statistics
EFY	Eleventh Five Year Plan
ELEC	Electricity, Gas and Water supply
FII	Foreign Institutional Investor
FINRE	Financing Insurance, Real Estate and Business services
FYP	Five Year Plan
GCF	Gross Capital Formation
GDCF	Gross Domestic Capital Formation
GDP	Gross Domestic Product
GDPfc	Gross Domestic Product at Factor Cost
GDPmp	Gross Domestic Product at Market Price
GFCE	Government Final Consumption Expenditure
GFCF	Gross Fixed Capital Formation
GVA	Gross Value Added
HDI	Human Development Index
ICOR	Incremental Capital Output Ratio
MACH.	Machinery
MFG	Manufacturing including registered and unregistered sector
MQ	Mining and Quarrying
NAS	National Accounts Statistics
NCAER	National Council of Applied Economic Research
NDC	National Development Council
PCI	Personal Consumption Income
PDI	Personal Disposable Income
PFCE	Private Final Consumption Expenditure
PP	Perspective Planning
PPP	Purchasing Power Parity
THR	Trade, Hotel and Restaurant
TOR	Terms of Reference
TSC	Transport, Storage and Communication

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TOR and Approach of the Working Group

In the context of the formulation of the Twelfth Five Year Plan (2012-17), the Planning Commission set up a Working Group for 'Estimation of Investment: its Composition and Trends for Twelfth Five year Plan (2012-17)' with the following composition.

1.	Sh. Shashanka Bhide, Senior Research Counsellor, National Council for Applied Economic Research, New Delhi	Chairperson
2.	Sh. Ramesh Kolli, former ADG, National Accounts Division, Central Statistical Office, MOSPI	Member
3.	Ms. T.Rajeshwari, DDG, NAD, MOSPI	Member
4.	Prof. Basant Pradhan, DPC, IEG, Delhi	Member
5.	Sh. B.D.Virdi, Adviser (DPPD), Planning Commission	Member
6.	Representative of RBI (Ms. Balbir Kaur)	Member
7.	Ms. Sibani Swain, Director, PP division, Planning Commission	Member Secretary

The Terms of Reference (TOR) of the Working Group are as under:

- (a) Assessment of the current investment scenario
- (b) Estimation of the aggregate investment requirement broad sector-wise during the Twelfth Five Year Plan for achieving GDP growth target.
- (c) Projection of private investment demand comprising corporate investment and household sector investment.

The Working group met twice. In the first meeting of the Working Group held on 19th July, 2011 under the chairmanship of Dr. Shashanka Bhide, Senior Research Counsellor, National Council of Applied Economic Research, the above mentioned TOR was discussed and it was decided that the Working Group would specially look into Gross Fixed Capital Formation (GFCF) at sectoral level. The Time Series analysis on investment would be confined to the time period 1980-81 to 2009-10. Incremental Capital Output Ratio (ICOR) computed from historical time series data would be used for estimation of investment requirement. ICOR

would be calculated on the basis of GFCF. Aggregate investment would be worked out by applying some ratio method to take care of Change in stocks. This exercise would be undertaken in the PP Division.

Compilation of data relating to Capital Formation at Sub- National level has been a long felt necessity. At present no such State wise data is compiled and maintained by the CSO. Some states do compile such data. But the data is not validated by CSO and consistency with the national level data is also not maintained. As regards estimation of investment requirement at State level, it was noted that the Working Group on 'Issues relating to Growth and development at Sub National Levels' would work out the state-wise GSDP growth target for the Twelfth Plan. Once the growth targets are made available, it would be possible to compute the Investment requirement for States by applying national level ICOR and making appropriate adjustments. **Thus estimation of State level investment requirement was included as an additional TOR for this Working Group.**

In the second meeting of the Working Group held on 13th December, 2011, the methodology for computation of implicit ICOR for nine production sectors on the basis of observed data as well as firming up of sectoral ICOR for the Twelfth Plan was discussed and consensus arrived at. Disaggregation of National GDP growth target to State specific growth target, as worked out in the Perspective Planning Division, was also presented and firmed up. It was agreed that State level investment requirement would be worked out for three broad sectors of the economy, such as Agriculture, Industry and Services. It was agreed to finalize the report on the basis of the discussions held in these two meetings.

All the Members of the Working Group actively participated in the deliberations and provided valuable inputs. The Working-Group would like to place on record its deep appreciation of the contribution made by Dr. P.C. Parida and Shri Devender Pratap of NCAER. The research support provided by Ms. Manushi Sharma, Ms. Shivani Gupta and Ms. Manika Gupta, the then interns in the Planning Commission are also gratefully acknowledged. The Group is thankful to Dr. Sadhana Shrivastav, Economic Officer, Planning Commission for providing secretariat services.

Report of the Working-Group on Estimation of Investment, its Composition and Trend for Twelfth Five-Year Plan (2012-13 to 2016-17)

I. INTRODUCTION AND AN OVERVIEW OF MACROECONOMIC CONDITIONS

1.1 Introduction

The resilience of the Indian economy to the external economic shocks created by the global crisis of 2008 and 2009 was reflected in a quick recovery of growth rate in GDP in 2009-10 and 2010-11. However, the second bout of global demand shock largely driven by the Sovereign Debt crisis of the European countries and slow economic growth in the USA have had adverse implications for the Indian economy and poses a challenge to India's growth prospects. India's growth prospects depend largely on its ability to tackle supply side constraints in the domestic economy. But with the growing global linkages of the economy its growth prospects cannot be viewed in isolation of developments in the world economy.

The recent overall slowdown in Gross Domestic Product (GDP) is attributed to a number of global as well as domestic factors viz., uncertainty in the global economy, exacerbation of the Euro Zone crisis, hardening of crude oil prices in the international market, persistent rise in domestic prices followed by tight monetary policy, withdrawal of fiscal stimulus, successive increases in the lending rates until April 2012 and moderation in the level of Foreign Institutional Investment (FII) flows which has resulted in sharp depreciation of the rupee in the foreign exchange market.

The Indian economy on the eve of the Twelfth Plan is characterized by strong macro fundamentals and relatively good performance over the Eleventh Plan period, though clouded by slowdown in growth in 2011-12 due to the persistent inflation coupled with the increased economic uncertainty around the globe. Against this backdrop it is important that the economy's strengths are harnessed and the challenges are addressed appropriately.

India's success in raising its average growth rate of the economy in the Eleventh Five Year Plan period is a result of its inherent strength, which includes (i) high level of domestic investment and savings rates, (ii) high level of domestic consumption, (iii) the demographic dividend that the country is reaping recently, (iv) presence of robust corporate sector and (v)

sustained fiscal consolidation and financial sector management. The challenges emanate from the economy's transition to a higher growth trajectory, the structural changes that come with it and the expectations it generates. Besides, there are external challenges arising from the economic uncertainty in the global world. Also there are serious concerns about sovereign debt, fiscal un-sustainability and macro-economic imbalances across the world. India needs to build upon its own economic strength in terms of its domestic component reflected in the level of savings & investment.

The Twelfth Five Year Plan (2012-17) is, thus, launched in a more uncertain macroeconomic environment than the Eleventh Plan. The Approach Paper to the Twelfth Five Year Plan that has been approved by the National Development Council (NDC) envisages a target annual average GDP growth rate of 9 % provided supportive policies are put in place. This is considered a feasible target from a macro-economic perspective.

Investment Rate is the most important driver of GDP growth. Over the past six decades of planning, the capital formation in the economy has undergone substantial changes both in its trend as well as in its composition. The structure of Investment has changed in terms of sectoral composition, asset classification, and also by source of institutions. Each of this change has been concomitant with the structural change in the economy & has implications for the growth prospects.

This report seeks to work out the investment requirement during the Twelfth Five Year Plan under alternative growth target scenarios. The first chapter of the report highlights the macro economic context in which the investment requirement has to be estimated. The second chapter examines the composition and trend of capital formation in the country over the past three decades. The methodology for estimation of aggregate investment requirement is discussed in chapter three. The findings of the committee on investment requirement at all India level are provided in chapter four. Fifth chapter introduces the issues relating to capital formation at the sub national level and attempts to workout the state level investment requirement by applying national level indicators.

1.2 Macroeconomic Environment: Structural Changes in the Economy

During the last six decades of planning, Indian economy has steadily accelerated the GDP growth rate from an average of 3.5 per cent per year during the first three decades of planning

(1950 to 1980) to 5.4 per cent during the 1980s and 5.7 per cent during the 1990s and further to a little less than 8 per cent during the 2000s. The rate of increase in GDP and per capita income over the years is shown in **Table 1**.

Indian economy has been on this high growth trajectory of 7-8 per cent for about a decade now and has reached a stage where the growth becomes sustainable with high level of domestic savings and investments. The strong resilience to the external shock in the wake of global economic and financial crisis, exhibited by the Indian economy reassured the existence of strong macroeconomic fundamentals. India has assumed the position of one of the fastest growing economy in the world next to China and fourth largest economy in the terms of Purchasing Power Parity (PPP).

Table 1: Annual Average Growth rate of GDPfc and Per Capita Income (at 2004-05 constant prices)

Year	GDP at factor cost (%)	Per Capita Income (%)
1950-51 to 1960-61	3.9	2.3
1960-61 to 1970-71	3.7	1.3
1970-71 to 1980-81	3.2	0.8
1980-81 to 1990-91	5.4	3.0
1990-91 to 2000-01	5.7	3.6
2000-01 to 2010-11	7.6	5.9

Note: The figures are simple average of annual growth rates.

Data Source: National Accounts Statistics (2004-05 back series), National Accounts Statistics 2011 & Various Press releases of CSO on National Accounts up to 31st May 2012.

The average decadal rate of growth of the Real Per Capita Income declined during the period 1950-51 to 1980-81. However it has been increasing steadily since the 80's and has doubled from the 3% in the 80's to about 6% in the first decade of the new millennium. A comparative analysis of growth rate of PCI across the globe for some select countries (**Table 2**) indicates India's PCI is fast increasing next only to China.

Table 2: Per capita GDP at PPP constant 2005 International Dollar

Country Name	2000	2005	2010	CAGR	CAGR
				2000-05	2005-10
World	7890	8840	9889	2.3%	2.3%
Bangladesh	970	1165	1485	3.7%	5.0%
Bhutan	2703	3480	4780	5.2%	6.6%
China	2667	4115	6810	9.1%	10.6%
India	1769	2300	3240	5.4%	7.1%
Indonesia	2623	3102	3880	3.4%	4.6%
Japan	28613	30310	30903	1.2%	0.4%
Korea, Rep.	18730	22783	27027	4.0%	3.5%
Malaysia	10209	11544	13186	2.5%	2.7%
Nepal	903	954	1075	1.1%	2.4%
Pakistan	1845	2145	2417	3.1%	2.4%
Philippines	2697	3051	3560	2.5%	3.1%
Singapore	38037	45374	51969	3.6%	2.8%
Sri Lanka	3063	3515	4555	2.8%	5.3%
Thailand	5497	6675	7672	4.0%	2.8%

Source: World Development Indicators

India's growth story has been primarily driven by service sector growth. The predominance of agriculture in GDP has come down and its share as a percentage of GDP has declined substantially from 35.7% of GDP in 1980-81 to 14.7% in 2009-10 and to 14.5% in 2010-11. **Table 3** below represents the share of the three sectors, viz, agriculture, industry and services as a percentage of GDP. The percentage share of agriculture sector has declined in the past thirty years though almost 60% of India's population is still dependent on agriculture for its livelihood. The share of industry has increased from 25.7% in the beginning of 1980s to about 28% in 2009-10. However, the share of manufacturing sector remains relatively stable at 16% of GDP. It may be seen in the table below that the services sector accounts for 57.2% of the country's GDP in 2009-10 while industrial and agricultural sectors contribute 28.1% and 14.7% respectively in 2009-2010.

Table 3: Sectoral Share as a percent of GDPfc at constant (2004-05) prices

Year	Agriculture	Industry	Services	Total
1980-81	35.7%	25.7%	37.6%	100.0%
1981-82	35.3%	26.2%	37.5%	100.0%
1982-83	34.2%	25.9%	39.0%	100.0%
1983-84	35.0%	25.9%	38.3%	100.0%
1984-85	34.2%	25.9%	39.0%	100.0%
1985-86	32.9%	25.9%	40.4%	100.0%
1986-87	31.4%	26.3%	41.6%	100.0%
1987-88	29.9%	26.8%	42.8%	100.0%
1988-89	31.3%	26.6%	41.5%	100.0%
1989-90	29.9%	27.1%	42.6%	100.0%
1990-91	29.5%	27.6%	42.5%	100.0%
1991-92	28.5%	27.3%	43.9%	100.0%
1992-93	28.9%	26.8%	44.1%	100.0%
1993-94	28.2%	26.7%	44.8%	100.0%
1994-95	27.8%	27.4%	44.5%	100.0%
1995-96	25.7%	28.4%	45.7%	100.0%
1996-97	26.2%	28.0%	45.5%	100.0%
1997-98	24.5%	27.9%	47.5%	100.0%
1998-99	24.4%	27.3%	48.2%	100.0%
1999-00	23.3%	26.9%	49.9%	100.0%
2000-01	22.3%	27.3%	50.4%	100.0%
2001-02	22.4%	26.6%	51.0%	100.0%
2002-03	20.1%	27.4%	52.5%	100.0%
2003-04	20.3%	27.2%	52.5%	100.0%
2004-05	19.0%	27.9%	53.0%	100.0%
2005-06	18.3%	28.0%	53.7%	100.0%
2006-07	17.4%	28.7%	54.0%	100.0%
2007-08	16.8%	28.7%	54.4%	100.0%
2008-09	15.8%	28.1%	56.1%	100.0%
2009-10	14.7%	28.1%	57.2%	100.0%
2010-11	14.5%	27.8%	57.7%	100.0%
2011-12	14.01%	27.00%	58.99%	100.0%

The sectoral growth rate of GDP over plan periods starting with VI plan onwards is indicated in **Table 4**. As can be seen global economic slowdown, low growth in agriculture sector due to bad monsoon and drought like situation in 2008-09 and 2009-10, and slowdown in

domestic demand caused by persistent price rise in the domestic market and concomitant high cost of borrowing has impacted India's growth performance.

During the EFP, against original growth rate target of 9%, the realised GDP growth rate is estimated at 7.9% comprising 3.3% in agriculture, 6.6% in industry and 9.8% in services.

Table 4: Sector-wise GDP Growth Rate (Compounded Annual Growth Rate)

Plan/sectors	VI Plan	VII Plan	VIII Plan	IX Plan	X Plan	EFP
	1980-85	1985-90	1992-97	1997-02	2002-07	2007-12
Agriculture	5.7	2.9	4.8	2.4	2.4	3.3
Industry	5.2	6.5	7.1	4.5	9.2	6.6
Services	5.6	7.4	7.3	8.1	8.8	9.8
GDP	5.5	5.7	6.5	5.7	7.6	7.9

On the expenditure side of national income the composition has changed in favour of aggregate investment measured by Gross Domestic Capital Formation (GDCF). The share of investment in total GDP at current market prices has increased from 23.4% in 8th plan to 31.3% during 10th five year plan and further to 37.7% during the first three years of 11th plan. In fact both gross domestic savings and investment have undergone structural change during the 10th five year plan itself. High level of domestic investment has been an inherent strength with Indian economic situation which is also a necessary condition for sustaining a high growth momentum. As depicted in the **Table 5**, while investment rate has accelerated significantly during last decade, the Private Final Consumption Expenditure (PFCE) has gradually declined to about 59% of GDP. India's investment rate in 2009 was nearly double the world average and well ahead of several of the Asian economies (**Table 6**).

Table 5: Share of investment as a percentage of GDPmp at Constant (2004-05) prices during Various Plans

Five-Year Plan Period	PFCE	GFCE	GDCF
VI Plan	74.3%	11.2%	20.0%
VII Plan	70.2%	12.6%	21.3%
VIII Plan	64.9%	11.6%	23.4%
IX Plan	62.7%	12.6%	25.4%
X Plan	59.7%	11.1%	31.3%
XI Plan	59.1%	11.0%	37.7%

Table 6: International Comparisons of Investment Rate as a percentage of GDP

Country Name	2000	2005	2009	2010
	as % of GDP			
World	22.40	21.90	19.14	19.90
Bangladesh	23.02	24.53	24.37	24.41
Bhutan	48.21	49.91	41.21	NA
China	35.12	42.10	48.24	47.78
India	24.16	34.66	36.47	34.77
Indonesia	22.25	25.08	31.00	32.49
Japan	25.44	23.57	20.20	20.22
Korea, Rep.	30.56	29.69	26.28	29.15
Malaysia	26.87	19.99	14.44	21.42
Nepal	24.31	26.45	31.66	34.69
Pakistan	17.23	19.08	18.22	15.37
Philippines	18.37	21.55	16.59	20.54
Singapore	33.18	19.92	26.36	23.83
Sri Lanka	28.04	26.83	24.43	27.79
Thailand	22.84	31.44	21.24	25.94

Source: World Development Indicators

II. TREND AND COMPOSITION OF AGGREGATE INVESTMENT (GCF)

2.1 Trend of GFCF and GCF

Investment measured by Gross Capital Formation (GCF) comprises Gross Fixed Capital Formation (GFCF) and Change in Stock (CIS). GFCF refers to creation of physical assets and hence the productive capacity of economy is captured by this aggregate. Change in stock primarily measures the inventories i.e. the working capital. It is the GFCF which is important for measuring the potential growth of the economy and also accounts for more than 90% of the Gross Domestic Investment.

Table 7 provides data on the trend of GFCF and GCF since 1980-81 onwards. As can be observed, in the 1980s investment rate i.e. GCF as a percent of GDP at market prices never rose above 24%, ranging from 19.4% to 22.7%. During the 1990s, investment rate increased above 24% of GDP and crossed 25% mark during last three years of the decade. It was during the decade beginning 2000-01, the investment rate went up well above 30% mark.

A structural break point has been observed in the rate of capital formation in the year 2004-05 reflecting a significant shift in the time series (**Chart 1**). Both rates of investment in fixed capital and total capital have undergone this structural transformation. However, the acceleration in investment did suffer a setback since the year 2008-09 and rate of investment (GFCF) has declined gradually to 32% of GDP in 2011-12 from the peak level of 33.7% achieved in 2007-08.

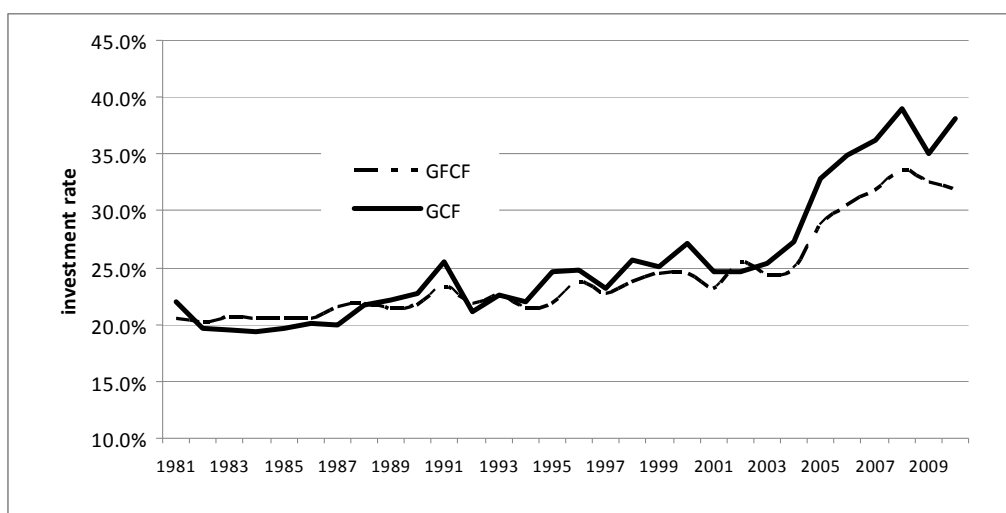
It may be noted that the gap between GCF and GFCF has phenomenally increased during the last decade, especially since 2004-05. This could be attributed to (a) increased stock of inventories that has been maintained at a level ranging from 2% to 4% of GDP during this period and (b) inclusion of 'valuables' (accounting for about 2% of GDP at present) as a component of GCF since the base revision in 1999-00.

**Table 7: Composition of Investment as a percentage of GDPmp at constant prices
(2004-05) Prices**

Year	GFCF	CIS	Valuables	Errors & Omissions	GCF
1981-82	20.2%	2.6%	0.0%	-3.2%	19.6%
1982-83	20.7%	1.9%	0.0%	-3.1%	19.5%
1983-84	20.6%	0.7%	0.0%	-1.9%	19.4%
1984-85	20.5%	1.6%	0.0%	-2.5%	19.6%
1985-86	20.6%	2.4%	0.0%	-2.9%	20.2%
1986-87	21.5%	1.8%	0.0%	-3.4%	19.9%
1987-88	21.9%	0.5%	0.0%	-0.7%	21.7%
1988-89	21.4%	1.8%	0.0%	-1.0%	22.2%
1989-90	21.7%	1.1%	0.0%	-0.2%	22.7%
1990-91	23.4%	1.0%	0.0%	1.1%	25.5%
1991-92	21.9%	-0.1%	0.0%	-0.7%	21.1%
1992-93	22.6%	1.2%	0.0%	-1.2%	22.6%
1993-94	21.4%	-0.2%	0.0%	0.9%	22.0%
1994-95	21.9%	1.2%	0.0%	1.5%	24.7%
1995-96	23.7%	1.8%	0.0%	-0.8%	24.7%
1996-97	22.7%	-1.1%	0.0%	1.6%	23.2%
1997-98	23.8%	0.8%	0.0%	1.1%	25.6%
1998-99	24.5%	-0.2%	0.0%	0.7%	25.0%
1999-00	24.4%	2.2%	0.8%	-0.2%	27.2%
2000-01	23.2%	0.7%	0.7%	0.2%	24.7%
2001-02	25.5%	-0.1%	0.6%	-1.4%	24.6%
2002-03	24.4%	0.7%	0.6%	-0.2%	25.4%
2003-04	25.0%	0.7%	0.9%	0.7%	27.3%
2004-05	28.7%	2.5%	1.3%	0.4%	32.8%
2005-06	30.5%	2.9%	1.1%	0.4%	34.9%
2006-07	31.8%	3.4%	1.2%	-0.2%	36.2%
2007-08	33.7%	4.1%	1.1%	0.1%	39.0%
2008-09	33.5%	1.9%	1.4%	-1.3%	35.6%
2009-10	33.1%	2.9%	2.0%	0.5%	38.5%
2010-11	32.5%	3.7%	2.4%	-0.8%	37.7%
2011-12*	32.0%	3.5%	2.5%	NA	NA

* excludes errors and omissions

CHART 1: Trend in Rate of Capital Formation



A relatively high and long-run sustainable rate of growth depends upon improvements in the supply-side of the economy. Supply-side factors, such as investment, education & training and technological change will determine the underlying trend rate of economic growth in the long run. As investment is the most critical supply side factor of the economy it is also a necessary condition to have a higher level of investment for ensuring high growth momentum in the economy. As has been already noted, the rate of investment has increased significantly during the last decade with a structural break point in investment observed in the year 2004-05. This has been evidenced with a trend analysis of both gross capital formation and gross fixed capital formation. The trend growth rate of investment, obtained through semi-log specification, is summarised in **Table 8**. The findings indicate that both GFCF and GCF have gone through a structural break in the same year (2004-05). The structural Break point in the year 2004-05 was tested by using slope dummy in the following regression analysis.

Table 8: Trend rate of growth of investment (% per year) estimated using Semi-Log Trend Equation

Type of Investment	Estimated annual growth rate %		Adjusted R ² for the estimated equation
	1980-81 to 2002-2003	2004-05 to 2009-10	
GCF	6.14	14.26	0.9894
GFCF	6.37	12.83	0.9949

Notes:

1. Trend values are obtained through semi log specification
2. Trend growth rate is statistically significant at 1% level of significance.
3. Structural break point is observed in 2004-05, when tested by using slope dummy that also improved the adjusted R².

Structural break point can be attributed to the following factors:

- Removal of price controls on capital, reduction in corporate tax rates and more liberal capital market environment.
- The reforms did away with the License Raj, reduced tariffs on imports and interest rates and ended many public monopolies, allowing automatic approval of foreign direct investment in many sectors.
- The Indian industrial sector underwent significant changes as a result of the economic reforms of 1991, which removed import restrictions, brought in foreign competition, led to privatisation of a number of public sector industries, liberalized the FDI regime, improved infrastructure and led to an expansion in the production of fast moving consumer goods.
- The services sector provides employment to most of the work force and is growing quickly. It has the largest share in the GDP, accounting for 55% in 2007-08. Information technology and business process outsourcing are among the fastest growing sectors. The growth in the IT sector is attributed to increased specialization, and an availability of a large pool of low cost, highly skilled and educated class of workers.
- Government partially opened up infrastructure to the private sector allowing foreign investment, and as a result a significant part of infrastructure, barring railways, is today constructed and maintained by private sector, in exchange for tax and other concessions from the government to keep the investments financially viable.
- Reforms brought about by the Electricity Act of 2003 caused far-reaching policy changes, including mandating the separation of generation, transmission and distribution aspects of electricity, abolishing licensing requirements in generation and opening up the sector to private players, thereby paving the way for creating a competitive market-based electricity sector.

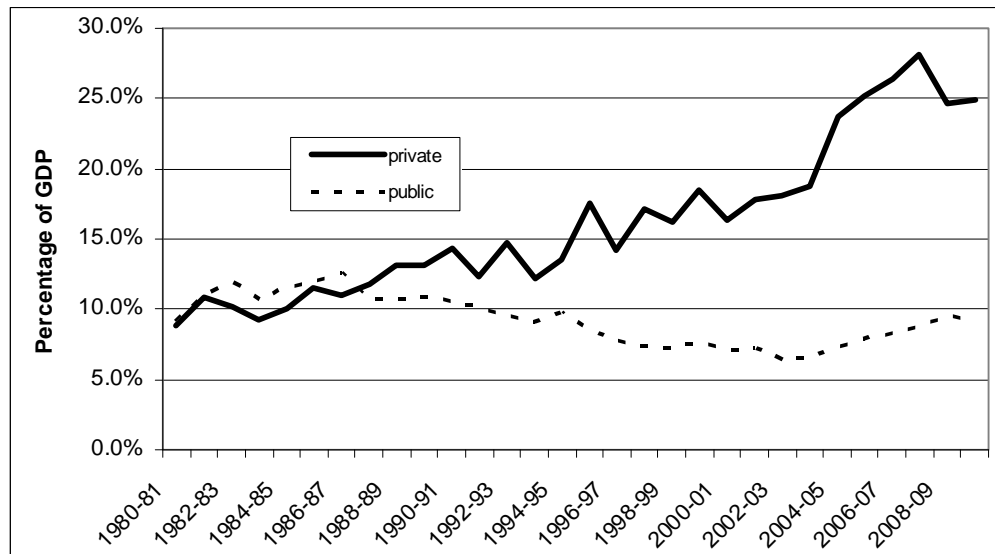
Analysis of the trend in investment over plan periods suggests emergence of structural break during the Tenth Plan period. In the terminal year of the Tenth Plan, the investment rate was estimated at 35.7 per cent of GDP, which increased further during the Eleventh Plan. The average investment rate realised during the first four years is estimated to be around 36.5 per cent. There has been decline in the aggregate investment during 2008-09, the crisis year.

However, this decline was not so much on account of shortfall in fixed capital formation but mainly on account of a reduction in inventories.

2.2 Trend and Composition of Investment by Source of Institutions

Another type of structural change is discernible in the investment behaviour of the economy in terms of the change in relative shares of public and private investment (**Table 9**). Years of reforms have marked a significant break from the previous pattern of sources of investment. A major role is being played by the private sector since 1987-88 in investment activity. Dominance of public investment declined in the post reform period continuously as public sector's role came down from its commanding heights (**Chart 2**).

CHART 2: Trend in Gross Capital Formation



The rapid increase in private sector investment in the aggregate investment is in large part a reflection of the impact of the reforms initiated in the 1990s, which reduced restrictions on private investment and created a more favourable investment climate. It reflects the fact that the private sector has responded positively with an improvement in the investment climate. The reduced requirement by the Central Government for meeting budgetary mismatches, and for overall public sector financing has improved the availability of resources for the private sector considerably. Furthermore, the corporate sector has responded to increased global competition by improving its productivity and efficiency through increased application of

technology. The economic reform process has helped greatly in making the policy environment more conducive for more efficient entrepreneurial activity.

In the post reform period the rate of investment of the private corporate sector has increased from around 4 per cent in the 1990-91 to above 15% in 2007-08, then came down to about 11% of GDP in 2008-09 and again started picking up (**Chart 3**). Higher retained profits along with availability of resources from the banking sector facilitated by the lower financing requirement of the Government and the increased access to the domestic and international capital markets led to a sharp increase in the investment rate of the private corporate sector.

CHART 3: Trend of Private Corporate Investment in Post Reform Period

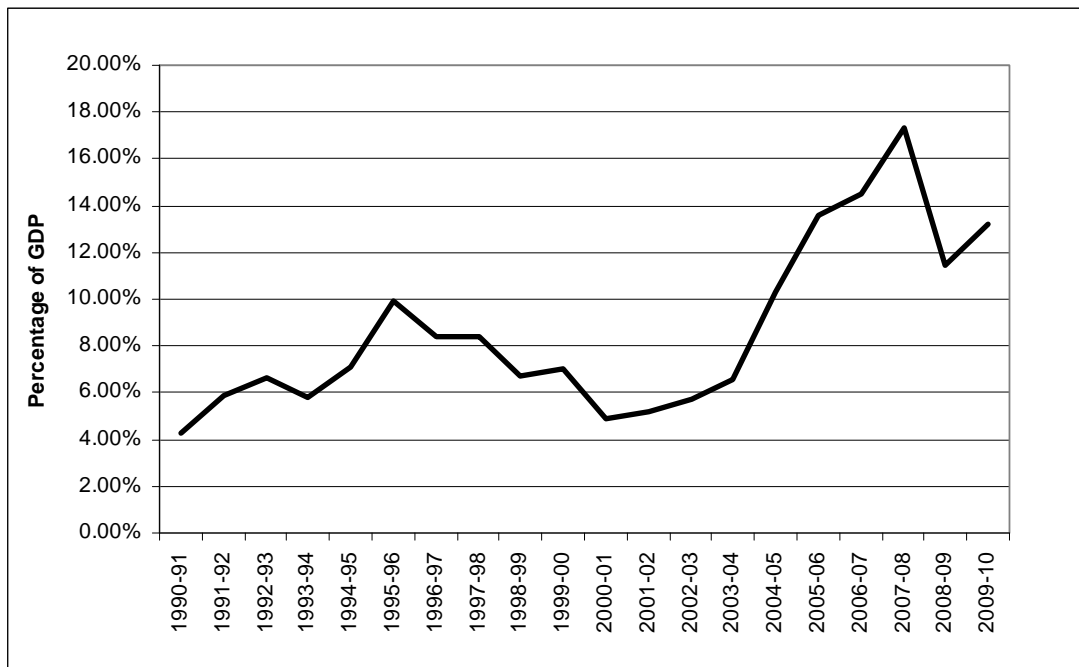


Table 9 below provides institution wise investment rate in India since 1980-81 on an annual basis. It is evident that dominance of public investment in the Gross Domestic Capital Formation has declined gradually and substantially since the year 1987-88. Investment by private corporate sector in terms of GDP exhibited increasing trend in the post reform period, but accelerated since 2004-05, virtually driving the structural break point of the Gross Domestic Capital Formation in India in that year. Capital formation by the Household sector steadily increased during the last three decades, but the increase is more pronounced since 1999-00. In brief, both private corporate sector and household sectors have contributed to the high rate of Investment during the decade beginning 2000-01.

Table 9: Trend and Composition of Investment by Institutions

Year	GCF Adjusted	Public Investment	Private Corporate	Household	Valuables
	% of GDPmp at current prices				
1980-81	19.2%	9.2%	2.5%	6.4%	0.0%
1981-82	18.9%	11.0%	5.5%	5.3%	0.0%
1982-83	19.1%	11.9%	5.4%	4.7%	0.0%
1983-84	18.2%	10.7%	3.3%	6.0%	0.0%
1984-85	19.1%	11.5%	4.2%	5.8%	0.0%
1985-86	20.6%	11.9%	5.3%	6.3%	0.0%
1986-87	20.1%	12.5%	5.1%	5.8%	0.0%
1987-88	21.9%	10.8%	3.5%	8.3%	0.0%
1988-89	22.8%	10.8%	3.9%	9.1%	0.0%
1989-90	23.7%	10.8%	4.1%	9.0%	0.0%
1990-91	26.0%	10.6%	4.3%	10.1%	0.0%
1991-92	21.8%	10.2%	5.9%	6.5%	0.0%
1992-93	23.0%	9.5%	6.6%	8.1%	0.0%
1993-94	22.2%	9.1%	5.8%	6.4%	0.0%
1994-95	24.7%	9.7%	7.1%	6.4%	0.0%
1995-96	25.3%	8.6%	9.9%	7.6%	0.0%
1996-97	23.7%	7.8%	8.4%	5.8%	0.0%
1997-98	25.6%	7.4%	8.4%	8.7%	0.0%
1998-99	24.2%	7.3%	6.7%	9.5%	0.0%
1999-00	26.8%	7.7%	7.0%	11.5%	0.8%
2000-01	24.4%	7.2%	4.9%	11.5%	0.7%
2001-02	24.3%	7.2%	5.2%	12.7%	0.6%
2002-03	24.8%	6.5%	5.7%	12.3%	0.6%
2003-04	26.9%	6.6%	6.6%	12.1%	0.9%
2004-05	32.8%	7.4%	10.3%	13.4%	1.3%
2005-06	34.7%	7.9%	13.6%	11.7%	1.1%
2006-07	35.7%	8.3%	14.5%	11.9%	1.2%
2007-08	38.1%	8.9%	17.3%	10.8%	1.1%
2008-09	34.3%	9.4%	11.3%	13.5%	1.3%
2009-10	36.6%	9.2%	12.7%	12.4%	1.8%
2010-11	35.1%	8.8%	12.1%	12.8%	2.1%

Note: GCF has been adjusted for errors and omissions; data on valuables is available only from 1999-00 onwards.

One notable feature in the flow of investment during the Eleventh Five Year Plan has been a gradual increase in public investment both as a share of aggregate investment and as a

percent of GDP. The public investment rate was about 7 per cent in the Ninth Plan; in the Tenth Five-Year Plan public investment rose slightly as a percentage of GDP and increased to 7.6 percent but its share in total investment dropped sharply to 23.9% of total capital formation from 29% during Ninth Plan. In the eleventh plan the public sector investment increased at a higher rate to reach above 9% of GDP and its share in aggregate investment also increased above 25%.

This turnaround of the share of public investment in GDP and total investment in the Eleventh Plan (**Table 10**) may be attributed to the sharp decline in the growth rate of private sector investment during the crisis year of 2008-09 and in the immediately subsequent years 2009-10 and 2010-11. Thus, public investment has helped sustain the momentum of overall investment during the crisis period.

Table 10: Composition of Investment by Institutions during various Plans

Period	% of GDP			Public Investment (as % of Total)
	Total	Public	Private	
VI plan	18.9%	10.9%	9.8%	57.5%
VII plan	21.8%	11.4%	12.1%	52.5%
VIII plan	23.8%	8.9%	14.4%	37.7%
IX plan	25.0%	7.3%	17.2%	29.3%
X plan	31.0%	7.3%	22.4%	23.9%
XI plan	36.0%	9.1%	25.7%	25.2%

Notes:

1. Total Investment has been adjusted for errors and omissions
2. 11th Plan figures are only for first four years.

The high rates of investment (over 36.0 per cent of GDP) and private sector savings (34.0 per cent of GDP) during the Eleventh Five year Plan constitute strong macro-economic fundamentals supporting high growth. However, there has been a slowdown in the pace of increase in private corporate investment, as the uncertainties flowing out of the global crisis as well as the sharp rise in global energy and commodities prices have led to more caution on new investments.

2.3 Composition of GFCF by Types of Assets

GFCF includes ‘construction activities’ and ‘machinery and equipment’. The dominant mode of investment so far happens to be the construction activities with some variations over the years. However, the share of construction activities in the total GFCF has gradually declined

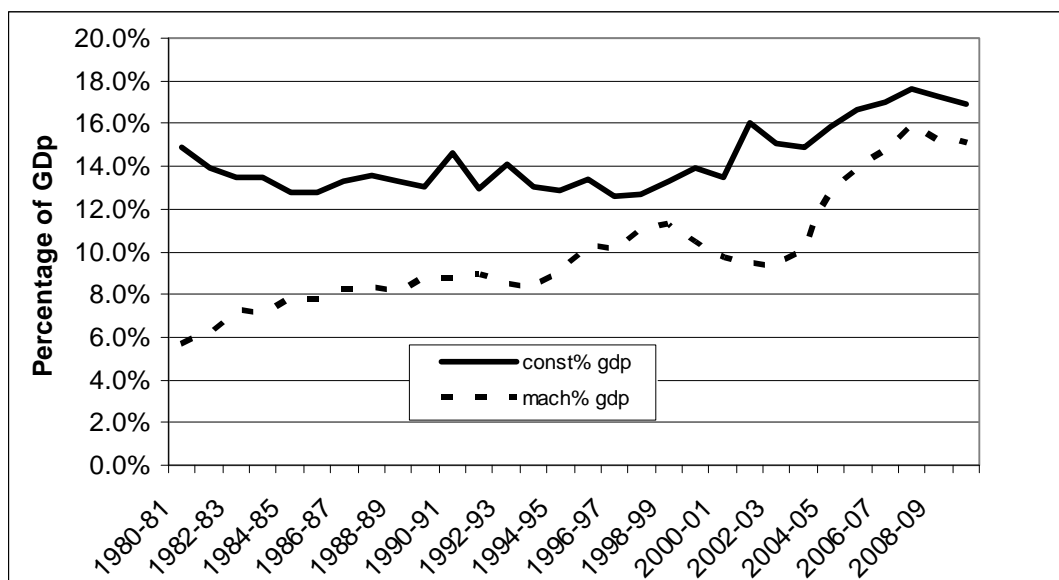
over years. The increased share of machinery and equipment in the GFCF is mainly accounted for by private corporate sectors, whereas construction activities remain predominant in public sector investment. **Table 11** presents the declining dominance of construction activities in the asset creation of the country.

Table 11: Trend in Rate of GFCF by Type of Assets

Year	% of GDP	% of GFCF		% of GDP	
	GFCF	Construction	Machinery & Equipment	Construction	Machinery & Equipment
1980-81	20.6%	72.5%	27.5%	14.9%	5.7%
1981-82	20.2%	69.2%	30.8%	14.0%	6.2%
1982-83	20.7%	65.0%	35.0%	13.5%	7.3%
1983-84	20.6%	65.3%	34.7%	13.4%	7.1%
1984-85	20.5%	62.1%	37.9%	12.7%	7.8%
1985-86	20.6%	62.3%	37.7%	12.8%	7.8%
1986-87	21.5%	61.8%	38.2%	13.3%	8.2%
1987-88	21.9%	62.0%	38.0%	13.6%	8.3%
1988-89	21.4%	62.3%	37.7%	13.3%	8.1%
1989-90	21.7%	60.1%	39.9%	13.1%	8.7%
1990-91	23.4%	62.6%	37.4%	14.6%	8.7%
1991-92	21.9%	59.4%	40.6%	13.0%	8.9%
1992-93	22.6%	62.5%	37.5%	14.1%	8.5%
1993-94	21.4%	61.0%	39.0%	13.0%	8.3%
1994-95	21.9%	58.5%	41.5%	12.8%	9.1%
1995-96	23.7%	56.7%	43.3%	13.4%	10.3%
1996-97	22.7%	55.4%	44.6%	12.6%	10.1%
1997-98	23.8%	53.5%	46.5%	12.7%	11.0%
1998-99	24.5%	54.1%	45.9%	13.3%	11.3%
1999-00	24.4%	57.1%	42.9%	13.9%	10.5%
2000-01	23.2%	58.2%	41.8%	13.5%	9.7%
2001-02	25.5%	62.8%	37.2%	16.0%	9.5%
2002-03	24.4%	61.8%	38.2%	15.1%	9.3%
2003-04	25.0%	59.5%	40.5%	14.9%	10.1%
2004-05	28.7%	55.2%	44.8%	15.8%	12.9%
2005-06	30.5%	54.6%	45.4%	16.7%	13.9%
2006-07	31.8%	53.6%	46.4%	17.1%	14.8%
2007-08	33.7%	52.5%	47.5%	17.7%	16.0%
2008-09	33.5%	52.2%	47.8%	17.5%	16.0%
2009-10	33.1%	52.3%	47.7%	17.3%	15.8%
2010-11	32.5%	52.8%	47.2%	17.1%	15.3%

Both construction activities and share of machinery and equipments have increased as percent of GDP over years; however, increase has been sharper for machinery and equipment (**Chart 4**).

CHART 4: Trend and Composition of GFCF



The investment trends for public sector witnessed decline in the share of construction over the years during the pre-reform period, while the share of machinery and equipment increased over the same period (**Chart 5**). However, after reforms the trends have reversed with construction's share rising and share of machinery and equipment falling. This development is consistent with the new economic policy stance, in which Government withdrew itself from the direct production of goods and started focusing on development of infrastructure that required expansion of construction activities. For the private corporate sector, dominant share for investment remained with 'machinery & equipment' over the years (**Chart 6**).

CHART 5: Trend and Composition of GFCF in public Sector

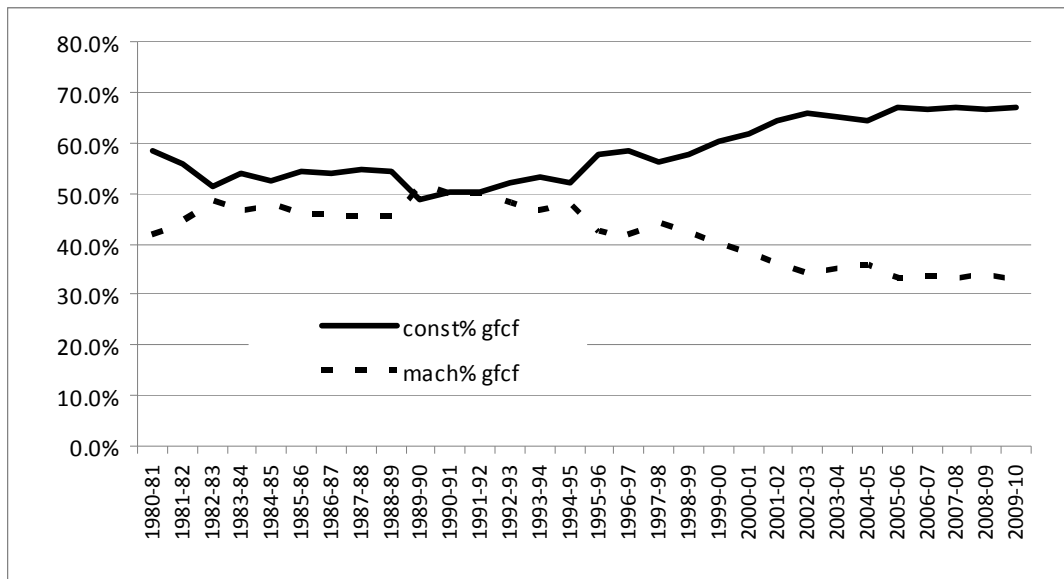
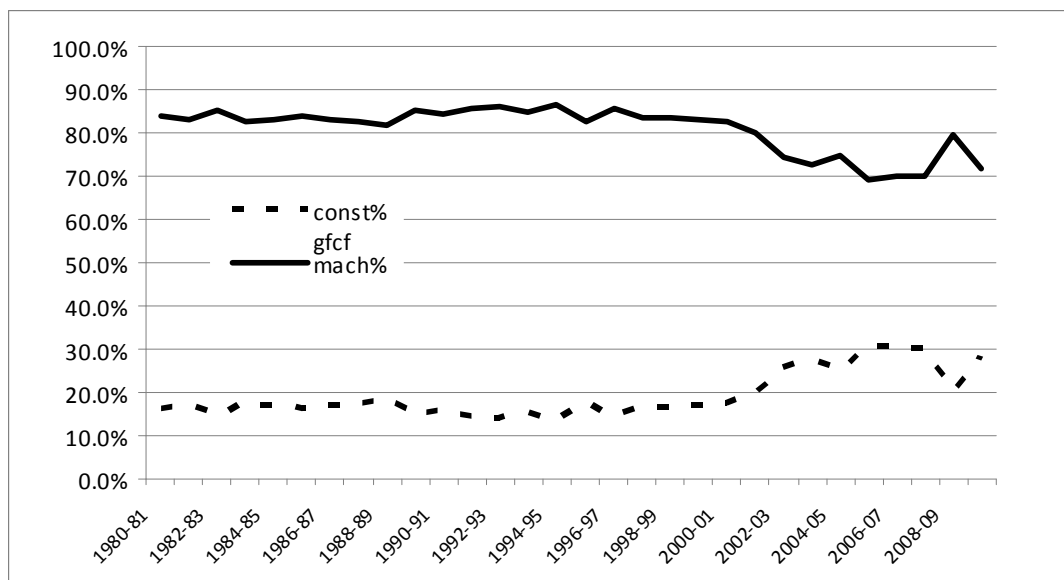


CHART 6: Composition of Private Corporate Sector GFCF



The rising share of machinery and equipment in the overall GFCF is essentially due to the rising share of private corporate sector in total GFCF.

2.4 Capital Intensity of GDP Broad Sector-wise

Higher investment rate is almost a necessary condition for higher economic growth. Investment rate is an indicator of average capital intensity of GDP measured ex-post. The

indicator, which is based on observed value, does not indicate any technical relationship between capital and output, since the investment rate subsumes inefficiency in the system, unutilised capacity of the existing stock of productive assets.

Capital intensity varies widely across the production sectors. **Table 12** provides investment rate across nine broad sectors of the economy. ‘Trade, Hotels and Restaurants’ (THR), followed by ‘Agriculture, Forestry and Fishing’ (AGR) are the two least capital intensive sectors so far. Investment rate for THR exhibited declining trend during Eighth, Ninth and Tenth Plan but seems to have increased sharply during Eleventh Plan. Release of investment data for all the five years of Eleventh Plan could further clarify the position. However, Agriculture sector has been showing gradual increase in capital intensity since the Ninth Five year plan implying increased mechanisation and energy intensity of this sector.

‘Construction’ Sector is known to be the most labour intensive sector with the lowest rate of investment at around 4 to 5 per cent of Gross Value Added (GVA) in the sector. However, there is an upward trend in the investment rate of this sector since the Ninth Five year Plan onwards. Investment rate was 9.3 and 17.7 respectively during the Ninth and Tenth Plan.

Table 12: Investment Rate (GCF based) During Five Year Plans: Sector wise (GCF as a % of GDPfc at constant 2004-05 prices)

Sector	VI PLAN	VII PLAN	VIII PLAN	IX PLAN	X PLAN	XI PLAN
	1980-85	1985-1990	1992-97	1997-02	2002-07	2007-10
AGR	9.70	9.25	8.88	11.53	13.85	18.67
MQ	45.97	48.80	31.27	15.74	41.97	74.89
Mfg	42.72	48.66	55.83	56.96	67.55	79.98
Elec	171.96	166.53	108.76	88.40	91.10	111.09
Const	5.66	4.89	5.73	11.79	23.93	30.36
THR	12.13	12.48	9.41	10.89	13.90	16.52
TSC	29.73	31.86	33.94	31.89	27.05	29.38
FINRE	26.67	23.48	26.02	35.45	35.69	32.60
ADMOTH	35.58	32.77	27.71	26.17	36.36	44.48
GDP	23.86	25.33	25.21	27.13	32.74	38.93

Note: AGR = Agriculture and allied sectors; MQ = Mining and quarrying; Mfg = Manufacturing; Elec = Electricity, Gas and Water Supply; Const = Construction, THR = Trade, hotels and restaurants; TSC = Transport, storage and communication; FINRE = Finance, Insurance and Real Estate; ADMOTH = Administration and Other Services.

The rate of capital formation in '**Mining and Quarrying**' sector did show some declining trend during Ninth and Tenth Plan, but starts increasing during Eleventh Plan; whereas **Manufacturing** sector shows an upward trend in the investment pattern through different Five Year Plans. There is continuous increase in the investment rate since Sixth Five year Plan onwards in the manufacturing sector. India is quickly rising as a worldwide manufacturing hub with a huge number of companies changing their manufacturing base to the country and making it more Capital Intensive day by day.

'Electricity, Gas and Water Supply' is the sector with highest rate of investment at more than 100 per cent of sectoral GVA. While power generation is highly capital intensive, it is also true that there is huge amount of transmission and distribution losses attributing to this high investment rate for the sector. The rate of investment in this sector declined substantially from about 147% of GVA during the Sixth Plan period to 93% of GVA during the Ninth Plan and to 103% during the Tenth Plan. During Eleventh Plan the investment rate shows signs of increase, though data for the entire plan period is yet to be incorporated.

In the 'Transport, storage and communication', 'Transport', particularly Railways is highly capital intensive. For the group as whole, investment rate increased from around 30.9 percent during the Sixth Plan to higher than 40 percent during the Eighth Plan and started showing declining trend after that. Technological revolution in the communication sector has primarily contributed to this decline. '**Financing, Insurance, Real Estate**' sector also experienced a rising trend in the rate of investment during the successive Plans.

In brief, investment pattern varies widely across sectors and exhibits fluctuating trend. The investment rate for the economy as a whole is the weighted average of the sectoral investment rate. Share of each sector in the GDP is taken as weights here. Any assessment of future investment requirement, with given GDP growth target, would be determined by (a) sector specific capital intensity and (b) sectoral growth pattern. The following section discusses, in detail, the estimation of investment requirement during the Twelfth Five Year Plan.

III. ESTIMATION OF AGGREGATE INVESTMENT REQUIREMENT

In this section we discuss the methodology adopted and exercises undertaken to estimate the investment requirement during the Twelfth Five Year Plan. Savings and Investments are the two critical macro economic parameters, which needs to be worked out in the context of formulation of five year plans, once the GDP growth target is firmed up. The Approach paper to Twelfth Five Year Plan envisages a GDP growth target of 9 per cent on average per year. However, in the backdrop of uncertainty in the global economy and signs of economic slowdown in the country in the current fiscal, driven by both global uncertainty and domestic inflation a lower growth scenario is currently under discussion. The working group on Savings has made projection of savings under three GDP growth rate scenarios such as 8 per cent, 8.5 per cent and 9 per cent. Accordingly, this Working Group decides to work out investment requirement under the same three GDP growth target scenarios along with an additional scenario of 9.5% growth target for GDP.

The objective of this group is to estimate the following:

1. Estimation of GFCF broad sector wise
2. Estimation of aggregate GFCF as per cent of GDP_{fc} for the Twelfth Plan period
3. Estimation of aggregate GCF as per cent of GDP_{fc} for the Twelfth Plan period
4. Estimation of aggregate GCF as per cent of GDP_{mp} for Twelfth Plan period
5. Disaggregation of aggregate investment to private investment and public investment.

3.1 Data Sources

The entire exercise (including the analyses in the previous sections) is based on time series data obtained from NAS covering the period 1980-81 to 2010-11. All the computation is carried out in real terms at 2004-05 prices. The time series on GDP, GCF, and GFCF along with their sectoral component is obtained from the back series data of 2004-05 NAS series released by the CSO, National Accounts Statistics 2011 and various press releases by CSO up to 31st May 2012.

3.2 Estimation of GFCF across broad sectors

The sector wise estimation of GFCF is confined to nine broad sectors namely ‘Agriculture, Forestry and Fishing’, ‘Mining & Quarrying’, ‘Manufacturing’, ‘Electricity, Gas & Water

Supply’, ‘Construction’, ‘Trade, Hotels & Restaurants’, ‘Transport, Storage & Communication’, ‘Financing, Insurance & Real Estate’, ‘Community, Social & Personal Services’. The estimation of investment requirement for achieving the sector specific target growth rate is made on the basis of Incremental Capital Output Ratio (ICOR).

3.3 Incremental Capital Output Ratio (ICOR)

The Incremental Capital-Output Ratio (ICOR) is a summary expression for the existing technical conditions and structural configuration of the economy which captures the relationship between investment and additional productive capacity. ICOR is commonly measured as the ratio of investment rate to growth rate for a particular period. Some of the standard assumptions in the traditional Harrod-Domar framework of calculating ICOR include, inter-alia, (a) the economy is on a steady growth path, (b) there is no lag between investment and setting up of additional capacity, i.e. investment instantaneously translates into additional productive capacity, (c) there is a full capacity utilization, (d) unchanging production structure within a sector. While these assumptions overlook the rigidities as well as flexibilities in the real world, the overall framework is a reasonable tool for providing overall benchmarks for assessing investment requirements.

The working group agreed to base its estimation of investment requirement on the observed relationship between capital formation and output in the past. The following steps have been taken to compute the ICOR.

On the basis of a simple Harrod-Domar framework the ICOR is calculated by dividing the investment ratio by the Growth Rate of GDP in each sector, i.e.

$$ICOR = i / g$$

where, $i = Inv / GDP$

and $g = \text{Growth Rate of GDP/sectoral value added}$

Applying this to the historical data, the ICOR is calculated for the economy as a whole as well as for different sectors. It may be mentioned that this ICOR is calculated plan wise based on Gross Fixed Capital Formation. This ICOR has been calculated cumulatively in the following manner.

$$ICOR_{plan} = \sum_{t=1}^5 GFCF_t / (Y_5 - Y_0) \dots\dots\dots (i)$$

where, GFCF is the Gross Fixed Capital Formation,

Y is the level of output, represented by the value added in sectors as well as GDP for the economy as a whole.

Y₅ is the value added/GDP in the terminal year of the plan and

Y₀ is the value added/GDP in the base year of the plan.

The plan wise ICOR computed as explained above for all the nine sectors are reported in **Table 13** below. It is interesting to note that there is wide variation in ICOR both across sectors as well as across different plan periods. For each sector the ICOR keeps changing from plan to plan. For most of the sectors ICOR has increased over successive plan periods except for the sectors like Electricity, Trade and Hotels, Transport Storage & Communications. These sectors have realized a declining trend in ICOR. For Mining and Quarrying observed ICOR has been least during the Ninth Plan; and increased in the subsequent Plan period. For ‘Manufacturing’ sector observed ICOR has been highest during the Ninth Plan period. The ICOR for the economy as a whole has been highest during the Ninth Plan period and lowest during Tenth Plan period.

One interesting thing to note here is that while sector specific ICOR varies widely across Plan periods the total ICOR has not fluctuated much. It has been fluctuating within the range of 4 - 4.5 across all the five year Plan periods except for the Tenth Five Year Plan period during which ICOR for the economy has been the lowest at 3.7.

Table 13: Cumulative Plan Wise ICOR, based on 3-year Moving Average (GFCF Based)

Sector	VI Plan	VII Plan	VIII Plan	IX Plan	X Plan	XI Plan
AGR	2.5	3.0	2.9	4.2	4.1	6.6
MQ	7.7	5.0	7.7	4.7	6.6	15.3
Mfg	6.2	6.8	5.9	12.7	6.2	8.7
Elec	20.5	18.4	15.4	18.3	13.0	16.2
Const	1.9	0.7	1.3	1.4	1.7	3.1
THR	1.4	1.4	1.0	1.1	1.1	2.0
TSC	4.9	5.0	4.4	3.8	2.3	2.2
FINRE	2.8	2.5	3.4	4.1	3.9	2.7
ADMOTH	6.3	5.0	5.1	3.4	6.1	4.6
Total	4.3	4.1	4.0	4.5	3.7	4.4

Note: Sector-wise abbreviations explained in the note to Table 12.

If the capital output ratio is a known constant or varies with a specific trend, then this exercise of estimating required investment for a predetermined growth target becomes easy. Unfortunately in practice there has been considerable instability in the capital-output ratio. The working group discussed the issue of applying historical ICOR for estimation of investment requirement during Twelfth Five Year Plan. In the absence of data for entire period of Eleventh Plan it would not be appropriate to base our future projection on the Eleventh Plan numbers. Further during the first four years of Eleventh Plan the economy has experienced slowdown primarily on account of demand deficiency; hence Eleventh Plan ICOR could not be taken as accurate measure of capital efficiency. Higher ICOR is anticipated due to existence of large unutilized capacity created due to demand deficiency. The working group agreed to take the average of Tenth Plan and Eleventh Plan ICOR for each sector as the implicit ICOR for Twelfth Five year Plan. Accordingly the suggested sector specific ICORs for Twelfth Five Year Plan were worked out as follows (**Table 14**). The ICOR for the three broad sectors such as Agriculture, Industry and Services for the Twelfth Five Year are estimated as 5.32, 6.48 and 2.95 respectively.

Table14: Incremental Capital Output Ratios

Sector	X Plan	XI Plan	XII Plan
AGR	4.05	6.58	5.32
MQ	6.64	15.25	10.95
Mfg	6.20	8.68	7.44
Elec	13.02	16.18	14.60
Const	1.66	3.10	2.38
THR	1.13	2.00	1.56
TSC	2.26	2.23	2.24
FINRE	3.95	2.74	3.34
ADMOTH	6.08	4.59	5.33
GDP	3.73	4.37	4.04

Note: Sector-wise abbreviations explained in the note to Table 12.

3.4 GDP growth target during Twelfth Plan with Sectoral Disaggregation

The sector specific ICOR are applied to sectoral GDP estimated for Twelfth Five year Plan under different GDP growth rate scenario. As has been mentioned earlier investment has been estimated for four growth target scenario such as 8%, 8.5%, 9% and 9.5%. For each of this GDP growth target sectoral growth target has been worked out by linear projection within a

sectoral consistency framework. **Table 15** presents the sectoral growth target for Twelfth Plan.

Table 15: Twelfth Five Year Plan (2012-17): Sectoral GDP Growth Target Annual Average (%)

Sector	Scenario 1	Scenario 2	Scenario 3	Scenario 4
AGR	3.5	3.8	4.0	4.2
MQ	4.2	4.5	4.8	5.0
Mfg	8.6	9.2	9.7	10.2
Elec	6.5	6.9	7.3	7.6
Const	8.2	8.7	9.3	9.7
THR	8.3	8.8	9.4	9.8
TSC	10.4	11.0	11.7	12.3
FINRE	10.0	10.6	11.3	11.8
ADMOTH	7.0	7.4	7.8	8.2
GDP Growth Target	8.0	8.5	9.0	9.5

Note: Sector-wise abbreviations explained in the note to Table 12.

The exercise undertaken to arrive at the sectoral growth pattern envisaged for Twelfth Five Year Plan indicated in Table 14 has not factored in the implication of National Manufacturing Policy (NMP), which has already been notified after Cabinet's approval. NMP aims at improving the share of manufacturing sector in GDP from present level of about 16% of GDP to 25% in coming 10 years. Growth implication of this for manufacturing sector would be substantial and may necessitate some upward revision in the growth target of this sector.

3.5 Estimation of Investment Requirement during Twelfth Plan

The steps taken to estimate the Investment requirement are as under:

1. Gross Value Added (GVA) for nine sectors has been estimated by applying sector specific growth target. The GVA has been estimated at constant 2004-05 prices.
2. Then sector specific Gross fixed Capital Formation (GFCF) was estimated at 2004-05 prices by applying estimated ICOR for Twelfth Plan (from table 12) to the sectoral GDP numbers.
3. Computed Gross Capital Formation (GCF) at constant 2004-05 prices for each sector by applying an average ratio (0.099) of Change in Stock (CIS) to GFCF realized during 2004-05 to 2011-12 and adding. In brief, GCF calculation for this was $GCF = GFCF*(0.099)$.
4. Then sectoral GCF was aggregated to obtain total GCF or aggregate investment.

5. At the first instance, as explained above, Investment Rate has been calculated as a percent of GDP at factor cost at constant prices for each sector and for the entire economy.
6. However, Investment being an expenditure component is required to be expressed in terms of GDP at market prices (GDPmp). GDPmp is estimated from GDP at factor cost at 2004-05 prices by multiplying a constant factor 1.075 (see box 1 below for details)
7. Computed aggregate investment rate as a percent of GDP at constant market prices.

Table 16 provides the estimated investment requirement as a ratio of GDPfc and GDPmp at constant 2004-05 prices during Twelfth Plan as a percentage of GDPmp under alternative growth target scenarios.

The exercise undertaken to arrive at the above investment rates does not include the value of 'Valuables', which forms a part of Gross Capital Formation in the aggregate since the year 1999-2000 with the revision of NAS series in that year. At present 'valuables' accounts for about 1.9 % of GDP. If this component of GCF is factored in, the investment rate as per cent of GDPmp under each scenario would be stepped up by another 2 per cent point.

Table 16: Required Investment Rate during 12th Five Year Plan

Sector	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	GDP growth target			
	8%	8.50%	9%	9.50%
AGR	20.0	21.2	22.4	23.5
MQ	48.7	51.7	54.6	57.2
Mfg	64.8	68.5	72.3	75.6
Elec	97.3	103.1	108.8	113.9
Const	19.9	21.0	22.2	23.2
THR	13.2	13.9	14.7	15.4
TSC	23.2	24.5	25.8	26.9
FINRE	33.4	35.3	37.2	38.9
ADMOTH	38.1	40.4	42.6	44.6
Investment as a % of GDPfc	32.9	34.8	36.7	38.5
Investment as a % of GDPmp	30.5	32.4	34.2	35.8

Note: Sectoral investment rates are as percent of GDPfc

We also note that the projected investment rates (GCF/GDPMP) under the GDP growth scenario of 8.5% is close to what was observed in the years 2008-09 to 2010-11 (Table 6). The maintenance of GDP growth rate of 8.5 per cent requires maintaining the already achieved overall rate of investment.

Relating Gross Domestic Product at Market Price to GDP at Factor Cost

Two possible approaches were attempted to estimate GDPMP are:

- **Linear regression model where GDPMP is regressed over GDPFC.**
- **The ratio of GDPMP and GDPFC.**

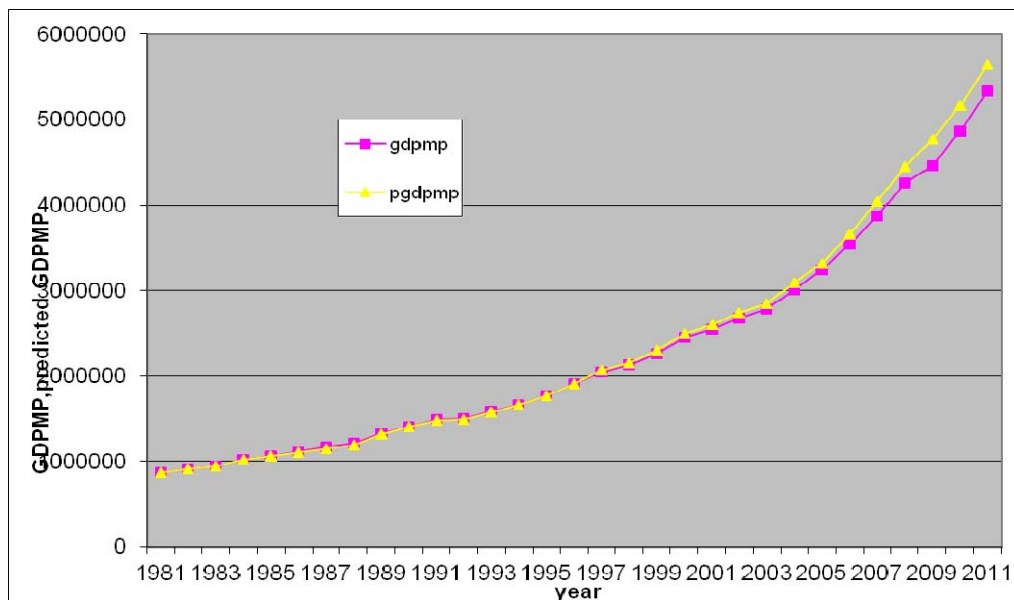
a) **Linear regression method**

In this method, GDPMP is regressed over GDPFC using the time series data available on back series of GDPMP and GDPFC from 1980-81 onwards at constant prices. Unit Root test has been conducted for each of the time series by using the Dickey Fuller Test and both the series were found to be non stationary. It was only at the stage of second difference that no unit root was found. Therefore, the second difference of GDPMP was regressed over second difference of GDPFC to establish a statistical relationship between the two variables.

The regression results are as follows:

D(GDPmp, 2)	Coefficient	t	Adjusted R ²
D(GDPfc, 2)	1.305396	9.96	0.7783
Constant	-805.4251	-0.13	

The predicted value GDPMP has been plotted over the observed value of GDPMP in the following chart. The predicted line seems to be a perfect fit up to the year 2002-03; and starts deviating in the upward direction thereafter. Application of regression method for estimation of GDPMP could result in some upward bias. Therefore the ratio method was also tried as discussed in the following para.



Note Continued.

The relationship between the observed values of GDP_{FC} and GDP_{MP} estimated at constant 2004-05 prices is found to follow a definite pattern over decades. Therefore this ratio could be applied to the estimated GDP_{FC} figure. As can be seen from the table below, the ratio of GDP_{MP} to GDP_{FC} in the last three decades has gradually declined.

Year	Average
1981-2010	1.092
1981-1991	1.097
1991-2001	1.094
2001-2010	1.085
Eleventh Plan	1.073

On taking the decadal average of this ratio, it is found that the last decade, the ratio has been less than 1.09 compared to the earlier decade where it has been close to 1.1. . However, the ratio has further reduced to an average of 1.073 during the Eleventh Plan. It is therefore thought appropriate to assume a GDP_{MP} to GDP_{FC} ratio of about 1.075 during the Twelfth Five Year Plan. Accordingly the GDP_{MP} series has been computed from the estimated GDP_{FC} series for all the five years of Twelfth Plan.

IV. ESTIMATION OF PRIVATE CORPORATE AND HOUSEHOLD INVESTMENT

4.1 Three Approaches of Estimation

We examine estimates of private corporate and household investment under three alternative approaches for the period from 2010-11 till the end of the 12th Plan period (2016-17). The focus is on estimating private investment in constant 2004-05 prices.

One of the important motivations for estimating private investment separately is that it provides an indication of the level of resources that may have to be generated from the public sector in order to meet the GDP growth goals. Although the share of public sector in total GFCF has declined over the years in the recent period, there has been a tendency for the share to remain stable from 2006-07. This pattern may have continued in the recent years due to the impact of global financial crisis on private investment.

The trends in public and private investment at the industry level also show the same pattern as at the aggregate level. In agriculture, industry and services, the share of public sector in total GFCF has remained stable in the period following 2006-07. If private investment does not reach the levels needed to achieve overall GDP growth rate, increase in public investment may be needed. The average ratio of public investment (GFCF) to GDPmp (both in constant prices) was 8.6 per cent for the period 2007-08 to 2009-10. This may be the maximum sustainable level of public investment in the medium term given the pressures on fiscal system presently faced.

Will private investment meet the balance of requirements of investment in the medium term future? We examine the question using three alternative approaches to estimate private investment.

The *three alternative approaches* followed are:

- (1) Applying the average growth trend of private corporate and household investment between 2000-01 and 2009-10 to the future years upto 2016-17.
- (2) Applying the average ratios of private corporate and household investment to GDP at current market prices observed between 2000-01 and 2009-10 to the future years upto 2016-17.

(3) Applying the average increase in the ratio of GFCF in private corporate and household sector to overall GDP in market prices observed during 2000-01 and 2009-10 to the future years.

All these three cases reflect extrapolation of the historical experience of the recent decade to the medium term future of 12th Five Year Plan period. While this is a simplistic framework, we believe that (1) using the experience of the past decade is more realistic than using either the more recent five years or the earlier five years of the decade and (2) projections based on investment functions at the sectoral level require several assumptions and in this period of significant volatility, it may be best to use the past experience of investment trend.

Given the weak investment scenario from 2008-09 to till the first-half of 2011-12, there are concerns that high growth rates of private investment seen during 2004-5 to 2007-08 may not be realised. Therefore, a longer time period average is likely to provide a more realistic benchmark for the next five years.

We have used investment and GDP data provided by the Central Statistical Office for the analysis. For obtaining investment rates, we need estimates of GDP at market prices. IN the first instance we have calculated GDPmp at constant prices based on growth rates of 8 per cent year in 2011-12 and 2012-13 and 9 per cent thereafter. The estimated GDPmp is given **in Table 17**. For a comparison, we have also presented subsequently estimates of private investment under an average rate of growth of GDPmp by 8.5 per cent during the 12th FYP period.

Table 17: GDP at constant market prices (Base 2004-05) (Rs. Crore)

Sector	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
GDPmp at constant prices (2004-05 base)	5595856	6043524	6587442	7180311	7826539	8530928
Annual growth rate of GDPmp at constant prices (2004-05 Base) (%)		8.0	9.0	9.0	9.0	9.0

(1) Average growth trend estimation

In this approach, first we have calculated the annual growth rate of private corporate and household investments and then taken average growth rate of each series between 2000-01 and 2009-10. This average growth rate is then applied to the base year value of 2010-11 and the subsequent years.

We compute the investment rate based on GDPmp given in **Table 17**. The estimated levels of investment and ratios of private corporate and household investment to GDPmp are given in **Table 18**.

**Table 18: Private Corporate and Household Investment at constant 2004-05 prices:
Approach 1 (Rs. Crore)**

Sector	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Private corporate	691253	796664	918149	1058160	1219521	1405489
Household	723803	788409	858782	935437	1018933	1109882
	As % of GDPmp					
Private corporate	12.35	13.18	13.94	14.74	15.58	16.48
Household	12.93	13.05	13.04	13.03	13.02	13.01

(2) Private Investment Based on Constant Ratio to GDP

In this approach, first we have calculated the ratio of private corporate and household investment to GDPmp between 2000-01 and 2009-10 in constant prices and then calculated the average ratio during the said period. The assumptions relating to growth rate of GDPmp for the 12th FYP period is the same as in Approach 1 above.

Finally multiplying the average ratio of private corporate investment to GDPmp in each future year we get the projected values of investment. The projections of private corporate and household investment at constant prices using this method are given in Table 19.

Table 19: Private Corporate and Household Investment at constant 2004-05 prices (Rs. Crore): Approach 2

Sector	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Private corporate	614508	669814	730097	795806	867428	867428
Household	757497	825672	899982	980981	1069269	1069269
	as % of GDPmp					
Private corporate	10.87	10.87	10.87	10.87	10.87	10.87
Household	13.39	13.39	13.39	13.39	13.39	13.39

The projected private investment as a ratio of GDP works out to only 24.26 per cent of GDPmp in the terminal year of the 12th Five Year Plan, well below 29.17 per cent under the first approach. The approach clearly provides a lower limit to the private investment scenario in the medium term, particularly for the private corporate investment.

(3) Projections Based on Trend Ratio of GFCF to GDP

We obtain a third alternative estimate of private investment for the 12th Five Year Plan period based on the average annual increase in the ratio of GFCF to GDP between 2000-01 to 2009-10 for private corporate and household sectors. The ratio of investment to GDP increases over the years under this approach unlike the case of Approach 2.

The average increase in the ratio of GFCF to GDPmp (in constant prices) in the case of private corporate sector works out to be 0.47 percentage points and in the case of household sector 0.139 percentage points. Applying these average changes on the ratios in 2010-11 onwards we project the ratios of GFCF to GDPmp for the two sectors and then obtain the level of GFCF for each year of 12th Five Year Plan.

The projected levels of GFCF for the private sector are provided in **Table 20**. In order to provide a comparison with the other two approaches, using the same assumptions on the growth rate of GDPmp as in the previous two approaches, we also provide estimated ratios of GFCF to GDPmp in **Table 20**.

Table 20: Private Corporate and Household Investment at constant 2004-05 prices (Rs. Crore): Approach 3

Sector	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Private corporate	599790	674353	757008	856428	967613	1091873	1230663
Household	664491	725531	792085	872650	961301	1058840	1166150
Share in GDPmp (%)							
Private corporate	11.45	11.92	12.39	12.86	13.33	13.80	14.27
Household	12.69	12.83	12.97	13.11	13.25	13.39	13.52

These estimates are closer to the projections under Approach 1 although they are somewhat lower. Under Approach 1, the projected investments as a ratio to GDP are sensitive to the assumption of GDP growth rate but under Approach 2, the ratios are not sensitive to the assumption regarding GDP growth. But the projected levels of investment are sensitive to the assumptions regarding growth rate of GDP.

(3) Comparison across three approaches

For comparison, the results from the three alternative approaches are given in **Table 21** below. The estimates of private corporate investment are the highest under the first method and the estimates of household investments are highest in the third method. Overall, the first method provides the highest level of private investment during the 12th FYP period.

Table 21: Private corporate and Household Investment at constant Prices (as % of GDPmp)

Sector	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Approach 1 : Based on Growth Rate						
Private Corporate	12.35	13.18	13.94	14.74	15.58	16.48
Household	12.93	13.05	13.04	13.03	13.02	13.01
Approach 2 : Based on Constant Ratio of GFCF to GDP						
Private Corporate	10.9	10.9	10.9	10.9	10.9	10.9
Household	13.4	13.4	13.4	13.4	13.4	13.4
Approach 3: Based on Constant Increase in the Ratio of GFCF to GDP						
Private Corporate	11.9	12.4	12.9	13.3	13.8	14.3
Household	12.8	13.0	13.1	13.3	13.4	13.5

As we had noted initially, we have worked out the investment rates under an average rate of growth of GDPmp of 8.5 per cent during the 12th Five Year Plan¹. The estimates presented above were based on the assumption of average growth rate of 8.8% during the 12th Five Year Plan period. The results under the three Approaches for slightly lower GDP growth scenario are provided in **Table 22**.

Table 22: Private corporate and Household Investment at constant Prices under average annual GDP growth of 8.5% (% of GDP mp)

Item	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Approach 1 : Based on Growth Rate						
Private Corporate	12.3	13.1	13.9	14.7	15.6	16.5
Household	12.9	13.0	13.0	13.0	13.0	13.0
Approach 2 : Based on Constant Ratio of GFCF to GDP						
Private Corporate	9.9	9.9	9.9	9.9	9.9	9.9
Household	12.4	12.4	12.4	12.4	12.4	12.4
Approach 3: Based on Constant Increase in the Ratio of GFCF to GDP						
Private Corporate	11.9	12.4	12.9	13.3	13.8	14.3
Household	12.8	13.0	13.1	13.2	13.4	13.5

At a slightly lower rate of growth, the estimated investment rates are higher under Approach 1 because the investment projections are independent of GDP growth assumption. The projections of investment ratios do not change with the lower GDP growth. Given the need for investments commensurate with the GDP growth assumptions, we retain the projections under Approach 3 as the more realistic projections of private investment during the 12th Five Year Plan period.

The estimated investment requirements for the economy were estimated as 35.5%, 35.9% and 35.0% under the three alternative scenarios of GDP growth in the earlier sections.

The three alternative estimates of private investment (average for the 12th FYP period in Table 6) provide the ratio of GFCF to GDPmp for the private sector at 27.8% in Approach 1,

¹ The assumed growth rates of GDP in constant prices during 2012-13 to 2016-17 are: 7, 8, 9, 9 and 9% over the previous year.

22.3% under Approach 2 and 26.7% under Approach 3 as the average for the 12th FYP period.

As we had noted at the beginning of this section, public investment ratio to GDP at 8.6 per cent appears to be maximum sustainable level based on the experience of the past decade. The Approaches 1 and 3 indicate that if public sector contribution to GFCF in terms of ratio to GDPmp is maintained at the present level of 8.5%, the private sector investment can meet the investment requirements needed to achieve GDP growth rate of 8.5% per year during the 12th Five Year Plan period. Facilitating sustained improvement in private investment will be the challenge for maintaining overall annual GDP growth of about 8.5 per cent.

V. STATE LEVEL INVESTMENT REQUIREMENT

Capital formation at State level is an important indicator of the economic development of the State. These estimates are important for setting plausible targets of growth, investments, technology change and improving Human Development Index (HDI) both at the national and regional levels. Besides, data on capital formation at State level is important for investment decisions for the private and public sector enterprises.

5.1 Initiatives of the States to compile Estimates of GFCF

The responsibility for compiling estimates of GFCF at the State level lies with the respective State Directorates of Economics and Statistics (State DESs). The CSO's role in this has been to provide the requisite training and supply supra-regional sector estimates of GFCF, to the State DESs. Following intensive and regular trainings conducted by the CSO for the benefit of State DES officials, many states now compile estimates of GFCF (and some GCF) for the public sector. These estimates are compiled by the States on the basis of analysis of budget documents being undertaken by them and the annual reports of the non-departmental commercial undertakings in the public sector.

In view of limited data on GFCF at state level from the RBI's company finance studies, the AIDIS and the enterprise surveys of the NSSO, only a few States are able to prepare estimates of private sector (which includes both private corporate and household sectors). These estimates are being prepared on the basis of information available from enterprise surveys conducted by the CSO/NSSO. The benchmark estimates as available from enterprise surveys are moved forward with suitable indicators for other years. The estimates as prepared by the states are released by some of them through their publications "Estimates of capital formation". The information relating to compilation of state specific capital formation data is summarized in the tables given below **(Statements I & II)**.

Statement- I: Gross Fixed Capital Formation by Industry of Use (Constant Prices)

S. No.	STATE	PUBLIC CAPITAL FORMATION	PRIVATE CAPITAL FORMATION	TOTAL (Public + Private) CAPITAL FORMATION
1.	Andhra Pradesh	NA	NA	NA
2.	Assam	NA	NA	NA
3.	Bihar	NA	NA	NA
4.	Goa	NA	NA	NA
5.	Gujarat	NA	NA	NA
6.	Haryana	NA	NA	1993-94 to 1996-97 [1997-98(P) to 2000-2001(P)] (1993-94 prices) 1999-00 R to 2005-06R (1999-00 prices)
7.	Himachal Pradesh	NA	NA	NA
8.	Karnataka	NA	NA	NA
9.	Kerala	NA	NA	NA
10.	Madhya Pradesh	1993-94 to 2000-01 [2001-02(P), 2002-03(Q)]		1993-94 to 2000-01 [2001-02(P), 2002-03(Q)]
11.	Maharashtra	NA	NA	NA
12.	Meghalaya	NA	NA	NA
13.	Odisha	NA	NA	NA
14.	Punjab			1993-94 to 2002-03 (1993-94 prices)
15.	Rajasthan	NA	NA	NA
16.	Tamil Nadu	NA	NA	NA
17.	Uttar Pradesh	NA	NA	1969-70 to 1973-74 1974-75 to 1978-79 1979-80 to 1984-85 (1970-71 prices)
18.	West Bengal	1990-91 to 2004-05	NA	1990-91 to 2004-05

Note: P = Provisional Estimates, Q = Quick estimates

Source: EPW Research Foundation

Statement-II Gross Fixed Capital Formation by Industry of Use (Current Prices)

S. No.	STATE	PUBLIC CAPITAL FORMATION	PRIVATE CAPITAL FORMATION	TOTAL (Public + Private) CAPITAL FORMATION
1.	Andhra Pradesh	1993-94 to 2002-03 (1993-94 base) 1999-2000 to 2004-05 (1999-2000 base)	1993-94 to 2002-03 (1993-94 base) 1999-2000 to 2004-05 (1999-2000 base)	1980-81 to 1987-88 (1980-81 base) 1993-94 to 2002-03 (1993-94 base) 1999-2000 to 2004-05 (1999-2000 base)
2.	Assam	NA	NA	NA
3.	Bihar	2002-03 to 2006-07(RE) (1999-00 base) (classification not specified)		
4.	Goa	NA	NA	NA
5.	Gujarat	1990-91 to 2004-05 (2005-06 Provisional) (1993-94 base)	NA	NA
6.	Haryana	NA	NA	1978-79 to 1987-88 (1980-81 base) 1993-94 to 1996-97 [1997-98(P) to 2000-2001(P)] (1993-94 base) 1999-00 R to 2005-06R (1999-00 base)
7.	Himachal Pradesh	1992-93 to 2007-08 (1999-00 base)	NA	NA
8.	Karnataka	NA	NA	NA
9.	Kerala	NA	NA	1980-81 to 1985-86 (1980-81 base)
10.	Madhya Pradesh	1993-94 to 2000-01 [2001-02(P), 2002-03(Q)]	NA	1993-94 to 2000-01 [2001-02(P), 2002-03(Q)]
11.	Maharashtra	1980-81 to 2006-07 (1993-94 base)	NA	NA
12.	Meghalaya	1993-94 to 2004-05	NA	NA

S. No.	STATE	PUBLIC CAPITAL FORMATION	PRIVATE CAPITAL FORMATION	TOTAL (Public + Private) CAPITAL FORMATION
		(1993-94 base)		
13.	Odisha	1993-94 to 1998-99 [1999-2000(P)] (1993-94 base)	NA	NA
14.	Punjab	NA	NA	1979-80 to 1987-88 (1980-81 base) 1993-94 to 2002-03 (1993-94 base)
15.	Rajasthan	NA	NA	1975-76 to 1986-87 (1980-81 base) 1999-2000 to 2006-07
16.	Tamil Nadu	1980-81 to 1988-89 (1980-81 base) 1993-94 to 2004-05 (1993-94 base)	NA	NA
17.	Uttar Pradesh	NA	NA	NA
18.	West Bengal	1990-91 to 2004-05		1990-91 to 2004-05

Note: P = Provisional Estimates, Q = Quick estimates

Source: EPW Research Foundation

Non-availability of historical data on capital formation at State level is a serious limitation for estimating the state-level investment requirement during the Twelfth Plan corresponding to state level growth target. With this limitation, estimation of state specific investment requirement is attempted by applying sector wise national level ICOR to the State growth target. The methodology followed in arriving at the requisite figures is explained below.

- The very first step in this exercise is to disaggregate the GDP growth target at national level to State specific growth target across broad sectors, namely, Agriculture, Industry and Services.
- National level ICOR for these three sectors is computed for the Twelfth plan period from the national level ICOR estimated for nine sectors in the previous section.
- The three sector ICOR has been applied to the sector specific growth target (for three sectors) at the State level to arrive at sector wise investment requirement of the States.

- Sector specific investment requirement is added up to obtain total investment requirement of the States.

5.2 State specific Growth Target

Based on the national growth target, state-wise break up has been made on the basis of State specific economic performance since the year 2004-05. This is the new base year for which Gross State Domestic Product (GSDP) series is available with sector-wise break-up. The potential and constraints present in each State and scope for improvement, as per judgment of the working group, have been taken into account in this exercise. Since potential and constraints are best identified at the sectoral level, the aggregate growth performance of each State has been broken down into their sectoral components.

The distribution of national growth target among nine major sectors of the economy has been indicated in the **Table 15** in section III. Based on those numbers GDP growth target has been computed for three broad sectors as presented in **Table 23**. State-wise disaggregation of national targets for each of these sectors has been made keeping in view the requirement for sectoral consistency across the States, their past growth performance, future growth potential, and the need for the erstwhile slow growing States to expand faster than before so as to catch up with the rest of the Indian economy.

Table 23: Growth Target of GDPfc for Twelfth Plan: Across three broad sectors and overall

Alternative Scenarios	Agriculture	Industry	Services	Overall GDP
Scenario 1	3.5	8.0	8.9	8.0
Scenario 2	3.8	8.5	9.5	8.5
Scenario 3	4.0	9.1	10.1	9.0
Scenario 4	4.2	9.5	10.6	9.5

For the estimation of investment requirement at the sub national level the Working Group agreed to adopt only 9% GDP growth target scenario. Hence the State level growth target has been worked out pertaining to 9% growth target at the national level following the steps as described below.

1. In the first stage, contribution of each State to the overall growth performance of each of these three sectors at the national level has been assessed from the past data (covering GSDP

series of 2004-05 to 2010-11). The trend growth rate of sectoral GSDP has been taken as the basis for this purpose.

2. In the next stage, State specific growth rate for each sector has been specified in proportion to the national level growth target so that contribution of each State to the all India level sector specific growth target is maintained at the same level as that achieved during 2004-05 to 2010-11. This is a simple linear projection of the sectoral growth rates at state level.

3. The sectoral growth targets for each State have been then adjusted keeping in view the potentialities and constraints present in each State; and scope and need for improvement so that the erstwhile slow growing States realize their full potential. Here, the sector wise growth performance of States during the first four years of the Eleventh Plan is taken into consideration. The following adjustments have been made.

- In Agriculture & allied sector, there has been an upward adjustment for the states of Bihar, J & K, Kerala, and U.P. Agriculture in Kerala needs a special mention here. As per the prevailing rules in the State of Kerala, the land used for cultivation of paddy can not be put to other use and since paddy cultivation is not found to be lucrative, large patch of land remains fallow having implication for agriculture sector growth in the State. Downward revision has been carried out for states like Chhattisgarh, Gujarat, Maharashtra, Puducherry and Rajasthan, keeping in view their performance during the first four years of Eleventh plan.
- In Industrial sector, there is a significant upward adjustment for the states of Assam, Jharkhand and west Bengal. Downward adjustment has been carried out for Andaman & Nicobar Islands, Chandigarh, Delhi, Gujarat, Karnataka, Maharashtra and Nagaland.
- In Service sector, no adjustment has been made in this exercise, since all States have kept pace with all India growth performance in Service sector.

The sectoral growth targets so arrived at have been combined to estimate the State level GSDP growth targets for the Twelfth Plan period.

Table-24 below presents the sector-wise realization of economic performance in each State during the Eleventh Plan period. **Table 25** captures the realized sector specific growth rate in each State during 2005-06 to 2011-12. The State-wise distribution of GDP growth Target (consistent with the annual average GDP growth rate of 9% at the national level) for Twelfth Five Year Plan is given in **Table 26**. This assessment of State growth targets for the Twelfth

Plan is a unilateral exercise conducted by the Working Group. The Planning Commission may take a view after going through the process of State level consultations.

Table 24: State-wise and sector-wise Growth Rate of GSDP during the Eleventh Five Year Plan (2007-2012) (% per year)

S. NO.	State/ UT	Agriculture & allied	Industry	Services	Total
1	Andaman & Nicobar	4.3	-2.2	12.3	6.1
2	Andhra Pradesh	5.4	8.2	9.6	8.3
3	Arunachal Pradesh	5.6	13.9	10.2	9.4
4	Assam	4.8	4.5	8.9	6.9
5	Bihar	1.2	16.0	15.8	12.1
6	Chandigarh*	6.5	0.8	12.2	10.0
7	Chhattisgarh	6.7	7.3	11.2	8.4
8	Delhi	7.3	7.6	12.3	11.5
9	Goa	1.0	7.1	11.9	9.0
10	Gujarat	4.5	9.8	11.5	9.8
11	Haryana	3.4	7.0	12.6	9.1
12	Himachal Pradesh	1.1	8.2	11.8	8.1
13	Jammu&Kashmir	0.7	4.3	9.9	6.2
14	Jharkhand	7.9	4.6	10.2	7.3
15	Karnataka	5.7	5.3	10.3	8.0
16	Kerala	0.0	5.9	10.3	8.0
17	Madhya Pradesh	5.6	9.4	10.8	9.1
18	Maharashtra	1.9	8.1	9.9	8.6
19	Manipur	8.3	3.6	8.0	6.5
20	Meghalaya	3.3	12.4	9.3	9.1
21	Mizoram*	9.4	12.2	11.1	11.0
22	Nagaland	2.9	9.7	5.2	5.2
23	Odisha	3.4	8.3	10.3	8.2
24	Puducherry	11.5	8.7	9.1	9.0
25	Punjab	1.7	9.3	8.4	6.9
26	Rajasthan	6.6	5.2	9.1	7.2
27	Sikkim*	4.8	25.0	14.0	16.2
28	Tamil Nadu	1.1	4.9	11.1	8.3
29	Tripura	5.8	9.3	9.8	8.7
30	U.P.(divided)	3.0	5.4	9.6	6.9
31	Uttarakhand	2.5	12.3	13.8	11.6
32	West Bengal	2.8	5.1	9.7	7.3
	All India	3.3	6.6	9.8	7.9

* Growth rates are estimated for only the first 4 years of the Eleventh Plan because of lack of complete data

Calculations are based on GSDP data as on March 2012.

**Table 25: State-wise and sector-wise Growth Rate during (2005-06 to 2011-12)
(% per year)**

S. No.	State/ UT	Agriculture	Industry	Services	Total
1	Andaman & Nicobar	4.4	6.9	10.2	7.7
2	Andhra Pradesh	5.0	9.8	10.2	8.9
3	Arunachal Pradesh	5.0	10.1	9.5	7.9
4	Assam	4.1	2.7	8.7	6.0
5	Bihar	3.3	15.2	13.9	11.3
6	Chandigarh*	4.8	7.7	11.8	10.9
7	Chhattisgarh	7.3	9.4	10.5	9.2
8	Delhi	4.9	7.2	12.3	11.4
9	Goa	1.8	7.8	11.1	9.0
10	Gujarat	6.4	10.4	11.5	10.3
11	Haryana	4.2	7.5	12.8	9.4
12	Himachal Pradesh	1.5	9.0	11.4	8.3
13	Jammu&Kashmir	0.7	5.1	9.4	6.1
14	Jharkhand	8.0	0.7	9.7	5.1
15	Karnataka	5.1	7.4	10.6	8.7
16	Kerala	-0.2	6.6	10.8	8.3
17	Madhya Pradesh	5.4	9.8	9.7	8.6
18	Maharashtra	4.7	10.8	10.5	10.0
19	Manipur	5.9	3.9	7.5	5.8
20	Meghalaya	3.3	12.0	9.1	8.7
21	Mizoram*	6.6	13.1	9.2	9.3
22	Nagaland	2.5	11.4	7.1	6.3
23	Odisha	3.1	9.3	10.5	8.5
24	Puducherry	9.1	10.4	11.2	10.5
25	Punjab	1.8	11.3	8.2	7.2
26	Rajasthan	5.9	7.5	9.2	7.8
27	Sikkim*	3.9	19.8	12.4	13.4
28	Tamil Nadu	4.6	7.4	12.3	10.1
29	Tripura	5.7	9.9	8.6	8.2
30	U.P.(divided)	2.8	7.3	9.1	7.0
31	Uttarakhand	2.0	15.7	13.8	12.3
32	West Bengal	2.6	5.3	9.6	7.2
	All India	3.7	7.8	10.0	8.3

* Growth rates are estimated for the period from 2005-06 to 2010-11 because of lack of complete data
Calculations are based on GSDP data as on March 2012.

**Table 26: State-wise and sector-wise Growth Target for the Twelfth Five Year Plan
(2012-2017) (% per year)**

S. No.	State/ UT	Agriculture	Industry	Services	Total
1	Andaman & Nicobar	2.37	8.00	9.28	8.17
2	Andhra Pradesh	5.19	9.47	9.89	8.89
3	Arunachal Pradesh	2.96	9.25	10.88	8.72
4	Assam	3.82	5.00	9.74	7.63
5	Bihar	3.50	9.75	10.71	9.35
6	Chandigarh	4.05	6.00	10.79	10.23
7	Chhattisgarh	4.00	10.43	10.52	9.59
8	Delhi	-1.88	6.00	10.36	9.71
9	Goa	0.40	8.67	10.54	9.38
10	Gujarat	3.00	10.00	10.53	9.59
11	Haryana	3.43	9.35	10.36	9.18
12	Himachal Pradesh	5.07	9.54	9.45	8.84
13	Jammu&Kashmir	1.50	8.50	9.04	7.51
14	Jharkhand	6.36	5.00	9.86	7.57
15	Karnataka	4.63	8.50	9.78	8.70
16	Kerala	1.50	8.50	10.33	9.19
17	Madhya Pradesh	4.95	8.67	9.09	8.02
18	Maharashtra	5.00	9.75	10.41	9.83
19	Manipur	5.31	5.72	8.77	6.98
20	Meghalaya	3.12	9.63	9.60	8.62
21	Mizoram	6.86	10.74	9.66	9.29
22	Nagaland	2.34	10.00	10.20	8.55
23	Odisha	4.00	9.57	9.87	8.86
24	Puducherry	4.00	9.77	9.87	9.55
25	Punjab	2.62	9.75	9.33	8.10
26	Rajasthan	4.60	7.94	9.62	8.31
27	Sikkim	3.96	10.01	10.28	9.62
28	Tamil Nadu	4.30	8.64	10.80	9.79
29	Tripura	5.87	7.20	8.55	7.58
30	U.P.(divided)	3.50	9.08	9.69	8.32
31	Uttarakhand	2.04	10.00	10.59	9.64
32	West Bengal	3.25	9.00	9.81	8.59
	All India	4.0	9.1	10.1	9.0

It may be mentioned here that the exercise has not factored in the implication of National Manufacturing Policy, which aims at improving the share of manufacturing sector in GDP from present level of about 16% of GDP to 25% in coming 10 years. Growth implication of this for manufacturing sector would be substantial and may necessitate some upward revision in the growth target of Industry sector. Accordingly sectoral composition of GSDP growth target and GSDP growth target itself would undergo some revision.

5.3 Estimation of State Level Investment Requirements

The state level investment requirements have been worked out on the basis of the ICORs obtained at the national level for the various sectors and the projected GSDP growth rates of states at the sectoral level. The National level ICOR for the three broad sectors of the economy namely Agriculture, Industry and Services that has been worked out from the historical data has been used for the purpose. However, in reality, the State level ICOR for each sector would vary from that of national ICOR because:

- ICOR, which is a summary expression of the relationship between investment and output, varies from one sub-sector to the other depending on the capital intensity of the sub-sectors within the broad sectoral groupings. For example, within the Industrial sector the ICOR is maximum for the power sub-sector, particularly in case of hydro-electric power. The ICOR could be relatively low for the manufacturing (unregistered) sub-sector. So the ICOR for the industry as a whole is the weighted average of the ICOR of the sub-sectors and determined by the relative shares of the sub-sectors within the broad head industry. The same principle applies to other sectors like Agriculture and Services. To the extent that there is inter-State variation in the structural composition of each broad sectors, there will be divergence in the Sectoral ICORs from state to state.
- ICOR, as a measure of capital efficiency, is also influenced by factors other than technology like gestation lag for investment. Gestation lag could vary from State to State partly due to technical reasons but mostly due to the inter-state variation in quality of governance, which is reflected both in policy directives and their implementation at the State level.
- The computed ICOR, worked out on the basis of historically observed time-series, subsumes excess capacity existing in the system. Excess capacity can be higher during the economic down turn, especially when the slowdown is caused by demand constraint. It can

be appreciated that extent of excess capacity can not be uniform across the States. Application of all India level ICOR uniformly to all States violates this principle.

The ICOR for the three broad sectors such as Agriculture, Industry and Services for the Twelfth Five Year are estimated as 5.32, 6.48 and 2.95 respectively as referred to in section III of this report). These sectors specific ICOR are applied to sector specific growth target worked out for each States as presented in **Table 26** to arrive at State wise and sector wise investment requirement both as percentage of sectoral GSDP and total GSDP. **Table-27** presents sector specific required rate of Gross Fixed Capital Formation for each State during the Twelfth Five Year Plan.

Table 27: State-wise and sector-wise Rate of Gross Fixed Capital Formation-Twelfth Five Year Plan (2012-2017) (% of sectoral GSDP)

S. No.	State/ UT	Agriculture & allied	Industry	Services	Total
1	Andaman & Nicobar	12.15	48.00	25.06	32.87
2	Andhra Pradesh	25.91	54.75	26.56	33.42
3	Arunachal Pradesh	15.11	52.58	28.95	33.58
4	Assam	19.33	36.68	26.17	26.73
5	Bihar	17.99	63.49	28.54	33.61
6	Chandigarh	20.44	30.86	28.72	28.89
7	Chhattisgarh	20.46	58.66	28.07	42.32
8	Delhi	0.00	30.86	27.69	28.00
9	Goa	2.11	49.56	28.13	35.99
10	Gujarat	15.50	57.92	28.10	38.96
11	Haryana	17.44	53.09	27.70	33.92
12	Himachal Pradesh	25.39	54.09	25.48	38.27
13	Jammu&Kashmir	7.86	48.63	24.45	29.09
14	Jharkhand	31.46	36.68	26.47	30.84
15	Karnataka	23.25	53.13	26.29	33.91
16	Kerala	7.86	51.17	27.61	31.03
17	Madhya Pradesh	24.78	56.22	24.58	33.63
18	Maharashtra	25.33	57.33	27.81	36.19
19	Manipur	26.52	33.61	23.79	27.46
20	Meghalaya	15.91	54.57	25.84	32.64
21	Mizoram	33.74	60.21	25.99	34.93
22	Nagaland	12.03	63.89	27.30	29.81
23	Odisha	20.46	56.22	26.49	36.18
24	Puducherry	20.46	55.27	26.50	39.45
25	Punjab	13.40	57.37	25.17	34.05
26	Rajasthan	22.91	46.50	25.88	31.82
27	Sikkim	20.02	56.47	27.51	39.00
28	Tamil Nadu	21.68	50.76	28.76	33.82
29	Tripura	29.14	41.72	23.24	28.81
30	U.P.(divided)	17.99	52.64	26.06	31.06
31	Uttarakhand	10.51	57.15	28.24	36.99
32	West Bengal	16.53	53.50	26.36	29.78
	All India	20.41	53.86	26.05	32.86

The rate of GCF (GFCF plus Change in Stocks) for each State along with its sectoral distribution has been computed by applying the average ratio of GCF to GFCF (1.099) obtained from the National level data. The State specific required rate of GCF for the Twelfth Plan is given in **Table-28**.

Table 28: State-wise and sector-wise Investment in Twelfth Five Year Plan (2012-2017) as % of Total GSDP

S. No.	State/ UT	Agriculture	Industry	Services	All sectors
1	Andaman & Nicobar	1.11	20.43	14.59	36.13
2	Andhra Pradesh	5.25	14.90	16.58	36.73
3	Arunachal Pradesh	3.28	17.99	15.63	36.91
4	Assam	4.20	7.33	17.85	29.38
5	Bihar	3.03	13.34	20.57	36.94
6	Chandigarh	0.11	3.36	28.27	31.75
7	Chhattisgarh	2.92	32.10	11.48	46.51
8	Delhi	0.00	4.30	26.47	30.77
9	Goa	0.08	22.22	17.25	39.55
10	Gujarat	1.54	25.63	15.65	42.82
11	Haryana	2.29	17.12	17.88	37.28
12	Himachal Pradesh	4.06	26.61	11.39	42.06
13	Jammu&Kashmir	1.47	16.50	14.00	31.97
14	Jharkhand	6.11	13.76	14.02	33.89
15	Karnataka	3.30	17.44	16.53	37.27
16	Kerala	0.67	11.82	21.61	34.10
17	Madhya Pradesh	6.02	17.58	13.36	36.96
18	Maharashtra	1.89	18.24	19.64	39.77
19	Manipur	6.92	11.35	11.91	30.17
20	Meghalaya	2.52	17.19	16.16	35.87
21	Mizoram	7.78	14.14	16.46	38.39
22	Nagaland	2.57	10.52	19.67	32.76
23	Odisha	3.29	21.97	14.51	39.76
24	Puducherry	0.98	27.91	14.47	43.36
25	Punjab	2.84	21.84	12.73	37.42
26	Rajasthan	3.75	15.83	15.40	34.97
27	Sikkim	1.82	25.96	15.09	42.87
28	Tamil Nadu	1.55	14.00	21.62	37.17
29	Tripura	7.76	10.27	13.63	31.66
30	U.P.(divided)	3.74	14.22	16.19	34.14
31	Uttarakhand	0.93	22.10	17.63	40.65
32	West Bengal	2.81	10.70	19.21	32.73
	All India	2.69	16.02	18.03	36.75

It may be noted here that GSDP numbers are always estimated at factor cost only. Therefore the rate of GFCF or GCF is expressed in terms of GSDP at factor cost in the State level

exercise. As can be observed, both sector specific investment requirement and total investment requirement in terms of GSDP vary widely across States, even if national level ICORs for Agriculture, Industry and Services (5.32, 6.48, and 2.95 respectively) have been uniformly applied to all States. This variation can be explained by inter-State divergence in the growth targets as well as differences in the composition of GSDP across the three broad sectors.

VI. CONCLUSIONS

The findings of this report have been based on a number of exercises. These include (a) estimation of GDP growth target across nine production sectors for the Twelfth Five Year Plan period under four different GDP growth scenarios, (b) estimation of Plan wise cumulative ICORs for the nine sectors from the observed time series, (c) computation of required rate of GFCF or GCF for the 12th Plan corresponding to the alternative growth scenarios, (d) projection of investment by Private Corporate Sector and House Hold Sector, (e) distribution of national growth target to State specific growth targets and (f) estimation of State level investment requirements in terms of corresponding GSDP growth targets.

At the national level, the exercise is limited to four GDP growth target scenarios: annual average growth rates of 8%, 8.5%, 9% and 9.5%. The sectoral growth targets have been estimated through linear projections within an inter-sectoral consistency frame work. At the state level, investment requirements are worked out taking only the 9% GDP growth target scenario. The state level estimates may require further calibration on the basis of growth rates of GSDP for each state that may be decided in the consultations of the Planning Commission with the states.

The required investment rate for the 12th five year plan for the economy as whole, based on GFCF, works out to be 32.9% of GDP at factor cost under the 8% growth target scenario. The realised rate of capital formation during Tenth and Eleventh Plan periods are estimated as 32% and 37%, respectively. The required investment rate computed by the working group is higher than the 10th plan figure but less than what was realized during 11th five year plan. It is worth indicating here that the realized ICOR has been the lowest during 10th plan among the recent three plans and much higher during the 11th plan. The exercise by the working group adopts the average ICOR of both 10th and 11th plan. The required investment rate accordingly has been placed within the limits of 10th and 11th plan realization.

It is difficult to make an assessment of state level investment requirement in the absence of availability of time series data pertaining to state level capital formation. The working group has attempted to make projections for state level investment requirement during twelfth plan on the basis of ICOR estimated for national level, which has been applied to sector-specific GSDP target. State level projection has been made only for a 9 per cent growth target

scenario. State level investment projection was consistent with national level investment requirement worked out for the twelfth plan.

Public investment in our exercise is assumed to be stable at 8.5% of GDP. Although share of public investment in total capital formation has shown some increasing trend during 11th plan, this increasing trend is attributable to economic slow down and its impact on private investment. During the Twelfth Plan, there is an expectation that the fiscal correction path imposed by FRBM legislation would be adhered and this may limit further increase in public investment as a ratio to GDP. Therefore, it would be critical to create necessary climate for raising investment by the private corporate sector and house hold sector to meet the required investment level for achieving the targeted growth rate of GDP.

ANNEXURE-I

F.No. N-12012/5/2011-PP
Planning Commission
(PP Division)

Yojana Bhawan, Sansad Marg,
New Delhi 110001
Dated: - 04.05.2011

ORDER

Subject: Formulation of the Twelfth Five Year Plan (2012-17) - Constitution of Working Group on Estimation of Investment, its Composition and Trends - Regarding.

In the context of the formulation of the Twelfth Five Year Plan (2012-17), it has been decided to set up a Working Group for Estimation of Investment, its Composition and Trends for Twelfth Five year Plan (2012-17).

2. The Composition of the Working Group is as under:

1.	Sh. Shashank Bhide, DG, National Council for Applied Economic Research, New Delhi	Chairperson
2.	Sh. Ramesh Kolli, former ADG, National Accounts Division, Central Statistical Office, MOSPI	Member
3.	Ms. T.Rajeshwari, DDG, NAD, MOSPI	Member
4.	Prof. Basant Pradhan, DPC, IEG, Delhi	Member
5.	Sh. B.D.Virdi, Adviser (DPPD), Planning Commission	Member
6.	Representative of RBI	Member
7.	Ms. Sibani Swain, Director, PP division, Planning Commission	Member Secretary

3. The Terms of Reference are as follows:-

- (a) Assessment of the current investment scenario.
- (b) Estimation of the aggregate investment requirement broad sector-wise during the Twelfth Five Year Plan for achieving GDP growth target.
- (c) Projection of private investment demand comprising corporate investment and household sector investment.

4. The expenses towards TA/DA of the official members in connection with the meetings of the Working Group will be borne by the parent Department/Ministry/Organization to which the official belongs, as per the rules of entitlement applicable to them. The non-official members of the Working Group will be entitled to avail TA/DA facilities as admissible to Grade I officers of the Government of India and this expenditure will be borne by the Convener Department.

5. The Chairperson of the Working Group, if deemed necessary, may constitute Sub-Groups / Taskforce and / or may co-opt additional members.

6. The Working Group may co-opt as members, officials/ non officials/ experts/representatives of other agencies, if required.
7. The Working Group will submit its report in 3 months time from the date of its constitution.

(Sibani Swain)
Director (PP)
Tel.No.23096634

Copy forwarded to:

1. Chairperson and Members of the Working Group
2. PS to Deputy Chairman, Planning Commission
3. PS to MOS (P&PI)
4. PS to All Members of Planning Commission
5. PS to Member Secretary, Planning Commission
6. PS to Secretary (Expenditure), Department of Expenditure
7. Ministry of Finance (Plan Finance Division)
8. PS to Secretary, Ministry of Home Affairs, New Delhi
9. Pr. Adviser/ Sr. Consultants/ Advisers/ JS (Admn.) /Heads of Division, Planning Commission
10. I.F.Cell, PC Division, Planning Commission.
11. Admn.I/Accounts I/Genl I & II Sections, Planning Commission
12. Information Officer, Planning Commission
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