

## LINKAGE BETWEEN PUBLIC EXPENDITURE ON EDUCATION AND ECONOMIC GROWTH IN INDIA

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### Abstract

*This paper delineates the trend and changing pattern of public expenditure on education and economic growth in 15 major states in India during the period from 1990-91 to 2013-14 and to examine the interrelationship between education expenditure and with economic growth in India. The study is based on secondary data from 1991 to 2014 collected from World Bank Development indicators, Finance Accounts of the State Governments, RBI-State Finances. For estimating the interrelationship this study has used the econometric methods like-unit root test, for testing the stationarity, for knowing causality padroni co-integration has used. India witnessed a persistent decline in social sector expenditure like health and education after the inception of New Economic Reform. The analysis depicts a declined trend and pattern of expenditure on education in the major states since the introduction of economic reforms. Regarding the linkage among public expenditure on education and economic growth in major states of India, by estimating causality and cointegration test, the analysis depicts that there exists a negative relationship between expenditure on education and economic growth in India.*

**Key Words:** Education, Economic Growth, Causality, India, Policy

**JEL Classification:** I25, I38

### Introduction

Education is the supreme form of wealth and is the fulcrum of every kind of development. It has both intrinsic and instrumental value; it is desirable not only for the individual but also for the society (Sen, 1999). In some of the developing countries where more than half of the population have not been to the classroom, it is important to first get the children enrolled before ensuring the quality of the educational system. The government outlay on education in India is about 4.1 per cent of GDP which is lower than the global weighted average of 4.9 per cent (UNDP report). While the developed countries like- U.S and U.K, it was 5.5 per cent of their GDP (Mishra and Mishra 2012). The Government of India (GOI) has accepted to invest 6% of GDP on education. Even after three decades of such resolution it is around 3% per annum (Education policy 1992). Prominent classical and neoclassical economist such as -Adam Smith, Romer, Lucas and Solow highlighted the contribution of education in developing their economic growth theories and models. The main theoretical approaches of modeling the relationships between education and economic performance are the neoclassical growth models of Robert Solow (1957) and the model of Romer (1990). Apart from the theoretical aspects, numerous empirical studies have absorbed on the issue of education and economic development. According to Marshall, the most valuable of all capital is that invested in human beings

(Kesharwani and Sinha, 2008). Education is not only a source of human capital but it is one of the important sources. The most prosperous economies of the world today exhibit the higher rate of educational attainment (UNDP, 2007). Denison (1967) is one of the first to focus on investing in education, which is thought to have effect on growth and development. Investment in education can boost growth and development by encouraging activities that can help catch up with technological progress. Human capital expenditure is an emerging issue in the recent era of 21<sup>st</sup> century. It implies expenditure on education is productive. When people are educated, they are more active and passionate in their productive fields. Since the last three and half decades, several macroeconomic policy changes during the structural adjustment programme have been initiated by governments. The critical macroeconomic policies change happened in India during the adjustment period were 1991 fiscal crisis, Fifth Pay Commission recommendations 1998, FRBM act 2003, and recently Economic Crisis 2008 respectively. The above macroeconomic policies have certain impacts on public expenditure on health and education directly or indirectly. Recently the public expenditure in India was hovering around one percent for health and three percent for education which registered one of the lowest among the developed as well as South-East Asian countries, except for Pakistan (Hooda, 2013). The shortage of public outlay in recent years, private expenditure on

education have steadily increased which is leading to inter-regional and inter-personal inequalities across the country (World Bank, 2016). Even with the limited funds, proper utilization of it helped to achieve better health and education outcomes as experienced by Sri Lanka and China (WHO, 2017). Looking at the overall health and education sector performance and their status of the people in India, it failed to deliver the constitutional commitment of "Right to Education" for all.

Based on Afridi (2016), Arabi & Abdalla (2013) who tried to estimate the causal relationship among human capital and economic growth. They concluded that there is a positive relationship between these variables. According to Hassan & Kalima (2012) they studied in Pakistan over the period 1972-2009 they found that there is both Short-run and Long-run relationship between human capital and economic growth in Pakistan. In the study of Khan (2012), Khan et al (2015) Asghar et al (2015) conducted that in Pakistan there is a unidirectional relationship between these variables. According to Baldacci et al. (2004) have attempted to studies in the sample of 120 developing countries, using the panel regression model they found that there is a positive effect on spending on education and health in economic growth. Further Mishra & Mishra (2012) have attempted to study about the relationship between human capital and economic growth by using Toda & Yamamoto Causality test they found that govt. spent 49% on education whereas in health it was 21%. Hence there exist a unidirectional relationship between these above stated variables.

### **Reforms and Expenditure in Social Sector Expenditure in India**

Since in the era of reforms began in mid-1991 which gives an unsatisfactory result with respect to social indicators, the relevant question to be considered is not what the situation would have been in the absence of reforms, but what it ought to be and whether the process of reform can enable such goals to be achieved. The impact of reforms based on initial conditions, growth rates and political commitment of state governments towards education, health, and nutrition. Initial conditions showed a wide variation in attainment, lack of correspondence between economic performance and social conditions, low government expenditure in low attainment states, a distorted pattern of expenditure skewed towards tertiary facilities in urban areas, and under-utilization of existing infrastructure. The increase in real per capita expenditure on social services between 1986-91 (pre-reform period) and 1991-96 (reform period) has been lower than that of real per capita total

expenditure. There was generally a reduction in the share of revenue allocated to social sectors during the reform years. According to (Dreze and Sen, 1995). In the beginning of the reforms in 1991 lagged the levels achieved in Southeast Asia 20 years earlier, where India's adult literacy rate in 1991 was 52 percent, compared with 57 percent in Indonesia and 79 percent in Thailand in 1971. The gap in social development required to be closed, not only to progress the welfare of the poor and enhance their income earning capacity, but also to create the preconditions for rapid economic growth. While the economic reforms required a withdrawal of the state from areas in which the private sector could do the job just as well, it also required an enlargement of public sector support for social sector development.

There have been several literatures dealing with public expenditure on education and its causal nexus to economic growth, most of the studies by Chandra (2011), Kyophilavong et al (2018), Eggoh et al (2015), Islam (2014), have clearly stated that there is a bi-directional relationship between public expenditure on education and economic growth. Nowak and Dahal (2016), applying co-integration test they have found that the GDP of developing growth and education is positive. Teles and Andrade (2007) have studied during the period 1991-2001, they found that there is a negative relationship between education expenditure and economic growth. Ray et al (2012) have found that 1% change in education leads 93% change in growth. After that they clearly stated that there does not exist any types of linkages among public expenditure on education and economic growth. This paper is the modest attempt to analyze the entire problem of Co-integration and Causality between expenditure on education and economic growth in India at panel level by adopting updated data and methodology.

### **Objectives of the study**

In the view of the above stated studies, this paper attempts to examine the following:

- 1) To analyze the trend and changing pattern of public expenditure on education in major states India.
- 2) To investigate the interrelationship between expenditure on education and economic growth in major states of India.

### **Hypotheses**

The hypotheses to be tested are as follows

- (a) There has been a significant decline in public expenditure on education in major states of India in the period 1991-2014.

(b) There is no significant relationship between expenditure on education and economic growth in all the major states of India.

### Database and Methodology

The present study is completely depends upon secondary sources of data from various government sources and plan documents. The data on Govt. expenditure on education are collected from RBI's annual report on State Government finance published in the RBI Bulletin, World Bank Development indicators, Finance Account of the State Governments, CMIE data base. For examining the trend and pattern of education expenditure, the present study has used simple Tabular and Graphical exercise and for estimating growth it depends on CAGR (Compound Annual Growth Rate). Again, to observe the interrelationship between education expenditure and GDP growth at aggregate level the study has used Panel Unit root test and Padroni Co-integration Test.

### Public expenditure on education: Types and Measurement

The government expenditure on social sector includes education, health, housing, employment, social security scheme, subsidy towards food security etc. But education constitute the major components of the Government financing. Mainly there are three sources of financing on education in India i.e., financing through central government, state government and non-government sector. Components of public expenditure on education

have 4 different types, they are—(a) Revenue Expenditure- (b) Capital Expenditure: (c) Plan and Non-plan expenditure.

### Changing Pattern of Public Expenditure on Education in Major States of India

The trend and changing pattern of education expenditures included by both central, state government are briefly described separately – (1) represent the Trends of Public Education Expenditure both Central and State Governments in India (aggregate level), (2) represent the Trends of Public Education Expenditure by the State Governments in India. (Disaggregate level)

### Trends of Education Expenditure by Central and State Governments in India (Aggregate level)

The trend and changing pattern of education expenditures included by both central, state government are briefly described in this section. There are mainly four components of public expenditure education. They are (a) Education (b) Sports (c) Art and (d) culture. Basically, there are five parts - (1) Trends in revenue expenditure on education (2) Trends in capital expenditure on education (3) Trends in plan expenditure on education (4) Trends in non-plan expenditure on education (5) Trends in total education expenditure on education. Expenditure on education has separately analyzed for central and state governments under revenue, capital, plan, and non-plan heads.

**Table: 1 Components wise share of Education Expenditure as a Percentage of GDP (all India)**

Year	Rev Exp as % of GDP	Cap Exp as % of GDP	Plan exp as % of GDP	Non-plan Exp as % of GDP	EDU as % of GDP
1991	2.78	0.05	0.28	2.55	2.83
1992	2.74	0.04	0.28	2.50	2.78
1993	2.62	0.04	0.28	2.38	2.66
1994	2.58	0.04	0.33	2.29	2.62
1995	2.54	0.04	0.34	2.24	2.58
<b>1991-95</b>	<b>2.65</b>	<b>0.04</b>	<b>0.30</b>	<b>2.39</b>	<b>2.69</b>
1996	2.50	0.03	0.35	2.18	2.53
1997	2.51	0.03	0.34	2.21	2.54
1998	2.68	0.03	0.34	2.37	2.71
1999	2.96	0.02	0.35	2.63	2.98
2000	2.94	0.02	0.32	2.63	2.96
<b>1996-00</b>	<b>2.72</b>	<b>0.03</b>	<b>0.34</b>	<b>2.40</b>	<b>2.74</b>
2001	2.72	0.02	0.32	2.42	2.74
2002	2.61	0.02	0.25	2.38	2.63
2003	2.45	0.02	0.25	2.23	2.47
2004	2.33	0.03	0.31	2.06	2.37

2005	2.30	0.05	0.36	1.99	2.36
<b>2001-05</b>	<b>2.48</b>	<b>0.03</b>	<b>0.30</b>	<b>2.22</b>	<b>2.51</b>
2006	2.27	0.06	0.40	1.93	2.33
2007	2.20	0.07	0.44	1.83	2.27
2008	2.45	0.11	0.56	1.99	2.55
2009	2.53	0.07	0.50	2.11	2.61
2010	0.26	0.01	0.06	0.21	0.27
<b>2006-10</b>	<b>1.94</b>	<b>0.06</b>	<b>0.39</b>	<b>1.61</b>	<b>2.00</b>
2011	0.26	0.01	0.06	0.21	0.26
2012	0.26	0.01	0.06	0.20	0.27
2013	0.26	0.01	0.06	0.20	0.27
<b>2011-13</b>	<b>0.26</b>	<b>0.01</b>	<b>0.06</b>	<b>0.21</b>	<b>0.27</b>
<b>MEAN</b>	<b>1.46</b>	<b>0.02</b>	<b>0.18</b>	<b>1.30</b>	<b>1.48</b>
<b>S.D</b>	<b>1.69</b>	<b>0.02</b>	<b>0.17</b>	<b>1.55</b>	<b>1.72</b>
<b>C.V</b>	<b>116.18</b>	<b>103.31</b>	<b>93.88</b>	<b>119.05</b>	<b>115.98</b>
<b>CAGR</b>	<b>-1.00</b>	<b>-0.99</b>	<b>-0.99</b>	<b>-1.00</b>	<b>-1.00</b>

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

Table-1 explains the expenditure on education incurred by the govt. both at central and state levels .At the central level the education expenditure as a percentage of GDP has been declining from 2.69 percent in the year 1991-95 to 2.65 percent in the period 2011-13.The compound annual growth rate shows a negative sign and it is -1.00 percent .The annual average growth rate was 8.19 percent in the

year 1996-00 than it has been declining to (-25.09 )percent during 2011-13.The same pattern can be observed for the states also ,where it has been declining constantly .The percentage share of education expenditure was 44.26 during 1991-95 to 4.16 in the year 2011-14.From the data, it is clearly shows that the education expenditure by the central and states govt. is very irregular.

**Table-2 Trends in Annual Average Growth rate of all the components of Education Expenditure**

<b>Year (India)</b>	<b>AAGR RE</b>	<b>AAGR CE</b>	<b>AAGR PLAN</b>	<b>AAGR N PLAN</b>	<b>AAGR EDU</b>
1991	0.00	0.00	0.00	0.00	0.00
1992	1.52	-2.20	1.51	1.46	1.46
19	-0.71	-10.44	4.34	-1.44	-0.86
1994	2.58	4.68	21.05	0.44	2.61
1995	3.57	3.09	8.56	2.85	3.56
<b>1991-95</b>	<b>1.39</b>	<b>-0.97</b>	<b>7.09</b>	<b>0.66</b>	<b>1.36</b>
1996	8.65	-2.92	33.68	5.29	8.48
1997	3.01	-4.61	-1.05	3.55	2.91
1998	11.60	7.80	4.05	12.70	11.55
1999	17.14	-33.04	9.45	17.55	16.54
2000	1.53	-6.67	-4.70	2.29	1.48
<b>1996-00</b>	<b>8.39</b>	<b>-7.89</b>	<b>8.29</b>	<b>8.28</b>	<b>8.19</b>
2001	12.03	-0.64	6.31	12.70	11.91
2002	-1.69	-9.07	-18.96	0.52	-1.76
2003	-0.47	24.86	2.66	-0.58	-0.27
2004	0.51	41.48	30.96	-2.39	0.92
2005	6.45	64.82	28.44	4.13	7.26
<b>2001-05</b>	<b>3.37</b>	<b>24.29</b>	<b>9.88</b>	<b>2.88</b>	<b>3.61</b>

2006	11.28	132.74	62.43	6.05	12.80
2007	4.57	31.32	18.20	2.57	5.27
2008	17.00	54.50	34.81	14.22	18.21
2009	10.95	-28.65	-5.77	13.54	9.28
2010	-89.02	-89.56	-87.57	-89.39	-89.04
<b>2006-10</b>	<b>-9.05</b>	<b>20.07</b>	<b>4.42</b>	<b>-10.60</b>	<b>-8.70</b>
2011	-83.66	-89.51	-82.31	-84.23	-83.85
2012	4.68	16.03	14.33	2.34	4.92
2013	3.34	17.82	4.45	3.43	3.67
<b>2011-13</b>	<b>-25.21</b>	<b>-18.55</b>	<b>-21.18</b>	<b>-26.15</b>	<b>-25.09</b>

The annual average growth rate also shows that the growth rate has declining over the years, it was 24.29 during the period 2000-05 and after that it had declined continuously 20.07 to -18.55 percent during

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

2006-10 to 2011-14 respectively.

**Table 3. Components wise Share of Education Expenditure as a Percentage of GSDP (all States)**

Year	RE as % GSDP	CE as a % GSDP	Plan as a % GSDP	Non plan as a % GSDP	EDU as a % GSDP
1991	44.90	0.80	4.54	41.16	45.70
1992	44.50	0.75	4.89	40.37	45.25
1993	43.83	0.65	5.20	39.28	44.48
1994	42.91	0.60	5.88	37.63	43.51
1995	41.83	0.54	6.02	36.36	42.38
<b>1991-95</b>	<b>43.59</b>	<b>0.67</b>	<b>5.31</b>	<b>38.96</b>	<b>44.26</b>
1996	41.30	0.42	6.20	35.52	41.72
1997	42.03	0.37	6.35	36.04	42.39
1998	45.32	0.52	6.26	39.58	45.84
1999	48.81	0.30	6.30	42.82	49.12
2000	47.77	0.20	5.64	42.32	47.96
<b>1996-00</b>	<b>45.04</b>	<b>0.36</b>	<b>6.15</b>	<b>39.25</b>	<b>45.40</b>
2001	42.71	0.24	5.15	37.80	42.95
2002	41.31	0.20	3.59	37.92	41.51
2003	38.84	0.20	3.39	35.66	39.05
2004	37.27	0.22	3.80	33.70	37.50
2005	36.22	0.51	4.64	32.08	36.73
<b>2001-05</b>	<b>39.27</b>	<b>0.27</b>	<b>4.11</b>	<b>35.43</b>	<b>39.55</b>
2006	35.56	0.53	4.86	31.23	36.09
2007	34.67	0.72	5.57	29.82	35.39
2008	36.49	0.81	5.93	31.37	37.30
2009	8.72	0.23	1.64	7.32	8.95
2010	4.02	0.08	0.79	3.32	4.11
<b>2006-10</b>	<b>23.89</b>	<b>0.48</b>	<b>3.76</b>	<b>20.61</b>	<b>24.37</b>
2011	4.04	0.07	0.80	3.31	4.11
2012	4.14	0.08	0.89	3.33	4.22
2013	3.90	0.10	0.85	3.32	4.17
<b>2011-14</b>	<b>4.03</b>	<b>0.08</b>	<b>0.85</b>	<b>3.32</b>	<b>4.16</b>
<b>MEAN</b>	<b>23.81</b>	<b>0.37</b>	<b>3.08</b>	<b>21.14</b>	<b>24.21</b>
<b>SD</b>	<b>27.98</b>	<b>0.42</b>	<b>3.15</b>	<b>25.20</b>	<b>28.35</b>
<b>CV</b>	<b>117.50</b>	<b>111.07</b>	<b>102.52</b>	<b>119.22</b>	<b>117.10</b>
<b>CAGR</b>	<b>-1.00</b>	<b>-0.99</b>	<b>-0.99</b>	<b>-1.00</b>	<b>-1.00</b>

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

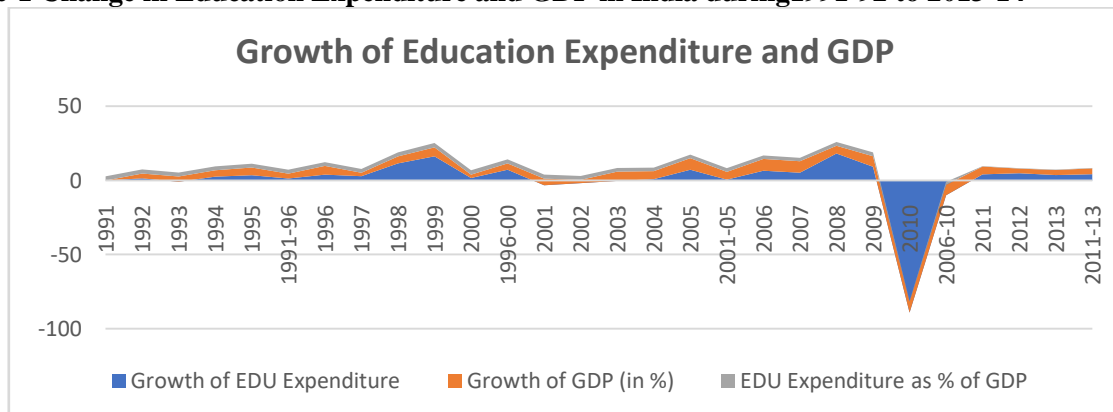
**Table-4 Trends in Annual Average Growth rate of all the components of Education Expenditure of Central Government**

Year	AAGR RE	AAGR CE	AAGE PL	AAGR N PL	AAGR EDU
1991	0.00	0.00	0.00	0.00	0.00
1992	2.32	-2.36	11.03	1.25	2.22
1993	2.00	-10.48	10.19	0.78	1.80
1994	2.13	-3.60	18.04	-0.09	2.03
1995	2.55	-4.67	7.64	1.66	2.47
<b>1991-95</b>	<b>1.80</b>	<b>-4.22</b>	<b>9.38</b>	<b>0.72</b>	<b>1.70</b>
1996	4.56	-18.63	9.14	3.45	4.26
1997	4.13	-9.64	4.80	3.83	3.98
1998	12.90	46.67	3.18	14.97	13.21
1999	14.20	-39.09	6.69	14.70	13.61
2000	0.07	-32.84	-8.46	1.09	-0.14
<b>1996-00</b>	<b>7.17</b>	<b>-10.71</b>	<b>3.07</b>	<b>7.61</b>	<b>6.98</b>
2001	-6.60	26.67	-4.54	-6.71	-6.45
2002	-1.17	-14.04	-28.87	2.52	-1.25
2003	-0.08	8.16	0.34	-0.08	-0.04
2004	1.12	15.09	18.08	-0.40	1.21
2005	4.77	145.90	31.96	2.64	5.61
<b>2001-05</b>	<b>-0.39</b>	<b>36.36</b>	<b>3.39</b>	<b>-0.40</b>	<b>-0.19</b>
2006	5.97	13.33	12.91	5.07	6.06
2007	5.05	46.47	23.44	2.90	5.66
2008	10.73	18.47	12.12	10.65	10.88
2009	-74.40	-69.49	-70.44	-75.02	-74.30
2010	-50.43	-61.11	-48.19	-51.26	-50.70
<b>2006-10</b>	<b>-20.62</b>	<b>-10.46</b>	<b>-14.03</b>	<b>-21.53</b>	<b>-20.48</b>
2011	5.77	-14.29	6.97	4.90	5.30
2012	5.56	16.67	13.88	3.85	5.81
2013	3.09	28.57	-0.75	3.11	2.30
2014	-11.16	-31.11	20.80	-18.55	-10.53
<b>2011-14</b>	<b>0.82</b>	<b>-0.04</b>	<b>10.23</b>	<b>-1.67</b>	<b>0.72</b>

Source- Author’s compilation from handbook of statistics on State Government Finance, RBI (by authors)

In the above table -3&4 indicates that, the compound annual growth rate of revenue expenditure and coefficient of variation are just -0.99 percent and 83.17 percent, respectively over the same started period. On the other hand, revenue expenditure of the state governments has been declining from 43.59 percent during 1991-95 to 4.03 in the period 2011-14 (Table-3). The annual average growth of revenue expenditure has been declining from 14.20percent in the year 1999 to (-11.16) percent in the year 2014(Table-4). The declining trend of revenue expenditure of central and state government is because of fiscal prudence in recent years.

**Figure-1 Change in Education Expenditure and GDP in India during1991-92 to 2013-14**



Source-computed by authors

**Table-5 Growth of Education Expenditure and GDP in India, 1991-2014**

YEAR	Growth of EDU Expenditure	Growth of GDP (in %)	EDU Expenditure as % of GDP	YEAR	Growth of EDU Expenditure	Growth of GDP (in %)	EDU Expenditure as % of GDP
1991	0.00	0.00	2.83	2003	-0.27	6.26	2.47
1992	1.46	3.24	2.78	2004	0.92	5.39	2.37
1993	-0.86	3.57	2.66	2005	7.26	7.82	2.36
1994	2.61	4.30	2.62	<b>2001-05</b>	<b>0.59</b>	<b>5.22</b>	<b>2.51</b>
1995	3.56	5.20	2.58	2006	6.60	7.95	2.33
<b>1991-96</b>	<b>1.36</b>	<b>3.26</b>	<b>2.69</b>	2007	5.27	7.74	2.27
1996	3.95	5.90	2.53	2008	18.21	5.21	2.55
1997	2.91	2.33	2.54	2009	9.28	7.09	2.61
1998	11.55	4.70	2.71	2010	-89.04	7.44	0.27
1999	16.32	6.02	2.97	<b>2006-10</b>	<b>-9.94</b>	<b>7.09</b>	<b>2.00</b>
2000	1.68	2.27	2.96	2011	4.15	5.28	0.26
<b>1996-00</b>	<b>7.28</b>	<b>4.24</b>	<b>2.74</b>	2012	4.92	3.12	0.27
2001	-3.19	4.45	2.74	2013	3.67	3.41	0.27
2002	-1.76	2.19	2.63	<b>2011-13</b>	<b>4.24</b>	<b>3.94</b>	<b>0.27</b>

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

In order to examine whether expenditure on education has been keeping pace with economic growth, the percentage growth of the two variables were examined during the entire study period. It is clear from the figure-1 and table-5 that education expenditure as a proportion of GDP has been largely constant around 2 percent during 1991-92 to 2011-13. The stationary nature of education expenditure as a proportion of GDP explains the macro prospective of govt. financing of education sector outlay in India, in the study period. The figure-1 indicates a similar pattern or path of education expenditure diverge from GDP and touched the negative part of horizontal axis. During the whole time period Growth line of Education expenditure touched the negative phase in the year 1993, 2001, 2002, 2003 and 2010 respectively. The

same fluctuation was observed for the growth curve of GDP but it never touches the negative phase or below the horizontal axis.

#### **Education Expenditure by the State Governments (Disaggregate level)**

The same data base has applied to study the education expenditure pattern of all major states in India. To present a comparative Picture of state's financing pattern vis-à-vis level of GDP growth, the present study tried to analyze the education Expenditure of the states, again dividing them into two categories like economically developed (or richer states) and economically less Developed states (or poorer states) according to their GSDP during 1991-2014. The Median value was used as the threshold for categorizing the states.

**Table-6 State According to Order of Average GSDP per capita, 1991-2014(Rs)**

State	1991-95	1996-00	2001-05	2006-10	2011-14
<b>Economically Less Developed State</b>					
<b>Bihar</b>	6861.29	6480.53	8169.89	11418.92	16680.92
<b>U.P.</b>	10718.98	12263.92	14025.99	18160.96	22045.41
<b>M.P.</b>	13205.43	14912.24	16703.85	22211.72	29964.58
<b>Rajasthan</b>	12231.32	16435.21	19649.02	27402.74	36215.16
<b>Assam</b>	13175.13	14695.24	18298.46	22099.15	27037.16
<b>Odisha</b>	11047.23	13114.39	17673.14	27578.76	33371.04
<b>West Bengal</b>	13557.02	18434.63	24007.37	31420.36	39695.89
<b>Economically Developed State</b>			<b>Median = 41361.27</b>		
<b>Kerala</b>	16574.02	22823.95	32835.11	48822.26	61291.27
<b>Tamilnadu</b>	17576.16	24288.83	31107.51	50619.11	68932.52
<b>Punjab</b>	25824.28	30818.74	36921.74	48815.33	48815.33
<b>Maharashtra</b>	23672.11	29769.91	37450.97	58219.89	75103.61
<b>A.P.</b>	15280.62	19466.11	26091.47	39415.05	51561.48
<b>Karnataka</b>	15812.41	21937.27	28052.89	41505.43	51701.59
<b>Gujarat</b>	19972.41	26827.4	34289.31	54165.59	70249.76
<b>Haryana</b>	23958.29	29430.16	39739.27	57390.28	74601.19
<b>India</b>	<b>17204.89</b>	<b>21385.46</b>	<b>26400.58</b>	<b>36721.6</b>	<b>45435.9</b>

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

The total state government expenditure on Education was collected from RBI data source on State Government Finance and deflated the estimated annual population during 1991-2014, to regulate the per capita Expenditure on education by

all the states. The table-6 clearly depicts the cut-off median value i.e.,41361.27 Rs-per capita GSDP, which demarcate the boundary between developed less developed states.

**Table 7: Per Capita Education Expenditure of Major States in India: 1991-2014**

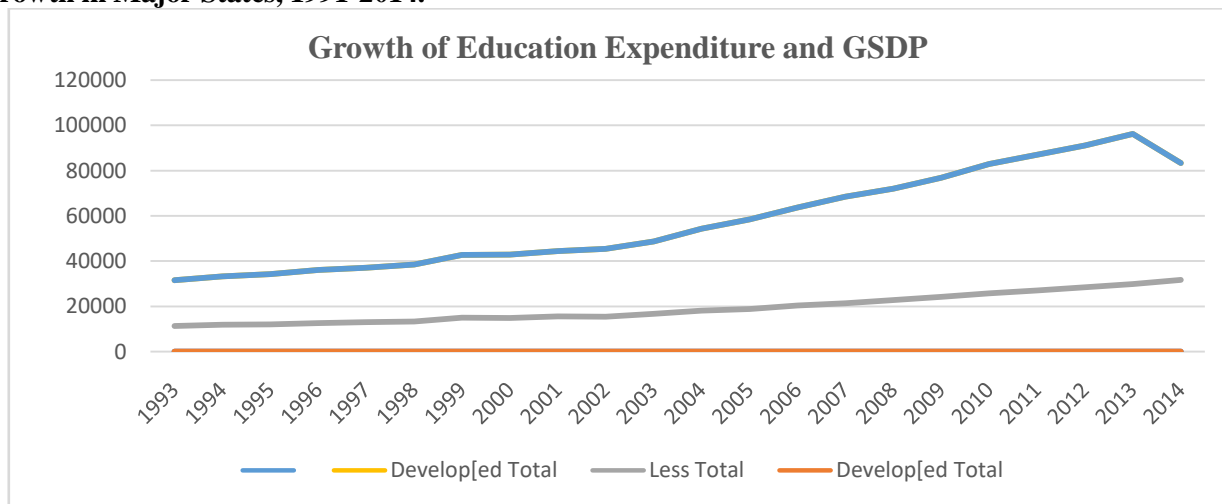
States	1991-95	1996-00	2001-05	2006-10	2011-14
<b>Economically Less Developed</b>					
U.P.	347.18	406.46	417.45	357.56	82.81
Bihar	380.77	472.42	410.37	339.26	73.29
West Bengal	407.29	561.39	608.10	462.20	84.48
M.P.	438.84	537.93	402.27	350.83	95.66
Odisha	419.86	541.06	551.58	458.23	103.62
Rajasthan	456.29	605.91	671.20	676.34	108.49
Assam	667.77	751.67	861.68	573.63	144.16
<b>Economically Developed</b>					
A.P.	393.35	477.23	593.99	444.21	107.97
Karnataka	497.35	669.62	781.50	881.21	141.15
Haryana	540.65	704.95	765.86	683.19	155.54
Gujarat	559.20	769.23	744.46	562.27	146.62
Tamilnadu	563.00	744.43	742.04	633.95	169.32
Maharashtra	590.57	845.83	1017.58	760.85	188.15
Punjab	618.88	822.17	845.54	549.44	133.10
Kerala	722.89	834.62	980.32	772.50	186.13
<b>India</b>	<b>462.41</b>	<b>589.18</b>	<b>660.89</b>	<b>716.50</b>	<b>120.98</b>

Source- Author’s compilation from handbook of statistics on State Government Finance, RBI by authors)

Table-7 represents the per-capita expenditure on education into two categories of states, divided into economically developed and economically less developed. The general notion is that State having high GSDP per capita spends more on education

and vice versa, but there are few exceptions that emerged from the table below. More specifically, not all the economically rich states are spending more on education as compared to the economically lesser one.

**Fig-2: Trends of Per Capita Education Expenditure and GSDP according to Level of Economic Growth in Major States, 1991-2014.**



Source-computed by authors

Figure-2 clearly depicts the per capita growth of GSDP and education expenditure among economically developed and less developed states.

The two curves at the lower part of the showed that the gap between per capita GSDP and education expenditure is relatively lower as compare to the



developed states. This figure clearly suggested that the poorer states might be spending lesser amount on education, but they have been maintaining an equal trend as far as the growth of GSDP is

concerned. In the other way, the developed states are allocating relatively higher amounts but fall short of the growth of their respective GSDP.

**Table: -8 Trends in Per capita Education Expenditure as a Percentage of GSDP of all the major States, 1991-2014**

Year	Average for Economically developed States	Average for Economically less developed States	Year	Average for Economically developed States	Average for Economically less developed States
1991	3.81	3.26	2005	3.36	2.14
1992	3.90	3.14	2001-05	3.48	2.47
1993	4.07	2.85	2006	3.31	2.08
1994	4.04	2.73	2007	3.23	2.06
1995	4.27	2.67	2008	3.32	2.17
1991-95	4.02	2.93	2009	0.81	0.53
1996	4.14	2.63	2010	0.36	0.24
1997	4.12	2.72	2006-10	2.21	1.41
1998	4.30	2.98	2011	0.36	0.24
1999	4.61	2.98	2012	0.36	0.25
2000	4.35	3.03	2013	0.32	0.24
1996-00	4.30	2.87	2014	0.38	0.17
2001	3.76	2.79	2011-14	0.36	0.22
2002	3.64	2.69	MEAN	<b>2.19</b>	<b>1.58</b>
2003	3.48	2.51	SD	<b>2.59</b>	<b>1.92</b>
2004	3.14	2.24	CV	<b>118.42</b>	<b>121.34</b>
-	-	-	CAGR	<b>-1.00</b>	<b>-1.00</b>

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

The growth figure of GSDP and per capita expenditure on Education in the poorer states and developed states do not represent homogeneous clusters. There are inter-states differences among the developed and underdeveloped states. The

figures clearly reveal that all the developed and underdeveloped states have not been maintaining a unique pattern of spending on education over the year's vis-a-vis at the level of GSDP.

**Table-9 Per capita Revenue Expenditure of Major States of India-1991-2014**

States Name	1991-95	1996-00	2001-05	2006-10	2011-14
Bihar	377.7	470.3	404.8	332.6	71.5
U.P.	341.2	403.2	410.5	340.7	80.7
Odisha	415.2	537.6	547.7	457.0	101.6
Assam	656.0	745.8	854.9	571.4	144.1
M.P.	424.2	529.5	398.4	332.7	94.2
Rajasthan	451.6	601.1	666.6	670.2	107.8
West Bengal	404.6	558.3	607.2	461.1	82.1
A.P.	391.4	476.2	590.7	438.2	106.1
Karnataka	494.5	662.1	778.8	863.0	137.9
Kerala	708.6	825.5	972.8	766.6	183.7
Tamilnadu	557.6	736.1	727.8	619.0	166.0
Gujarat	554.3	765.3	737.7	535.7	136.5
Haryana	526.0	697.2	761.7	667.7	152.8
Maharashtra	586.7	841.5	1016.8	750.2	187.4
Punjab	599.4)	818.5	842.7	532.5	128.8
<b>India</b>	<b>455.5</b>	<b>583.2</b>	<b>652.6</b>	<b>693.5</b>	<b>118.1</b>

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

Table-9 gives the information on revenue expenditure on education by the government for the period of 1991 to 2014 of fifteen major states in India. It shows that there is a slight difference among the major 15 states in the revenue expenditure on education as % GSDP. This trend is largely because of the increased revenue

expenditure on the three components i.e., culture, sports and education. Even though there has been persistent decline in revenue expenditure for all the major states after the economic reforms, but slight differences can be observed among developed and underdeveloped states of India.

**Table-10 Per capita capital expenditure of major states of India-1991-2014**

States	1991-95	1996-00	2001-05	2006-10	2011-14
<b>Economically Less Developed</b>					
Bihar	3.05	2.05	5.50	6.64	1.77
U.P.	5.89	3.20	6.86	16.86	2.04
M.P.	14.62	8.38	3.78	18.03	1.43
Rajasthan	4.59	4.75	4.56	6.12	0.59
Assam	11.71	5.78	6.76	2.21	0.01
Odisha	4.58	3.37	3.79	1.20	1.99
West Bengal	2.63	3.06	0.82	2.14	2.30
<b>Economically Developed</b>					
Kerala	14.19	9.08	7.48	5.86	2.38
Tamil nadu	5.32	8.29	14.20	14.94	3.26
Punjab	19.45	3.62	2.81	16.92	4.21
Maharashtra	3.78	4.239	0.761	10.64	0.70
A.P.	1.93	0.98	3.27	5.96	1.83
Karnataka	2.84	7.49	2.65	18.18	3.09
Gujarat	4.83	3.90	6.67	26.48	10.12
Haryana	14.64	7.74	4.08	15.48	2.73
<b>India</b>	6.82	5.67	8.28	22.91	2.82

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

Table -10 represents the capital expenditure on education for the major fifteen states show an increasing trend in the nominal term but the case of percentage share of GSDP contributed by these states for capital expenditure has seen too much

declining trend which is below one per cent level throughout the study period. The same pattern can be found in case of all India trend of education expenditure as a proportion to GDP.

**Table-11 per capita plan education expenditure of major states of India :1991-2014**

States	1991-95	1996-00	2001-05	2006-10	2011-14
<b>Economically Less Developed</b>					
Bihar	25.04	22.37	42.04	91.16	30.94
U.P.	33.55	40.18	48.62	86.62	22.62
M.P.	71.43	93.98	65.95	97.42	28.361
Rajasthan	76.41	84.48	70.49	80.22	26.31
Assam	205.11	234.09	162.99	49.80	28.49
Odisha	70.10	209.19	79.21	88.90	34.67
West Bengal	17.75	22.04	39.76	84.70	22.26
<b>Economically Developed</b>					
Kerala	40.17	55.36	48.80	41.01	17.04
Tamil nadu	35.19	46.56	53.08	60.50	35.92
Punjab	74.93	112.33	57.91	47.69	19.83
Maharashtra	48.27	54.09	35.80	51.31	11.50
A.P.	24.47	52.38	77.54	67.56	23.49
Karnataka	82.43	126.70	150.18	211.48	41.67
Gujarat	19.48	53.05	57.19	81.01	25.35
Haryana	93.96	106.60	96.54	180.68	51.13
<b>India</b>	51.96	72.52	79.12	140.44	27.63

Source- Author's compilation from handbook of statistics on State Government Finance, RBI (by authors)

Table-11 provides an information on plan expenditure by the government for the period 1990-91 to 2013-14. The all-India trend also shows a decline from 1991 to 2014 and it was just hovering around 0.39 percent of GDP. The above analysis

shows all the major states have been experiencing a declining share of GSDP for development of education infrastructures from the plan expenditure account.

**Table-12 Per capita non-plan Education expenditure of Major States of India:1991-2014**

States	1991-95	1996-00	2001-05	2006-10	2011-14
<b>Economically Less Developed</b>					
Bihar	355.7	450	368.3	248	42.3
U.P.	313.6	366.2	368.8	270.9	60.1
M.P.	367.4	443.9	336.3	253.4	67.2
Rajasthan	379.6	521.4	600.7	596.1	82.1
Assam	205.1	234.0	162.9	49.8	28.4
Odisha	349.7	331.8	472.3	369.3	68.9
West Bengal	389.5	539.3	568.3	378.5	82.3
<b>Economically Developed</b>					
Kerala	682.71	779.25	931.51	731.48	169.08
Tamil nadu	527.80	697.86	688.95	573.45	133.39
Punjab	543.94	709.83	787.62	501.75	113.25
Maharashtra	542.29	791.73	981.77	709.52	176.64
A.P.	368.87	424.84	516.44	376.63	84.47
Karnataka	414.91	542.90	631.31	669.72	99.48
Gujarat	539.72	716.17	687.27	481.25	121.27
Haryana	446.68	598.34	669.31	502.50	104.41
<b>India</b>	410.45	516.65	581.76	576.06	93.34

Source- Author's compilation from handbook of statistics on State Government Finance, RBI(by authors)

Table-12 represent the non-plan expenditure on Education which indicates a decreasing trends path for major 15 states in India during 1990 to 2014. In the above table depicts the information on the non-plan expenditure, which shows increasing trends in the nominal terms but declining trend in case of percentage share of GSDP contributed by all the major 15 states in India during the period of 1990-91 to 2013-14.

### **Nexus between Education Expenditure and Economic Growth in Indian Major States**

Over the years there have been an extensive research work that studied the contribution of human capital in the growth process for both developed and developing economies. Barro (1991) focused that primary and secondary enrolment rates have a positive growth effect, but this was not always true for adult literacy rates. Barro and Sala-i-Martin (1995) deliberatethat the average schooling years have a significant positive effect on the economic output. By applying input-output analysis Jorgenson et.al (2003) studied the sources of growth for the economy of the United States over the period of 1977-2000 and they found that economic growth for the US was dominated by investments in information and higher education. Bloom et al. (2004) tried to investigate the impact

of human capital on economic growth, they find that schooling and life expectancy both have positively contribute to economic growth. In a study conducted by Musibau and Rasak (2005) have studied long run relationship between education and economic growth in Nigeria. They have adopted two channels to test the significance of human capital for economic growth. In the first channel, human capital is used as an independent factor of production and in the second channel; human capital affects economic growth through technology parameter.

### **Methodology for Panel Co-integration and Causality**

In order to study the impact on Education expenditure on economic growth and to examine the causalrelationship between Education Expenditure and with economic growth in the major Indian states, this study has used panel data over the period 1991-2014. Real education expenditure and real GSDP are considered for the analysis. The econometric methodology for panel co-integration and causality between EDU and GSDP consists of two steps. First, it employed panel unit root test proposed by Levin, Lin & Chu (2002), Im-Pesaran-Shin (2003), ADF unit root test and PP unit root test to determine the order of

integration of each variable. In the next step, was applied panel co-integration tests proposed by Pedroni (1999, 2004) to examine the long run relationship between EDU and GSDP.

**Unit Root Test**

Generally, the Augmented Dicky-Fuller (ADF) unit root test is normally used to detect the order of integration of time series variables but the traditional ADF unit root suffers from the problem of low power in rejecting the null hypothesis of stationarity of the time series for small size data. To resolve the above problem, we use LLC (Levin et al., 2002) and IPS (Im et al., 2003), panel unit root test based on ADF principles. LLC unit root test assumes homogeneity in the dynamics of the autoregressive coefficients for all panel members, while IPS assumes heterogeneity in the dynamics. LLC suggests a panel base ADF test with a panel setting and restricts lag coefficient  $\varphi_i$ , to keep it identical across cross sectional regions. The test enforces homogeneity on the autoregressive coefficients  $\{\varphi_i\}$  that indicates the presence or absence of a unit root whereas the intercept and trend may vary across individual series. The model only allows heterogeneity only in the intercept and is given by

$$\Delta Y_{i,t} = \alpha_i + \varphi_i Y_{i,t-i} + \sum_{j=1}^{p_i} \beta_j \Delta Y_{i,t-j} + \varepsilon_{i,t} \quad (1)$$

Where  $Y_{i,t}$  is a series for panel member (state)  $i=(i = 1,2,3 \dots \dots, N)$  over period  $t (t=1, 2, 3 \dots T)$  and  $p_i$  is the number of lags in the ADF regression. The error term  $(\varepsilon_{i,t})$  is assumed to be IID  $N(0, \sigma^2)$  and independent across the members of the sample. This model allows for fixed effects, unit specific time trends and common time effects. As stated, the coefficient of the lagged dependent variable is restricted to be homogeneous across all units of panel. Hence, the null hypothesis of non-stationarity is stated as:

$$H_0: \varphi_i = 0, \text{ to be tested against alternative,} \quad (2)$$

$$H_1: \varphi_i = \varphi < 0 \text{ for all } i.$$

The fixed effect model is (1) is based on usual t-statistic,

$$t_y = \frac{\hat{\varphi}}{(s.e \hat{\varphi})} \quad (3)$$

Where  $\varphi$  is restricted by being kept identical across members or units of the panel or regions under both the null and alternative hypotheses.

The IPS test begins by specifying a separate ADF regression for each cross section (state  $i$ ):

$$\Delta Y_{i,t} = \alpha_i + \varphi_i Y_{i,t-i} + \sum_{j=1}^{p_i} \beta_j \Delta Y_{i,t-j} + \varepsilon_{i,t} \quad (4)$$

Where  $Y_{i,t}$  is a series for panel member (state)  $i=(i = 1,2 \dots \dots, N)$  over period  $t (t=1, 2 \dots T)$  and  $p_i$  is the number of lags in the ADF regression. The

error term  $(\varepsilon_{i,t})$  is assumed to be IID  $N(0, \sigma^2)$  for all  $i$  and  $t$ . Both  $\varphi_i$  and the lag order  $\beta$  in equation (4) are allowed to vary across sections (States). IPS relaxes the assumption of homogeneity of the coefficients of the lagged dependent variable. It tests the null hypothesis that each section in the panel has a unit root for all cross-section units against the alternative that at least one of the series is stationary.

$$H_0: \varphi_i = 0 \text{ for all } i, \text{ is tested against the alternative,} \quad (5)$$

$$H_1: \varphi_i = \varphi_i < 0 \text{ for } i=1, 2 \dots N1, \varphi_i=0, \\ i=N_1+1, N_1+2 \dots \dots, N$$

The alternative hypothesis simply indicates that some or all of the individual series are stationary. Im et al (2003) developed two test statistics for IPS and called them the LM-bar and the t-bar tests. The IPS t-bar statistic is calculated using the average of the individual Dickey-Fuller  $\tau$  statistics shown below.

$$\bar{t} = \frac{1}{N} \sum_{i=1}^N \tau_i \quad (6)$$

$$\tau_i = \frac{\hat{\varphi}_i}{s.e(\hat{\varphi}_i)} \quad (7)$$

Assuming that the cross sections are independent, IPS uses the standardized t-bar statistic

$$\bar{Z} = \frac{\sqrt{N}(\bar{t} - E(\bar{t}))}{\sqrt{Var(\bar{t})}}$$

The term  $E(\hat{t})$  and  $Var(\hat{t})$  in (8) are the mean and variance of the  $\tau$  statistic

**Co-integration Test**

It is used for to test the existence of a long-run co-integration among EDU and GSDP by applying panel co-integration tests suggested by Pedroni (1999 and 2004). I will make use of seven panel co-integrations by Pedroni (1999), since he determines the appropriateness of the tests to be applied to estimated residuals from a co-integration regression after normalizing the panel statistics with correction terms.

The procedures projected by Pedroni (1999 and 2004) make use of estimated residual from the hypothesized long-run regression of the following form:

$$Y_{it} = \alpha_i + \sum_{j=1}^{p_i} \beta_{ji} X_{jit} + \varepsilon_{it} \quad (9)$$

And

$$\varepsilon_{it} = \rho_i \varepsilon_{i(t-1)} + w_{it} \quad (10)$$

Where,  $Y_{it}$  and  $X_{jit}$  are two observable variables;  $\varepsilon_{it}$  represents the disturbance term from the panel regression;  $\alpha_i$  allows for the possibility of state specific fixed effects and the coefficients of  $\beta_{ji}$  allows for the variation across individual states. The null hypothesis of no co-integration of the pooled (within dimension) estimation is  $H_0: \rho_i = 1$

for all I against  $H_0: \rho_i = \rho < 1$ . The null hypothesis of no-cointegration of the pooled (between-dimension) estimation is  $H_0: \rho_i = 1$  for all I against  $H_0: \rho_i = \rho < 1$  for some  $i$ . Pedroni suggested two sets to determine the existence of heterogeneity of the co-integration vector. The first is the within dimension approach which covers four statistics, like- panel V-statistic, panel  $\rho$  statistic, panel PP-statistic and panel ADF-statistic (Pedroni, 1999).

The second test based on between-dimensional approach (group test), includes three statistics like the group  $\rho$ -statistic, group PP-statistic and group ADF statistic respectively. These statistics are based on estimators that simply average the individually estimated coefficients for each member. All the seven panel co-integration statistics are computed as below.

**Panel v-statistic**

$$Z_v = [\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\epsilon}_{it-1}^2]^{-1} \tag{11}$$

**Panel  $\rho$ -statistic**

$$z_\rho = [\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\epsilon}_{it-i}^2]^{-1} \sum_{i=1}^N \sum_{t=1}^T L_{11i}^{-2} (\hat{\epsilon}_{it-1} \Delta \hat{\epsilon}_{it} - \hat{\lambda}_i) \tag{12}$$

**Panel PP-statistic**

$$Z_t = [\hat{\sigma}^2 \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\epsilon}_{it-1}^2]^{-0.5} \sum_{i=1}^N \sum_{t=1}^T L_{11i}^{-2} (\hat{\epsilon}_{it-1} \Delta \hat{\epsilon}_{it} - \hat{\lambda}_i) \tag{13}$$

**Panel ADF-statistic**

$$Z_t^* = [\hat{\sigma}^{*2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\epsilon}_{it-1}^{*2}]^{-0.5} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\epsilon}_{it-1}^* \Delta \hat{\epsilon}_{it}^* \tag{14}$$

**Group  $\rho$ -statistic**

$$\tilde{Z}_\rho = \sum_{i=1}^N (\sum_{t=1}^T \hat{\epsilon}_{it-1}^2)^{-1} \sum_{t=1}^T (\hat{\epsilon}_{it-1} \Delta \hat{\epsilon}_{it} - \hat{\lambda}_i) \tag{15}$$

**Group pp-statistic**

$$\tilde{Z}_t = \sum_{i=1}^N (\hat{\sigma}^2 \sum_{t=1}^T \hat{\epsilon}_{it-1}^2)^{-0.5} \sum_{t=1}^T (\hat{\epsilon}_{it-1} \Delta \hat{\epsilon}_{it} - \hat{\lambda}_i) \tag{16}$$

**Group ADF-statistic**

$$\tilde{Z}_t^* = \sum_{i=1}^N (\sum_{t=1}^T \hat{\sigma}_i^2 \hat{\epsilon}_{it-1}^{*2})^{-0.5} \sum_{t=1}^T (\hat{\epsilon}_{it-1}^* \Delta \hat{\epsilon}_{it}^*) \tag{17}$$

Here  $\hat{\epsilon}_{it}$  is the estimated residual from equation (9) and  $\hat{L}_{11i}^{-2}$  is the estimated long run covariance matrix for it  $\Delta \hat{\epsilon}_{it}$ . Likewise,  $\hat{\sigma}_i^2$  and  $\hat{\sigma}_i^{*2}$  ( $\hat{\sigma}_i^{*2}$ ) are the long run and contemporaneous variances for individual  $i$ . The above seven tests are based on the principle of asymptotically standard normal distribution given by their respective panel/group co-integration statistic.

Except Panel v statistic, the remaining statistics diverge to negative infinite, which states that large negative value reject null hypothesis. In the case of panel v statistics, the large positive value rejects the null hypothesis of no-cointegration. All the above statistics are able to explain individual specific short-run dynamics, individual specific fixed effects, individual specific slope coefficients and deterministic trends which would be most useful to analyse the co integration using panel data.

**Empirical Results and Discussion**

**Panel Unit Root Test**

Before examining the Panel Co-Integration test, we first check for the order integration of each variable

by using the Im et al. (2003), IPS unit root test, ADF unit root test and PP unit root test. The test like Im et al. and IPS test are more appropriate for the balanced panel and consider heterogeneity in at least one of the individual states under the alternative hypothesis (Khan et al. 2015). The results shown in the Table-13 suggest that GSDP, and EDU are non-stationary in both the Test at their level and become stationary at first difference. Thus, we conclude that each variable is integrated of order one i.e.,  $GSDP \sim I(1)$ , and  $EDU \sim I(1)$  respectively. The results of Panel Unit Root tests (LLC and IPS Tests) reported in Table-13, support the hypothesis of a unit root in all variables across states as well as the hypothesis of zero order integration at first differences. The expenditure on Education sector, all the tests are insignificant at level and become stationary at first difference. Given the results of LLC, and IPS tests, it is possible to apply panel co-integration method in order to test for the existence of the stable long-run relation between economic growth and education expenditure.

**Table- 13 Results of Panel Unit Root Test**

**Panel Unit Root Test – Levin, Lin & Chu**

Variable	Level		First order difference	
	Constant	Constant + Trend	Constant	Constant + Trend
LOGGSDP	5.33 (1.00)	-0.63 (0.26)	-6.13*** (0.00)	-4.21*** (0.00)
LOGEDU	0.65(0.74)	5.68(1.00)	-14.03***(0.00)	-9.69***(0.00)

**Panel Unit Root Test – Im, Pesaran and Shin W-stat**

	Level		First order difference	
	Constant	Constant + Trend	Constant	Constant + Trend
LOGGSDP	11.89 (1.00)	3.07 (0.99)	-11.27*** (0.00)	-10.58***(0.00)
LOGEDU	-0.79(0.21)	3.63(0.99)	-11.53***(0.00)	-10.91***(0.00)

**Panel Unit Root Test – ADF - Fisher Chi-square**

	Level		First order difference	
	Constant	Constant + Trend	Constant	Constant + Trend
LOGGSDP	0.14 (1.00)	20.13 (0.91)	169.35*** (0.00)	148.05*** (0.00)
LOGEDU	26.86(0.63)	5.95(1.00)	181.37***(0.00)	159.65***(0.00)

**Panel Unit Root Test – PP - Fisher Chi-square**

	Level		First order difference	
	Constant	Constant + Trend	Constant	Constant + Trend
LOGGSDP	42.4(0.06) *	68.02 (0.00) ***	320.89*** (0.00)	796.78*** (0.00)
LOGEDU	35.25(0.23)	11.52(0.99)	339.19***(0.00)	693.87***(0.00)

Source-Computed by Authors

Note: \*\*\* indicates rejection of the null hypothesis of no-cointegration at 1% and 5%, levels of significance

**Pedroni Co-integration Test**

The results of the panel Unit Root test, we test for co-integration relationship by employing the panel cointegration test developed by Pedroni (1999, 2004). This test allows for cointegrating vectors of differencing magnitudes between groups and

allows for fixed effects. The results of Pedroni co integration test based on panel  $v$ -statistics, panel  $\rho$  statistics, panel PP-statistic and panel ADF statistic are reported in Table-14

**Table- 14 Results of the Padroni’s Panel Co-integration Test: Co-integration between Education and GSDP**

Test Statistics	Calculated values	Probability	Weighted calculated values	Probability
<b>(Within-Dimension)</b>				
Panel $v$ -Statistics	-3.21	0.99	-3.21	0.99
Panel $\rho$ -Statistics	3.86	0.99	3.80	0.99
Panel PP-statistics	5.77	1.00	5.52	1.00
Panel ADF-statistics	6.09	1.00	6.16	1.00
<b>(Between Dimension)</b>				
Group $\rho$ statistics	5.43	1.00		
Group PP-statistics	7.86	1.00		
Group ADF-statistics	8.64	1.00		

Source-Computed by Authors

Notes: (1) The parentheses indicate the probability of significance. Estimation follows no deterministic trend. \*\*\* \*\* \* Indicates significant at the 1 %, 5% & 10% level respectively. (2) All statistics are from Padroni’s procedure (1999) where the adjusted

values can be compared to the N (0,1) distribution. The Pedroni (2004) statistics are one-sided tests with a critical value of -1.64 ( $k < -1.64$  implies rejection of the null), except the  $v$ -statistic that has

a critical value of 1.64 ( $k > 1.64$  suggests rejection of the null).

Based on Unit Root test results, we have tried the presence of cointegration between economic growth and education expenditure. Again, to test whether the variables are cointegrated using Pedroni's (1999, 2001, and 2004). This is to investigate whether long-run steady state or cointegration exist among the variables. Citeaux and Olivier (2000) state that the panel cointegration tests have much higher testing power than conventional cointegration test. Since the variables are found to be integrated in the same order  $I(1)$ , we continue with the panel cointegration tests proposed by Pedroni (1999, 2001, and 2004). The Pedroni Cointegration test is applied to the 15 Indian states with total of 510 observations. Cointegrations are carried out for without trend and the summary of the results of cointegrations analyses are presented in Table-14.

In constant level the present study found that all the 7 statistics does not reject the null hypothesis of no co-integration at one and 5% level of significance. Apart from the above statistics all the weighted statistics are in significant. The result of the panel co-integration test for Edu and GSDP in the model with constant level, so that EDU does not hold co-integration in the long-run for a group of major 15 states with respect to GSDP.

### Summary and Conclusion

The study has revealed the following important observations

- 1) Overall, the trends of public expenditure on education sector under both revenue and capital hands, both at central and state level, reveal a declining pattern but there has been a slight improvement in it in the recent years.
- 2) At the central level plan education expenditure as a percentage of GSDP has been declining from 0.30 percent during the period 1991-95 to 0.06 percent during 2011-13. So, over the study period plan education expenditure has been declining. The same pattern can be observed for the states also, where it has been declining constantly. The percentage share of plan education expenditure was 5.31 during 1991-95 and it declined to 0.85 percent during 2011-14.
- 3) The non-plan expenditure as a percentage of GDP stood at 2.39 percent during 1991-95 but declined to 0.21 percent during 2011-13 at the central level. In case of the state's government, the same pattern can be observed. The percentage share of non-plan education expenditure was 38.96 percent during 1991-95 but it has declined to 3.32 percent during 2011-14.

- 4) The percentage share of education expenditure which was 2.69 percent during the period from 1991-95 has been declining 2.65 percent during 2011-13. The percentage of state government's education expenditure as a proportion to GSDP stood at 44.26 percent during the period of 1991-95 but at the same time has experienced a declining pattern during the period from 2011-13 (4.16) percent.
- 5) There is difference in the growth and pattern of public education expenditure. The economically developed states are found to be spending more in terms of per capital expenditure on education but in terms of proportion of GSDP is concerned, the performance is opposite as compared to the economically less developed states.
- 6) The linkage between education expenditure and economic growth is estimated by using the panel co-integration and causality techniques for all the fifteen major states. The unit root tests like-LLC and IPS methods are used to examine the stationarity and estimated results confirmed that all the variables are stationary after the first difference.
- 7) The relationship between EDU and GSDP the study showed that all the 7 statistics does not reject the null hypothesis of no co-integration at 1% and 5% level of significance. Apart from the above statistics all the weighted statistics are in significant.
- 8) Education expenditure and GDP are combined of order one in all the major states of India, both at the state and central level based on state wise unit root and panel unit roots tests, but last 10 years it was around 0.27 percent.
- 9) The Pedroni co-integration test of all the seven statistics shows that there is no significant relationship between education and GSDP in 15 India major states.

### Policy Implication and Suggestions

- 1) The Govt. Should focus more on revenue and capital heads of social sectors for a better education status in India.
- 2) The Govt. mostly take necessary steps to reduce the of fiscal deficit, for achieving the target goals in social sectors.
- 3) Necessary steps should be taken to reduce the volatility of external aid from state to state.
- 4) Political commitment for Education should be given more priority in the five-year plans and yearly Budget.
- 5) Universal education infrastructure and health insurance coverage should be broad-based and managed professionally.

- 6) To achieve the 6% level of education expenditure, the Govt. of India should generate an alternative source of finance from external grants and alternative tax revenue.
- 7) More emphasis should be given on the Public Private Partnership (PPP) approach, which ultimately filled the gap in the field of social sector.

### References

1. Afridi, H. A., (2016): Human Capital and Economic Growth of Pakistan, *Business and Economic Review*: Vol. 8, Issue 1:2016 pp- 77-86.
2. Arabi, M. and Abdalla, S. (2013): The Impact of Human Capital on Economic Growth: Empirical Evidence from Sudan. *Research in World Economy*, Volume No-4 June 30.
3. Asghar, N., Awan, A., and Rehman, H., (2015): Human Capital and Economic Growth in Pakistan: A Cointegration and Causality Analysis, *International Journal of Economics and Finance* 4(4).
4. Baldacci, E., Clements, B., Gupta, S., and Cui, Q., (2004): Social Spending, Human Capital, and Growth in Developing Countries: Implications for Achieving the MDGs. *International Monetary Fund WP/04/217*.
5. Barro, Robert J. (1991): Economic growth in a cross section of countries. *Quarterly Journal of Economics*, 106(2), 407-443.
6. Barro, R.J. (2013): Education and economic growth. *Annals of Economics and Finance*, 14(2), 301-328.
7. Bloom, D. E., Canning, D., and Sevilla, J. (2004): The Effect of Health on Economic Growth: A Production Function Approach. *World Development*, 32(1), 1-13.
8. Chandra, A., (2011): Nexus Between Government Expenditure on Education and Economic Growth: Empirical Evidences from India., *Romanian Journal for Multidimensional Education*, Vol3, No-6, pp-73-85, April.
9. Denison, E. (1967): Why growth rates differ?, Washington DC: Brookings Institution.
10. Dreze, J., and Sen, A., (1995): *Book on Development and Participation*. Oxford University Press, ISBN-0-19-925748-5(Hbk.) 0-19-925749-3(Pbk.)
11. Education Policy (1992): <https://www.education.gov.in/nep-new>.
12. Eggoh, J., Houeninvo, H., and Sossou, G.A., (2015): Education, Health and Economic Growth in African Countries. *Journal of Economic Development*, 40(1), 93-111.
13. Hassan, M., and Kalim, R., (2012): The triangular causality among education, health and economic growth: A time series analysis of Pakistan, January 2012, *World Applied Sciences Journal* 18(2):196-207.
14. Hooda, S. (2013): Determinants of Public Expenditure on Health in India: A Panel Data Analysis at Sub-National Level, *Journal of Quantitative Economics*, 14, 257-282.
15. Islam, R., M., (2014): Education and Economic Growth in Bangladesh -An Econometric study, *Research Gate*, January.
16. Jorgenson, D., Mun, S., and Kevin, J., (2003): Growth of U.S. Industries and Investments in Information Technology and Higher Education, *Article in Economic Systems Research* · February, 2003.
17. Khan, J. (2012). The Role of Human Capital in Economic growth of Pakistan (1971-2008), Ph. Din Economics Thesis Submitted to Department of Economics, University of Peshawar, Pakistan.
18. Lee, Jong-Wha., (1995): Capital Goods Import and Long-run Growth. *Journal of Development Economics*, Vol.48, pp.91-110.
19. Mishra P.K. and Mishra S.K. (2012): The Triangulation Dynamics Between Education, Health & Economic Growth in India. *The Journal of Commerce*, Vol-7, No.2 p.p. 69-89.
20. Musibau, A., (2005): Long Run Relationship between Education and Economic Growth in Nigeria: Evidence from the Johansen's Cointegration Approach, *Regional Conference on Education in West Africa: Constraints and Opportunities* Dakar, Senegal, November 1st - 2nd, 2005. Cornell University / CREA / Ministère de l'Éducation du Sénégal.
21. Nowak, A., Z., and Dahal, G., (2016): The Contribution of Education to Economic Growth: Evidence from Nepal, *International Journal of Economic Sciences*, Vol No-2/2016.
22. Ray, S., Pal, K.M., and Ray, A.I., (2012): Assessing Causal relationship between Education and Economic Growth in India, *Vidyasagar University, Journal of Economics*, Vol. XVI, 2011-12.
23. Robert J. Barro and Xavier Sala-i-Martin, (1997): Economic growth, *Journal of Economic Dynamics and Control*, Elsevier, vol. 21(4-5), pages 895-898. ISSN – 0975-8003.
24. Romer, P. M., (1990): Endogenous Technological Change. *The Journal of Political Economy*, 98(5), 71-102.
25. Solow, R. M., (1957): Technical Change and the Aggregate Production Function. *The Review of Economics and Statistics*, 39(3), 312-320.
26. Teles, K., V., and Andrade, J., (2007): Public investment in basic education and economic



- growth, *Journal of Economic Studies*, 352-364, February.
27. United Nations Development Programme (2007): *Human Development Report 2007-2008*. Retrieved from <http://hdr.undp.org/en/reports/global/hdr2007-2008/> on June 30, 2010.
28. World Bank annual report 2016 (English): Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/763601475489253430/World-Bank-annual-report-2016>.
29. World Health Organization, (2017):<https://www.who.in>.