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ECONOMIC GROWTH, EDUCATION EXPENDITURE AND INCOME INEQUALITY IN INDIA

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ABSTRACT

Many researchers report a negative association between economic growth and economic inequality. If it is true, what are the considerations for this relation? What are the expected reasons for linking these two? Using the data across 15 major states of India from 1983 to 2011-12 this paper explores one such mechanism; growth rate of output raises public expenditure on education and it decreases inequality with growth of public education expenditure in India. Economic inequality can be measured by both a singular measure of inequality (either relative measure or absolute measure of inequality) and plural measure of inequality (both relative measure and absolute measure of inequality) that can be captured by different families of inequality measures; a measure from the Lorenz-Gini family or from any other family. To check the robustness of the results, in this paper we consider the plural measure of inequality from the Lorenz-Gini family as well as from another family, viz., the SD-CV family.

KEYWORDS

public education expenditure, economic growth, combined income inequality, relative inequality, absolute inequality, index of inequality.

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1. INTRODUCTION

The term economic growth refers to the increase in nation's capacity to produce the goods and services to fulfill the needs of the people. Many people define economic growth as the increase in per capita income of a country at constant price. People can enjoy a higher living standard by higher per capita income that is the main goal of economic development. Economic growth i.e., an increase in national income especially, per capita income is therefore necessary for economic development. Literally, the term economic growth refers to an increase in the country's net national product (NNP). This improvement in income leads to the transformation of an economy from a state of under-development to a state of development, from an agrarian to highly industrialized society, from a low saver to a high saver and from rural to urban. This transformation is mainly reflected in a sustained and steady rise in national and per capita income.

Public expenditures are the expenditures incurred by the public authorities; central government, state government and local government either for protecting citizens or for promoting their economic or social welfare. According to Wagner's law, there is a causal relationship between public expenditure and economic development. According to the law, in the time of economic development the rate of increase of public expenditure is greater than the rate of increase of per capita community output. The growth of the economy leads to the increase of demand for various needs of people and government has to raise the expenditure to fulfill it.

Wagner distinguishes three types of activities that cause an increase in government expenditure.

1. Maintenance and enforcement of law and order, internally and externally
2. Participation in material production
3. Provision of social services

There is a positive relation between economic growth and public expenditure for social services. The governments of a state/country provide many types of social services. Education facilities are one of them. There exists a mixed education system in India in which both private and public sector co-exists. Two types of expenditures; private expenditure and public expenditure can divide total expenditure on education in India. However, we consider only public expenditure on education because per pupil private expenditure on education has more variability than per pupil public expenditure on education. Total public expenditure on education is the sum of expenditures incurred by the state governments and the central government as education falls under the concurrent list in India.

By economic inequality in a society, we mean the gap between rich and poor in the distribution of stock economic variables like asset or wealth or of flow economic variables like income or expenditure. The term typically refers to inequality among individuals or groups within a society, but can also refer to inequality among countries. In macroeconomic context, income distribution is defined by how a nation's total GDP/GNP/GNI is distributed amongst its population. The issue of economic inequality is also related to the issue of equity – equality of outcome given equality of need and opportunity.

There is a strong relation between education expenditure and income inequality in the existing literature. Sylwester (2002a) argues that expenditure on education is one of the important factors for reducing income inequality. Public education expenditure has a vital role to decrease inequality in India (Kayet and Mondal, 2015). In addition, many researchers argue a negative relation between economic growth and income inequality. Sylwester (2000) develops the link among economic growth, education expenditure and income inequality.

However, this paper develops a link among education expenditure, economic growth and income inequality in Indian context. Using cross section data of major states of India from the period 1983 to 2011-2012, this paper explores that growth rate of output raises public expenditures on education and it decreases income inequality with a certain level of public expenditure for education in India.

This paper is constructed as follows. Section 2 presents a brief review of literatures related to this field, some methodological issues are briefly discussed in section 3, section 4 presents the theoretical model which formalizes some of the assumptions underlying the empirical specification, the results of some popular and convenient testing procedures of panel data estimation which gives the information regarding the selection of best fitted model are discussed in section 5, in section 6 the empirical results are discussed. A conclusion and some policy measures follow.

2. BRIEF REVIEW OF LITERATURE

Some authors try to estimate the correlation of two facts viz., relation between education expenditure and economic growth. The correlation is however estimated by Jorgenson and Fraumeni, (1992) for USA, Jung and Thorbecke, (2001) for Tanzania and Zambia, Ogujiuba and Adeniyi, (2005) for Nigeria, Aziz, Khan and Aziz,

(2008) for Pakistan and Chandra, (2010) for India. The results of the studies show that there is a direct relation between education expenditure and economic growth; especially education expenditures directly affect economic growth. Fiszbein and Psacharopoulos, (1993) show an interesting fact Venezuela in their paper which indicates that primary education expenditures have maximum effects on economic growth whereas higher education expenditures have minimum effects. This happens because the opportunity cost of higher education is too high that reduces the benefits from higher education. However, the outcomes of the overall studies are quite mixed which indicates that, some studies give the direct relationship between these two whereas others give the inverse relationship. Education expenditure negatively affects economic growth, Nurudeen and Usman (2010). According to A M Nalla Gounden (1967) the rate of return of education expenditures are lower than that of physical capital so it is not an effective forms of investment for economic growth. But the year 1967 is not a perfect time to examine it. *Which factors do affect economic growth in India?* Bosworth, Collins and Virmani (2007) estimate and suggest that education has very negligible effects on economic growth. By ECM Pradhan (2009) tests the causal relationship between government education expenditure and economic growth in India for the period 1951 to 2001. He suggests that, there is unidirectional causality between these two in India; from economic growth to education expenditure. A similar work by Chandra, (2010) by using linear and non-linear Granger causality methods for India from 1951 to 2009 and concludes that there is bi-directional causality between education expenditure and gross domestic product in India. However, Fernandez and Rogerson (1997) test the effects of growth in income and enrolled pupils on government elementary and secondary education expenditure and they suggest that the ratio of the per student education expenditure to per student personal income is constant.

Economic inequality continues to be a very serious problem for community. Benabou (1996) and Barro (1999) give various studies and theoretically argue that economic inequality may be one of the important factors of economic growth. Two papers by Alesina & Rodrik (1994) and Persson & Tabellini (1994) say that, income inequality can able to reduce growth though some authors cannot agree with them. Education is one of the important factors for explaining economic inequalities. There are some theoretical models, which determine the relation between education and income inequality and predict that public education can able to reduce income inequality. A model developed by Glomm and Ravi Kumar (1992) whether students can choose the public education or private education and concludes, income inequality obviously falls under public education system. Saint Paul & Verdier (1992), Eckstein & Zilcha (1994) and Zhang (1996) construct theoretical models and conclude that, expenditures for education are very effective for reducing income inequality over time. Kayet and Mondal (2015), Sylwester (2002a) argues that expenditure on education is one of the important factors for reducing income inequality. Moreover, Kayet A and Mondal D (2016) state that government expenditure for education can able to reduce food inequality in India. In addition, by constructing a theoretical model Sylwester (2002b) says that public education can able to reduce income inequality as students have sufficient income and go to school. Tax is a compulsory levy and people are bound to pay it whether they are rich or poor. Since the opportunity cost of attaining school is higher for poor people than rich people then they are too poor to attend school. The poor people have to pay tax but they may not enjoy the opportunities of public education. To prove this Jimenez (1986) intrudes an important paper and states that sometimes government expenditures on education do not give the benefit to the poor and, so do not reduces inequality. Fields (1980) states that, though in many countries, governments expend a large amount for education but they fail to reduce income inequality. By reviewing many studies Ram (1989) is not agreed the view of previous studies that there is very strong relation between education and income inequality.

3. METHODOLOGICAL ISSUES

The central theme of this paper is how does growth rate of output affect the expenditure for public education and inequality in India?

The study uses panel data consisting of all major states (15 states) of India from the year 1983 to 2012 for examining these issues. The advantages of using panel regression are that, panel data are much heterogeneous in nature as it captures both cross section and time series data. The combination of both cross section and time series data gives more information, more variability of data, less co-linearity among variables, more degrees of freedom and more efficiency. There may or may not be the actual effects of exogenous/explanatory variables on endogenous/dependent variable by using only cross section data or only time series data. The model with panel data can be estimated by three very popular and convenient techniques viz., the fixed effect model **(FEM)**, the random effect model **(REM)** and the pooled regression technique **(OLS).** However, first we estimate all models by three techniques of panel data analysis, later only the best fitted model is selected according to Breusch-Pagan LM test and Hausman specification test. Random effect model is better fitted than ordinary least square technique if the χ^2-value of Breusch-Pagan LM test for random effect is statistically significant or the probability value of χ^2 is less than a specified level of significance. Hausman specification test also indicates that, if there is no systematic difference in coefficients i.e., a statistically significant χ^2-value or the probability value is less than a specified level of significance then fixed effect model is better fitted than random effect model. On the other hand, if there is a systematic difference in coefficients i.e., there is not a statistically significant χ^2-value or the probability value is greater than a specified level of significance then random effect model is better fitted than fixed effect.

There are two views of income inequalities, viz., the rightist view of inequality and the leftist view of inequality. The rightist view of inequality may be called the relative measure of inequality and the leftist view of inequality may be called the absolute measure of inequality for positive growth in income. There are very strong debates for using these two views of inequality. The debate between these two types of inequalities is strongly explained by Kolm (1976). He is also agreed with the view that inequalities can be measured by both relative as well as absolute measure of inequality. Kolm calls the relative measure of inequality as the 'rightist' measure because the richer sections of the community accept this measure for positive growth in income and the absolute measure of inequality as the 'leftist' measure because the poorer section of the community accept this measure for positive growth in income. But it is always not true because for the opposite case i.e., for negative growth in income or when income falls the richer section accept an absolute measure whether the poorer section accept a relative measure. Nevertheless, these are two well-accepted views and thus we consider both the views for explaining rural inequality in India.

In this paper, we consider two families – the Lorenz-Gini family as well as another family viz., the SD-CV family and use the plural measures of inequality. Lorenz curve is nothing but the graphical representation of Gini ratio and so these two belong in the same family; the Lorenz-Gini family. Gini coefficient is used for measuring relative inequality in the Lorenz-Gini family and absolute Gini is used for measuring absolute inequality in the same family. Similarly, standard deviation (SD) and Coefficient of variation (CV) are used as a measure of absolute inequality and relative inequality respectively in the SD-CV family. An index measure of inequality in both families is also considered. The Gini index is nothing but the Gini coefficient for large population and so it is unnecessary to calculate Gini index separately for India, where population size is very large.

4. THE MODEL

Let us consider two equations for determining the public education expenditure, denoted by **EE**, and the income inequality, denoted by **Inq**:

EE = f [mpce (+), wpr (+), snae (+), hdi (?), X] + α GrOtp … (1)

Inq = ø [mpce (+), wpr (+), snae (?), EE (-), Z] + β GrOtp … (2)

Both *f [*]* and *ø [*]* are assumed to be linear function. In equation (1) and (2) **mpce** denotes monthly per capita consumption expenditure, **wpr** denotes work participation rate, **snae** denotes share of non-agricultural employment, **hdi** denotes human development index. ***X*** and **Z** of respective equations denote other factors that are associated with education expenditure and income inequality besides those listed and GrOtp denotes the growth rate of output. The signs **'+', '–', '?'** in parentheses indicate the positive, negative and ambiguous effect of the respective variables.

In equation (1), it is assumed that states with higher income can allocate more resources towards education. A higher level of monthly per capita consumption expenditure and work participation rate implying the high level of income of the consumer leading to increases in national income and, hence, faster growth. Thus monthly per capita consumption expenditure and work participation rate are expected to be positively associated with public expenditure on education. Increase in share of non-agricultural employment means transfer of labourers from agricultural sector to non-agricultural sector leading to increases in income of the people. Thus, it is expected to be positively associated with public expenditure on education. The effect of human development index upon public education expenditure is ambiguous. States with low human capital may invest more on education in order to more quickly increase human capital but states with high human capital are willing to continue to fund a high level of expenditure due to more increase human capital. It is also assumed that states with higher growth rate of output can afford to allocate more resources towards education.

However, the share of non-agricultural employment is expected to be positively related to the education expenditure but it has an ambiguous effect on income inequality. It is already mentioned above that the share of non-agricultural employment increases in income of the people especially poor people leads to decreases in income inequality. On the other hand, an increase in share of non-agricultural employment may imply the development of the capitalist sector leading to a larger increase in non-wage income than wage income and so increase in inequality. It is assumed that public education expenditure is expected to be negatively associated with income inequality. Education, especially in an area where there is a high demand for workers, creates high wages for those having education. As a result, those who are unable to afford education, or choose not to pursue optional education, generally receive much lower wages leading to higher inequality. If there is no significant variation in access to education, then increase in education expenditure leads to decrease in inequality. It is also assumed that states with higher growth rate of output can reduce income inequality.

The character (sign) of α & β in these two equations are very important as there are many possibilities.

(i) Let, $\alpha \neq 0$ and $\beta = 0$, then growth rate of output helps to determine education expenditures, but it does not otherwise affect income inequality and so the growth rate of output can be used as an instrumental variable for education expenditure in an inequality regression (along with other variables).

(ii) If $\alpha \neq 0$ and $\beta \neq 0$, then growth rate of output would not only directly influence public education expenditures, but would also have a direct effect upon income inequality given some level of education expenditure.

(iii) If $\alpha = 0$ and $\beta \neq 0$, then growth rate of output affects income inequality but not through public education expenditures.

(iv) If $\alpha = 0$ and $\beta = 0$, then growth rate of output neither affects public education expenditure nor affects income inequality.

4.1 EMPIRICAL SPECIFICATION

Let us consider two basic linear models. Let PCEE denotes per capita public education expenditure and CInq denotes the combined income inequality[1] in 15 major states of India for the period 1983 to 2012. The matrix **C** contains exogenous control variables including a constant term, Combined monthly per capita consumption expenditure (CMPCE), combined work participation rate (CWPR) and combined share of non-agricultural employment (CSNAE). Matrix **D** contains human development index (HDI) which is also an exogenous control variable that determines the level of education expenditure but it does not determine the income inequality. Also let the growth rate of output (GrNSDP) is assumed to be exogenous variable.

Specification 1: $PCEE_{it} = \alpha_0 C_{it} + \alpha_1 GrNSDP_{it} + \alpha_2 D_{it} + U_{it}$

Specification 2: $CInq_{it} = \beta_0 C_{it} + \beta_1 PCEE_{it} + \beta_2 GrNSDP_{it} + V_{it}$

$i = 1, 2, 3,..., 15$ ***(15 major states of India)***

$t = 1, 2, 3,..., 7$ ***(1983-2012)***

Monthly per capita consumption expenditure, work participation rate and share of non-agricultural employment are included in both equations and these variables are used as control variables for both public expenditures on education and income inequality in India.

5. THE FITTEST MODEL FOR EMPIRICAL TEST

Though the panel data set is estimated by three popular techniques/models, but the question is, what model do we select for the data set –Random Effect Model (REM), Fixed Effect Model (FEM), or Ordinary Least Square (OLS) technique? The answer of this question can simply be given by very popular and convenient two tests viz., Breusch-Pagan LM test for random effect and Hausman specification test.

TABLE 1: SELECTED MODEL OF EMPIRICAL SPECIFICATION 1 AND SPECIFICATION 2

I	II	III	IV	V	VI	VII
Dependent Variables	**P-value of Chi² (Whether REM is significant or not)**	**P-value of Chi bar² (Whether REM is more significant than OLS or not) (Breusch-Pagan LM test)**	**P-value of F (Whether FEM is significant or not)**	**P-value of F (Whether FEM is more significant than OLS or not)**	**P-value of Chi² (Whether FEM is more significant than REM or not) (Hausman specification test)**	**Best fitted model**
Per capita public expenditure on education	0	0	0	0	0.1686	**REM**
Relative inequality in Lorenz-Gini family	0	0	0	0	0.2602	**REM**
Relative inequality in SD-CV family	0	0	0	0	0.0017	**FEM**
Index of inequality in SD-CV family	0	0	0	0	0.8808	**REM**
Absolute inequality in Lorenz-Gini family	0	0	0	0	0.1123	**REM**
Absolute inequality in SD-CV family	0	0	0	0	0.0000	**FEM**

The estimated results for testing the appropriate technique applied for the two specifications are given in table (1). From table (1) it is seen that REM is itself a significant model (P-value of $\chi2 = 0$) and the $\chi2$-value of Breusch-Pagan LM test for random effect is significant at the 0% level for testing the first empirical specification indicating that REM is better fitted than OLS. FEM is itself a significant model (P-value of $\chi2 = 0$). Finally, from the Hausman specification test it is seen that there is a systematic difference in coefficients i.e., there is not a statistically significant $\chi2$-value (P-value of $\chi2 = 0.1686$) implying that the random effect model is better fitted than fixed effect model.

In the same way it can conclude that, random effect model is the best model for explaining relative inequality and absolute inequality in Lorenz-Gini family and index of inequality in SD-CV family (P-values of $\chi2$ of Hausman specification test are 0.2602, 0.1123 and 0.8808 respectively). For explaining relative and absolute inequality in SD-CV family, the fixed effect model is the best model (P-values of $\chi2$ of Hausman specification test are 0.0017 and 0.00 respectively).

6. EMPIRICAL FINDINGS

From the estimated results given in table (2) it is seen that, the overall explanatory power (R^2) of the specification 1 is 74.79%, the within state or inter-temporal explanatory power (R^2) is 81.91% and the between state or inter-state explanatory power (R^2) is 58.81% suggesting that specification 1 is significantly explained by these explanatory variables.

[1] In India NSSO published the raw data of consumption expenditure for rural and urban areas separately and based on these data NSSO itself calculate inequality for rural and urban areas separately. However, the overall inequality (or better named as combined inequality) for India and its major states can be calculated by combining the raw data of consumption expenditure for rural and urban areas with their corresponding population.

TABLE 2: PANEL REGRESSION: SPECIFICATION 1

PCEE	Coefficient	Standard error	P>|z|
CMPCE	1.276059	0.1844643	0
CWPR	-9.932539	7.620083	0.192
CSNAE	16.38776	5.163911	0.002
HDI	-6.868673	2.404874	0.004
GrNSDP	**1194.086**	**734.8682**	**0.074**
Cons	-432.8549	356.9968	0.225
R-Square	**Within = 0.8191**		
	Between = 0.5881		
	Overall = 0.7479		

From table 2, it is also seen that, the coefficient of combined monthly per capita consumption expenditure (**CMPCE)** is positive (1.276059) and significant at the 0% level in explaining per capita public expenditure on education in India suggesting that states with more monthly per capita consumption expenditure is associated with rising per capita public expenditure on education. One rupee increase in combined monthly per capita consumption expenditure per capita public expenditure on education will rise by Rs. 1.28. The coefficient of combined share of non-agricultural employment (**CSNAE)** is positive (16.38776) and significant at the 0.2% level in explaining per capita public expenditure on education in India suggesting that states with more share of non-agricultural employment is associated with rising per capita public expenditure on education. One rupee increase in combined share of non-agricultural employment per capita public expenditure on education will rise by Rs. 16.39. The coefficient of human development index **(HDI)** is negative (-6.868673) and significant at the 0.4% level in explaining per capita public expenditure on education in India suggesting that states with less human development index is associated with rising per capita public expenditure on education. One percent decrease in human development index per capita public expenditure on education might increase by Rs. 6.87 in order to more quickly increase human capital. The coefficient of growth rate of net state domestic product **(GrNSDP)** is positive (1194.086) and significant at the 7.4% level in explaining per capita public expenditure on education in India suggesting that states with more growth rate of net state domestic product is associated with rising per capita public expenditure on education. One percent increase in growth rate of net state domestic product per capita public expenditure on education will rise by Rs. 1194.09. However, the coefficient of combined work participation rate becomes insignificant implying that it has no role in determining the per capita public expenditure on education in India.

TABLE 3: PANEL REGRESSION: SPECIFICATION 2

Dependent Variable	$\beta_2 = 0$					$\beta_2 \neq 0$				
	Relative inequality in Lorenz-Gini Family	Relative inequality in SD-CV Family	Index of inequality in SD-CV Family	Absolute inequality in Lorenz-Gini Family	Absolute inequality in SD-CV Family	Relative inequality in Lorenz-Gini Family	Relative inequality in SD-CV Family	Index of inequality in SD-CV Family	Absolute inequality in Lorenz-Gini Family	Absolute inequality in SD-CV Family
CMPCE	0.00010 (0.00)	0.00043 (0.00)	8.1E-08 (0.00)	0.54 (0.00)	1.65 (0.00)	0.00010 (0.00)	0.00042 (0.00)	8.0E-08 (0.00)	0.54 (0.00)	1.65 (0.00)
CWPR	0.00425 (0.00)	0.01396 (0.004)	1.5E-06 (0.023)	4.14 (0.001)	18.08 (0.005)	0.00387 (0.00)	0.00947 (0.056)	1.1E-06 (0.047)	3.57 (0.005)	12.52 (0.062)
CSNAE	0.00101 (0.058)	0.00349 (0.139)	-3.6E-07 (0.346)	-0.13 (0.862)	-0.44 (0.889)	0.00102 (0.053)	0.00321 (0.162)	-3.6E-07 (0.336)	-0.12 (0.866)	-0.80 (0.796)
PCEE	**-0.00002 (0.016)**	**-0.00010 (0.012)**	**-2.4E-08 (0.00)**	**-0.04 (0.001)**	**-0.19 (0.001)**	**-0.00002 (0.033)**	**-0.00009 (0.03)**	**-2.2E-08 (0.001)**	**-0.04 (0.003)**	**-0.17 (0.002)**
GrNSDP	-	-	-	-	-	-0.09300 (0.169)	**-0.68454 (0.014)**	**-1.2E-04 (0.009)**	**-162.15 (0.081)**	**-847.55 (0.024)**
Cons	0.01618 (0.707)	-0.34911 (0.128)	-2.7E-06 (0.933)	-349.49 (0.00)	-1484.58 (0.00)	0.03734 (0.392)	-0.11773 (0.624)	2.1E-05 (0.521)	-317.94 (0.00)	-1198.10 (0.00)
Within R^2	**0.5269**	**0.5067**	**0.2964**	**0.9456**	**0.8842**	**0.5315**	**0.4701**	**0.3397**	**0.9469**	**0.8910**
Between R^2	**0.5696**	**0.3228**	**0.2163**	**0.9084**	**0.8271**	**0.5744**	**0.3507**	**0.2659**	**0.9111**	**0.8337**
Overall R^2	**0.5328**	**0.3625**	**0.2357**	**0.9139**	**0.8025**	**0.5423**	**0.3425**	**0.2867**	**0.9171**	**0.8173**

Probability values are in parentheses

Table 3 presents the empirical results in specification 2, first $\beta_2 = 0$ and then without this assumption. The coefficient of **CMPCE** and **CWPR** are positive and significant in explaining all types of income inequality in India whether the restriction **($\beta_2 = 0$)** is imposed or not. This suggests that these two variables are associated with rising income inequality in India. The coefficient of **CSNAE** is positive and significant in explaining relative income inequality in Lorenz-Gini family in India whether the restriction **($\beta_2 = 0$)** is imposed or not. This implies that this variable is associated with rising income inequality in India. However, the coefficient of **CSNAE** becomes insignificant for explaining other types of income inequality suggesting that it has no role in explaining the other types of income inequality in India. The coefficient of per capita public expenditure on education **(PCEE)** is negative (-0.00002) and significant at the 1.6% level with the restriction and is also negative (-0.00002) and significant at the 3.3% level without the restriction in explaining the relative inequality in Lorenz-Gini family suggesting that it is associated with falling relative income inequality in this family in India. The coefficient of growth rate of net state domestic product **(GrNSDP)** becomes insignificant indicating that it has no role for explaining the relative inequality in Lorenz-Gini family in India. This suggests that the growth rate of output helps to determine education expenditures, but it does not otherwise affect relative income inequality in Lorenz-Gini family and so the growth rate of output can be used as an instrumental variable for education expenditure in an inequality regression (along with other variables).

The coefficient of per capita public expenditure on education **(PCEE)** is negative (-0.00010) and significant at the 1.2% level with the restriction and is also negative (-0.00009) and significant at the 3% level without the restriction in explaining the relative inequality in SD-CV family suggesting that it is associated with falling income inequality in this family in India. The coefficient of **GrNSDP** is negative (-0.68454) and significant at the 1.4% suggesting that it is associated with falling relative income inequality in SD-CV family in India. This suggests that the growth rate of output would directly not only influences public education expenditures, but would also have a direct effect upon relative income inequality in SD-CV family given some level of education expenditure.

The coefficient of per capita public expenditure on education **(PCEE)** is negative (-2.4E-08) and significant at the 0% level with the restriction and is also negative (-2.2E-08) and significant at the 0.1% level without the restriction in explaining the index of inequality in SD-CV family suggesting that it is associated with falling income inequality in this family in India. The coefficient of **GrNSDP** is negative (-1.2E-04) and significant at the 0.9% suggesting that it is associated with falling

index of income inequality in SD-CV family in India. This suggests that the growth rate of output would directly not only influences public education expenditures, but would also have a direct effect upon index of income inequality in SD-CV family given some level of education expenditure.

The coefficient of per capita public expenditure on education **(PCEE)** is negative (-0.04) and significant at the 0.1% level with the restriction and is also negative (-0.04) and significant at the 0.3% level without the restriction in explaining the absolute inequality in Lorenz-Gini family suggesting that it is associated with falling absolute income inequality in this family in India. The coefficient of **GrNSDP** is negative (-162.15) and significant at the 8.1% suggesting that it is associated with falling absolute income inequality in Lorenz-Gini family in India. This suggests that the growth rate of output would directly not only influences public education expenditures, but would also have a direct effect upon absolute income inequality in Lorenz-Gini family given some level of education expenditure.

The coefficient of per capita public expenditure on education **(PCEE)** is negative (-0.19) and significant at the 0.1% level with the restriction and is also negative (-0.17) and significant at the 0.2% level without the restriction in explaining the absolute inequality in SD-CV family suggesting that it is associated with falling absolute income inequality in this family in India. The coefficient of **GrNSDP** is negative (-847.55) and significant at the 2.4% suggesting that it is associated with falling absolute income inequality in SD-CV family in India. This suggests that the growth rate of output would directly not only influences public education expenditures, but would also have a direct effect upon absolute income inequality in SD-CV family given some level of education expenditure.

7. CONCLUDING REMARKS

This paper tries to discuss the link among economic growth, education expenditure and inequality in Indian context. Can the growth rate of output play the significant role for explaining the public expenditures on education in India? The results give that there is a positive correlation between these two suggesting that the growth rate of output should speed up public expenditures on education in India. On the other hand, growth rate of output has not only direct effect on public education expenditures, but also has an inverse effect upon inequality in majority of the cases. However, the growth rate of output helps to determine education expenditures, but it does not otherwise affect relative income inequality in Lorenz-Gini family and so the growth rate of output can be used as an instrumental variable for education expenditure in an inequality regression

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APPENDIX

TABLE 1: SUMMERY STATISTICS OF VARIABLES

Variable	Mean	Median	Standard Deviation	Minimum	Maximum	No of observations
PCEE	1060.37	919.82	580.32	282.08	2787.91	105
CINQ (Gini coefficient)	0.316933	0.315000	0.046435	0.205181	0.469172	105
CINQ (CV)	0.721362	0.709508	0.145010	0.430688	1.193170	105
CINQ (CV-index)	0.000104	0.000098	0.000031	0.000049	0.000207	105
CINQ (Absolute Gini)	345.37	305.94	157.25	138.88	1029.94	105
CINQ (SD)	790.18	686.71	404.23	291.52	2749.87	105
GrNSDP	0.0657	0.0620	0.0381	-0.0406	0.2463	105
CMPCE	1061.20	982.37	345.55	578.36	2333.44	105
CWPR	41.12	41.36	5.13	27.25	52.25	105
CSNAE	43.50	42.52	12.07	22.11	79.61	105
HDI	35.50	32.60	21.91	2.40	100.00	105

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