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Effects of public school education expenditure on income inequality: Evidence from 15 major States of rural India

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Abstract: Using panel data for 15 major states of India for the period 1983 to 2012, this paper empirically examines whether more funding on school education (both elementary and secondary levels) by various state governments and central government taken together can affect the distribution of income/expenditure in rural sector of India. From the findings it is observed that public expenditure on school education helps reducing income inequality whether we use the rightist view of inequality or relative inequality as measured by Gini coefficient or, the leftist view of inequality or absolute inequality as measured by either absolute Gini or by Standard Deviation of income in rural sector of India. These findings are robust to the inclusion of various socio-economic and demographic variables. The findings, therefore, suggest that devoting more public expenditure on school education may be one way to reduce income inequality in India. We have also tried to explain the nature of variation in all the variables, viz, the dependent variable (income inequality as measured by three methods) and all explanatory variables (as mentioned in section IV) across 15 major states of India and over the time period from 1983 to 2012. In our results we see that the inter-state variation is more significant than inter-temporal variation for all explanatory variables and explained variable except school education expenditure. For school education expenditure the inter-temporal variation is more significant than inter-state variation.
Keywords: Relative inequality, Absolute inequality, Expenditure on school education

INTRODUCTION

Education is a very powerful instrument for overcoming inequalities, promoting human development, accelerating social transformation and achieving economic progress. It is very important for a country to increase the education level of people. More educated people build more educated society via more education level. More public expenditure on education plays a vital role to attain better education level of all people Kayet and Mondal [1] If the people (mainly poor people) attain better education level (at least school level) they get more opportunity of higher education and also get job opportunity. Consequently their income levels increase and the income gaps between rich and poor people decrease.

Economic inequality (also known as the gap between rich and poor, income inequality, wealth disparity, or "wealth and income differences") comprises all disparities in the distribution of economic assets and income. The term typically refers to inequality among individuals and 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 is distributed amongst its population. The issue of economic inequality is related to the idea of equity: equality of opportunity and equality of outcome.

Income distribution has always been a central concern of economic theory and economic policy. Classical economists such as *Adam Smith*, *Thomas Malthus* and *David Ricardo* were mainly concerned with factor income distribution, that is, the distribution of income between the main factors of production, land, labour and capital.

Modern economists have also addressed this issue, but have been more concerned with the distribution of income across individuals and households. Important theoretical and policy concerns include the relationship between income inequality and economic growth. The distribution of income within a community may be represented by the Lorenz curve. The Lorenz curve is closely associated with measures of income inequality, such as the Gini coefficient.

One important reason behind the existence of inequality is variation in individuals' access to education. 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, Sylwester [2]. However this paper examines a vital issue that explains how income inequality affected by the amount of funding by different state governments and central government on public education of school level (both elementary and secondary) in India and its major 15 states?

BRIEF REVIEW OF LITERATURE:

Many people would agree that income inequality is harmful to society. Benabou [3] and Barro [4] provide surveys of various theoretical arguments as to why inequality might deter economic growth. Alesina and Rodrik [5] and Persson and Tabellini [6] both report that income inequality lowers growth in across section of countries although others have expressed doubts upon their findings. According to Alesina and Perotti [7] countries with more income inequality are also more likely to suffer from political instability. Besides these views that societal inequalities are undesirable and that income inequalities may exert negative influences upon the economic and political environments, it is important to understand how policymakers try to reduce social inequalities and inequalities in the distribution of income. Education can play an important role in reducing both types of inequalities. Schultz [8] proposes increasing human capital as one way to lower income inequality and increased support for public education might be one way to accomplish this. Some theoretical models also predict that public education lowers income inequality. Glomm and Ravi Kumar [9] develop a model where agents can choose between a private and public education system. Although whether or not income inequality declines under a private education system depends upon parameters, income inequality unambiguously declines under a public education system. Saint-Paul and Verdier [10], Eckstein and Zilcha [11] and Zhang [12] also developed models where continued support for public education lowers the level of income inequality over time. However, Sylwester [13] develops a model where public education can lower the level of income inequality provided that agents have sufficient resources to forgo income and attend school. If people are too poor to attend school, then promoting public education can actually cause the distribution of income to become more skewed since the poor are taxed for revenue but do not enjoy the benefits of the public education system. In addition, Jimenez [14] argues that many public education expenditures do not benefit the poor at all and, hence, do not lessen income inequality. Fields [15] also argues that the degree of income inequality did not diminish even as many countries devoted more resources to public education. Finally, Ram [16] reviews previous theoretical and empirical papers and concludes that there is not strong support that increasing education within the population lowers income inequality. Given these studies, it is not very clear whether public education expenditure can actually lower the level of income inequality over time.

Education is often considered to exert significant impact on personal income. Education can improve an individual's skills and signal his or her innate productivity; so that workers with a high educational attainment often receive high earnings. Expanding education investment is therefore believed to be one of the key measures to reduce poverty and income inequality, particularly in developing countries. As Ashen Felter and Rouse [17] point out, "The school is a promising place to increase the skills and incomes of individuals. As a result, educational policies have the potential to decrease existing, and growing, inequalities in income". Heckman [18] also declares that "human capital is the asset that ultimately determines the wealth. Fostering access to education will reduce inequality in the long run". Guangjie Ning [19] points out that increasing educational expenditure with no complementary measures such as reforming the education system and establishing a competitive labour market helps less in reducing income inequality. Sylwester [2] suggests that education expenditures may be important along other dimensions and, specially, to reducing income inequality. However, Kayet, A and Mondal, D [1] examined that, public expenditure on education (all levels) significantly reduce income inequality in rural India. They suggested that if government takes a policy by increasing expenditure on education in their budget, inequality will obviously fall.

METHODOLOGY:

We have used Panel data regression to explain income inequality by some socio-economic and demographic variables in rural India. If we take only cross section data or only time series data, proper results may not found. We have taken two types of income inequalities, viz, the rightist view of inequality or relative measure of inequality as measured by Gini coefficient and the leftist view of inequality or absolute measure of inequality as measured by absolute Gini or by Standard deviation of income.

Kolm[20] in his famous article 'Unequal Inequalities I' [Kolm, 1976] has well taken up this debate between absolute and relative inequality. He has been of the opinion that inequalities can be measured by both the ways and the researchers in this field have used

both of them. He has tried to define a relative measure of inequality as a 'rightist' measure of inequality as the richer section of the community or the capitalist class or their union prefers to accept it when income increases (by equal amount or by equal proportion) and an absolute measure of inequality as 'leftist' measure of inequality as the poorer section of the community or the labour class or the labour union prefers to accept it when income increases. However, viewing relative measure of inequality as 'rightist' and absolute measure of inequality as 'leftist' is not completely true, because when income falls (by equal amount or by equal proportion) the richer section of the community or the capitalist class or their union prefers to accept an absolute measure of inequality and the poorer section of the community or the labour class or the labour union prefers to accept a relative measure. Anyway, these are two well accepted views and Kolm himself was convinced of both the views. And that's why we have considered both the views in Indian context.

In the present context, comparable absolute inequality in consumer expenditure can be easily measured if we have the values at constant prices. A simple absolute measure of inequality can be obtained by multiplying Gini coefficient by the respective average MPCE at constant prices. However, this measure is not very useful at all in the absolute context as the change in inequality from transfer of expenditure from one person to another is dependent on the number of persons present in between them and not on their income difference. Standard deviation of consumer expenditures as a measure of absolute inequality becomes better than absolute Gini as in this measure the change in inequality from transfer of expenditure from one person to another is dependent on their income difference Thus as a relative measure we have taken Gini coefficient and as an absolute measure we have taken both absolute Gini and standard deviation of income. We have examined the role of public expenditure on school education in explaining variation in inequalities of both types.

School education expenditure individually cannot explain income inequality properly because income inequality depends on some socio-economic, demographic, political and other variables. Population is a very important demographic variable for explaining income inequality. It affects income inequality directly. If population of a country increases, income inequalities will also increase and vice-versa. We have estimated population in rural India by Lagrangian nonlinear interpolation method as per needs. Monthly per capita expenditure (MPCE) and work participation rate (WPR) are two important macroeconomic determinants for explaining economic growth. There is a direct relationship between MPCE & WPR and economic growth. If MPCE and WPR rise (fall) economic growth will also rise (fall). Theoretically there is an inverse relationship between economic growth and equity. If economic growth rise (fall) equity will fall (rise) means economic inequality will raise (fall). Thus there is a direct relationship between economic growth and economic inequality. Hence theoretically MPCE and WPR are positively related with income inequality. Share of non agricultural employment (SNAE) is also an important factor for explaining income inequality in rural India. If share of non agricultural employment increases in rural sector, this means a transfer of labourer from agricultural sector to non agricultural sector leading to an increase in income of rural poor, consequently the income gap between rich and poor is expected to decrease. Thus the relationship is expected to be inverse one. 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 an increase in inequality.

A two-way ANOVA test is used to explain the nature of variation in all the variables, viz, the dependent variable (income inequality as measured by three methods) and all explanatory variables (will mention in section IV) across 15 major states of India and over the time period from 1983 to 2012. As inequality depends on a number of variables which have either inter-state or inter-temporal or both types of variation, inequality is expected to have significant variation of both types. Two-way ANOVA for all hypothesized factors are done in the second step to have a first-hand judgment about whether a factor is responsible for inter-temporal variation or for inter-state variation or both. If a factor is found to have a significant inter-state variation but an insignificant inter-temporal variation then this factor cannot be responsible for inter-temporal variation of inequality but this factor may or may not be responsible for inter-state variation of inequality.

VARIABLE

We have used various socio-economic as well as demographic variables as explanatory variables to explain income inequality. Here income inequality is measured by consumer expenditure data (Gini coefficient for relative inequality, and for absolute inequality we have used two methods viz. Absolute Gini and Standard Deviation) because in India direct income inequality data are not available. Public expenditure on school education (sum of elementary level and secondary level) (SCHEDUEXP) by both various state governments & central government is used as one of the important explanatory variable in our model. Major important demographic and socio-economic variables that explain income inequality in

rural sector like rural population of India (RPOP), monthly per capita expenditure in rural sector (RMPCE), work participation rate in rural sector (RWPR), share of non agricultural employment in rural sector (RSNAE) are used as explanatory variables in our model. Both consumer expenditure and school education expenditure are measured at constant (2009-10) prices.

DATA SOURCE

We have used consumer expenditure data of rural sector for different states of India published by NSSO consumer expenditure report from different quinquennial survey from 1983 to 2011-12.

Table-1: Trends in relative inequality (Gini coefficient) in major states of India (Rural)

	RURAL						
STATES	**1983-84**	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	0.292	0.301	0.290	0.240	0.290	0.278	0.271
ASSAM	0.195	0.222	0.180	0.200	0.190	0.244	0.172
BIHAR	0.255	0.264	0.220	0.210	0.200	0.225	0.190
GUJARAT	0.252	0.233	0.240	0.230	0.270	0.254	0.266
HARYANA	0.279	0.281	0.300	0.240	0.320	0.301	0.245
KARNATAKA	0.300	0.292	0.270	0.240	0.260	0.234	0.305
KERALA	0.330	0.323	0.290	0.270	0.340	0.417	0.472
MADHYA PRADESH	0.292	0.290	0.280	0.240	0.270	0.292	0.275
MAHARASHTRA	0.283	0.331	0.300	0.260	0.310	0.268	0.277
ORISSA	0.257	0.267	0.240	0.240	0.280	0.261	0.217
PUNJAB	0.279	0.293	0.260	0.240	0.280	0.289	0.293
RAJASTHAN	0.340	0.311	0.260	0.210	0.250	0.225	0.217
TAMIL NADU	0.324	0.323	0.310	0.280	0.320	0.264	0.288
UTTAR PRADESH	0.290	0.279	0.280	0.250	0.290	0.263	0.237
WEST BENGAL	0.284	0.252	0.250	0.220	0.270	0.238	0.218

Table-2: Trends in absolute inequality (Gini) in major states of India (Rural)

(Rs. At 2009-10 prices)

	RURAL						
STATES	**1983-84**	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	190.36	225.30	217.13	178.75	256.40	283.63	349.09
ASSAM	124.29	190.15	119.40	143.41	160.03	210.49	150.40
BIHAR	135.13	168.16	127.91	133.15	128.90	153.55	160.20
GUJARAT	174.71	175.51	188.28	215.68	242.03	251.95	326.46
HARYANA	268.93	281.20	305.04	285.81	419.14	420.07	386.80
KARNATAKA	197.60	203.24	189.15	201.75	201.17	189.25	358.88
KERALA	270.70	318.53	296.43	346.14	522.47	771.38	995.87
MADHYA PRADESH	165.78	191.84	184.16	162.53	176.34	232.64	241.27
MAHARASHTRA	176.50	248.12	217.10	214.76	263.72	271.05	333.05
ORISSA	143.50	158.99	140.79	152.25	169.85	178.68	160.55
PUNJAB	268.93	334.37	301.83	296.90	356.96	426.76	511.04
RAJASTHAN	243.49	258.53	220.81	191.82	218.88	225.82	261.60
TAMIL NADU	205.28	232.26	237.52	240.36	287.21	255.47	364.04
UTTAR PRADESH	171.31	193.76	201.02	192.07	230.60	217.58	208.19
WEST BENGAL	167.56	176.00	184.47	170.56	228.81	104.30	209.03

Note: Calculated by authors.

Table-3: Trends in absolute inequality (Standard Deviation) in major states of India (Rural)

(Rs. At 2009-10 prices)

	RURAL						
STATES	**1983-84**	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	402.06	490.81	470.54	370.60	557.12	575.51	894.33
ASSAM	252.57	328.52	231.03	278.36	312.87	425.68	276.61
BIHAR	288.03	387.48	261.93	273.54	264.49	290.09	282.36
GUJARAT	381.58	363.45	377.68	416.54	489.93	512.30	855.17
HARYANA	504.21	577.91	598.02	528.30	869.57	838.27	1106.72
KARNATAKA	1027.07	456.44	391.51	406.59	507.12	366.70	966.34
KERALA	609.83	680.39	584.54	651.34	1011.77	1861.74	4485.65
MADHYA PRADESH	359.00	422.05	398.11	338.86	376.17	471.90	433.67
MAHARASHTRA	369.69	665.94	465.04	427.99	571.78	538.82	826.24
ORISSA	307.92	347.67	297.92	304.93	373.19	343.40	242.40
PUNJAB	535.46	681.12	587.05	554.17	686.53	863.23	1635.25
RAJASTHAN	531.81	543.44	451.17	373.59	477.32	437.29	601.51
TAMIL NADU	450.73	518.84	519.91	504.28	697.95	513.69	941.18
UTTAR PRADESH	371.12	418.61	413.17	396.94	527.81	443.89	387.56
WEST BENGAL	337.08	398.69	415.37	348.45	523.21	404.11	402.03

Note: Calculated by authors.

Data of expenditure on school education (sum of elementary and secondary education) are taken from the Analysis of budget expenditure on education (various issues), Ministry of Human Resource Development, Government of India.

Table-4: Trends in school education expenditure (sum of elementary and secondary) in major states of India (Rural)

(Rs. At 2009-10 prices) (in Crore)

	1983-84	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	1713.43	2050.54	2586.26	3415.88	4467.42	6298.24	10498.79
ASSAM	715.78	914.92	1410.58	1903.67	2712.56	3347.12	4602.48
BIHAR	1677.35	2295.64	2987.77	3632.15	2521.08	6030.63	7210.99
GUJARAT	1362.69	1911.69	2594.68	4560.68	4328.37	6850.62	8475.17
HARYANA	482.41	702.39	874.90	1737.95	1784.21	4229.96	4773.57
KARNATAKA	1089.18	1870.20	2797.65	3481.66	4675.60	7166.60	8300.35
KERALA	1327.83	1647.61	2153.59	2518.26	3593.14	4634.33	6083.18
MADHYAPRADESH	1214.87	1650.96	2421.46	3734.14	2708.76	5146.04	6976.26
MAHARASHTRA	2427.45	3651.47	4485.02	7241.92	11069.36	18997.58	20533.54
ORISSA	654.53	922.42	1369.54	2039.54	2121.86	4185.71	4757.21
PUNJAB	826.76	1099.54	1383.33	2418.06	2382.81	2967.27	4269.53
RAJASTHAN	1114.71	1611.65	2352.40	4138.20	4574.91	8366.03	9254.41
TAMIL NADU	1493.12	2237.59	3599.05	5501.97	4658.53	8928.71	10301.74

Population data are collected from different Census report and we have estimated population in rural India by Lagrangian nonlinear interpolation method as per needs.

Table-5: Trends in population in major states of India (Rural)

Note: Calculated by authors.

	1983-84	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRAPRADESH	42831686	45878030	50653897	54634646	56351592	56613681	56304099
ASSAM	17226362	18636753	20640806	22618901	24350214	26156892	26900494
BIHAR	58701575	56752804	61395096	71318967	80007689	89077166	92803761
GUJARAT	24193976	25593010	28266490	31046706	32889749	34302060	34740518
HARYANA	10588764	11505291	13097966	14653020	15635354	16332647	16527481
KARNATAKA	27528745	29419188	32036596	34310020	35863614	37107275	37514782
KERALA	20724033	20975646	22623349	23793322	22496865	19135467	17253100
MADHYAPRADESH	45043328	49214496	48112028	44454919	45432682	50069857	52986723
MAHARASHTRA	42520377	45569841	50196651	54601591	57831489	60660582	61673670
ORISSA	24223495	25898579	28309676	30624440	32504107	34338954	35058798
PUNJAB	12654097	13523444	14744491	15820587	16563393	17166253	17366699
RAJASTHAN	28386055	31067129	36143549	41738642	46085995	50146779	51678102
TAMIL NADU	33968459	35883902	35999323	34946240	35214659	36524884	37344601
UTTAR PRADESH	95619509	103848258	115734545	127878547	138962864	150923831	155958555
WEST BENGAL	42286773	46006917	51686386	56639582	59407431	60939085	61193868

Data of monthly per capita expenditure in rural sector from NSSO consumer expenditure report, data of work participation rate in rural sector and share of non agricultural employment from NSSO Employment Unemployment report of different quinquennial survey from 1983 to 2011-12.

Table-6: Trends in monthly per capita expenditure, Work participation rate and share of non agricultural employment in major states in India (Rural)

	Monthly per capita expenditure (Rs. At 2009-10 prices)						
	1983-84	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	651.47	747.34	760.77	759.43	884.77	1020.14	1287.75
ASSAM	637.92	856.87	680.16	713.42	820.74	863.47	876.05
BIHAR	529.25	637.38	575.26	644.73	630.25	681.03	844.10
GUJARAT	692.80	752.33	799.30	923.03	900.69	994.92	1226.79
HARYANA	962.64	1001.83	1014.57	1196.01	1303.83	1393.59	1580.73
KARNATAKA	659.60	696.00	709.86	835.89	768.28	806.54	1175.59
KERALA	819.70	986.94	1028.80	1281.61	1530.87	1850.68	2108.11
MADHYA PRADESH	567.47	662.40	664.09	672.19	663.42	796.59	877.52
MAHARASHTRA	623.47	750.37	718.51	831.69	857.89	1010.93	1204.15
ORISSA	557.48	595.10	579.21	624.76	602.72	682.80	739.32
PUNJAB	962.64	1139.65	1141.03	1243.62	1279.44	1479.80	1744.02
RAJASTHAN	716.96	829.99	849.55	918.93	892.74	1004.48	1203.22
TAMIL NADU	633.58	720.08	773.74	860.65	909.88	968.44	1263.92
UTTAR PRADESH	589.88	693.85	721.59	781.23	804.80	828.67	879.23
WEST BENGAL	589.88	699.45	734.63	761.42	849.35	855.10	960.17

Work participation rate							
	1983-84	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	0.541	0.549	0.575	0.542	0.544	0.521	0.522
ASSAM	0.333	0.342	0.353	0.349	0.391	0.368	0.343
BIHAR	0.383	0.396	0.351	0.338	0.316	0.283	0.275
GUJARAT	0.485	0.49	0.488	0.499	0.513	0.459	0.447
HARYANA	0.364	0.427	0.372	0.346	0.424	0.396	0.356
KARNATAKA	0.49	0.482	0.517	0.487	0.542	0.497	0.45
KERALA	0.428	0.438	0.381	0.387	0.4	0.383	0.382
MADHYA PRADESH	0.499	0.489	0.494	0.462	0.459	0.426	0.405
MAHARASHTRA	0.52	0.512	0.514	0.484	0.521	0.488	0.486
ORISSA	0.439	0.457	0.442	0.423	0.452	0.41	0.417
PUNJAB	0.466	0.407	0.392	0.41	0.44	0.391	0.406
RAJASTHAN	0.511	0.498	0.5	0.446	0.459	0.436	0.424
TAMIL NADU	0.534	0.536	0.539	0.513	0.528	0.501	0.485
UTTAR PRADESH	0.403	0.391	0.378	0.345	0.371	0.344	0.338
WEST BENGAL	0.378	0.401	0.376	0.349	0.379	0.392	0.39
Share of non agricultural employment							
	1983-84	**1987-88**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
ANDHRA PRADESH	0.197	0.201	0.206	0.212	0.282	0.314	0.305
ASSAM	0.2	0.203	0.208	0.324	0.257	0.295	0.380
BIHAR	0.164	0.191	0.156	0.194	0.22	0.332	0.324
GUJARAT	0.148	0.186	0.213	0.202	0.228	0.218	0.254
HARYANA	0.223	0.292	0.281	0.314	0.358	0.402	0.422
KARNATAKA	0.155	0.174	0.187	0.179	0.189	0.243	0.298
KERALA	0.369	0.395	0.436	0.519	0.58	0.643	0.686
MADHYA PRADESH	0.097	0.099	0.101	0.129	0.175	0.176	0.279
MAHARASHTRA	0.142	0.154	0.176	0.173	0.201	0.206	0.229
ORISSA	0.208	0.182	0.192	0.218	0.311	0.324	0.378
PUNJAB	0.174	0.201	0.254	0.274	0.33	0.379	0.476
RAJASTHAN	0.133	0.28	0.201	0.223	0.271	0.366	0.392
TAMIL NADU	0.251	0.305	0.296	0.321	0.348	0.363	0.488
UTTAR PRADESH	0.177	0.191	0.2	0.237	0.273	0.333	0.363
WEST BENGAL	0.263	0.333	0.366	0.364	0.372	0.438	0.468

THE EMPERICAL SPECIFICATION:

The empirical specification is constructed as follows.

Let INQR denote the income inequality (consumer expenditure) in rural sector of India (Gini coefficient for relative inequality and, absolute Gini and SD for absolute inequality). Our model is represented by-

$$\mathbf{INQR = \alpha + \beta_1\ SCHEDUEXP + \beta_2\ RPOP + \beta_3\ RMPCE + \beta_4\ RWPR + \beta_4\ RSNAE + U}$$

Where, U is random error term.

THE FINDINGS:

We regresses INQR on a set of explanatory variables which we have already denoted in our model. The estimated regression equation of random effect in relative inequality (Gini-coefficient) sense be-

INQR (Gini) = 0.0035916[4] -5.89e-06 SCHEDUEXP[1] + 5.47e -10 RPOP[2] +0 .000106 RMPCE[1]
(0.0453842) (1.26e-06) (2.48e-10) (.0000227)
+ 0.3900259 RWPR[1] +0.0082 RSNAE[4] .....(1)
(0.0782209) (0.0574671)

R-square: within = 0.3386
Between = 0.5505
Overall = 0.4555

Values within parentheses are standard errors.
[1] Denote 1% level of significance.
[2] Denote 5% level of significance.
[3] Denote 10% level of significance.
[4] Denote >10% level of significance.

The estimated regression equation of random effect in absolute inequality (absolute Gini)) sense be –

INQR (Abs Gini) = -313.3077[1] - 0.0085461 SCHEDUEXP[1] +7.65e-07 RPOP[2] +0.4624723 RMPCE[1]
(64.93164) (.0018149) (3.53e-07) (0.0325686)
+347.9439 RWPR[1] – 11.24746 RSNAE[4] .....(2)
(111.7638) (82.48181)

R-square: within = 0.8148
Between = 0.8964
Overall = 0.8572

And the estimated regression equation of random effect in absolute inequality (standard deviation) is

INQR (SD) = -1435.654[1] - 0.0333119 SCHEDUEXP[1] + 3.84e-06 RPOP[2] +1.494079 RMPCE[1]
(351.0262) (0.0115667) (1.83e-06) (0.189615)
+1289.495 RWPR[2] +267.1402 RSNAE[4] .....(3)
(587.3903) (467.6702)

R-square: within = 0.5756
Between = 0.8015
Overall = 0.6198

From the overall results it is seen that our results are very robust. In the first model the overall explanatory power (R^2) is 46%, within groups or within States or inter temporal explanatory power (R^2) is 34% and between groups or between States is 55%. In the second model the overall explanatory power (R^2) is 86%, within groups or within States or inter temporal explanatory power (R^2) is 81% and between groups or between States is 90%. And in the third model the overall explanatory power (R^2) is 62%, within groups or within States or inter temporal explanatory power (R^2) is 58% and between groups or between States is 80%. It is seen that the inter-state variation of income inequality is more significant than that of inter-temporal variation (see appendixTable1: ANOVA test).

Public expenditure on school education (SCHEDUEXP) is negatively affects income inequality in India and its major states in both senses (relative as well as absolute i.e. in rightist and leftist view of inequality). It is statistically significant at the level of less than 1% in both relative sense (measured by Gini coefficient) (see appendix table 2) and absolute sense (measured by absolute Gini and standard deviation) (see appendix table 3 & 4). It means that if public expenditure on education increases, income inequality will decrease and vice-versa. This happens because more expenditure on school education leads to more education for all and consequently more employment of poor people. It is seen that the inter-temporal variation of school education expenditure is more significant than inter-state variation (appendixTable1).

In our results rural population is positively related with rural income inequality in both senses. The results are very robust because it is statistically significant at the level of 2.7% in relative sense (appendix table 2) and 3% in absolute sense (absolute Gini) (appendix table 3) and also 3.6% in absolute sense measured by standard deviation (appendix table 4). So our hypothesis is accepted. In our estimated results (in both senses) the hypotheses about MPCE and WPR are accepted. Here MPCE is the most significant factor in both senses for explaining income inequality as it is statistically significant at 0% in both cases (appendix table 2, 3 & 4). WPR is also highly significant factor for explaining income inequality in rural India as it is statistically significant at 0% in relative inequality(appendix table 2) and 0.2% in absolute inequality (measured by absolute Gini) (appendix table 3) and that of also 2.8% in absolute inequality (measured by standard deviation) (appendix table 4). Share of non agricultural employment (SNAE) is insignificant in both cases as it is statistically significant at the level of more than 10%. Because in rural India share of non agricultural employment is very low and so there is no significant role. Though it has no important individual role for explaining income inequality in rural sector of India, it has an important role in our overall model. If we exclude this variable from our model the overall explanatory power will fall from 46% to 44.76% in relative inequality sense and, from 86% to 85.71% in absolute inequality sense measured by absolute Gini and from 62% to 61.48% in absolute inequality sense measured by standard deviation in income. From the ANOVA test it is seen that the inter-state variation of rural population, rural monthly per capita expenditure, rural work participation rate and rural non- agricultural employment are more significant than that of inter-temporal variation (see appendix Table1).

CONCLUSION:

It is very difficult to explain variation in income inequality only by some measurable explanatory variables. There are varieties of socio-economic, demographic, political and other types of variables which can explain economic inequality and all of them are not measurable. Moreover, it is not possible to include all types of variables in the model due to lack of data in India. In our model we have included some measurable socio-economic and demographic variables for explaining income inequality (mentioned in unit IV) and we get very robust results. From the above results, it appears that public expenditure on school education in India inversely affects income inequality. If government takes a policy by increasing expenditure on school education for rural India in their budget, inequality will obviously fall. This paper suggests that public school education expenditure is very important along with other factors in reducing income inequality in rural sector of India.

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AppendixTable1:

ANOVA TESTS (Two-Factor Without Replication)						
Relative Inequality(Gini)						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	0.113999	14	0.008143	10.45381	3.48E-13	1.811297
Inter temporal	0.022612	6	0.003769	4.838184	0.000275	2.208554
Absolute Inequality(Absolute Gini)						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	866945.9	14	61924.71	11.86138	1.43E-14	1.811297
Inter temporal	226228.1	6	37704.68	7.222149	3.1E-06	2.208554
Absolute Inequality(SD)						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	7587920	14	541994.3	3.943782	3.65E-05	1.811297
Inter temporal	3212875	6	535479.1	3.896374	0.001758	2.208554
School Education Expenditure						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	4.96E+08	14	35450973	10.90709	1.21E-13	1.811297
Inter temporal	7.54E+08	6	1.26E+08	38.66742	3.53E-22	2.208554
Rural Population						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	7.89E+16	14	5.63E+15	143.4807	2.16E-52	1.811297
Inter temporal	3.11E+15	6	5.18E+14	13.20656	1.78E-10	2.208554
Rural MPCE						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	4931718	14	352265.5	28.13018	7.74E-26	1.811297
Inter temporal	2675206	6	445867.7	35.60478	4.18E-21	2.208554
Rural Work Participation Rate						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Inter State	0.415643	14	0.029689	68.23245	9.82E-40	1.811297
Inter temporal	0.029624	6	0.004937	11.34736	2.98E-09	2.208554

Appendix Table 2: Panel Regression Results (Gini-coefficient)

INQR	Coef.	Std.Err.	z	P>|z|	95% Conf.Interval	
SCHEDUEXP	-5.89E-06	1.26E-06	-4.68	0	-8.35E-06	-3.42E-06
RPOP	5.47E-10	2.48E-10	2.21	0.027	6.14E-11	1.03E-09
RMPCE	0.000106	2.27E-05	4.68	0	6.16E-05	0.0001504
RWPR	0.3900259	0.078221	4.99	0	0.236716	0.543336
RSNAE	0.0082432	0.057467	0.14	0.886	-0.10439	0.1208767
CONS	0.0035916	0.045384	0.08	0.937	-0.08536	0.092543
R-square: within = 0.3386 between = 0.5505 overall = 0.4555						

Appendix Table 3: Panel Regression Results (Absolute Gini)

INQR	Coef.	Std. Err.	z	P>|z|	95% Conf Interval	
SCHEDUEXP	-0.00855	0.001815	-4.71	0	-0.0121	-0.004989
RPOP	7.65E-07	3.53E-07	2.16	0.03	7.23E-08	1.46E-06
RMPCE	0.462472	0.032569	14.2	0	0.398639	0.5263056
RWPR	347.9439	111.7638	3.11	0.002	128.891	566.9969
RSNAE	-11.2475	82.48181	-0.14	0.892	-172.909	150.4139
CONS	-313.308	64.93164	-4.83	0	-440.571	-186.044
R-square: within = 0.8148 between = 0.8964 overall = 0.8572						

Appendix Table 4: Panel Regression Results (Standard Deviation)

INQR	Coef.	Std. Err.	z	P>|z|	95% Conf Interval	
SCHEDUEXP	-0.03331	0.011567	-2.88	0.004	-0.05598	-0.0106417
RPOP	3.84E-06	1.83E-06	2.1	0.036	2.49E-07	7.43E-06
RMPCE	1.494079	0.189615	7.88	0	1.12244	1.865718
RWPR	1289.495	587.3903	2.2	0.028	138.2315	2440.759
RSNAE	267.1402	467.6702	0.57	0.568	-649.477	1183.757
CONS	-1435.65	351.0262	-4.09	0	-2123.65	-747.6551
R-square: within = 0.5756 between = 0.8015 overall = 0.6198						