

Determinants of Expenditure on Education

An Empirical Analysis Using State Level Data

Using a panel of 15 major states from India, this paper examines patterns and changes in the allocation of government funds for education, particularly higher education, over a span of two decades, before and after the introduction of the new economic policies. State real per capita income, with elasticity less than one, is found to significantly enhance educational expenditure at the aggregate, elementary, secondary and higher levels. Moreover, contrary to general perceptions, education expenditure at all levels has been significantly lower after liberalisation vis-à-vis the pre-economic reform era. This is particularly detrimental for the vulnerable sections of the population, i e, for females and backward social groups. It is evident that even after controlling for the economic reform process, privatisation exerts a negative significant impact on expenditure on higher education.

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I Introduction

The focus of the world economists, particularly those pertaining to the developing nations, has been increasingly shifting towards embarking on a twin policy of achieving economic growth with human development. Economic growth alone, it is felt, is not enough to generate sustainable development because the impact seldom percolates down to the bottom most section of the society. Hence, policy-makers in India, since independence, have placed an overriding importance on the provision of basic social services like education, health and nutrition to all sections of society, particularly the poor. Given the large base of poor in India, this policy induced substantial increase in social expenditure. For instance, budgetary allocation for education has been steadily increasing from around 1 per cent of its gross domestic product in 1950-51 to 4.02 per cent in 2000-01¹ but this falls short of the desired target of 6 per cent as outlined in the recommendations of the Education Commission in 1966 and reiterated by the national education policy, 1986 and 1992. Moreover, given the resource constraints faced by a developing country like ours, there are certain limits on the expenditure increase, especially when it is not accompanied by an increase in income. Consequently, late 1980s saw the cut backs in expenditure on social services due to fiscal stringency. This was further accentuated with introduction of New Economic Policy of 1991 and the government encouraging participation of private agents in sectors that hitherto had been public monopolies.

The emphasis of the present paper is to examine the pattern and changes in the allocation of government funds for education (particularly higher education) over the span of two decades, before and after the introduction of the new economic policies. Our focus has been on analysing if there exists a structural break in pattern of expenditure pre- and post-economic reforms. The paper is divided into the following sections: Section II briefly reviews the education policies of the government. Patterns of

education expenditure, including spending on various levels of education are elucidated in the Section III. It shows that there is considerable heterogeneity in expenditure pattern across states as well as for different educational levels. Section IV hence estimates the factors governing the interstate differential in educational spending (for different levels) using panel-specific econometric models. Finally, Section V concludes.

II Economic Reforms and Changing Educational Policies

The government of India launched a series of economic reform measures in July 1991. These measures included consistent and coordinated steps to reduce protection and liberalise controls over industry and foreign investment and increase competition in areas dominated by monolithic public sector enterprises. These policies had serious implications for social sector, as it led to drastic reduction in public subsidies and development expenditure, particularly on social services. The central government's expenditure on social sector as a percentage of GDP declined from 1.43 per cent in the period 1985-90 to 1.41 per cent in the period 1991-97. Similarly, the state governments' expenditure on social sector as a percentage of GDP decreased from 6.6 per cent in period 1985-90 to 6.2 per cent in 1990-95. The latter change is more important because state government's share in total expenditure on social sector is very large.

It is obvious from above discussion that the resources for social services in general are declining after liberalisation. Juxtaposed with this is the fact that there exists considerable heterogeneity across the states and different population sub-groups in terms of educational performance. In one end of the spectrum is a state like Kerala with long-standing commitment towards improvement of social indicators, having a literacy rate as high as 90.86 per cent in 2001. On the other end of the spectrum lie the so-called BIMARU states of Bihar (47.00), Madhya Pradesh (63.74),

Rajasthan (60.41) and Uttar Pradesh (56.27) having a comparatively lower level of literacy. Even after more than 50 years since independence, India has not been able to resolve the gender gap present in educational indicators. The Census 2001 reveals a substantial difference in the male vis-à-vis female literacy rate at 75.96 and 54.28, respectively. The gap is larger for a state like Bihar where the male literacy rate is almost double of that of the female population as compared to Kerala with a male literacy rate of 94.20 and female literacy rate of 87.86 per cent. Similar discrepancy is also evident between those belonging to the scheduled caste and scheduled tribe category as compared to the general population. The Census 2001 data also highlights that the literacy rate for scheduled caste stands at 54.34 whereas that for scheduled tribe is 46.84 for all-India. The literacy rate for the general population is 65.38 in 2001.

In this section, we analyse how the educational policies, particularly pertaining to the higher education sector, have responded to these challenges. Education is financed through both governmental and private resources. However, a major commitment from government is required in financing education because of the positive externalities associated with it. The beneficial impact of education is not restricted to the individual alone but spills over to other members in the community, e.g., there is well-documented evidence of the beneficial impact of mother's education on health of her children, increased training enhances productivity of not only an individual worker, but has a positive spillover effect on his/her co-workers, etc. Thus, education is widely considered as public good. It is also recognised that while considering the private returns to education, an individual does not take account of these externalities. Hence, provision of education may be suboptimal when left only to market forces and government intervention is required to provide an optimum level of education (taking into account the private as well as the social benefits).

However, when we come to each level of education, it is not clear whether to categorise it as public good or merit good. Elementary education is widely accepted as public good. On the other hand, in case of higher education, it is observed that while it is beneficial to the society, the private returns from higher education are more than social returns. Thus it is generally recommended that the burden of financing higher education should be shifted to private individuals. The liberalisation process feeds this line of thinking. This also gets reflected in our changing educational policies with greater emphasis on generation of additional resources through conventional and non-conventional measures. The national policy on education (NPE) (1986, 1992) as well as the recommendations made by the University Grant Commission (UGC) recognises the need for reducing the role of government in education sector and increasing the role of private sector, particularly in the sphere of higher education.

The NPE was adopted by the Parliament in May 1986. It was further updated in the year 1992. The NPE provides a comprehensive framework including a "plan of action", assigning specific responsibilities for organising, implementing and financing its proposals. The policy reiterates the constitutional obligation of achieving universal education at the elementary stage through greater access and retention of children up to 14 years in age. It emphasises the need for substantial improvement in quality of education to enable all children to achieve essential levels of learning with greater priority to achieving higher enrolment of girls, SCs and STs. The primary importance (in case of secondary

and elementary education) is on programmes aimed at the following: universalisation of elementary education, liquidating illiteracy, equality of access to educational opportunities to all sections throughout the country, enhancing the social relevance, quality and functional effectiveness of educational programmes, generating knowledge and developing technologies in scientific fields crucial to self-sustaining economic development. In this context, it is interesting to note that the policy does not elucidate the role of private institutions for elementary and secondary education.

However, in case of higher education the NPE clearly points out that the non-government sector can play a major role in funding higher education. Note, it is clearly stated in the document that "resources, to the extent possible, will be raised by mobilising donations, asking the beneficiary communities to maintain school buildings and supplies of some consumables, raising fees at the higher levels of education and effecting some savings by the efficient use of facilities" (National Policy on Education 1986, p 35).

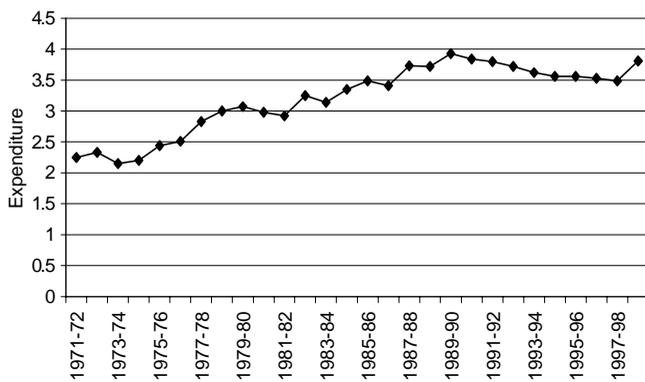
Similar measures, in terms of generating resources for higher education through non-government sources, have also been echoed by the UGC. The UGC was formally established in November 1956 as a statutory body of the government of India through an act for the coordination, determination and maintenance of standards of university education in India. The UGC is the only grant-giving agency in the country, which has been vested with the dual responsibility of providing funds and that of coordination, determination and maintenance of standards in institutions of higher education. The UGC, in recent years has documented the need for greater role of private sector in financing higher education [UGC 2003]. Private financing of higher education is advocated on the following grounds: private returns on higher education far exceed the social returns; private sector benefits the most from higher education and public funding for higher education is insufficient to take up the challenging task of expansion and diversification of higher education system to meet the continuously growing demand. On one hand, it assures that providing quality higher education is the primary responsibility of the government and it will not withdraw from this responsibility. However, simultaneously it mentions that industrial houses may be encouraged to be partners with educational institutions directly for the development of human resources dedicated to their interests. The remaining portion of this chapter elucidates how far these changing policies have triggered off changes in actual expenditure pattern of the government on education.

III Pattern of Expenditure on Education

The total (state and central government) educational expenditure expressed as a percentage of GDP gives a good indication of priority given to education in the society. Mid-1980s, i.e., the era when human resource development was given top-most priority, we see an increasing trend in educational expenditure as a per cent of GDP (see the figure).

However, with the advent of 1990s, the per cent of educational expenditure started declining. This was due to reform process and government's efforts to cut down its expenses on social sector. Table 1 shows the growth rates of per capita real expenditure on education for three decades 1970s, 1980s and 1990s.

Figure: Expenditure on Education as Percentage of GDP



Source: Selected Educational Statistics, 2000-01.

The growth rate of per capita real expenditure has increased from 5.65 per cent in 1970s to 6.37 per cent in 1980s. Thereafter growth rate has decreased to 4.48 per cent in 1990s. The efforts of the government to withdraw from the education sector have resulted in the declining growth rate of per capita real expenditure on education.

Not only is the public funding on education declining over the last few years, but also the available resources are expended on meeting functional expenses, i.e., payment to teachers, etc., rather

Table 1: Trends in Expenditure on Education

Period	Average Per Capita Real Expenditure	Coefficient of Variation	Growth Rate
1971-72 to 1980-81	142.56	18.70	0.0565
1981-82 to 1990-91	243.24	19.50	0.0637
1991-92 to 1998-99	344.22	10.98	0.0408

Note: Growth rates are calculated with log-linear model.

Source: Calculated from the Analysis of Budgeted Expenditure on Education.

Table 2: Revenue and Capital Expenditure on Education

Year	Revenue Expenditure (Rs Lakh)	Percentage of Total	Capital Expenditure (Rs Lakh)	Percentage of Total	Total Expenditure (Rs Lakh)
1980-81	22730.40	99.22	177.83	0.78	22908.23
1985-86	50273.44	98.89	564.88	1.11	50838.32
1990-91	111666.54	98.84	1306.15	1.16	112972.68
1995-96	201467.27	99.17	1684.16	0.83	203151.44
1999-2000	374241.74	99.23	2917.60	0.77	377159.34

Source: Analysis of Budgeted Expenditure on Education (selected years).

Table 3: Expenditure on Education by Levels
(Rs lakh)

Year	Elementary Education		Secondary Education		Higher Education		Technical Education		Total
	Actual	Per Cent of Total	Actual	Per Cent of Total	Actual	Per Cent of Total	Actual	Per Cent of Total	
1974-75	71254.03	45.37	48385.38	30.81	20649.19	13.15	6632.62	4.22	157067
1980-81	153724.88	39.58	103690	26.70	48366.57	12.45	13695.17	3.53	388420
1985-86	344832.29	39.58	229387.25	26.33	104672.3	12.01	34541.6	3.96	871302
1990-91	795552.61	40.56	553111.31	28.20	231185.3	11.79	75301.36	3.84	1961585
1995-96	1521775.67	39.86	1034408.3	27.09	387133.3	10.14	129024.6	3.38	3817809
1996-97	1785044.06	40.66	1173572.6	26.74	428786.2	9.77	145000.8	3.30	4389648
1997-98	2039152.74	42.00	1326244.8	27.32	485913.8	10.01	162256.4	3.34	4855214
1998-99 (RE)	2639203.4	42.86	1684374.7	27.35	631464.8	10.25	162256.4	2.63	6157891
1999-2000 (BE)	2899719	37.63	1759661.2	22.84	799655	10.38	256419.3	3.33	7705630

Source: Calculated from the Analysis of Budgeted Expenditure on Education (various years).

than on more productive items, e.g., improvement of infrastructure, etc. This becomes evident when we explore the pattern of disbursement of funds under the revenue and capital heads (Table 2).

Expenditure on education can be on recurring items such as salary of teachers, administrative staff, etc., or it can be on capital infrastructure such as school building, libraries, equipment, etc. Expenditure on recurring items comes under the revenue account, whereas that on non-recurring items constitutes the capital account. As can be observed from Table 2, revenue expenditure constitutes major part, around 99 per cent, of total expenditure from 1980-81 to 1999-2000. On the other hand, the capital account forms negligible portion of total spending.

So far we have looked into the changing pattern of total public expenditure on education and growth rate pre- and post-liberalisation. However, one of our primary interests is to analyse the devolution of funds for higher education vis-à-vis the other levels of education. To address this issue, we have looked into the public spending on education at a more disaggregated level in Table 3. The greater priority to elementary and secondary education as compared to higher education is envisaged from the fact that as early as in 1974-75 approximately 45 per cent of total funds were allocated for elementary education, 30 per cent for secondary education and around 17 per cent for higher (inclusive of technical) education. The share of elementary, secondary and higher education has all declined marginally during reform period, but started picking up during mid-1990s. However, the pace of change has been more for elementary education as compared to higher education.

State-wise Expenditure on Education

As discussed in Section II, the state governments have borne the lion share of expenditure on social services. Education sector is not an exception. Note, after education was brought into the concurrent list from the state list through the 42nd Constitutional amendment, it was expected that the share of the central government would increase considerably. In reality, the share of the central government continues to be low and even in the second-half of 1990s, the central government's share in total revenue expenditure on education has remained at around 14 per cent [Tilak 1995]. However, the proportion of state income allocated for meeting education expenses shows a far from uniform trend. This becomes clear when we explore the proportion of current net state domestic product (NSDP) spent on education for 15 major states over the decade prior to and after the introduction of new economic policies (refer to the Appendix). In 1990-91,

the share of current NSDP allocated for education has declined compared to the corresponding proportion in 1985-86 for Andhra Pradesh, Haryana, Karnataka and Maharashtra. Prominent decline is observable in 1995-96. Comparing the percentage share of total education expenditure (to state income) for 1995-96 and 1990-91 we find that the requisite proportion has declined for all of the 15 major states except Assam and Rajasthan. This downward trend in the expenditure is somewhat reversed in the second-half of 1990s, where education sector has been given relatively more importance by state governments (refer to Appendix).

Moreover, there exists considerable heterogeneity amongst the states in terms of their aggregate spending on education at all levels. The share of public funds allocated for education has been consistently high for Kerala for the period of 1980-81 to 1999-2000 hovering between 5 and 6 per cent. The only exception is the year 1999-2000 when the share dropped marginally to 4.98. Surprisingly, the BIMARU states, namely, Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh did not display a distinctly different pattern from the other major states so far as percentage share of educational expenditure is concerned. In fact, in 1999-2000, Bihar (at 7.18 per cent) was the second-largest state in terms of proportion of fund allocated for education. However, this finding is not conclusive. As pointed out by Tilak (1995), if the state income is low (as in case of BIMARU states), then very low amount of spending on education will also give the impression that higher proportion of NSDP has been spent on education.

To get a clearer understanding of the disparity across states in their commitment towards education financing, we have also computed the coefficient of variation of real per capita expenditure on education (reported in Table 4).² Coefficient of variation is showing a declining trend till the first-half of 1990s indicating that the interstate differences in real per capita spending has been going down. However, it has increased from 20.81 (for 1990-91 to 1994-95) to 27.95 (for the period 1995-96 to 1999-2000) in the period immediately after the inception of the new economic policies. Question is how far this rising disparity is reflected across different levels of education?

Hence, after studying the trend of overall expenditure pattern, let us look at the levelwise expenditure pattern for the 15 major states. We are particularly interested in the pattern of expenditure on higher education. Table 5 shows the mean per capita spending and coefficient of variation for four levels of education, namely, elementary, secondary, higher and technical education.³ It can be observed that the average per capita spending is substantially higher in case of elementary education compared to higher and technical education. This substantiates previous statistics revealing the preference of the state governments towards elementary education. Further, the coefficient of variation is substantially lower for elementary and secondary education as compared to higher and technical education. This represents the heterogeneity existing among the states in availability of facilities for higher and technical education. Further, it also indicates that in cases where states do not have enough funds to support all levels of education, they are concentrating on the provision of the elementary and secondary education and thus trying to achieve the goal underlined in the NPE (1986).

The above discussion on pattern of state government finances on education (both overall and for different levels) clearly shows that there exists considerable heterogeneity amongst states in terms of real per capita spending on education. Moreover, this

imbalance is also observed within an individual state across the various levels of education. An important issue to address is: What determines how much a state is willing to spend on education of its populace? The next section of this paper tries to explore the factors governing states' spending on education at a macro level.

IV Determinants of Public Expenditure: Panel Estimates

The primary interest is to estimate the magnitude and significance of variation in state real per capita income in determining the spending pattern of public education. In addition to this we shall also investigate the impact of liberalisation and privatisation on government spending after controlling for broad demographic and economic indicators at state level. Further, grants from centre also play a major role in financing state expenditure. Grants on an average have accounted for around 12 per cent of total state spending for the period 1980 to 2000 [Lalvani 2004]. The impact (if any!) of grants for expenditure on education per se is worth investigating.

Few studies, primarily based on developed nations, have analysed the factors governing public expenditure on education at local [Poterba 1996], state [ibid; She 2004; Verbina and Chowdury 2002] and national level [Strawczynski and Zeira 2003]. The variable of particular interest, i.e., real per capita income is positively associated with expenditure on education. Moreover, in all of the above-mentioned studies, income elasticity was less than one indicating that education spending is inelastic to changes in income. No such consistent result emerged so far as the demographic indicators are concerned. A negative significant relationship was established between per child (or per capita) education spending and proportion of population in school-going age group (five to 17) using macro level data from the US [Poterba 1996; She 2004] and Russia [Verbina and Chowdury 2002]. However, no such significant relationship was found by Strawczynski and Zeira (2003) who unlike the other studies had

Table 4: Trends in State-wise Real Per Capita Expenditure on Education

Period	Mean	Coefficient of Variation
1980-81 to 1984-85	193.44	29.89
1985-86 to 1989-90	256.98	25.88
1990-91 to 1994-95	302.33	20.81
1995-96 to 1999-2000	364.29	27.95

Source: Calculated from *Analysis of Budgeted Expenditure on Education*.

Table 5: Trends in State-wise Real Per Capita Expenditure on Different Levels of Expenditure

Period	Elementary		Secondary		Higher		Technical	
	Mean	Coeff of Var	Mean	Coeff of Var	Mean	Coeff of Var	Mean	Coeff of Var
1980-81 to 1984-85	78.17	30.32	55.91	44.24	39.01	79.76	9.6	102.72
1985-86 to 1989-90	108.03	24.83	71.34	47.31	37.29	75.18	8.53	94.34
1990-91 to 1994-95	126.24	22.66	85.32	39.64	32.7	80.09	7.41	81.54
1995-96 to 1999-2000	155.83	31.16	106.64	49.94	32.34	80.14	7.79	109.27

Source: Calculated from *Analysis of Budgeted Expenditure on Education*, Coeff of Var denotes coefficient of variation.

looked into both public and private education expenditure in Israel. The other demographic control often incorporated is the proportion of population above the age group of 60. The underlying reason might be that such countries are often characterised by old age security/welfare programmes. Hence, this population subgroup may be competing with the available scarce public resources on one hand and also have no incentive to vote in favour of governments encouraging greater allocation of public funds on education. Estimated results matches with a priori expectations. For example, Poterba (1996) found that an increase in the fraction of elderly residents in a state is associated with a significant reduction in per child educational spending even after controlling for income, poverty and urbanisation. Further, the reduction is even larger when the elderly residents are predominantly from a different racial group than the school-age population. This inverse relationship between educational spending and aging of population is also supported by the other studies. This section is subdivided into the following sub-categories: Section 4.1 presents the model specification and data used in this study and Section 4.2 highlights the associated empirical results.

Model Specification and Data

The determinants of public education expenditure can be broadly classified as economic, demographic and social variables. India, on the other hand, had undergone different structural adjustments and policy reforms, namely, liberalisation and privatisation. Given this, the explanatory variables that we use to determine real per capita public expenditure on education is enlisted as follows: *Economic variables:* The existing literature highlights the significant role played by income in determining educational expenditure. Hence, the per capita NSDP (in 1993-94 prices) is incorporated to capture the economic well-being of the state. Both income and education have been expressed in logarithmic terms to enable us to compute the income elasticity. Given the federal structure, the state governments in India depend on the centre in terms of their revenue-generating capacity. Grants from the centre acts as one of the major elements in it. We have taken total grants from the centre, as percentage of NSDP, and expressed in natural logarithm, as another economic variable. These two variables, namely, income and grants, are expected to have a positive impact on education expenditure.

Demographic variables: Changes in composition of school-going population affect pattern of education spending. To control for this aspect, we have included the proportion of population belonging to the following age groups: five to nine ("Pop 5-9"), 10-14 ("Pop 10-14"), 15-19 ("Pop 15-19") and 20-24 ("Pop 20-24"). Micro-level studies (based on primary and secondary data) highlight the disadvantageous position of marginalised groups in educational achievement and household expenditure on education. In order to account for these factors, the proportion of population belonging to scheduled caste, scheduled tribe and sexratio⁴ are introduced. In addition to these variables we have also included the proportion of rural population ("rural"), which is largely dependent on the government for access to educational institutions.

Policy variables: One of our primary objectives is to analyse whether there exists any significant change in public expenditure on education prior to and after the introduction of the new economic policies in 1991. The binary variable "reform" is created such that it takes the value of zero prior to policy changes

and is one thereafter, i.e., from 1991-92 to 1999-2000. Negative and significant coefficient of "reform" would indicate that economic reforms have adversely affected education spending. Recent years have witnessed rapid privatisation of the education sector in India, particularly the professional and technical courses. We have designed two variables, namely, "Engginst" and "Medinst", to capture the impact of degree of privatisation on state financing of education. The variables measure the rate of privatisation in engineering and medical institutions. The engginst (medinst) takes the value one if the proportion of private engineering (medical) institutions in a state is higher than the national average and is zero otherwise. Given these explanatory variables the model is formulated as follows:

$$\text{Edu exp}_{it} = \delta_i + \beta_1 * \text{Income}_{it} + \beta_2 * \text{SC}_{it} + \beta_3 * \text{ST}_{it} + \beta_4 * \text{Rural}_{it} + \beta_5 * \text{Grants}_{it} + \beta_6 * \text{Pop 5-9}_{it} + \beta_7 * \text{Pop 10-14}_{it} + \beta_8 * \text{Pop 15-19}_{it} + \beta_9 * \text{Pop 20-24}_{it} + \beta_{10} * \text{Sexratio}_{it} + \beta_{11} * \text{Engginst}_{it} + \beta_{12} * \text{Medinst}_{it} + \beta_{13} * \text{Libdummy} + \beta_{14} * \text{Time} + \epsilon_{it} \dots(1)$$

where $i = 1, \dots, 15$ refers to states, $t = 1, \dots, 20$ indicates time, δ_i captures state-specific effect, and ϵ_{it} is the random error term varying across both cross section and time. Note, in addition to the explanatory variables enlisted above, we have also included a time trend. Two alternative model specifications have been tried. Firstly, a basic panel fixed effect model has been estimated to control for state-specific effects. Secondly, we have also presented the generalised least square estimates of the above model to account for heteroskedasticity and panel-specific autocorrelation among the error terms.⁵ Separate analysis has been carried out for aggregate education expenditure as well as that at individual level, i.e., primary, secondary and higher.

The requisite model (equation (1)) has been estimated using annual data from 1980-81 to 1999-2000 for 15 major Indian states. Data on NSDP and grants is obtained from Reserve Bank of India's publications; on education expenditure (total and individual level) from various issues of *Analysis of Budgeted Expenditure on Education*; on the demographic variables from the Census of India. In order to calculate the proportion of private medical and private engineering colleges, we have looked into lists of medical and engineering colleges available at websites of Medical Council of India and All-India Council of Technical Education, respectively. More detailed description of the data sources is provided in the Box. Table 6 outlines some descriptive statistics of the variables used in our panel regressions. The average public education expenditure across the 15 major states over a span of 1980-81 to 1999-2000 stood at 279.257 units – a meagre 3.8 per cent of the average real per capita NSDP. A lion's share of the funds have been devoted towards elementary education (41.92 per cent) as compared to tertiary level education which attracted only 12.76 per cent of public funds devoted to education.

However, considerable discrepancy exists across the states with respect to their allocation for education. Average education expenditure, for all levels, was found to vary from 180.26 units in Uttar Pradesh to 370.88 units in Kerala. This explains the wide range reported for this variable (Table 6). A substantially high standard deviation is also prevalent in case of real per capita state domestic product. The emphasis on greater private participation in the field of higher education is evident from the fact that nearly 43 per cent of the engineering colleges across the 15 major states are under private management/ownership. The corresponding proportion for the medical colleges is comparatively lower at

14.6 per cent. Note, for both cases, the share of private colleges have shown a rising trend. The corresponding share for engineering discipline increased from 36.12 per cent in 1980-81 to 51.49 per cent in 1999-2000 and that for medical colleges increased from 12.07 per cent to 17.58 per cent in the interim period (not shown in Table 6).

Empirical Results

The results for the aggregate education expenditure is presented in Table 7 and that for expenditure at primary, secondary and higher level is reported in Tables 8, 9 and 10, respectively. The results are discussed under the broad classifications specified earlier. *Economic variables:* States with higher per capita income was found to spend more on education. This is evident from the positive significant coefficient of "income" for both the fixed effect as well as the generalised least square estimates (Table 7). The income elasticity at 0.242 and 0.219 respectively, is significantly less than one. This implies that aggregate expenditure on education is inelastic to changes in income. This is not surprising given that we have used only public expenditure on education. One would usually associate education expenditure being need-based and hence a necessity.

To get a better understanding of the impact of these socio-economic level at a more disaggregated level, we have also looked into the determinants of education expenditure for elementary, secondary and higher education. "Income" has a significant positive impact on public expenditure on education irrespective of the level study. Moreover, income elasticity at each level, i.e., elementary, secondary and tertiary education is found to be less than one. The result is surprising for higher education because although there is a change in classification with higher education no longer being considered as a purely public good but actual expenditure pattern reveals that the former is yet to be considered as a "luxury" item (Tables 8, 9 and 10). The magnitude of income elasticity is highest for secondary education (0.838 and 0.507), followed by higher (0.276 and 0.269) and elementary education, respectively (0.137).

Further, grants from centre induce a positive significant impact on public expenditure on education both at aggregate level and also individually at elementary, secondary and higher level (Tables 7 to 10). The effect is highest in case of secondary education followed by elementary education.⁶

Box

(1) The NSDP figures from 1980-81 to 1993-94 are taken from Economic and Political Weekly Research Foundation and those from 1994-95 to 1999-2000 are taken from RBI website. Further, in order to maintain the consistency over the years we have combined the figures for Bihar and Jharkhand, Madhya Pradesh and Chhattisgarh and Uttar Pradesh and Uttaranchal to derive the values of NSDP for Bihar, Madhya Pradesh and Uttar Pradesh, respectively. Variable income is defined as real per capita NSDP. The year 1993-94 is taken as the base year for calculating real state income. Further, the population figures are obtained from the census.

(2) Data on demographic variables, namely, proportion of persons belonging to scheduled caste and scheduled tribe, proportion of rural population (rural), proportion of population belonging to the age group five to nine (Pop 5-9), 10 to 14 (Pop 10-14), 15 to 19 (15-19) and 20 to 24 (20-24), number of female per 1,000 male population (Sexratio), is obtained from the Census of 1981, 1991 and 2001. Data from Census 2001 has been obtained from www.censusindia.net/results. Figures for in between years are obtained using "interpolation" technique.

Table 6: Descriptive Statistics of Variables Used in the Panel Regressions

Variable	Mean	Std Dev	Minimum	Maximum
Education expenditure in real per capita terms	279.257	96.875	75.946	727.760
Elementary education expenditure in real per capita terms	117.068	43.603	24.029	299.217
Secondary education expenditure in real per capita terms	79.800	42.046	1.498	288.321
Higher education expenditure in real per capita terms	35.639	14.588	5.335	85.872
Real per capita NSDP	7217.511	2669.100	3330.858	14997.940
Proportion of private engineering colleges	0.430	0.334	0.000	1.000
Proportion of private medical colleges	0.146	0.222	0.000	0.810
Grants as proportion of current NSDP	0.024	0.017	0.005	0.117
Percentage of SC population	15.901	5.664	6.820	28.800
Percentage of ST population	7.927	7.367	0.000	23.270
Percentage of rural population	75.074	8.309	57.111	90.120
Proportion of population in age group of five to nine	0.129	0.018	0.055	0.160
Proportion of population in age group of 10 to 14	0.120	0.012	0.047	0.141
Proportion of population in age group of 15 to 19	0.096	0.010	0.034	0.118
Proportion of population in age group of 20 to 24	0.089	0.01	0.031	0.107

Table 7: Determinants of Expenditure on Education

Column Variable	Fixed Effects Model			Fixed Effects GLS Model		
	(1) Coef	(2) Std Err	(3) P> t	(4) Coef	(5) Std Err	(6) P> t
Income	0.242	0.093	0.010	0.219	0.068	0.001
SC	-0.031	0.017	0.079	-0.045	0.016	0.006
ST	-0.020	0.013	0.129	-0.023	0.012	0.058
Rural	0.008	0.009	0.364	0.016	0.008	0.036
Grants	0.129	0.027	0.000	0.080	0.020	0.000
Pop 5-9	-1.441	1.757	0.413	0.856	1.474	0.561
Pop 10-14	-1.903	3.654	0.603	-10.007	4.250	0.019
Pop 15-19	6.494	5.504	0.239	14.300	6.382	0.025
Pop 20-24	-1.943	4.351	0.656	-3.451	4.159	0.407
Sexratio	-0.004	0.001	0.001	-0.003	0.001	0.052
Engginst	0.014	0.022	0.532	0.008	0.021	0.696
Medinst	-0.037	0.030	0.219	-0.017	0.029	0.554
Reform	-0.162	0.026	0.000	-0.122	0.019	0.000
Time	0.049	0.004	0.000	0.048	0.003	0.000
Constant	7.587	1.661	0.000	5.729	1.835	0.002
R-square (within)		0.863				
				Wald $\chi^2(28)$	3648.170	0.000
				Prob > χ^2		

Table 8: Determinants of Expenditure on Elementary Education

Column Variable	Fixed Effects Model			Fixed Effects GLS Model		
	(1) Coef	(2) Std Err	(3) P> t	(4) Coef	(5) Std Err	(6) P> t
Income	-0.073	0.143	0.608	0.137	0.077	0.077
SC	-0.050	0.027	0.061	-0.036	0.018	0.048
ST	-0.042	0.019	0.031	-0.013	0.015	0.382
Rural	0.008	0.013	0.538	0.029	0.010	0.002
Grants	0.116	0.042	0.006	0.051	0.025	0.039
Pop 5-9	-1.261	2.683	0.639	-0.125	1.947	0.949
Pop 10-14	-12.571	5.431	0.021	-13.337	6.201	0.032
Pop 15-19	24.272	8.326	0.004	23.012	8.568	0.007
Pop 20-24	-5.540	6.674	0.407	-5.428	4.940	0.272
Sexratio	-0.004	0.002	0.052	-0.003	0.002	0.107
Reform	-0.214	0.039	0.000	-0.176	0.024	0.000
Time	0.061	0.006	0.000	0.056	0.004	0.000
Constant	9.213	2.523	0.000	4.200	2.188	0.055
R-square (within)		0.749				
				Wald $\chi^2(28)$	2060.720	0.000
				Prob > χ^2		

Demographic variables: Demographic variables, namely, SC, ST, sexratio and rural, measure the effort of the government to extend educational facilities to deprived classes. States with a higher proportion of scheduled caste population was found to have a significantly lower expenditure on education at aggregate,

elementary and higher level. This is particularly discouraging in view of the fact that these social groups already lag behind others in terms of their educational status. Similar results were also obtained for the scheduled tribe group. The variable ST is generally negative and significant for aggregate and elementary education. The only case when it enters with a positive sign is when we consider the generalised least square estimates at the secondary stage. However, the impact is not significant.

Is there a gender bias present for those states where the female population is higher than their male counterpart? Our empirical findings provide a substantial answer. The coefficient of sexratio enters with a negative significant coefficient in majority of the cases. Although, this is a macro-level analysis it clearly highlights the need for government to put sustained effort in designing policies and allocating resources targeted towards female population. The coefficient of "rural" is in general positive and significant at aggregate and elementary level. Dearth of private providers in rural areas implies that the government has to assume a significant role in terms of provision of educational facilities in rural areas. This is partially borne out by our results. However, as expected government commitment is more apparent at the elementary stage than at higher levels. The other variables in this category used to control for school/college-going age group is significantly affecting educational expenditure in some cases.

Policy variables: The variable reform displays a negative and significant coefficient irrespective of level of education. These results endorse the view that allocation of resources in favour of social sectors, such as education, has significantly declined in the post-reform era. Our result corroborates the findings of Rani (2004) and Tilak (2004). The latter documented the declining trend in allocation of resources for higher education in India, particularly post-1991-92, and analysed the alternative mechanisms designed for generation of revenue from non-government sources for financing tertiary education.

Binary variables, Engginst and Medinst incorporated to capture the degree of privatisation of higher education plays a significant role even after we control for reform. Negative and significant coefficient of these variables in case of higher and technical education clearly demonstrates the following: states where the proportion of private colleges (for these courses) is higher than the national average has progressively withdrawn from provision of higher education.

Table 9: Determinants of Expenditure on Secondary Education

Column Variable	Fixed Effects Model			Fixed Effects GLS Model		
	(1) Coef	(2) Std Err	(3) P> t	(4) Coef	(5) Std Err	(6) P> t
Income	0.838	0.244	0.001	0.507	0.109	0.000
SC	0.017	0.045	0.703	0.012	0.026	0.659
ST	-0.047	0.033	0.153	0.011	0.044	0.808
Rural	0.007	0.023	0.756	-0.016	0.015	0.305
Grants	0.146	0.071	0.041	0.075	0.027	0.006
Pop 5-9	-5.836	4.576	0.203	-0.850	3.565	0.812
Pop 10-14	4.835	9.264	0.602	4.574	6.028	0.448
Pop 15-19	1.460	14.203	0.918	8.518	9.072	0.348
Pop 20-24	-5.840	11.385	0.608	-16.292	6.387	0.011
Sexratio	-0.003	0.003	0.358	-0.005	0.003	0.085
Reform	-0.094	0.067	0.163	-0.088	0.029	0.003
Time	0.021	0.009	0.026	0.032	0.006	0.000
Constant	0.266	4.304	0.951	6.392	3.039	0.035
R-square (within)	0.484		Wald chi ² (28) 1334.030 Prob > χ^2 0.000			

Table 10: Determinants of Expenditure on Higher and Technical Education

Column Variable	Fixed Effects Model			Fixed Effects GLS Model		
	(1) Coef	(2) Std Err	(3) P> t	(4) Coef	(5) Std Err	(6) P> t
Income	0.276	0.115	0.018	0.269	0.089	0.002
SC	-0.037	0.021	0.086	-0.043	0.021	0.043
ST	-0.014	0.016	0.381	-0.024	0.022	0.279
Rural	0.016	0.011	0.134	0.007	0.013	0.617
Grants	0.071	0.034	0.038	0.041	0.025	0.101
Pop 5-9	2.371	2.174	0.276	4.536	2.467	0.066
Pop 10-14	7.356	4.521	0.105	7.250	4.486	0.106
Pop 15-19	-23.851	6.808	0.001	-24.713	7.297	0.001
Pop 20-24	12.769	5.382	0.018	9.690	6.348	0.127
Sexratio	-0.010	0.002	0.000	-0.009	0.002	0.000
Engginst	-0.044	0.028	0.111	-0.049	0.023	0.035
Medinst	-0.067	0.037	0.070	0.009	0.037	0.800
Reform	-0.160	0.032	0.000	-0.122	0.027	0.000
Time	0.054	0.005	0.000	0.051	0.005	0.000
Constant	9.526	2.054	0.000	10.683	2.366	0.000
R-square (within)	0.778		Wald chi ² (28) 2559.140 Prob > χ^2 0.000			

Appendix: State-wise Expenditure on Education

State	Total Exp on Edu- cation (Rs Cr)	Current NSDP (Rs Cr)	Exp as a Per Cent of NSDP	Total Exp on Edu- cation (Rs Cr)	Current NSDP (Rs Cr)	Exp as a Per Cent of NSDP	Total Exp on Edu- cation (Rs Cr)	Current NSDP (Rs Cr)	Exp as a Per Cent of NSDP	Total Exp on Edu- cation (Rs Cr)	Current NSDP (Rs Cr)	Exp as a Per Cent of NSDP	Total Exp on Edu- cation (Rs Cr)	Current NSDP (Rs Cr)	Exp as a Per Cent of NSDP
	1980-81			1985-86			1990-91			1995-96			1999-2000		
Andhra Pradesh	299.13	7754.87	3.86	704.41	14139.61	4.98	1238.31	31624.06	3.92	2214.26	71796.00	3.08	4403.48	112966.00	3.90
Assam	91.37	2365.04	3.86	226.11	5325.96	4.25	509.15	9775.07	5.21	1032.95	17170.00	6.02	2287.54	26273.00	8.71
Bihar	238.91	6945.30	3.44	591.47	13527.41	4.37	1404.41	24927.16	5.63	2087.4	38018.00	5.49	4597.14	64067.00	7.18
Gujarat	214.84	7109.99	3.02	521.42	13143.75	3.97	1051.18	26259.27	4.00	2096.79	61736.00	3.40	3853.78	90763.00	4.25
Haryana	84.05	3209.65	2.62	186.10	6127.13	3.04	390.69	12955.06	3.02	786.65	26166.00	3.01	1474.33	42922.00	3.43
Karnataka	200.67	6090.63	3.29	494.65	11139.08	4.44	878.66	22403.52	3.92	1921.95	50028.00	3.84	3088.09	85038.00	3.63
Kerala	241.48	4631.37	5.21	490.17	7878.05	6.22	880.85	14746.96	5.97	1819.09	35330.00	5.15	2837.31	56926.00	4.98
Madhya Pradesh	217.94	8396.19	2.60	496.11	14478.99	3.43	1275.18	31749.13	4.02	2256.94	56531.00	3.99	3495.36	90382.00	3.87
Maharashtra	461.42	15472.86	2.98	962.20	27007.86	3.56	2038.21	59325.05	3.44	4113.24	140730.00	2.92	10513.41	216664.00	4.85
Orissa	125.19	3527.51	3.55	207.61	6378.82	3.25	540.51	9901.21	5.46	1115.39	23822.00	4.68	1985.45	34223.00	5.80
Punjab	162.20	4371.64	3.71	275.06	8201.86	3.35	561.28	16446.95	3.41	751.56	34218.00	2.20	2341.61	54380.00	4.31
Rajasthan	160.70	4835.16	3.32	374.27	8987.12	4.16	909.45	21423.08	4.25	1845.82	41690.00	4.43	3266.40	69420.00	4.71
Tamil Nadu	285.48	8066.29	3.54	649.28	15289.97	4.25	1450.6	30926.38	4.69	2532.16	69719.00	3.63	4760.98	112741.00	4.22
Uttar Pradesh	380.85	15604.66	2.44	864.86	27472.99	3.15	2316.46	55121.93	4.20	3802.07	99792.00	3.81	6898.14	155273.00	4.44
West Bengal	271.99	10443.78	2.60	582.02	18957.52	3.07	1500.95	34290.08	4.38	2096.43	67136.00	3.12	5231.52	116899.00	4.48

Source: Calculated from the *Analysis of Budgeted Expenditure on Education* (various issues).

V Conclusion

In this paper, we have explored government financing of education in India over a span of 1980-81 to 1999-2000 across the 15 major states of the country using macro-level indicators. Our focus has been on analysing if there exists a structural break in pattern of expenditure pre- and post-economic reforms. Economic reform has certainly affected public expenditure on social sector in general and that on education sector in particular. Particular interest was to assess the income effect and that induced by liberalisation and commercialisation of higher education. The panel-based regressions are robust to both model specifications as well as to how we have defined educational expenditure. Income, with elasticity less than one, is found to significantly enhance educational expenditure at aggregate, elementary, secondary and higher level. Moreover, contrary to general perception, education expenditure at all levels has been significantly lower after liberalisation vis-à-vis pre-economic reform era. This is particularly detrimental for the vulnerable sections of the population, i.e., for females and backward social groups. States with a higher proportion of population belonging to SC, ST and with higher female to male ratio are any case found to incur significantly lower expenditure on education. In addition to this, we find that even after controlling for the economic reform process, privatisation exerts a negative significant impact on higher education. In other words, government's commitment towards meeting higher educational expenses is lower in those states where proportion of private engineering and medical colleges is relatively higher than the national average rate. **FW**

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Notes

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- 1 www.education.nic.in
- 2 Mean real capita expenditure on education is calculated by taking the average across the 15 major states for the requisite time periods.
- 3 Op cit.
- 4 Sex ratio is defined as proportion of female to male population.
- 5 See Greene (2003) for better exposition.
- 6 In addition to this we have also tried an alternative specification to ascertain whether there exists any flypaper effect in terms of education expenditure of the state governments. As pointed out by Lalvani (2004) "A test of the flypaper effect would show if grants exerted greater stimulatory effect on expenditures of state government than would an equivalent increase in income". In this context, we have replaced total grants by "lump sum grants". Lump sum grants are defined as total grants (given by the Finance and Planning Commissions) excluding grants given by the centre under the category "central sector and centrally-sponsored schemes" (see Lalvani 2004 for further details). The panel estimates reveal that lump sum grants does not induce any significant impact on public expenditure on education, either at aggregate level or for elementary, secondary and higher levels. Change of specification also does not alter the sign and level of significance of the other explanatory variables.

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