



CONTRIBUTION OF PUBLIC EXPENDITURE ON EDUCATION TO ECONOMIC GROWTH:AN ASSESSMENT

Dr. Satyabrata Mishra

Associate Prof. and HOD P.G. Department of Environmental Economics M.P.C. (A) College, Takhatpur,
Baripada, Mayurbhanj, Odisha

Abstract

The present study estimates the contribution of public expenditure on education to economic growth by using the central government expenditure on education. It has been observed that the public expenditure on education is positively associated with National Income. The growth of public expenditure on education (in real terms) is not impressive. Intra-sectorally, the contributions of public expenditures on higher education and on elementary education at current prices to national income are relatively higher. The cumulative growth rate of public expenditure on each of different levels (and types) of education would generate an equal cumulative growth rate of National Income.

I. Introduction

Education is defined as the investment of current time and resources for future earnings. It holds the key to economic growth. For, it acts both as an agent of change and as an input. Public expenditure on education is positively associated with economic growth (or National Income). Many studies have been made from time to time all over the world to assess the contribution of public expenditure on education to economic growth. Notable among them are, the studies made by Becker, Denison, Dholakia, Harbison and Myers, Mukerji and Krishna Rao, Psacharopoulos, Schultz, Solow, Tilak and Todaro. In recent years, the experience of three countries-Finland, Italy and Belgium-have once again proved the positive association between education and economic growth.

II. The Present Study

The present work attempts to estimate the contribution of education to economic growth by assessing the impact of public educational expenditure on National Income. It uses only the central government expenditure on education. The other expenditures on education are not considered due to data constraint. The present study covers a period of 11 years from 1990-91 to 2000-01.

III. Objectives of the Study

The objectives of the present work are listed below:

1. to estimate the contribution of total public expenditure on National Income (or economic growth) both of current and constant prices separately.
2. to calculate the effects of public expenditure on different levels and types of education on NI both at current and constant prices separately.
3. to predict the level of national income when the total public expenditure on education is 6 per cent of National Income. This is also carried out both for current and constant prices separately.
4. to assess the impact of each level (and type) of public educational expenditure on public expenditure on education at current and constant prices separately.
5. to compute the cumulative growth rates of national income, total public expenditure on education and public expenditure on different levels (and types) of education at current and constant prices separately; and
6. to make comparison of all the above as between current and constant prices.

III. Methodology

The present Endeavour is an empirical one using secondary data collected from India, Economic survey 2001-2002 and 2002-2003 and analyses of Budget Expenditure Education (various issues). It employs statistical tools like simple regression, regression and cumulative growth rate to analyse the data. Semilog formation is throughout the study.

National Income is assumed to denote economic growth

Constant prices refer to 1993-94 prices.

Equations: (See Appendix - I&II)

The regression equation of public expenditure on education on National Income at current prices.

$$\text{Log } Y_t = \alpha + \beta X_t \quad (1a)$$

The regression equation of public expenditure on education on National Income constant prices.

$$\text{Log } Y_0 = \alpha + \beta X_0 \quad (1b)$$



The regression equation of total public expenditure on different levels (and types) education on National Income at current prices.

$$\text{Log } Y_t = a_1 + b_1 X_{1t} + c_1 X_{2t} + d_1 X_{3t} + e_1 X_{4t} + f_1 X_{5t} \quad (2a)$$

The regression equation of total public expenditure on different levels (and types) education on National Income at constant prices.

$$\text{Log } Y_0 = a_0 + b_0 X_{10} + c_0 X_{20} + d_0 X_{30} + e_0 X_{40} + f_0 X_{50} \quad (2b)$$

The regression equation of total public expenditure on different levels (and types) of education on public expenditure on education at-current prices.

$$\text{Log } PEE_1 = \lambda_{11} + \lambda_{21} X_{1t} + \lambda_{31} X_{2t} + \lambda_{41} X_{3t} + \lambda_{51} X_{4t} + \lambda_{61} X_{5t} \quad (3a)$$

The regression equation of total public expenditure on different levels (and types) of education on public expenditure on education at constant prices.

$$\text{Log } PEE_0 = \lambda_{10} + \lambda_{20} X_{10} + \lambda_{30} X_{20} + \lambda_{40} X_{30} + \lambda_{50} X_{40} + \lambda_{60} X_{50} \quad (3a)$$

With the help of the above equations, regressions are run by treating NI as dependent variable and TPE on DL (and T) of E as independent variables.

The CGRs of NI, PE on E and TPE on DL (and T) of E are estimated using the following formula.

$$\text{CGR} = \left(\frac{Y_t}{Y_0} \right)^{1/n} - 1 \times 100$$

IV. Limitations

The limitations of the present work are stated below:-

1. Central Government Expenditure on Education alone is considered
2. Time lag is ignored; and
3. NI is used instead of GDP in the prediction. All these are caused by data constraint.

V.Theoretical Expectations of the Variables

The PE on E and TPE on DL (and T) of E are positively associated with NI. So the signs of RCs in all the six equations (1a, 1b, 2a, 2b, 3a and 3b) are positive.

The Analysis

The results of the regressions and CGRs are analysed with the help of Tables 1 to 4.

Table 1, Impact of (PE on) E on NI

Prices	a/α	B/α	R^2
Current	0.14	0.95	0.98
Constant	0.43	0.81	0.91

'a' denotes the value of NI even when the PE on E is zero. The automatic generation of NI at constant prices (0.43) is greater than the corresponding figure (0.14) at current prices. This implies the fact that PE on E at current prices is not adequate enough to post a higher growth in NI. Hence it exhibits the declining growth of PE on E in real terms. This is consistent with the general expectation.

'b' is the RC of (PE on) E on NI at current prices. Every Rs. 100 of PE on E contributes Rs. 95 to NI at current prices. The corresponding figure at constant prices works out to Rs. 81. This reveals a positive association between PE on E and NI. Even though the value of 'b' at current prices is relatively higher than that of 'b' at constant prices, there is no room for complacency, for, the excess of 'b' at current prices over 'b' at constant prices might have been caused by inflation. This also agrees with the common expectation that increase in PE on E at current prices is in nominal terms only and not in real terms.



Table 2, **Impact of TPE on DL (and T) of E on NI**

Prices	Regression coefficients						R^2
	α_1/α_0	b_1/b_0	c_1/c_0	d_1/d_0	e_1/e_0	f_1/f_0	
Current	0.40	0.99	0.43	-0.08	2.01	-2.55	0.99
Constant	0.71	0.96	1.06	-1.23	0.22	-0.34	0.97

The excess value of ' α_0 '

(0.71) at constant prices over that of ' α_1 ' (0.40) at current prices discloses the fact that the TPE on DL (and T) of E at current prices is not as high as the TPE on DL (and T) of E at constant prices. This exhibits the tendency of decreasing growth of PE on E in recent years in the name of resource crunch.

Among the DL (and T) of E, the PE on EE causes 99% and 96% increase in NI at current and constant prices respectively. The increase in NI due to EE is the second largest (next only to HE) among DL (and T) of E. This is true at current prices only. And in case of constant prices PE on EE contributes the highest percentage to NI. This might be due to the fact that the returns from EE are high. Many studies have established this.

The RC of (PE on) SE on NI is comparatively higher (1.06) at constant prices than (0.43) at current prices. In this case, the relatively less increase in NI at current prices might be the result of slow growth of PE on SE in real terms. Incidentally, it is found that the share of PE on SE (out of the PE on E) has been stable around 30 per cent during the study period (Tilak 2004).

The -ve signs of ' d_1 ' and ' d_0 ' apparently denote deviation from the general expectation. But, in reality, it is not so. The -ve signs might have been caused by the withdrawal of state from the field of TE leaving it to market, which is dominated by the unaided I self-financing private educational institutions (For instance, there are nearly 250 Self-Financing Engineering Colleges in Tamilnadu alone). The PE on TE is not adequate enough to generate an increase in NI. This is true both at current and constant prices. The decline in PE on TE caused by the withdrawal of state, is adequately compensated by increased growth of private (both institution and student) expenditure on TE because of the marketization of TE. The recent boom in IT-SW industry fetches highly lucrative jobs with attractive salary and perks without any waiting period for job to the products of TE. This bubble in the IT-SW job market encourages parents-mostly middle and affluent sections-to seek admissions for their wards in these institutions even by paying huge donations and exorbitant fees. Thus, (the spurt in private expenditure on TE and the consequent) slash in PE on TE and substantial increases in the earnings of TE degree holders are responsible for the -ve signs of ' d_1 ' and ' d_0 '. It is interesting to note that the percentage of PE on TE out of the PE on E is found out to be around 4 per cent during the study period (Tilak 2004).

The RC of (PE on) HE on NI (e_1) at current prices (2.01) is far higher than that of it (0.22) at constant prices. In fact, ' e_1 ' bears the highest value among RC of DL (and T) of E on NI. The difference between the values of the two (e_1 and e_0) is considerable even if one accounts for inflation. This is not only due to the growth of outlay on HE (10 per cent out of the PE on E) during the 9th plan (Tilak 2004) but also due to the various benefits like technological progress, discoveries, progressivity, increase in individual life-time earnings, externalities, etc accruing from HE.

Yet another surprise is the -ve signs of ' f_1 and ' f_0 '. They denote -ve contribution of PE on DE to NI. As per the above stated results, NI decreases at the rate of 255 per cent and 34 per cent at current and constant prices respectively. This dismal performance might have been caused by the following reasons.

The PE on DE is not directly productive. It is declining at a faster rate due to the nonfilling of existing vacancies and stagnation of the DE in recent years. The PE on DE out of the PE on E constitutes hardly 1 per cent during the study period. (Analysis of Budget Expenditure on E, various issues, New Delhi, MHRD).



Table 3, Impact of PE on DE (and T) of E on PEE

Prices	Regression coefficients						R ²
	$\lambda_{11}/\lambda_{10}$	$\lambda_{21}/\lambda_{20}$	$\lambda_{31}/\lambda_{30}$	$\lambda_{41}/\lambda_{40}$	$\lambda_{51}/\lambda_{50}$	$\lambda_{61}/\lambda_{60}$	
Current	-0.04	0.42	0.09	0.01	0.22	0.29	1
Constant	-0.01	0.40	0.29	0.58	0.10	0.18	1

The -ve signs of both λ_{11} and λ_{10} exhibit only decreasing growth of PE on E. Besides, the Cline at current prices is more than the decline at constant prices. This might be due to the very slow growth of PE on E during the 1990s after the introduction of economic reform policies (Tilak 2004).

Intra-sectorally, the contribution of EE to PE on E at current prices is relatively higher. The value of λ_{21} is relatively higher than λ_{20} . When inflation is taken into account, this is not at all a satisfactory performance. The contributions of PE on SE and on TE to PE on E are negligible at current prices when compared to their respective figures at constant prices. This clearly registers decreasing growth of PE on SE and on TE in real terms. Though the contributions of PE on HE and PE on DE to PE on E at current prices are higher compared to their respective figures at constant prices, they are mostly due to inflation. And if at all there is any increase, it is marginal only.

An interesting attempt is made to predict the level of NI when the PE on E is 6 per cent of NI. This is predicted both for current and constant prices separately. The results are as under:

NI at current prices = 97244.307

NI at constant prices = 50786.986

Another interesting analysis is attempted to compare the CGRs of PE on DL (and T) of E at current and constant prices separately. The results are disclosed in Table 4.

Table 4, CGRs of PE on DL (and T) of E, PE ON E AND NI

Prices	EE	SE	TE	HE	DE	PE on E	NI
Current	12	12	12	14	12	12	13
Constant	5	5	5	6	5.4	5	5

The CGRs of PE on every level (and type) of E and PE on E at current prices are more than twice that of their respective figures at constant prices. If one makes proper accounting for inflation, the difference in CGRS between current and constant prices is very meagre. This denotes the growth of PE on E in nominal terms only. The above logic holds good in the case of the difference in the CGRs of NI between current and constant prices. In current prices, it is inferred that 12 per cent of CGR of PE on E is responsible for 13 per cent of CGR of NI. And 5 per cent of CGR of PE on E causes the same 5 per cent CGR of NI at constant prices. These figures imply the fact that a given percentage rise in CGR of PE on E would generate an equal percentage rise in the CGR of NI.

VI. Findings of the Study

The growth of PE on E is brighter in nominal terms only. But it is not so in real terms. This finding is strengthened by the recent report from UNDP (2003). According to this report, India ranks as low as eighty third, among one hundred and fifty four countries, in terms of proportion of the PE on E to GDP.

The positive relationship between PE on E and NI is another finding of the present study. This concurs with the findings of many studies. Intra-sectorally, PE on HE contributes the largest percentage to NI (at current prices) followed by PE on EE. This coincides with the findings of Prof. Tilak (2004), who has developed a strong case for increased subsidization of E particularly HE by shattering the very fabric of arguments stated against subsidization of HE. The replacement of the state by market in TE along with the boom in IT-SW sector is responsible for the -ve relationship between PE on TE and NI. The nature and size of PE on DE cause -ve relationship between PE on DE and NI.

The analysis relating to the assessment of the impact of PE on DL (and T) of E on PE on E unfolds the decreasing growth of PE on DL (and T) of E both at current and constant prices.



Intra-sectorally, the contribution of PE on EE to PE on E (at current prices) is relatively higher than the PE on other levels (and types) of E. And the contributions of PE on SE and PE on TE to PE on E at constant prices are comparatively higher than their corresponding figures at current prices. Out of the two gloomy figures, the PE on TE at current prices is the worst because the difference in the contributions of PE on TE to PE on E between the current and constant prices is comparatively larger than the difference in the case of SE. This registers the shrinking role of state in TE leaving it to the market.

Had the PE on E been 6 per cent of NI, its contributions to NI would have become Rs. 97244.307 at current prices and Rs. 50786.986 at constant prices. This is the finding of the analysis relating to prediction.

The CGRs of PE on DL (and T) of E and PE on E are estimated as around 12 per cent and 5 per cent at current and constant prices respectively. And the CGRs of NI at PE on DL (and T) of E would generate an equal CGR of NI both at current and at constant prices. The same is the result even when PE on E is considered.

VII. Conclusion

The present work is an attempt to establish, once again, the positive relationship between Public Expenditure on Education and National Income. Since the growth of public expenditure on different levels (and types) of education is not impressive, the government should allocate adequate funds (at least 6 per cent of GOP) for all levels (and types) of education in order to realise not only a considerable increase in the rate of growth of National Income but also to earn and retain the title of service capital of the world.

APPENDIX-I, ABBREVIATIONS

NI	:	National Income
CGRs	:	Cumulative Growth Rates
EG	:	Economic Growth
TPE on DL (and T) of E	:	Total Public Expenditure on Different Levels (and Types) of Education
PE on E	:	Public Expenditure on Education (or)
PEE	:	Public Educational Expenditure
E	:	Education
Ex	:	Expenditure
PE on EE	:	Public Expenditure on Elementary Education
PE on SE	:	Public Expenditure on Secondary Education
PE on TE	:	Public Expenditure on Technical Education
PE on HE	:	Public Expenditure on Higher Education
PE on DE	:	Public Expenditure on Department of Education
RC	:	Regression Coefficient

APPENDIX – II, THE EQUATIONS

Log	Y_t	=	$a + b X_t$	(1 a)
Where	Y_t	=	NI at current prices	
	X_t	=	PE on E at current prices	
	a	=	constant	
	b	=	RC of (TPE on) E on NI at current prices	
Log	Y_0	=	$\alpha + \beta X_0$	(1b)
Where	Y_0	=	NI at constant prices	
	X_0	=	TPE on E at constant prices.	
	α	=	Constant	
	β	=	RC of (TPE on) E on NI at constant prices.	
Log	Y_t	=	$a_1 + b_1 X_{1t} + c_1 X_{2t} + d_1 X_{3t} + e_1 X_{4t} + f_1 X_{5t}$	(2a)
Where	Y_t	=	NI at current prices	
	a_1	=	Constant	
	b_1	=	RC of (PE on) EE on NI at current prices	
	X_{1t}	=	PE on EE at current prices	
	c_1	=	RC of (PE on) SE on NI at current prices	
	X_{2t}	=	PE on SE at current prices	



	d_1	=	RC of (PE on) TE on NI at current prices	
	X_{3t}	=	PE on TE at current prices	
	e_1	=	RC of (PE on) HE on NI at current prices	
	X_{4t}	=	PE on HE at current prices	
	f_1	=	RC of (PE on) DE on NI at current prices	
	X_{5t}	=	PE on DE at current prices	
Log	Y_0	=	$a_0 + b_0 X_{10} + c_0 X_{20} + d_0 X_{30} + e_0 X_{40} + f_0 X_{50}$	(2b)
Where	Y_0	=	NI at constant prices	
	a_0	=	constant	
	b_0	=	RC of (PE on) E on NI at constant prices	
	X_{10}	=	PE on EE at constant prices	
	c_0	=	RC of (PE on) SE at constant prices	
	X_{20}	=	PE on SE at constant prices.	
	d_0	=	RC of (PE on) TE at constant prices	
	X_{30}	=	RC of TE at constant prices	
	e_0	=	RC of (PE on) HE at constant prices	
	X_{40}	=	PE on HE at constant prices	
	f_0	=	RC of (PE on) DE at constant prices	
	X_{50}	=	PE on DE at constant prices	
	IT-SW	=	Information Technology and Software	
Log	PEE_1	=	$\lambda_{11} + \lambda_{21} X_{1t} + \lambda_{31} X_{2t} + \lambda_{41} X_{3t} + \lambda_{51} X_{4t} + \lambda_{61} X_{5t}$	(3a)
Where	PEE_1	=	Public Educational Expenditure at current prices	
	λ_{11}	=	Constant	
	λ_{21}	=	RC of (PE on) EE on PEE at current prices	
	λ_{31}	=	RC of (PE on) SE on PEE at current prices	
	λ_{41}	=	RC of (PE on) TE on PEE at current prices	
	λ_{51}	=	RC of (PE on) HE on PEE at current prices	
	λ_{61}	=	RC of (PE on) DE on PEE at current prices	
Log	PEE_0	=	$\lambda_{10} + \lambda_{20} X_{10} + \lambda_{30} X_{20} + \lambda_{40} X_{30} + \lambda_{50} X_{40} + \lambda_{60} X_{50}$	(3b)
Where	PEE_0	=	Public Educational Expenditure at constant prices	
	λ_{10}	=	Constant	
	λ_{20}	=	RC of (PE on) EE on PEE at constant prices	
	λ_{30}	=	RC of (PE on) SE on PEE at constant prices	
	λ_{40}	=	RC of (PE on) TE on PEE at constant prices	
	λ_{50}	=	RC of (PE on) HE on PEE at constant prices	
	λ_{60}	=	RC of (PE on) DE on PEE at constant prices	

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