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THE LINKAGE BETWEEN HOUSEHOLD AND GOVERNMENT EXPENDITURE ON HIGHER EDUCATION: EXAMINING THE INDIAN CASE

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Abstract: *Drawing on National Sample Survey unit level data on India, the article estimates coefficients of elasticity to examine three important questions on the nature of household expenditure on higher education in India – (a) whether households complement or substitute government's efforts in spending on Higher education? (b) how do households behave in spending on education, given a change in their levels of income and finally (c) whether stipends/scholarships shoulder the burden on households. The results indicate that there is a complementary relationship between household and government expenditures on education; and that household expenditures respond favourably but less than proportionately to changes in household incomes. Further, the study also shows that stipends or scholarships play pivotal role in households' decision making regarding the resource allocation for higher education.*

Keywords: *government expenditure; household expenditure; higher education; elasticity.*

Introduction

It is well known that participation in higher education critically depends on the amount of investment made by both households as well as the State. Further, the studies have also argued that both are interrelated in such a way that in absence of either of them, there is likely to be under allocation of resources in education (Majumdar, 1983; Panchmukhi, 1989; Tilak (2002b). Now, while household expenditure in higher education depends on myriad set of individual as well as household socio-economic factors, government spending in education is actually a policy variable determined by the priority provided to higher education sector given, inter alia, economic health of a nation or the state, size of relevant age group population, share of SC/ST and rural-urban population divide in the states (Tilak, 1989, 1993; Chakrabarti and Joglekar, 2006).

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Hence, the present study seeks to answer the following two questions in context of India. *First,* what is the relationship between the expenditure incurred by the government and household in the domain of higher education? The main objective here is to examine whether government expenditure in higher education substitutes the spending incurred by the households or, induces the household to spend more (*i.e.* complementary in nature).

Second, it is overwhelmingly hypothesized that economic status of households positively influences the levels of household expenditure on education (Tilak 2002) *i.e.,* higher income households spend more on education than low-income households. Therefore, we also estimate the income elasticity in higher education in India.

The remaining part of the study is structured as follows. A discussion on the relationship between household and public spending in education based on the limited studies is presented in the next section (section 2). Section 3 describes the database and methodology adopted in empirical estimation. Results are presented in the 4th section. Section 5 provides the major findings of the analysis and concludes.

Household and Government Expenditure in Higher Education – A Brief Review of Literature

The literature on economics of education generally argues that there exists an optimum mix of government and household spending in education (Turnovsky, 1996; Dunn et. al., 2005; AgÈnor and Neanidis, 2006; Christie and Rioja, 2012). However, till date, there is no such theory of 'optimum' mix. The neo-classical economists who support household financing of higher education shares the view that, because in case of higher education the private benefit in terms of better labour market outcomes are much higher than that of other levels of education, the households are willing to pay for higher education. Therefore, if government withdraws from higher education expenditure (may be partially), private households will spend (to cover the shortfall). Nonetheless, the relationship between household and government expenditure till date remains ambiguous (UNESCO-BREDA, 2012). There are two chains of argument. Some evidence note that these expenditures are substitutable in nature, while others prove that they are complementary to each other. Regarding the substituting relationship between government and household expenditure, it is pointed out that if the facilities of public educational institutes are better, then the household would not feel the necessity to invest. Moreover, if the reverse occurs, then household would spend from their income to fill the gap of inadequate public expenditure on education. On the other hand, the complementary argument holds that if government spends more on access and quality education, households willingly invest on education enthusiastically (Tilak, 2000, 2003, 2009).

There are scant empirical studies available on examining the linkage between household and government expenditure in case of school education (Stafford, Lundstedt and Lynn, 1984; Tilak, 2000, 2002; World Bank, 2002; Kambhampati, 2008). In the Indian context, analyzing the National Accounts Statistics data, Tilak (2000) concludes:

(a) the coefficient of elasticity between household expenditure and government expenditure on education per capita is less than unity;

(b) a proportionate increase in gross national product per capita by unity will lead to a more than proportionate increase in government expenditure on education per capita and

(c) a unit proportionate increase in total household expenditure per capita also leads to a more than proportionate increase in household expenditure on education.

Further, estimating the data of Human Development in India (HDI) survey, conducted by the National Council of Applied Economic Research (NCAER), Tilak (2002b) found out that the elasticity coefficient between household expenditure and government expenditure on school education in rural India is positive, with value near unity and statistically significant. Evidently, both are complementary in nature which implies that increase in government expenditure encourages rural Indian households to spend more on their children's school education – leading to a significant rise in the total expenditure on education[1]. Similar results[2] are reported by Kambhampati (2008). She notes that state expenditure and household expenditure are complementary in nature for both boys and girls. She further investigated the impact of direct government expenditure in the form of scholarships; which had no impact on the household investment at the primary level of education. However, at the secondary level the picture changes. At this stage, government scholarships revealed positive and statistically significant effect on household investment in education; nonetheless, the relationship holds true only for boys.

However, all these empirical investigations are carried out at the level of school education but at the higher education level in India there is real scarcity of such analysis, mainly due to lack of data. Fortunately, NSS 64th round data on 'Participation and Expenditure in Education (2007-08) provides an opportunity to examine these issues. In the next section, we describe the database and detailed methodology of estimation adopted to test the relationship between Government and household expenditure.

Database and Methodology of Estimation

The present analysis is mainly based on two data sources. Information regarding household expenditure on higher education and the data of scholarship/stipend is obtained from NSS 64th round data on '*Participation and Expenditure in Education'* (2007-2008). For detailed information the unit level data of this round is extracted. State-wise

[1] Therefore, if government wishes to mobilize household finances for education, it is important that government increases its own allocation to education considerably. Conversely, and more clearly if government budgets on education are reduced, household expenditure may also decline resulting in severe underinvestment in education (Tilak, 2002a).

[2] Stafford, Lundstedt and Lynn (1984) also noted the similar complementary relationship between public expenditure and government expenditure in education in America.

government expenditure data is compiled from Analysis of Budgeted Expenditure. The dataset used for the entire analysis is cross-sectional.

The questions that this article attempts to answer are examined here with the help of elasticity coefficients. Coefficient of elasticity (coefficient β in the equation) estimated between household expenditure and government expenditure in higher education gives the magnitude of change in household expenditure for 1 per cent change in government expenditure. For example, if the coefficient of elasticity is equal to positive unity (=1) – then for every 1 per cent increase (decrease) in government expenditure on education, household expenditure will increase (decrease) by 1 per cent. If β is negative, then there is an inverse relationship between the two: if government expenditure increases household expenditure would decrease. Also, if the value of the coefficient is more than 1 – it is considered elastic; whereas, if it is less than 1 – it is inelastic. Elastic (or inelastic) means – household expenditure changes (increases or decreases) more (or less) than proportionately to unit proportionate change in government expenditure. Thus, the *sign* of β coefficient would indicate the nature of the relationship between the two – whether they are complementary to each other or substitutes.

The *value* of β also would help in determining the nature of the good (higher education in the present case) from the estimate of elasticity between household expenditure on higher education and household income. If the β is less than zero (i.e. negative) higher education is considered an inferior good – implying with the increase in income household would reduce expenditure on education. On the other hand, if β is greater than zero and less than 1, education is regarded as a normal good. If the value is more than 1, that means it is luxury (see Intriligator 1980).

In this context, one can identify at least three[1] forms of equation to estimate the coefficient of elasticity and the value of elasticity is sensitive to the form of equation (Tilak, 2002b). However, in the present context the double log functional form is estimated. Thus, the functional form of elasticity of Y to change in X could be denoted as:

$$lnY = \alpha + \beta\ lnX + \varepsilon \ldots\ldots\ldots \text{(a)}.$$

The reason being, the present analysis is based on cross sectional data. Thus, it could suffer from the problem of heteroscedasticity, as household living in different parts of the country are sampled together (Tilak, 2002). To check the presence of heteroscedasticity, we first run the semi-log regression equation and found the presence of heteroscedasticity. To counter this problem, we took the logarithmic transformation of all the variables and estimated double log form (mentioned in equation (a))[2].

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[1] The three functional forms are strictly linear, log-linear and double log forms respectively. Denoted as – $Y= \alpha + \beta X + \varepsilon$, $lnY= \alpha + \beta X + \varepsilon$ and $lnY = \alpha + \beta\ lnX + \varepsilon$, respectively. In addition, there are three other forms: inverse, log-inverse and log-log-inverse. For, detailed discussion on several Engel curve forms see Hassan and Johnson (1977), cited in Tilak (2002).

[2] Among the various alternative methods available to correct for heteroscedasticity, logarithmic transformation of all the variables is suggested for using in the OLS regression analysis, because "log transformation compresses the scales in which the variables are measured, thereby reducing tenfold difference between two values to a twofold difference" (see Gujarati 1985, p. 210).

Based on state level disaggregated data, the three elasticity coefficients estimated to examine the linkage between household and government expenditure in case of higher education in India:

(a) Elasticity of aggregate household expenditure on higher education to total government expenditure on higher education

(b) Elasticity of aggregate household expenditure on higher education to government expenditure in the form of scholarship/stipends

(c) Elasticity of aggregate household expenditure on higher education with respect to household income (proxied by household consumption expenditure). This is done since it is generally believed that household economic condition plays a pivotal role in determining expenditure on all goods and services, including education in general and higher education in particular (as higher education entails huge out-of- pocket expenditure on the part of household).

All elasticity coefficients are calculated for *both* stream as well as technical/professional higher education. These are separately calculated with the understanding that household expenditure incurred for both types of education are quite different in terms of the amount of monetary expenditure. As noted in NSS 64th round report, a household spends yearly around Rs. 7,360 on each child pursuing post higher secondary general education, while the same for technical/professional education is as high as Rs. 32,112 (p. H-3).

The equations estimated could be expressed as follows:

Higher Education (General)

ln(hh_exp_genedu) = α + β ln(Govt_exp_genedu) + ε……..……..(1)

ln(hh_exp_genedu/ps) = α +β ln(stipend_genedu/ps) + ε……...(2)

ln(hh_exp_genedu/ps) = α +β ln(hh_conexp/pc) + ε……..…....(3)

Higher Education (Technical)

ln(hh_exp_techedu) = α + β ln(Govt_exp_techedu) + ε……(4)

ln(hh_exp_techedu/ps) = α +β ln(stipend_techedu/ps) + ε……....(5)

ln(hh_exp_techedu/ps) = α +β ln(hh_conexp/pc) + ε……....(6)

The following table (Table 1) describes the variables and their notations which are used in the estimation:

Table 1: Variables, their Notations and Definitions

Variables	Definition of the variables used
hh_exp_genedu	household expenditure on general higher education, per annum
hh_exp_genedu/ps	Yearly household expenditure on general higher education per student
Govt_exp_genedu	Government expenditure on general higher education
hh_exp_techedu	household expenditure on technical education
hh_exp_techedu/ps	Yearly household expenditure on technical education per student
Govt_exp_techedu	Government expenditure on technical education
hh_conexp/pc	household per capita annual consumption expenditure (proxy for income)
stipend_genedu/ps	amount of scholarship/stipend annually provided (for general higher education) per student
stipend_techedu/ps	amount of scholarship/stipend annually provided (for technical/professional higher education) per student

Results

The following section provides the results and their interpretations.

It is noted in the earlier section that household expenditure in higher education may be complementary to government expenditure or, turn out to be substitute. A third possibility is household expenditure in higher education not at all or insignificantly related to government expenditure. Though, earlier studies on this subject (Stafford, Lundstedt and Lynn, 1987; Panchmukhi, 1989; Tilak 2000, 2002a, 2002b; Pathania, 2006; Kambhampati 2008) found complementary relationship between household expenditure and public expenditure in education; all such analysis essentially focused on school education.

To test the relationship in case of higher education in India, we have estimated the double log equations mentioned in the previous section (see, equation (1) to (6)) for both general higher education and technical higher education. Table 2 presents the elasticity coefficients in case general higher education.

The estimated coefficients clearly suggest that government expenditure and household expenditure for general higher education are complementary to each other and elastic in nature. The coefficient of elasticity is 1.081, which is significant at 1 percent level implying – one percent increase (or decrease) in government expenditure on higher education would induce households to spend (curtail) more than one percent on higher education. This result has important policy implication – if government wishes to mobilize household finances for higher education, it is important that the government should *increase* its allocation towards the sector[1].

[1] Pryor (1968) in this context argued that, 'if the elasticity of substitution of household for public expenditures is low, then a larger share of public financing should result in the production of a greater relative amount of education; if the elasticity of substitution of household for public expenditure is unity, then the way in which education is financed should make no difference in the relative amount of education that is produced; but if this elasticity is below unity, then

Table 2: Coefficient of Elasticity Results (General Education)

		Coefficient
(1)	***lnhh_exp_genedu on lnGovt_exp_genedu***	
	Elasticity Coefficient	1.081***
	t value	(9.806)
(2)	***lnhh_exp_genedu/ps on lnstipend/ps***	
	Elasticity Coefficient	0.122***
	t value	(119.93)
(3)	***lnhh_exp_genedu/ps on lnhh_conexp/pc***	
	Elasticity Coefficient	0.577***
	t value	(1424.207)

*Note: ***=coefficient is significant at 1% level; sample size is 35*

While equation (1) examines the impact of aggregate government expenditure on higher education in motivating households' expenditure towards it, we also scrutinized whether targeted government expenditure in the form of scholarship or stipends on higher education plays any role in influencing households' educational expenditure (see equation 2).

It is generally presumed that targeted government expenditure in the form of scholarship would substitute households' expenditure and reduce the burden on family. However, the direction and value of elasticity coefficient does not suggest the same in case of higher education in India. The elasticity coefficient of household expenditure on general higher education with respect to stipend is 0.122 (significant at 1 per cent level). Thus, evidence suggests that public provision in the form of scholarship or stipend actually motivate those benefitting[1] households to spend more for their ward's education. However, the impact is not as high as the aggregate (public) expenditure on higher education (mentioned in equation 1). This may be due to the reason that, the beneficiaries from targeted government support in the form of fellowship or stipend is very few (only 10.45 per cent of total enrolled students in higher education) compared to aggregate government expenditure (in the form of plan or non-plan revenue as well as capital expenditure on higher education).

Aggregate government expenditure on education actually caters *all* students, including those who are not eligible for any kind of targeted government support. Further, the complementary relationship suggests that as the out-of-pocket expenditure on students enrolled in general streams is not very high (compared to those pursuing technical or professional education) – the additional government support with meager amount of scholarship[2] does not help in substituting that amount. In this case the monetary

public financing of education should result in a higher ratio of total education expenditures to the GNP, other things remaining equal.'[quoted in Tilak (2002, p.12)].

[1] 10.45 per cent of enrolled students in higher education get the benefit of scholarship/stipends; of which 9.28 per cent are is pursuing general education and 1.12 per cent is enrolled in technical/professional courses.

[2] The average amount of fellowship provided to the general stream student is approximately Rs. 2064.

benefit from scholarship is *additive* to the existing household expenditure on education and encourages households (mostly from backward caste group[1]) to spend on their part resulting in better participation in higher education.

As noted earlier, high-income households spend more than the lower income households on higher education, ceteris paribus. Equation 3 seeks to capture the magnitude of this impact. Table 2 shows that the elasticity coefficient of household expenditure on higher education with respect to household total consumption expenditure is 0.577 (significant at one per cent level) – which is significantly less than the coefficient of elasticity with respect to government expenditure in higher education. This means, 1 per cent change in household income will change the household expenditure on higher education by 0.58 per cent. The positive sign again suggests that general higher education is a normal good. However, since the elasticity coefficient is less than unity – household expenditure on higher education is inelastic to change in household income. Tilak (2002a, 2002b) finds similar results in case of elementary education in rural India.

While all the aforementioned results are for general education stream, one confronts a different scenario in case of technical education possibly due to the following reasons: first, technical education requires larger investment on part of households (see, chapter 6 for details); second, not even one-fourth of the students enrolled in higher education are pursuing technical education[2]and finally, very few students[3] who are pursuing technical education are entitled for stipend or scholarships. In this backdrop, it would be interesting to examine the relationship between government and household expenditure in technical/professional higher education. Table 3 presents these results.

Table 3: Coefficient of Elasticity Results (Technical Education)

		Coefficient
(4)	***lnhh_exp_techedu on lnGovt_exp_techedu***	
	Elasticity Coefficient	1.077***
	t value	(3.675)
(5)	***lnhh_exp_techeduedu/ps on lnstipend/ps***	
	Elasticity Coefficient	-0.332***
	t value	(-118.5)
(6)	***lnhh_exp_techedu/ps on lnhh_conexp/pc***	
	Elasticity Coefficient	0.616***
	t value	(821.358)

*Note: ***=coefficient is significant at 1% level; sample size is 35*

[1] Amongst the enrolled students in general education, only 12 per cent get the benefit of scholarship. Further, 93.7 per cent benefitting students are belonging to ST, SC or OBC caste groups. Only 3.2 per cent gets merit cum means scholarship, while 0.2 receives handicapped scholarship and rest comes under miscellaneous grants/fellowship/scholarship.

[2] Only 21.9 per cent total enrolled students in higher education are attending technical education institutions.

[3] Only 5.1 per cent of enrolled students in technical education institutions receive scholarship.

Table 3. shows the relationship between aggregate household expenditure and aggregate government expenditure in technical education. As in case of general higher education, in technical/professional education also household and government expenditure is complementary to each other. The elasticity coefficient is 1.077 and statistically significant at 1 percent level. The more than unity value implies that a percentage increase in government expenditure will induce more than proportionate increase in household expenditure in favour of technical education. Further, the positive magnitude suggests that the relationship is highly elastic in nature. Thus, any increment in total government expenditure in technical education will induce the households to spend more from their part.

However, the estimated coefficient of elasticity of per student household expenditure on technical education with respect to per student government expenditure on stipends is a complete departure from the case of general higher education. The result shows that the household expenditure on technical education and stipend are inversely related. The coefficient of elasticity is -0.332 significant at one per cent level suggesting, 1 per cent increase in stipend would decrease the household expenditure by 0.332 per cent. Thus, unlike general education, targeted government expenditure in the form of scholarship/stipends in technical education actually substitutes household expenditure on technical education. This may be for households, whose wards are pursuing technical/ professional courses, incur huge out-of-pocket expenditure. According to NSS 64th round data, per student expenditure of Indian household in case of technical education is as high as Rs. 32,112. Thus, even a meager[1] amount of scholarship in technical education shoulders the burden of huge household expenditure and act as substitute.

The relationship between per student household expenditure on technical education with respect to households' economic condition, it could be stated that like general streams technical higher education is also a normal good, as the elasticity coefficient is 0.616 with 1 per cent significance level. This implies that with 1 per cent increase in income (proxied by annual per capita consumption expenditure) households increase their expenditure by 0.62 per cent, suggesting high income household allocate less than proportionate income[2] for spending on higher education. This value is marginally greater than that of the general education, although having the similar implication.

Conclusions

Drawn on 64th round NSS unit level data the present chapter attempted to examine three important issues, (a) what is the relationship between government aggregate expenditure on higher education and household expenditure on higher education in India (b) whether targeted direct expenditure incurred by government in the form of stipend or scholarship helps in substituting the burden on household or encourages the households to spend more on higher education and finally (c) what is the magnitude of

[1] According to NSS 64th round data, average scholarship availed by each student yearly is around Rs 2,650.

[2] As the intercept term is positive (5.132) at 1 per cent level of significance.

the impact of households' economic condition on households' educational expenditure (here, higher education). These are answered though calculating coefficient of elasticities for both general stream as well as technical higher education separately. The results could be summarized as follows –

(i) There exist positive and more than unity elasticity coefficients for household expenditure on higher education with respect to aggregate government expenditure on higher education, which are statistically significant. The results hold true for both general and technical/professional higher education. The findings suggest that government expenditure actually encourage the households to spend more on education, which ultimately results in greater availability of total resources for higher education.

(ii) Further, the results also suggest that when stipends provided to technical/professional students, it shoulders the burden on households' educational expenditure. However, in case of general education the reverse holds true. In this case, provision of scholarship/stipend induces further household expenditure.

(iii) Finally, the relationship between households' economic condition vis-à-vis households' educational expenditure corroborates earlier findings (Tilak, 2000, 2002b). The coefficient of elasticity shows a positive but less than unity value, implying an inelastic relationship; thus 1 unit increase in household income would result in a less than proportionate increase in household (higher) educational expenditure. This is also indicative of a strong relationship between poverty and educational expenditure (Tilak, 2000b, 2002b). However, as households' economic condition significantly influences the level of spending incurred by families on higher education, the enormity of the impact is not as high as that of aggregate government expenditure on higher education. Thus, we can conclude that if the government wants to mobilize more resources for higher education sector, it has to commit more resources by investing more in the sector. This will not only solve the problem of resource crunch, but also ensure equality of opportunity by providing better access and facilities to the people aspiring for higher education.

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