【研究論文】

Incidences of Public Education Spending in Developing Countries

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Abstract

This paper quantitatively analyzes the incidence of public education spending on the poor in developing countries by using the results of standard benefit-incidence studies and additional national data. Although there is considerable variation across studies, it is found that public education spending generally does not favor the poor, but it does favor them at a lower level of education. The poorest quintile (20% of the population), on average, receives 16.3% of total public education spending while the richest quintile receives 25.9%. In primary education, the poorest quintile receives 22.4% of public spending but only 5.5% in higher education. The cross-country analysis of variations in the incidence of public education spending implies that increased spending on education will be associated with increased share for the poor given that it is not devoted to spending on higher education.

Keywords

benfit-incidence analysis, meta-analysis, education, public expenditure, developing countries

1. Introduction

Many people would agree that education is one of the most important basic human rights and is central to equitable growth and poverty reduction. Equity, as well as efficiency, is an important reason for the government financing and provision of education services. The recent movement toward a more comprehensive and prioritized development strategy and the associated donors' assistance, for example a poverty reduction strategy, is expected to strengthen macro-level policy and financial commitments to educational goals in developing countries. Meanwhile, it will be further demanded by wider stakeholders to articulate and evaluate the rationale for public funds allocated to education. Certainly, it is important to articulate equity in education financing.

For measuring equity in education, four distinguished approaches can be seen in the literature.[1] To be brief, studies aim to analyze differences in the following: (i) access to education and the quality of access; (ii) the

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accumulation of human capital (e.g., educational attainment and return to education) as gains associated with access to education; (iii) the appropriation of public resources, in other words public subsidies associated with access to education; or (iv) private contributions such as direct costs to gain access and tax contributions. In any approach, decisions on equity would be based on norms and facts concerning distribution across various units (e.g., individuals and households) and/or the groups (e.g., by gender and income) for a period (e.g., current or lifetime differences) in a society.

The third approach, occasionally combined with the fourth approach, is called "benefit-incidence analysis." Such analysis in the education sector began with a study of higher education financing in the US (Hansen and Wesbrod 1969), and for developing countries, Jallade (1974). Jallade's is the first study to analyze the benefit-incidence in detail, followed by Meerman (1979) and Selowsky (1979). Recently, a fairly simple standard benefit-incidence analysis has become more available for developing countries. The analysis is expected to provide a measure for the effectiveness of public spending regarding the transfer of current benefits to the poor, as defined mostly by household consumption or income.

This paper aims to quantitatively analyze the incidence of public education spending on the poor in developing countries, using the results of 43 standard benefit-incidence studies from 34 countries. More specifically, it will assess whether and to what extent public education spending is effectively distributed to the poor and how the degree of equity in distribution varies across studies. Furthermore, with additional national data, it will consider what may explain the variation in the studies, with a focus on inter- and intra-sectoral allocation policies, and whether increased public education spending may increase the share for the poor. This cross-country analysis may help policy makers establish a benchmark from which to evaluate the current state and future impact of policy changes with respect to targeting public spending on the poor.

This paper is organized as follows. Chapter 2 elaborates a little further the methodology of a standard benefit-incidence analysis and describes the previous studies reviewed in this paper. Chapter 3 presents the results of the review and Chapter 4 concludes the paper.

2. Measuring the benefit-incidence and the studies used in this review

2.1 Measuring the benefit-incidence and the interpretation for policy implications

Broadly speaking, the empirical benefit-incidence literature may be categorized into two types. *Firstly*, a standard benefit-incidence analysis, which is widely used, combines the cost of providing public services with information on their use in order to generate distributions of the benefit of government spending.[2] This approach is also called expenditure-incidence analysis. *Secondly*, a fiscal- or budget-incidence analysis sums both the tax- and benefit-incidence estimates [e.g., Jallade (1974); Fields (1975)]. This approach is appropriate particularly in a society that has an education earmarked tax system or/and an income tax system strongly linked to workers' education.[3]

Recently, the standard benefit-incidence analysis has become more available for developing countries. The analysis is expected to provide a measure for the effectiveness of public spending regarding the transfer of current benefits to the poor. Although norms on equity between the poor and non-poor vary across countries and societies, studies tend to analyze resource distributions across groups classified by

a welfare indicator related to household income and consumption levels, such as consumption deciles and quintiles.[4] Representative formats that present the educational subsidy imputed to each of the classified groups include: subsidy per capita terms, as a share in the total subsidy (to be compared to share of population or share of school-aged children), and as a percentage of household consumption/income.[5] For example, Castro-Leal et al. (1999) found in their review of studies in nine African countries that the poorest 20 percent of the population (quintile) gains less than 20 percent of the subsidy, and significantly less in most cases. In addition, the studies often address the different distributional role of public education spending between a lower and higher level of education. Despite some differences in measurements and decision criteria on equity, as suggested in Selden and Wasylenko (1992), the studies generally confirm the arguments of Psacharopoulos (1977) that expenditure on primary education is pro-poor, either as a percentage of household income or in absolute terms, while expenditure on higher education levels tends to be pro-rich, but the exact point in the education system at which the rich become favored differs among countries.

The benefit-incidence results typically support the following policies for improving the equity: (i) increasing public resources to education while aligning sub-sectoral budget allocations, often towards primary education; and (ii) introducing cost-recovery and/or private provision at a higher level of education. In other words, benefit-incidence studies try to foresee what would happen on a distribution pattern of public spending if governments change the level and pattern of budget allocations to the education sector.

Broadly speaking, the following approaches may be taken to provide some thoughts or estimates of changes in the benefit-incidence over time. The first approach is to simply take an existing distribution pattern of public spending (or pattern of use of subsidized services) as given and generate a simple analysis by assuming that the pattern does not change significantly and that the observed-incidence of current spending would hold also for any additional spending (Demery 2000, p.20). The second is to examine changes in the benefit-incidences for two or more points in time within a country that might have arisen from changes in public spending [e.g., van de Walle (1992) for Indonesia, World Bank (1994a) for Columbia]. The third is to estimate "marginal" gains (gains from a change) that may be distributed differently from the average incidence in a group using cross-sectional data in a country [e.g., Lanjouw and Ravallion (1999)[6]]. In addition, a cross-country analysis of benefit-incidence results and the variation, which is the aim of this paper, may be helpful to draw policy insights for improving the targeting public spending to the poor.

2.2 Description of studies used in this paper and framework for comparison

I prepared a dataset that includes empirical results with respect to estimated benefit-incidences across income (consumption) quintiles measured as the quintile's share of the total subsidies for the education sector as a whole and for each level of education. A standard formula can be written as follows:

$$X_j = \sum_{i=1}^{n} \frac{S_i}{E_i} E_{ij} / \sum_{i=1}^{n} S_i * 100 \qquad (1)$$

where X_j is the benefit-incidence (incidence of public spending) for the j^{th} quintile, S_i is total public spending on the i^{th} level (often primary, secondary, or higher education, n=3), E_i is enrollment at the i^{th} level of education and E_{ij} is enrollment at the i^{th} level of education among the j^{th} quintile. The sum of the benefit for the j^{th} quintile at all levels of education divided by the

total public education spending provides the benefit-incidence for the j^{th} quintile for education as a whole. The benefit-incidence ranges from 0 to 100 percent.

In finding studies, I specifically rely on the two previous reviews, Selden and Wasylekno (1992) and Castrol-Leal, et. al (1999), and the World Development Source.[7] Most studies use data from the 1990s and a few use data from the 1970s and 1980s. I tried to incorporate information on how studies deal with measurement issues that analysts could face in estimating benefits and imputing the benefits to beneficiaries. These issues are related to the following questions: whether unit subsidy has regional/geographical variation at a level of education or variation by program (e.g., vocational vs. general education); whether revenues from cost-recovery are netted out of public unit subsidies; how investment expenditure is included as part of unit subsidy or excluded; and how benefit for those enrolled in private provision of education is estimated (e.g., no benefit as there is no government subsidy to private school).

The issues involved in imputing benefits to beneficiaries include: whether the unit of analysis is household or individual; whether the analysis includes all population in grouping to quintiles or disaggregated population (e.g., by gender, urban-rural area, and region); and whether a classifier for grouping to quintiles is per capita household consumption (expenditure/income), total household consumption, or per adult equivalent consumption.[8] While some studies provide comprehensive answers to these issues, most do not provide adequate information. This may be partly due to a lack of data and limited time for the studies.

Table 1 provides selective information on the dataset based on 46 studies in 34 developing countries. When a study provides a few distinguished sets of results through addressing measurement issues, the dataset includes the results separately. The table provides information on the country and year of data, the mythological type, the unit of analysis (whether it is individual or household), and the incidence of public education spending for the poorest quintile for education as a whole and by level of education. The sample countries have relatively regional variations, nine countries in Africa, two countries in Central Asia, six in East Europe, eight in East Asia and the Pacific, seven in Latin America, and two in the Middle East and North Africa. Overall, Table 1 shows that the distribution of public education spending is less likely to be targeted to the poor. In many cases in the table, the poorest quintile does not gain the larger share in the spending than their share in the total population (of households or individuals), i.e., 20 percent. Yet, the table also shows that the degree of non-poor varies among studies.

This paper will further compare their results through quantitatively analyzing: (i) variation across studies and (ii) factors that may explain the variation in consideration of typical policy recommendations in the previous studies. To analyze these factors, this paper will focus on the relationship of the incidence of spending on the poor to the level of public education spending and a sub-sectoral allocation of the spending:

$$X_j = \alpha_0 + \alpha_1 SPEND + \alpha_2 SHAREH + Z\beta + \mu_j \quad (2)$$

where SPEND is public education spending as a percent of Gross National Income (GNI) and SHAREH is higher education share of total education recurrent spending. Z denotes indicators as proxy for other country's socioeconomic factors such as per capita GDP. I use SHAREH as a most available proxy of sub-sectoral allocations.[9] The national aggregated data for the independent variables are added to the dataset corresponding to the country and year for each of the studies surveyed. The data mainly comes from the World Bank (2001) and

UNESCO (2002).[10]

3. The results of standard benefit-incidence studies in developing countries

3.1 The incidence of public education spending across the population

Table 2 summarizes a meta-analysis of the incidences of public spending across quintiles for education as a whole and for each level of education (primary, secondary and higher education). It shows the means of the incidence, the standard deviations, the minimum and maximum incidences, and the number of cases used for this analysis together with the numbers of the corresponding countries and studies. The table confirms that the distribution pattern of public education spending is less likely to be pro-poor, as a poorer quintile tends to receive a lower share of spending. On average, the poorest quintile receives 16.3% of the total education spending (with a standard deviation of 5.9 percentage points) and the richest quintile receives 25.9% (with a standard deviation of 9.3 percentage points).

Table 2 also confirms that the distribution pattern is greatly different by level of education. Spending on primary education is likely to be pro-poor, while spending on secondary and higher education is likely to be pro-rich. In primary education, the quintile's share is above 20% in the bottom three quintiles and it becomes below 20% in the top two quintiles. The richest quintile receives the least share, 14.8% of public spending on primary education with a standard deviation of 4.7 percentage points. On the other hand, the distribution pattern of higher education spending is largely skewed towards the rich. The poorest quintile receives only 5.5% of spending on higher education (with a standard deviation of 4.6 percentage points) and even the bottom two quintiles (i.e., the poor 40%) account for only 15%. More than a half of the spending goes to the richest quintile. In secondary education, although the distribution pattern is not pro-poor, the distribution pattern across quintiles is quite different from higher education. While the poorest quintile receives only 11.9% of the spending (with a standard deviation of 7.4 percentage points), wide variance exists and the second and third bottom quintiles receive relatively fare shares, 18.5% and 19.3%, respectively.

Table 2 also suggests that the unit of analysis would affect the results. The magnitude of inequality becomes slightly smaller for studies that analyzed the distribution across household quintiles rather than individual quintiles. For example, the mean of the poorest household quintile's share in total spending is 18.2% and the richest is 23.5%. On the other hand, the poorest individual quintile's share is 15.2% and the richest is 27.3%. This is partially because poor households tend to have more household members (especially younger ones) than the rich.

3.2 Cross-country analysis of factors that may explain the incidence for the poor

Although the distribution of public spending on education as a whole is likely to be non-poor, it appears that wide variance exists among the sample studies with respect to the degree of inequality. In some countries public education spending is strongly non-poor (e.g., 5% of the poor quintile's share in Guinea, 1994), while most countries have a modestly non-poor or neutral distribution pattern and the pattern is even pro-poor in a few countries (e.g., 30% in South Africa, 1993). Although measurement issues, e.g., unit of analysis, might explain some of the differences, other factors could be further considered. As equation (2) illustrates, the level of public education spending and sub-sectoral

Table 1 Poorest Quintile's Share in Public Education Spending in Selective Studies

Country	Year of	Method id	Unit	Poorest quintile's share in*				Source
				Total	Primary	Secondary	Higher	
Albania	1996	1	I	…	27.0	7.2	7.5	World Bank (2000b)
Armenia	1996	1	H	7.0	…	…	…	World Bank (2000a)
Bangladesh	1994	1	H	13.8	19.4	6.0	0.0	World Bank (1996a)
Bulgaria	1995	1	…	…	17.7	8.1	10.9	Pradhan and Zant (1998)
Bulgaria	1997	1	…	20.0	21.1	15.9	11.5	World Bank (1999a)
Colombia	1974	1	H	19.8	32.1	16.8	0.8	Selowsky (1979)
Colombia	1992	1	H	23.0	39.0	21.0	5.0	World Bank (1994)
Cote d'Ivoire	1995	1	I	14.0	19.0	5.2	12.0	Demery (2000)
Cote d'Ivoire	1995	2	H	19.4	28.8	11.2	…	ditto
Cote d'Ivoire	1995	3 M	I	16.2	22.8	6.8	17.4	ditto
Cote d'Ivoire	1995	4 F	I	8.9	14.0	4.2	0.0	ditto
Dominican Rep.	1996	1	…	22.7	28.8	17.6	3.2	World Bank (2000e)
Ecuador	1998	1	I	11.0	24.0	9.0	1.0	World Bank (2000d)
Ghana	1989	1	I	17.1	21.2	16.8	7.7	Demery, et.al. (1995)
Ghana	1989	2 M	I	17.2	22.3	18.7	5.9	ditto
Ghana	1989	3 F	I	16.8	19.8	13.8	11.1	ditto
Ghana	1992	1	I	16.4	21.8	14.9	6.0	ditto
Ghana	1992	2 M	I	17.7	22.7	17.0	7.5	ditto
Ghana	1992	3 F	I	14.6	20.7	11.8	3.2	ditto
Ghana	1992	4 C	I	16.7	17.4	18.6	9.5	ditto
Ghana	1998	1	I	…	20.4	18.8	12.5	Canagarajah and Ye (2001)
Guinea	1994	1	…	5.0	11.0	4.0	1.0	Castro-Leal, et. al. (1999)
India	1994	1	I	…	14.2	…	…	Lanjouw & Ravallion (1999)
Indonesia	1987	1	I	21.9	24.5	21.4	8.0	Van de Walle (1992)
Indonesia	1987	2 U	I	23.4	25.0	28.8	12.5	ditto
Indonesia	1987	3 R	I	22.9	23.7	23.3	9.9	ditto
Indonesia	1989	1	I	15.0	22.0	5.0	0.0	World Bank (1993)
Indonesia	1998	1	I	…	24.8	12.7	…	Lanjow, Peter et. al (2001)
Jamaica	1992	1	H	18.0	…	…	…	World Bank (2000a)
Jordan	1996	1	…	…	…	…	8.0	Hammer (1999)
Kazakhstan	1996	1	H	8.0	…	…	…	World Bank (2000a)
Kenya	1992	1	I	17.0	21.8	6.4	2.0	World Bank (1995a)
Kenya	1992	2 R	I	…	20.8	6.4	…	ditto
Kenya	1992	3 U	I	…	28.1	10.6	…	ditto
Kyrgyz	1993	1	H	14.0	…	…	…	World Bank (2000a)
Lao	1993	1	I	11.6	18.4	6.6	0.0	World Bank (1995b)
Macedonia, FYR	1996	1	I	18.5	25.4	12.6	7.1	World Bank (1999b)
Madagascar	1994	1	I	8.3	17.2	2.0	0.0	World Bank (1996b)
Madagascar	1994	2 V	I	8.2	16.8	1.9		ditto
Madagascar	1994	3 MV	I	8.0	17.0	3.0	0.0	ditto
Madagascar	1994	4 FV	I	8.0	16.0	1.0	0.0	ditto
Madagascar	1994	5 UV	I	9.2	21.5	5.9		ditto
Madagascar	1994	6 RV	I	11.5	16.5	1.9		ditto
Malawi	1991	1	I	10.0	15.0	7.0	3.0	Castro-Leal (1996a)
Malawi	1995	1	I	16.0	20.0	9.0	1.0	Castro-Leal (1996a)
Malaysia	1974	1	H	21.9	28.2	19.0	3.4	Meerman (1979)
Malaysia	1989	1	H	26.0	35.0	31.0	10.0	Hammer, et.al. (1995)
Moldova	1999	1	H	26.0	…	…	…	Tibi, et. al (2001)
Moldova	1999	2 U	H	24.3	…	…	…	ditto
Moldova	1999	3 R	H	28.2	…	…	…	ditto
Morocco	1999	1	I	12.0	21.1	7.3	1.7	World Bank (2001a)
Nepal	1996	1	H	11.0	…	…	…	World Bank (2000a)
Nicaragua	1993	1	H	9.0	…	…	…	World Bank (2000a)
Pakistan	1991	1	H	14.0	…	…	…	World Bank (2000a)
Panama	1997	1	H	20.0	…	…	…	World Bank (2000a)
Peru	1994	1	H	15.0	…	…	…	World Bank (2000a)
Peru	1997	1	I	20.6	28.4	15.5	6.2	World Bank (2001b)

Table 1 (Continued)

Romania	1994	1		I	24.0	27.0	18.3	7.8 World Bank (1997)
Romania	1997	1		I	24.0	31.0	26.0	10.0 Tesliuc, et. al (2000)
South Africa	1993	1		H	30.0	…	…	… Castro-Leal (1996b)
South Africa	1993	2	V	H	21.0	26.9	18.3	10.6 Castro-Leal (1996b)
South Africa	1993	3		I	19.9	25.8	18.8	6.1 Castro-Leal (1996b)
South Africa	1993	4	V	I	14.1	18.9	11.5	6.1 Castro-Leal (1996b)
Tanzania	1994	1		H	13.0	20.0	7.6	0.0 World Bank (1999c)
Uganda	1992	1		…	13.0	19.0	4.0	6.0 Castro-Leal, et. al. (1999)
Vietnam	1993	1		I	12.0	19.9	4.7	0.0 World Bank (2000c)
Vietnam	1998	1		I	…	26.1	8.6	0.6 World Bank (2000c)

Notes: Method-id: 1, Method most closes to standard among available results in a study; Other numbers are explained by the following: M, the sample includes males only; F, females, U, urban population; R, rural population; C, classifier is per adult equivalent consumption; V, variation in unit spending (e.g. variation by region).
Unit: H, Household is unit of analysis; I, Individual is unit of analysis. (…) Information is not available.
* For some countries, primary education refers to basic education. For Indonesia and Vietnam, the data for secondary are the arithmetic averages of junior and secondary education.

Table 2 Summar Statistics of Incidence of Public Education Sendin Across Quintiles

	Mean	Standard deviation	Minimum	Maximum	No. of obervations	No. of studies	No. of countries
Education as a whole							
Quintile 1	16.3	5.9	5.0	30.0	58	38	31
Quintile 2	18.8	3.4	12.0	28.5	55	35	28
Quintile 3	18.8	2.6	13.9	23.0	55	35	28
Quintile 4	20.3	2.8	15.0	27.0	55	35	28
Quintile 5	25.9	9.3	11.2	46.0	58	38	31
Primary							
Quintile 1	22.4	5.4	11.0	39.0	53	34	24
Quintile 2	22.8	2.4	17.7	28.0	50	31	21
Quintile 3	21.0	1.7	16.5	25.4	50	31	21
Quintile 4	19.1	2.8	11.0	24.2	50	31	21
Quintile 5	14.8	4.7	4.0	27.8	53	34	24
Secondary							
Quintile 1	11.9	7.4	1.0	31.0	52	33	23
Quintile 2	18.5	5.8	8.2	36.7	49	30	20
Quintile 3	19.3	4.2	10.6	26.6	49	30	20
Quintile 4	22.6	5.2	11.5	33.6	49	30	20
Quintile 5	28.1	11.5	10.0	50.3	52	33	23
Higher							
Quintile 1	5.5	4.6	0.0	17.4	46	33	24
Quintile 2	9.1	6.5	0.0	27.1	42	29	20
Quintile 3	14.3	7.7	0.0	32.4	42	29	20
Quintile 4	20.2	6.6	7.0	33.0	42	29	20
Quintile 5	51.9	20.3	21.0	100.0	45	32	23
Education as a whole by unit analysis							
Unit analysis is individual							
Quintile 1	15.2	4.9	8.0	24.0	33	18	14
Quintile 5	27.3	8.9	14.0	43.0	33	18	14
Unit analysis is household							
Quintile 1	18.2	6.7	7.0	30.0	21	18	16
Quintile 5	23.5	9.4	11.2	46.0	21	18	16

Source: Author's calculation using the data from source presented in Table 1.

allocation and the other country's socioeconomic factors might explain differences in the degree of inequality or equality.

To assess the extent of their relations, I regress the incidence of public education spending for the poorest quintile on the variables: SPEND and SHAREH with some specifications including the other two variables: a constant GDP per capita in US dollars (GDPPC) and the adult illiteracy rate as a percentage of people aged 15 and above (ILLITERATE). The regression results are reported in Table 3. The results are derived through using the Huber-White robust standard error method. To assess heteroskedasticity, I performed the Cook-Weisberg test. The test result suggests that there is no evidence of heteroskedasticity.

The specification (1) of the table shows that the coefficient upon SPEND is positive (1.563) and significant at the 1% level. A one-percentage point increase in SPEND increases the incidence among the poorest quintile by about 1.6 percentage points. However, not only the level of spending but also the sub-sectoral allocation appears to be important as expected (specification 2). The coefficient upon SHAREH is negative (-0.238) and significant at the 5% level[11] while the coefficient upon SPEND remains positive and significant at the 1% level.[12]

The specifications (3) and (4) show the results become robust after controlling for GDP per capita[13] and illiteracy rate. The coefficients upon SPEND and SHAREH remain positive and negative, respectively, and both statistically significant. This result does not change even if either of these two variables is dropped from regression (specifications 5 and 6), suggesting that multicollinearity between the two is not a serious problem. In the specification (3), GDP per capita is positively associated with the incidence for the poorest (0.002) at the 5% level of significance. In the specification (4), the coefficient upon GDPPC remains positive but not significant while the coefficient upon ILLITERATE is negative (-0.102) and significant at the 5% level.[14]

Table 3 also provides regression results for a reduced size of sample studies by keeping only

Table 3 Ordinary Least Square Regressions, with Robust Standard Errors,[a] Dependent Variable is the Poorest Quintile's Share

	Specification							
	(1)	(2)	(3)	(4)	(5)	(6)	(3)[b/]	(4)[b/]
Constant	9.292 ***	13.684 ***	13.294 ***	20.305 ***	26.694 ***	12.683 ***	11.766 ***	17.273 ***
	(6.850)	(5.130)	(5.600)	(4.490)	(7.210)	(4.820)	(4.620)	(3.390)
SPEND [c/]	1.563 ***	1.465 ***	1.174 ***	0.920 ***		1.098 **	1.128 ***	1.089 ***
	(6.340)	(5.650)	(4.220)	(3.090)		(4.420)	(3.050)	(3.670)
SHAREH [c/]		-0.238 **	-0.256 ***	-0.354 ***	-0.409 ***		-0.235 **	-0.338 **
		(-2.240)	(-2.850)	(-3.350)	(-3.400)		(-2.100)	(-2.670)
GDPPC			0.002 **	0.001	0.001	0.001 *	0.003 ***	0.003 ***
			(2.480)	(1.340)	(1.320)	(1.730)	(7.110)	(4.320)
ILLITER				-0.102 **	-0.140 ***	-0.081 **		-0.075
				(-2.290)	(-2.940)	(-2.080)		(-1.470)
N	55	50	50	46	49	51	32	28
R^2	0.340	0.401	0.493	0.610	0.447	0.5158	0.540	0.655

Notes: *** Statistically significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. a/ Huber-White robust t-statistics in parentheses. b/ For a reduced sample size by keeping only one result for each study if a study has multiple results with different methods. c/ The pairwise correlation coefficient between SPEND and SHAREH for the full sample is -0.24.

one set for each study in order to eliminate a possible bias from country- and year-specific factors of studies with multiple results. Overall, the regression results for the reduced sample are consistent with the findings for the full sample. In all specifications, the coefficient upon SPEND is positive and significant at the 1% level. The coefficient upon SHAREH is negative in all specifications, but the significance is less when compared to the regression results for the full sample. Specification (4) shows the coefficient upon SPEND is 1.089 at the 1% of significance level and the coefficient upon SHAREH is -0.338 at the 5% of significance level.

The results for both full and reduced samples suggest that the incidence for the poor would be higher when a country allocates more public resources to education but the incidence would not be much higher when a country allocates a larger share of the resources to higher education. For example, even if a country has a higher level of public education spending by 1 percentage point of GNI than the other country with the same economic and literacy levels, but the country also has a higher share of higher education by 6.2 percentage points, the difference in the incidence for the poor would be almost zero. That is no advantage in equity despite the high financial commitment to education as a whole.

In other words, the results imply that reallocating public education resources from higher education to other levels of education might be a policy measure to improve equity when GDP per capita and the level of public education spending are held constant. For countries where total education spending is rather small, it might be more appropriate to consider an increase in the overall spending while providing the highest priority to lower levels of education. This would result in a relatively smaller share of higher education without a reduction in the existing level of spending on higher education.[15]

3.3 Changes in the incidence for the poor over time in a country

Obviously, the cross-country analysis above does not observe various factors that might also explain the differences in the benefit-incidence for the poor. Some factors might be related to country-specific socioeconomic contexts, while others might be related to education sector policies (e.g., cost-recovery policy) and beneficiaries' response. It may be useful to compare changes over time in a country for which the results are available for multiple years, in order to ensure reliability of the cross-country regression analysis and get more clues on other factors that might explain a higher incidence for the poor. Thus, I tried to examine whether changes in the benefit-incidence favor the poorest quintile (poor 20%) by focusing on ten cases of medium- or long-term changes in six countries among the studies presented in Table 1. When the poor increases their share in spending over time, the change is considered to be pro-poor (if not, non-poor). Although the data are very limited, it is found that variations still exist across cases and there are a few more cases of pro-poor changes. As the information is not sufficient for any systematic review (e.g., panel regressions), two country cases are explained descriptively below.

The case of Malawi shows a strongly pro-poor change, which is an increase of 6 percentage points in the poor's share in public spending on education as a whole between 1990/1991 (10%) and 1994/1995 (16%). In particular, the improvement was seen in primary education. In Malawi, total public spending on education increased from 3.2% of GNI in 1991 to 5.4% in 1995 and the share of higher education declined slightly from 22.3% to 20.5%. And primary education increased the share in total recurrent education expenditures from 46.1% to 58.8%. The government also abolished primary school

fees during the period (Castro-Leal, 1996). Households responded positively to the policy changes, i.e., increased public resources and decreased private cost in primary education. The gross enrollment ratio jumped by 44.6 percentage points.

The case of Ghana shows mixed changes over 10 years. The change in the benefit-incidence from 1989 to 1992 was modestly non-poor for education as a whole (-0.7 percentage point from 17.1% to 16.4%), reflecting non-poor changes in secondary and higher education despite a pro-poor change in primary education. However, the changes became strongly pro-poor in secondary and higher education from 1992 to 1998 and modestly non-poor in primary education.

In Ghana, total public spending on education increased from 3.5% of GNI in 1989 to 4.5% in 1992, but slightly decreased to 4.2% in 1998, which is still higher than the level in 1989. However, the share of primary education in the total education budget declined from 45% in 1990 to 41% in 1998, while the shares of secondary education (junior and senior secondary) and university remained stable and the share of teacher training college increased (Canagarajah and Ye, 2001). Although primary education is free, in practice, all schools collect obligatory contributions from students. Between 1992 and 1998, the share of private enrollment in primary school remained at the same level, while private secondary school enrollment has increased substantially from one to seven percent. As a part of the education reforms initiated by the government in the late 1980s, the length of pre-university schooling was shortened from 17 to 12 years. This might have helped poor households keep their children in the education system to be eligible for universities. University education remained almost free from tuition in the 1990s (Girdwood, 1999).

4. Summary

This paper has attempted to quantitatively analyze the incidence of public education spending on the poor in developing countries by using the results of standard benefit-incidence studies and additional national data. Although there is considerable variation across studies, it is confirmed that public education spending generally does not favor the poor but it favors them at a lower level of education. The poorest quintile (20% of the population), on average, receives 16.3% of total public education spending while the richest quintile receives 25.9%. In primary education, the poorest quintile receives 22.4% of public spending but only 5.5% in higher education.

The cross-country regression analysis suggests that the incidence of public education spending on the poor is higher when a country allocates more public resources to education (as a percentage of GNI), but the incidence is not much higher when a country allocates a larger share of the spending to higher education. With caution on country specificities, this finding implies that increased spending on education will be associated with increased share for the poor given that it is not devoted to spending on higher education.

In addition, a descriptive analysis of changes in the incidence over time in two countries implies that policies regarding out-of-pocket education spending and private provision will be also among important factors determining the incidence on the poor. With improved information availability, future research is expected to examine the determinants of pro-poor distribution of public spending in a more comprehensive way. It is also expected to provide more policy insights on budgetary allocation with a sub-sector and budget execution process.

Despite the limited size and policy information of the reviewed studies, the findings

of this paper still provide a benchmark on which to assess equity in public education spending with respect to targeting to the poor. When the benefit-incidence is estimated and monitored appropriately over time in a country (e.g., pre- and post-poverty reduction strategy) and is possibly compared with other countries, it can become a more useful indicator of evaluating the country's commitment to poverty reduction. It may enable policy makers to evaluate the impacts of policy changes such as an increase in public education budget and the share allocated to primary education.

Such information, complemented by other dimensions of equity and efficiency in public education spending, is growing in demand by international donor communities that are moving toward a more coherent and coordinated approach in their assistance to developing countries. Even if some donors continue a more traditional approach, that is, project-type rather than sector-wide or basket-funding support, they are also expected to look at macro and sectoral policies and budgetary issues in a recipient country. This is required to rationalize their specific projects in broad policy contexts and to establish coherent goals.

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Notes

1 This is a slightly modified categorization on the basis of Mingat and Tan (1986).
2 Benefits for recipients of direct government payments (or indirect beneficiaries) such as salary for teachers can be analyzed in a so-called "money flow" approach which has a different viewpoint in assessing distributional impacts of governmental expenditures (De Wulf, 1975).
3 In addition, van de Walle (1998) suggests that a number of recent benefit-incidence studies can be interpreted as moving in a new approach combining a standard benefit-incidence analysis with a behavioral approach. The "behavioral approach" addresses the important limitations of a standard benefit-incidence analysis in assessing the impact of public spending on living standards. It aims to adopt the method of benefit valuation on the basis of individual preferences rather than a single utility function and to measure consumer surplus, benefits relative to a counterfactual world without government [e.g., Gertler and Glewwe (1990,1992) Lopex-Acevedo and Salinas (2000)]. However, no empirical benefit-incidence study with the new approach seems to be yet available for the education sector.
4 In some cases, studies aim to assess distribution across groups by other types of classifiers that are related to ethnicities and religions. For details of methodological steps, see Demery (2000).
5 The Lorenz curve (curve of concentration) and the Gini-coefficient are also used.
6 The study analyzed primary education only, not education as a whole.
7 http://www-wds.worldbank.org (January 2002, retrieved). I also checked other databases such as ERIC and ECONLIT.
8 In addition, some other issues include: how public spending on items for which users are not easily identified (e.g., scholarship abroad) is included in unit subsidy or excluded and how studies control potential biases in the

household survey data that cause common problems for benefit incidence (e.g., underestimate of university enrollments). Most studies do not provide the information on these issues.

9 Some other indicators are considered but not used in the model, for example the higher education share of total education spending (both recurrent and investment spending) and the private share of financing (or enrollments) in higher education. This is because these indicators are less available in international databases.

10 See Table A.1 that presents data added to a dataset of selective benefit-incidence studies presented in Table 1. Table A.1 also shows that the average public education spending of sample studies is 3.9% of GNI, close to an average for lower-middle income countries (4.1%) and a little higher than that for low income countries (3.3%). This may imply that there is no clear evidence on biased sample selection in terms of a priority given to education in budget allocation of public funds.

11 Due to data limitations, I could not calculate the disaggregated share for primary and secondary education in total recurrent spending. When SHAREH is replaced with the aggregated share for primary and secondary education (SHAREPS), the coefficient upon SHAREPS becomes also negative but insignificant. This suggests further studies required to see the effect of sub-sectoral allocations with much improved data.

12 On the other hand, when regressions are run for the incidence on the richest quintile, the coefficient upon SPEND is significantly negative and the coefficient upon SHAREH is positive.

13 If GDPPC is replaced with the natural log of GDP per capita (LGDP), the coefficient upon LGDP remains positive (3.307) and significant at the 1% level.

14 If ILLITERATE is replaced with the gross enrollment ratio for primary, secondary, or higher education, the coefficient upon any of these variables is not significant at all.

15 The lower share of higher education might also reflect cost-recovery policy in sample countries, whether public higher education institutions are free from tuition fees. As information on tuition is available only in some of the sample studies, the relation with the incidence is not analyzed here.

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