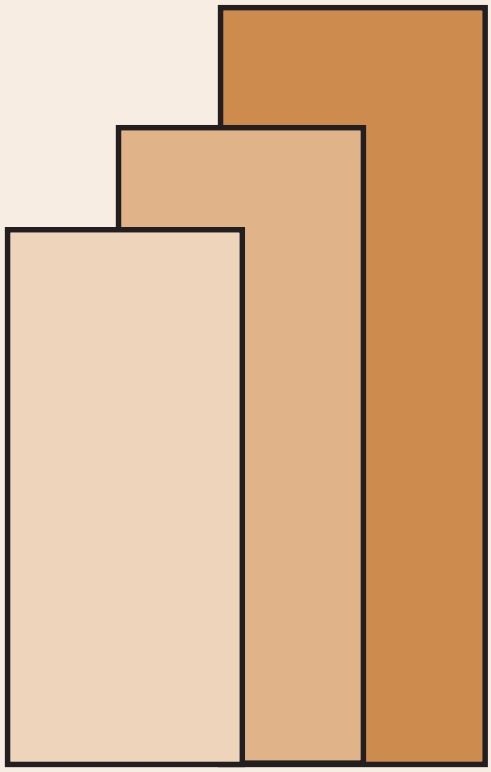
Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

Benefit Incidence Analysis of Public Spending on Education in the Philippines: A Methodological Note

Janet S. Cuenca

DISCUSSION PAPER SERIES NO. 2008-09



February 2008

For comments, suggestions or further inquiries please contact:
The Research Information Staff, Philippine Institute for Development Studies
5th Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: (63-2) 8942584 and 8935705; Fax No: (63-2) 8939589; E-mail: publications@pids.gov.ph
Or visit our website at http://www.pids.gov.ph

BENEFIT INCIDENCE ANALYSIS OF PUBLIC SPENDING ON EDUCATION IN THE PHILIPPINES: A METHODOLOGICAL NOTE

Janet S. Cuenca

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

FEBRUARY 2008

ABSTRACT

Benefit incidence analysis (BIA) is a tool used to assess how tax policy or government subsidy affects the distribution of welfare in the population. In other words, it evaluates the distribution of government subsidies among different groups in the population, in particular, among different income groups. The methodology involved in benefit incidence approach is straightforward. Nevertheless, defining deciles (or quintiles) is critical as benefit incidence estimates depend heavily on the number of individuals occupying each decile (or quintile) cell. Deciles can be defined over population, i.e., across individuals and across households. The purpose of this methodological note is to briefly illustrate the difference in benefit incidence estimates that are obtained when deciles of population/individuals in lieu of deciles of households are used in the analysis as applied on government spending on education in the Philippines.

Keywords: benefit incidence analysis, targeting, progressivity, Gini coefficient, concentration coefficient, concentration curve, education

BENEFIT INCIDENCE ANALYSIS OF PUBLIC SPENDING ON EDUCATION IN THE PHILIPPINES: A METHODOLOGICAL NOTE

Janet S. Cuenca

1. INTRODUCTION

Benefit incidence analysis (BIA) is a tool used to assess how tax policy or government subsidy affects the distribution of welfare in the population. In other words, BIA evaluates the distribution of government subsidies among different groups in the population, in particular, among different income groups.

In the literature, most of benefit incidence analyses divide the population into sub-groups (e.g. quintiles or deciles) based on household per capita income. Since expenditures on health and education are expected to have a redistributive impact, BIA is centered on assessing whether public spending is progressive, that is, whether it improves the distribution of welfare, proxied by household income or expenditure. Likewise, BIA shows how the initial "pre-intervention" position of individuals is altered by public spending or how well public spending serves to redistribute resources to the poor (van de Walle 1995). Put differently, it estimates how much the income of a household would have to be raised if the household would fully pay for the subsidized public services (Sabir 2003).

Benefit incidence analysis combines information on the utilization of government services by households or individuals with information on the cost of providing said services to assess the incidence of the benefits from government spending across income groups. BIA basically involves three steps: (i) array individuals or households by per capita income (or expenditures) and group by deciles or percentiles; (ii) compute estimate of unit subsidy of providing a particular type of government service as derived from official data on government spending; (iii) identify users of the government service (based on data on individual/household service utilization) and impute unit subsidy to said households or individuals (Demery 2000).

Benefit incidence thus depends on the household/individual behavior on the use of the government service and composition of government spending. Benefit incidence studies also assume that the value to consumers of a public service can be identified by the cost of providing it. They then assign benefits to the users of the service ranked by some agreed measure of current welfare. This provides a profile of the distribution of the specific category of public spending across the distribution of the chosen welfare indicator.

The methodology involved in benefit incidence approach is straightforward. Nevertheless, defining deciles (quintiles) is critical as benefit incidence estimates depend heavily on the number of individuals occupying each decile (quintile) cell. Deciles can be defined over population, i.e., across individuals and across households. Deciles of population/individuals result when all individuals, ranked by the welfare indicator[1] (e.g., per capita income or per capita expenditure), are divided into ten groups containing the same number of individuals regardless of their household membership. On the other hand, deciles of households are

[1] Information on the income and expenditure of individuals is not usually found in household surveys. Conventionally, individuals are assigned the per capita income or per capita expenditure of their respective household.

obtained when all households, ranked by the welfare indicator, are divided into ten equal groups. This yields deciles containing unequal number of individuals as poorer households tend to have more members as compared to richer households.

The purpose of this methodological note is to briefly illustrate the difference in benefit incidence estimates that are obtained when deciles of population/individuals in lieu of deciles of households are used in the analysis as applied on government spending on education in the Philippines.

The paper is organized as follows. Section 2 presents concepts related to benefit incidence approach as discussed in Manasan et al (2007). Section 3 gives example of benefit incidence estimates derived using both deciles based on population/individuals and deciles based on households. It ends with the concluding remarks in Section 4.

2. TARGETING AND PROGRESSIVITY

Benefit incidence analysis is better understood in relation to the concepts of targeting and progressivity of social spending. Targeting is a tool used to select eligible beneficiaries of any government intervention. In principle, it should concentrate the benefits of social assistance programs to the poorest segments of the population. All targeting mechanisms share a common objective: to correctly identify which households or individuals are poor and which are not. Targeting is a means of increasing the efficiency of the program by increasing the benefits that the poor can get with a fixed program budget (Coady, Grosh and Hoddinott 2004). Conversely, it is a means that will allow the government to reduce the budget requirement of the program while still delivering the same level of benefits to the poor.

One way to assess the targeting of government subsidies is with reference to the graphical representation of the distribution of benefits, i.e., concentration curve or benefit concentration curve. A concentration curve is generated by plotting the cumulative distribution of "benefits" of public spending on the y-axis against the cumulative distribution of population sorted by per capita income on the x-axis. One can assess the progressivity or regressivity[2] of a public subsidy by comparing the benefit concentration curve with the 45-degree diagonal and the Lorenz curve of income/ consumption.[3] The diagonal indicates neutrality in the distribution of benefits. If the distribution of benefits lies along this line, the poorest 10 percent of the population gets 10 percent of the subsidy (could be income or consumption); poorest 20 percent account for 20 percent of the subsidy; and so on. Thus, the diagonal reflects perfect equality in the distribution of benefits and it is also referred to as perfect equality (PE) line.

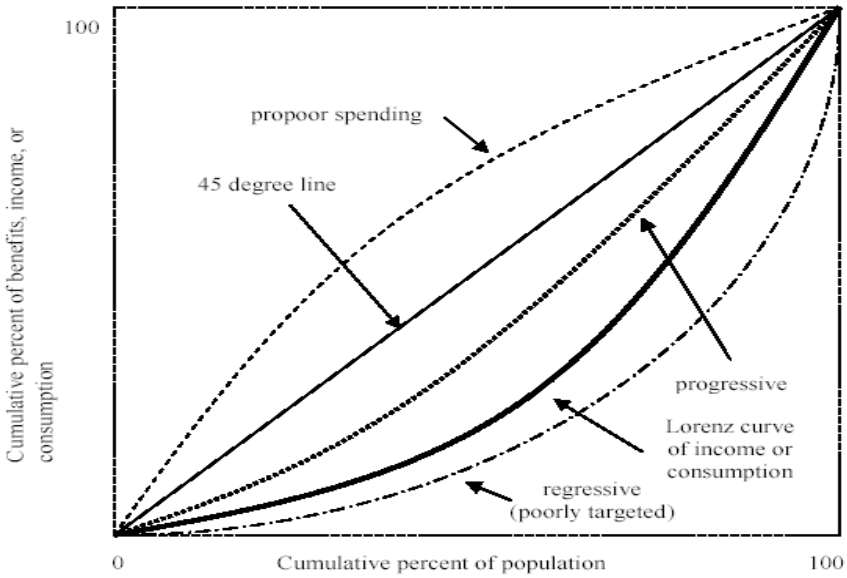
The distribution of benefits is said to be progressive if the lower income groups receive a larger share of the benefits from government spending than the richer income groups. For instance, if the concentration curve lies above the diagonal, then the poorest 10% of the population receives more than 10% of the benefits and the distribution of benefits is said to be progressive in absolute terms **(Figure 1)**. Conversely, if the benefit concentration curve

[2] Progressivity implies a preference for lower income groups while regressivity implies a more favorable treatment of higher income groups.

[3] Lorenz curve is a graphical depiction of the cumulative distribution of income on the y-axis against the cumulative distribution of population on the x-axis.

lies below the diagonal, then the poorest 10% of the population captures less than 10% of the benefits and the distribution of benefits is said to be regressive in absolute terms.

Figure 1. Lorenz and Concentration Curves



On the other hand, a benefit concentration curve that lies above the Lorenz curve of income signifies progressivity of public subsidy relative to income. To wit, the benefits share of the poorest 10% of the population is larger than its income share. Thus, if the benefits from the government service are converted to its income equivalent, the post-subsidy distribution of income-cum-benefit would be more equitable than the original distribution of income if the benefit concentration curve lies above the Lorenz curve of income. Conversely, a concentration curve that lies below the Lorenz curve of income distribution suggests transfers that are more regressively distributed than income.

The concentration coefficient, also called Suits index, is the most common summary measure of benefit incidence. It is estimated in like manner as Gini coefficient[4] but it is based on concentration curve instead of the Lorenz curve. While Gini coefficient is computed as the ratio of the area between the diagonal and the Lorenz curve (represented by A) to the total area below the diagonal (i.e., triangle cde or Area B)**,** the concentration coefficient is the ratio of the area bounded by the diagonal and the concentration curve to the total area below the diagonal (**Figure 2**).

If the distribution of benefits is progressive in absolute terms, the Suits index is negative. Conversely, if the distribution of benefits is regressive in absolute terms, then the Suits index is positive. On the other hand, if the Suits index is algebraically smaller than the Gini coefficient, then the distribution of benefits is said to be progressive relative to the distribution of income. It should be emphasized that the Suits index is only sensitive to the

---

[4] Gini Coefficient (Suits index) = Area of A/ Area of Triangle cde

but area of triangle cde = 0.5

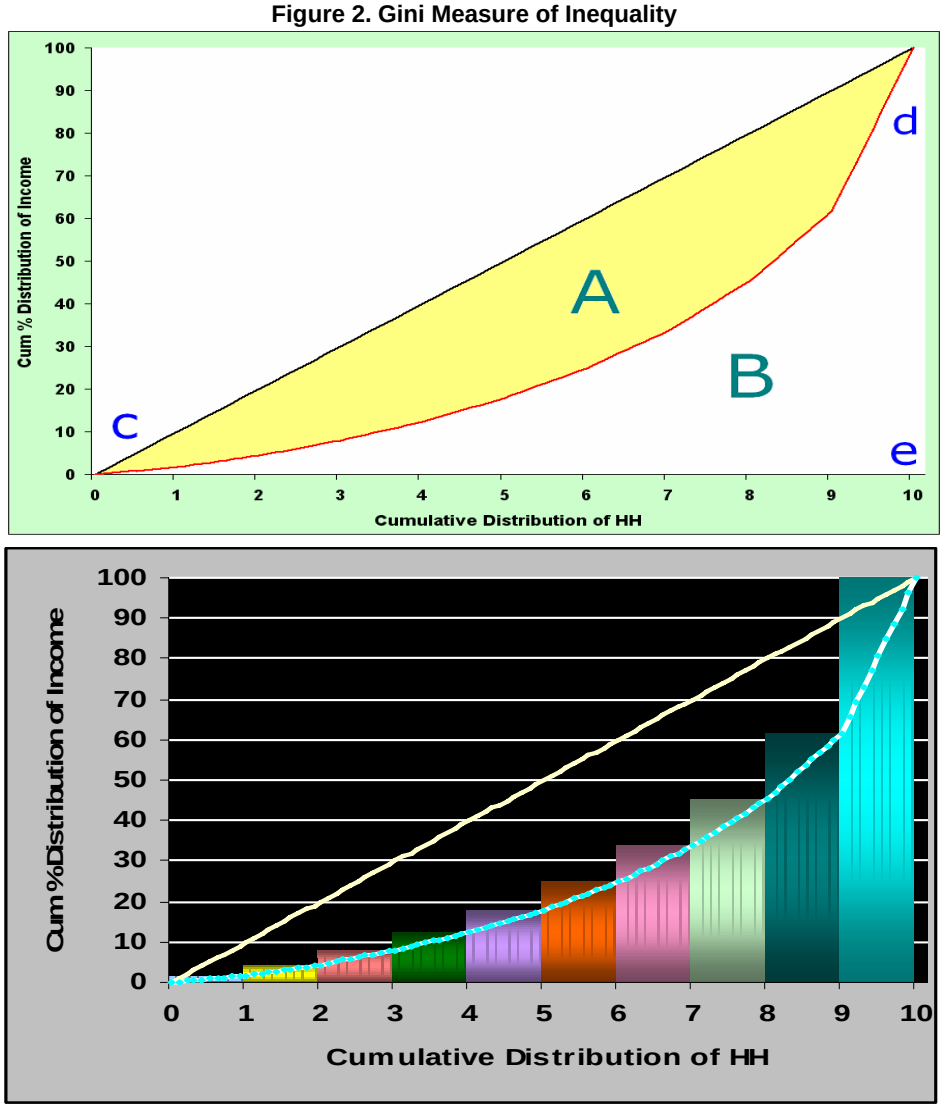
Thus, Gini Coefficient (Suits index) = 2A

where $\text{Area of A} = \frac{1}{2} - \left(\frac{1}{N} \sum_{i=1}^{N-1} C_i + (1/N) C_N \right), C_N = 1$

N is the number of equal divisions

relative magnitude of subsidies across income groups and not to the absolute amount of the subsidy.

Figure 2. Gini Measure of Inequality



3. BENEFIT INCIDENCE ESTIMATES: DECILES ON POPULATION/ INDIVIDUALS VS DECILES ON HOUSEHOLDS

Figure 3 presents graphically the benefit incidence of the 1998 public spending on education using deciles based on households. It can be gleaned from the figure that government spending on elementary and secondary education is progressive in absolute terms as the concentration curves lie above the diagonal (or PE line). This can be attributed to the fact that (i) richer households prefer private schooling over public spending; and (ii) households in the poorer deciles have more children than those in the richer deciles. Government spending on college education, on the one hand, is regressive in absolute terms as indicated by the fact that its concentration curve lies below the diagonal. As regards government spending on TVET, the concentration curve crosses the diagonal and so it poses an interesting question on whether it is progressive or regressive. By comparing the areas of the diagonal and the concentration curve in question, it is visible that the area of the TVET concentration curve is bigger than the area of the diagonal which indicates that the TVET subsidy is progressive.

However, sometimes it is difficult to see the difference. The concentration coefficient or Suits index provides a more precise answer.

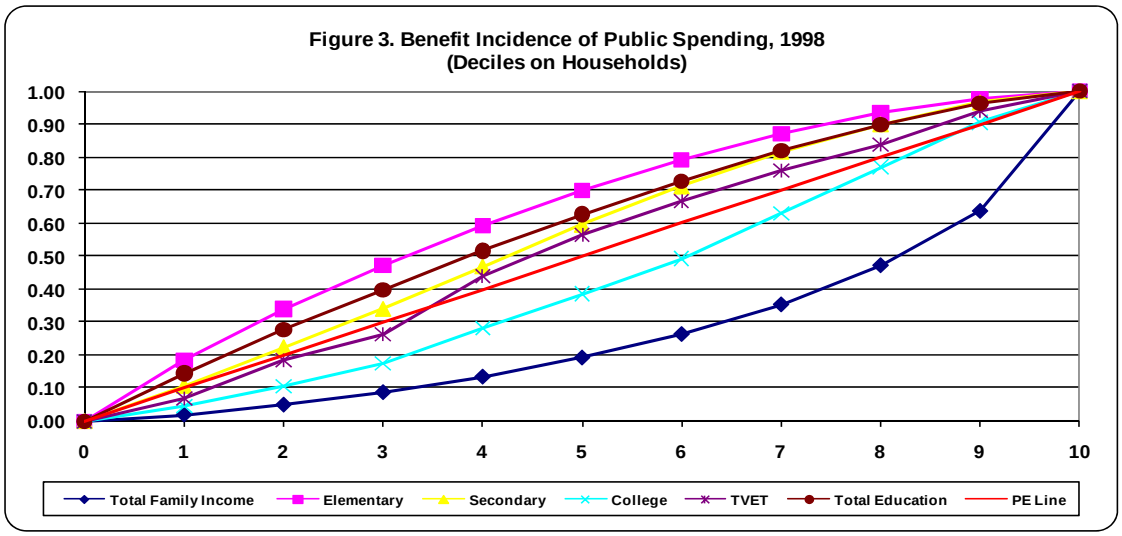
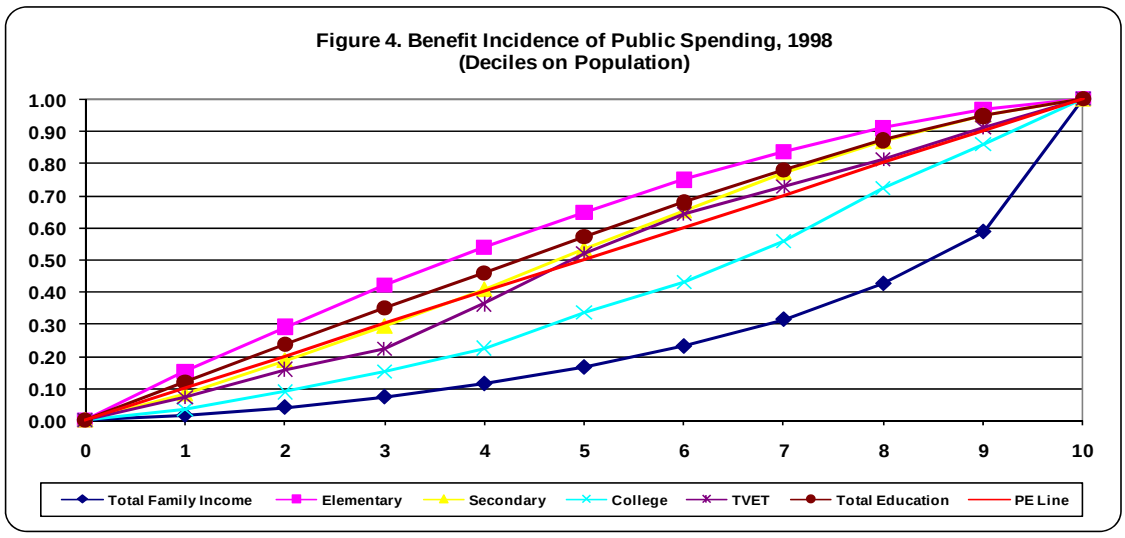


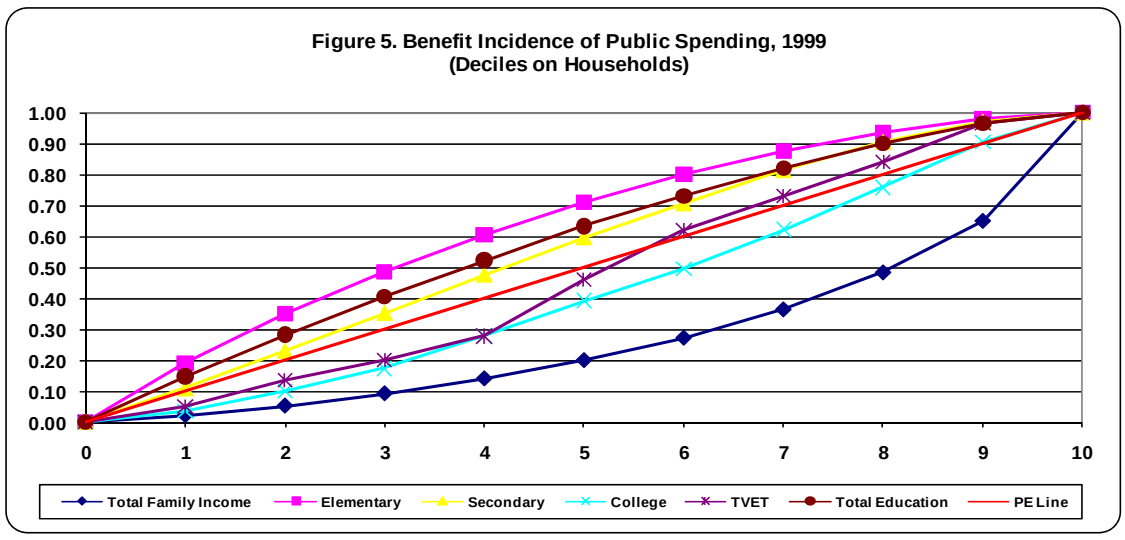
Table 1. Cumulative Distribution of Income and Government Spending on Education by Income Decile (%)

	Using deciles based on Household, 1998						Using deciles based on Population, 1998					
Deciles	Income	Elementary	Secondary	College	TVET	Total	Income	Elementary	Secondary	College	TVET	Total
1	2.01	18.47	10.70	4.45	6.86	14.54	1.52	15.03	8.13	3.36	6.86	11.70
2	5.02	33.99	22.44	10.60	18.51	27.78	3.97	28.95	18.55	8.73	15.75	23.51
3	8.80	47.34	34.03	17.46	26.38	39.69	7.21	41.86	29.22	15.03	22.27	34.84
4	13.51	59.20	46.89	28.08	44.04	51.65	11.32	53.66	40.68	22.35	36.11	45.90
5	19.29	69.82	59.50	38.56	56.60	62.68	16.47	64.55	53.25	33.41	51.92	57.23
6	26.42	79.24	71.08	49.28	66.71	72.75	22.98	74.81	65.18	42.77	64.31	67.73
7	35.42	86.96	81.67	62.87	76.09	81.99	31.35	83.67	77.01	55.62	72.79	77.80
8	47.27	93.29	89.94	77.06	83.84	89.95	42.51	90.92	86.74	72.36	81.21	87.05
9	63.73	97.82	96.56	90.51	94.05	96.38	58.68	96.77	95.02	85.85	91.25	94.63
10	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Suits Index	0.4571	-0.2723	-0.1256	0.1423	-0.0462	-0.1748	0.5080	-0.2005	-0.0476	0.2210	0.0151	-0.1008
	Using deciles based on Household, 1999						Using deciles based on Population, 1999					
Deciles	Income	Elementary	Secondary	College	TVET	Total	Income	Elementary	Secondary	College	TVET	Total
1	2.12	19.12	10.76	3.51	5.05	14.72	1.58	14.95	8.12	2.43	3.88	11.40
2	5.23	34.96	22.93	10.01	13.31	28.23	4.12	28.94	18.11	7.06	10.49	22.99
3	9.21	48.62	35.20	17.27	19.88	40.50	7.45	42.08	29.05	13.34	15.24	34.47
4	14.05	60.52	47.58	27.79	27.79	52.22	11.64	53.82	40.26	21.05	23.63	45.43
5	19.96	70.93	59.67	39.21	45.90	63.29	16.87	64.65	52.36	32.19	31.95	56.53
6	27.20	79.97	70.64	49.64	61.81	73.09	23.45	74.88	63.92	43.19	54.38	67.40
7	36.34	87.54	81.39	62.19	72.90	82.16	31.92	83.54	75.74	55.93	68.31	77.45
8	48.31	93.68	90.53	75.81	84.02	90.15	43.30	91.01	86.66	68.66	79.05	86.51
9	65.00	97.93	97.09	90.58	96.66	96.63	59.68	96.70	95.19	86.55	91.86	94.77
10	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Suits Index	0.4452	-0.2865	-0.1316	0.1480	0.0454	-0.1820	0.5000	-0.2011	-0.0388	0.2392	0.1424	-0.0939

Table 1 presents the cumulative distribution of income and education subsidy with the corresponding Suits index. Government spending on TVET, elementary and secondary education in 1998 is found to be progressive when the analysis is done using deciles of households. In contrast, government spending on college education is found to be regressive. The analysis done using deciles of population yields the same results for government spending on elementary and secondary education (**Figure 4)**. However, government expenditures on TVET and college education are both found to be regressive as evidenced by the positive Suits index.



On the one hand, **Figure 5 and Figure 6** display the benefit concentration curves of public spending on education in 1999. Looking at the two graphs, the elementary and secondary concentration curves dominate the diagonal and thus, government expenditures on elementary and secondary education are progressive. On the contrary, government expenditures on TVET and college are regressive as their concentration curves lie below the diagonal. Again, the estimated Suits indices attest to this **(Table 1)**.



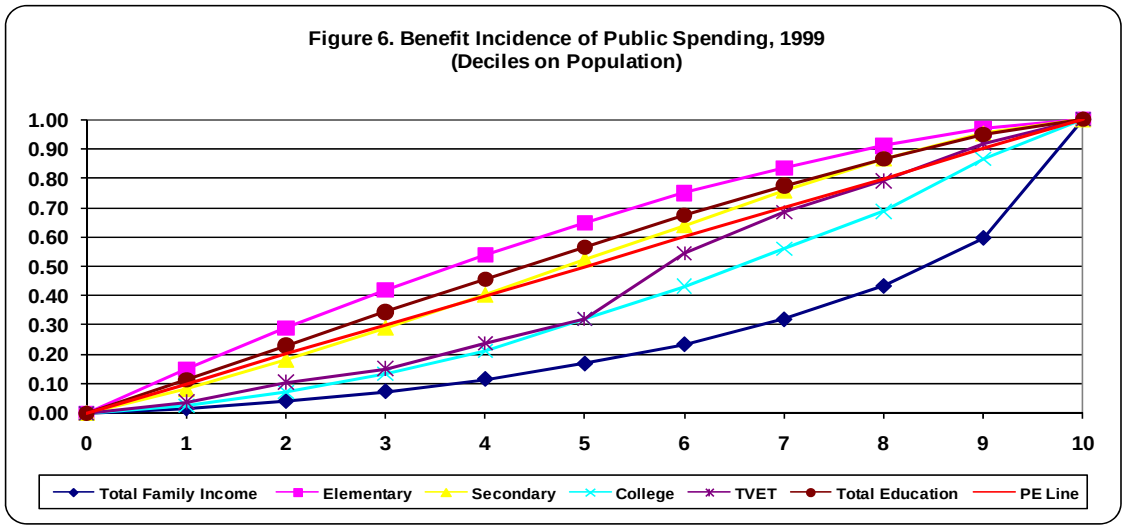


Table 2. Subsidy Rate by Decile (%)

1998	Deciles based on Households					Deciles based on Population				
Decile	Elementary	Secondary	College	TVET	Total	Elementary	Secondary	College	TVET	Total
1	35.96	6.73	2.14	0.33	45.17	38.84	6.79	2.15	0.44	48.22
2	20.08	4.91	1.97	0.37	27.33	22.22	5.38	2.12	0.35	30.07
3	13.82	3.88	1.76	0.20	19.66	15.58	4.16	1.88	0.20	21.82
4	9.83	3.44	2.18	0.36	15.81	11.24	3.53	1.72	0.33	16.82
5	7.17	2.75	1.75	0.21	11.89	8.27	3.09	2.08	0.30	13.73
6	5.16	2.05	1.45	0.14	8.80	6.17	2.32	1.39	0.18	10.06
7	3.35	1.49	1.46	0.10	6.40	4.15	1.79	1.49	0.10	7.52
8	2.09	0.88	1.16	0.06	4.19	2.54	1.10	1.45	0.07	5.17
9	1.07	0.51	0.79	0.06	2.43	1.41	0.65	0.81	0.06	2.93
10	0.23	0.12	0.25	0.02	0.62	0.31	0.15	0.33	0.02	0.81
1999	Deciles based on Households					Deciles based on Population				
Decile	Elementary	Secondary	College	TVET	Total	Elementary	Secondary	College	TVET	Total
1	33.91	6.66	1.51	0.29	42.36	36.18	6.86	1.42	0.30	44.76
2	19.11	5.12	1.89	0.32	26.44	21.13	5.26	1.69	0.32	28.40
3	12.86	4.03	1.65	0.20	18.73	15.10	4.39	1.74	0.17	21.41
4	9.23	3.35	1.97	0.20	14.75	10.71	3.56	1.70	0.24	16.21
5	6.62	2.68	1.75	0.37	11.42	7.93	3.09	1.97	0.20	13.19
6	4.68	1.98	1.31	0.26	8.24	5.95	2.34	1.55	0.42	10.26
7	3.11	1.54	1.25	0.15	6.04	3.91	1.86	1.39	0.20	7.37
8	1.92	1.00	1.03	0.11	4.07	2.51	1.28	1.03	0.12	4.95
9	0.96	0.51	0.80	0.09	2.36	1.33	0.69	1.01	0.10	3.13
10	0.22	0.11	0.24	0.01	0.59	0.31	0.16	0.31	0.02	0.81

Source: Appendix Tables 1 and 2

On the whole, total government spending on all levels of education is found to benefit poorer households more than richer households regardless of whether the analysis is done based on deciles of households rather than deciles of population. **Table 2** conveys the same message. The subsidy rate (i.e., the proportion of government spending on education attributable to given decile to the total income of households/individuals belonging to the said decile), is higher for households/individuals in poorer deciles vis-à-vis the subsidy rates computed for their richer counterparts. It is, in fact, declining as living standards rise. Interestingly, the estimated subsidy rates for the poorest 30 percent of the population at the elementary level is much higher in relation to the rates obtained for the same group at the other education levels. Suffice to say that higher government spending at the elementary level is indeed to the advantage of the poor.

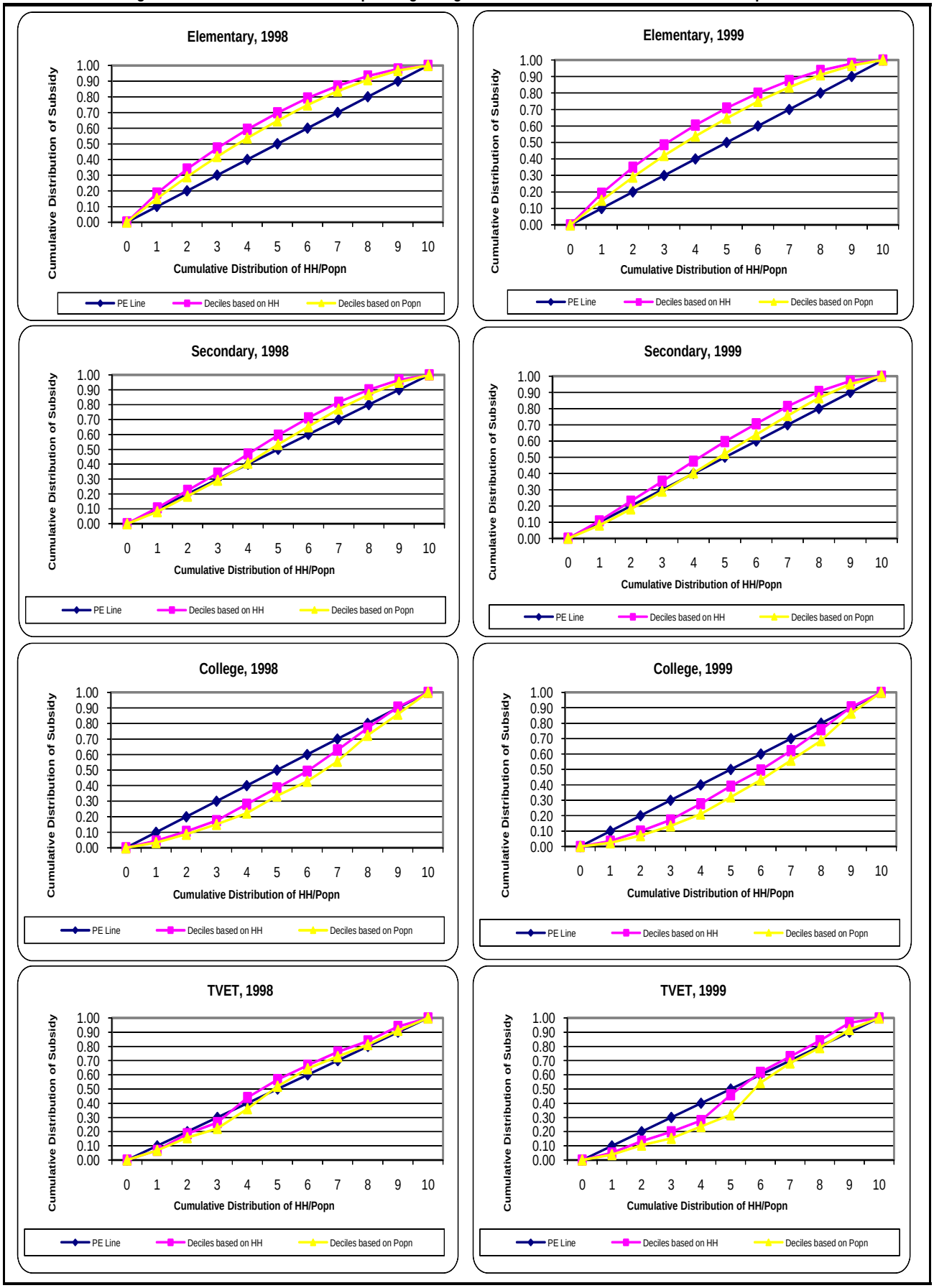
Table 3. Distribution of Government Spending on Education by Income Decile (%)

1998	Deciles on Households					Deciles on Population				
Deciles	Elementary	Secondary	College	TVET	Total	Elementary	Secondary	College	TVET	Total
1	18.47	10.70	4.45	6.86	14.54	15.03	8.13	3.36	6.86	11.70
2	15.52	11.74	6.16	11.65	13.24	13.92	10.43	5.37	8.89	11.81
3	13.35	11.59	6.86	7.87	11.90	12.91	10.67	6.30	6.51	11.33
4	11.86	12.86	10.61	17.66	11.96	11.80	11.46	7.31	13.84	11.07
5	10.62	12.61	10.48	12.56	11.03	10.88	12.57	11.06	15.82	11.33
6	9.42	11.57	10.72	10.12	10.07	10.26	11.93	9.36	12.38	10.49
7	7.72	10.59	13.60	9.37	9.24	8.86	11.83	12.85	8.49	10.08
8	6.33	8.27	14.19	7.76	7.96	7.25	9.74	16.74	8.42	9.24
9	4.53	6.62	13.45	10.21	6.42	5.84	8.28	13.48	10.03	7.59
10	2.18	3.44	9.49	5.95	3.62	3.23	4.98	14.15	8.75	5.37
1999	**Deciles on Households**					**Deciles on Population**				
Deciles	Elementary	Secondary	College	TVET	Total	Elementary	Secondary	College	TVET	Total
1	19.12	10.76	3.51	5.05	14.72	14.95	8.12	2.43	3.88	11.40
2	15.84	12.16	6.50	8.27	13.51	13.99	9.99	4.62	6.60	11.59
3	13.66	12.27	7.26	6.57	12.27	13.14	10.95	6.28	4.75	11.48
4	11.90	12.38	10.52	7.91	11.72	11.74	11.21	7.71	8.39	10.96
5	10.42	12.09	11.42	18.12	11.08	10.83	12.11	11.15	8.33	11.10
6	9.04	10.98	10.42	15.90	9.80	10.23	11.55	10.99	22.43	10.87
7	7.57	10.74	12.56	11.09	9.07	8.66	11.82	12.74	13.93	10.05
8	6.14	9.14	13.61	11.12	7.99	7.47	10.93	12.72	10.74	9.06
9	4.25	6.56	14.78	12.64	6.48	5.69	8.52	17.89	12.81	8.26
10	2.07	2.91	9.42	3.34	3.37	3.30	4.81	13.45	8.14	5.23

Source: Appendix Tables 1 and 2

Nevertheless, it is noteworthy that the degree of progressivity (regressivity) differs depending on how the deciles are defined. Government spending at the elementary and secondary level appears to be *more progressive* while TVET and college subsidy is *less regressive* when income deciles are defined based on the ranking of households rather than when income deciles are defined based on the ranking of individuals **(Figure 7).** This finding is perhaps better appreciated when one looks at the distribution of government spending across income deciles. **Table 3** shows that the poorer households appear to receive a bigger share of government spending when household deciles are used rather than when population deciles are used in the analysis.

Figure 7. Incidence of Education Spending Using Deciles on Households and Deciles on Population



To cite an example, in 1998 the poorest decile captures 19 percent of total government spending at the elementary level when deciles are defined based on the income distribution of households as opposed to 15 percent when deciles are defined based on the income distribution of individuals. Likewise, the poorest decile receives 11 percent and 4 percent of the total secondary and college subsidy, respectively in the first category (i.e., deciles on households) while the poorest decile captures only 8 percent and 3 percent of the total secondary and college subsidy, respectively in the second category (i.e., deciles on population).

The same pattern can be observed for education subsidy in 1999. These findings bring into light the decile definition problem. To elucidate, defining deciles over households when dealing with government service that is targeted to individuals, say education, can give misleading impression that a subsidy is pro-poor when in fact some other factor is influencing the distribution. Existing studies (e.g. Demery 2000) identified the population size of each household decile to be that factor. Since poorer household deciles tend to have more individuals, the education needs of these income groups are much greater and so are the benefits that accrue to them.

4. CONCLUDING REMARKS

Defining deciles (or quintiles) is critical in benefit incidence analysis as benefit accruing to a particular group is determined by the number of individuals occupying each decile (or quintile) cell. The choice between deciles defined over population/individuals and deciles defined over households depends on the government service in question and on its target beneficiaries. Population deciles are more appropriate when dealing with government services that benefit individuals (e.g., education and health services). Using household deciles could give misleading results. Since poorer households tend to have more children than richer households, poorer household deciles are expected to have more individuals. Consequently, the needs of these income groups are much greater and so are the benefits that accrue to them. Household deciles are recommended when dealing with government services that are provided at the household level (e.g. waterworks system and drinking water services).

REFERENCES

Coady, D., M. Grosh and J. Hoddinott. 2004. Targeting of Transfers in Developing Countries: Review of Lessons and Experience. Washington, D.C.: World Bank.

Davoodi, H. E. Tiongson, and E. Asawanuchit. 2003. "How useful are benefit incidence analysis of public education and health spending," IMF Working Paper 03/227, International Monetary Fund, Washington D.C.

Demery, Lionel. 2000. Benefit Incidence: A Practitioner's Guide. The World Bank. Washington, D.C.

Manasan, Rosario G., Cuenca, Janet S. and Eden C. Villanueva-Ruiz. 2008. Benefit Incidence of Public Spending on Education in the Philippines. PIDS Discussion Paper 2007-06, Philippine Institute for Development Studies.

Sabir, Muhammad. 2003. Benefit Incidence Analysis of Public Spending on Education. The Journal, NIPA Karachi, Vol.8, No.3, p-49-67.

van de Walle, Dominique. 1995. Public Spending and the Poor: What We Know, What We Need to Know. *Policy Research Working Paper* No. 1476. World Bank. Washington DC. June.

ANNEX
DATA REQUIREMENTS AND METHODOLOGY[5]

A. DATA REQUIREMENTS AND ISSUES INVOLVED

1. Government spending on a service (net of any cost recovery fees, out of pocket expenses by users of the service, or user fees)

BIA necessitates data on actual expenditures of the government on a certain service rather than budget allocation. The former represents the actual cost of services availed by the users and there is usually a big difference between the two. These data should be comprehensive as to include both recurrent and capital spending, and all levels of government (Davoodi et al, 2003). Spending data are ideally available in the relevant line agency or department. However, due to some reasons, these data cannot easily be obtained. Recent practice has been to use recurrent spending which frees analysts from the difficulty of estimating the flow of services/benefits from capital expenditures whose benefits extend beyond the usual period, i.e., one year. The problem comes in when capital budgets are large that they have significant impact on the benefit incidence of government expenditure. With regard to the levels of government spending, there are cases when spending is underreported because subnational data are not available.

Further, government spending must be exclusive of cost recovery revenue before computing for unit subsidies. It should be noted, however, that, netting out of such revenue is on a case-to-case basis, i.e., depending on whether or not the revenue will be retained by the facility providing the service. If so, the revenue should be treated as additional amount to the value of the service (government subsidy) households get. But if it will be returned to the national coffer, the revenue should be netted out of the spending. The problem here is the difficulty in obtaining information on such fees and if ever available, it is not as reliable as the public expenditure data and is not in needed format, i.e., by income or consumption group.

2. Public utilization of the service

Users of a government service are referred to as beneficiaries of the service. For educational services, beneficiaries may include pupils enrolled in primary schools, and students enrolled in secondary and tertiary schools. In the case of health services, beneficiaries may be pregnant women visiting a commune health center, and infants and children immunized in a public clinic. Information on the number of beneficiaries can be obtained through a household survey or from the service providers per se but there can be discrepancies between the two. It may be wise to use the numbers from the latter as they are the ones reflected in the official reports. The choice of which to use will affect the findings of a benefit incidence analysis. For example, if official report gives higher enrolments than the household survey, a unit subsidy based on the former will be lower than the estimate derived using the latter. Thus, data must be used with caution. It would be good to compare the two datasets. If the numbers vary remarkably then the analysts should choose the more reliable source of information.

[5] Draws heavily from Demery (2000) and Davoodi et al (2003)

3. Socio-economic characteristics of the population using the service

Information on the socioeconomic characteristics of the population using the service is useful when imputing or attributing a unit subsidy to beneficiaries because it gives idea on how government subsidies are distributed across individuals or households. Through it, analysis on the distributional impact of a subsidy is facilitated. Such information is not available from the service providers but household surveys such as Family Income and Expenditure Survey (FIES) and Annual Poverty Indicator Survey (APIS) have it. However, data users should be cautious in using information from these surveys as there may be biases in the data and even inconsistencies when compared with official reports.

Biases in data may arise due to sample design or structure of questionnaire that was used. One common example of these biases is found in data on the use of health services particularly curative health care. Since illness and injury are self-reported in most surveys, biases may result if poorer respondents do not report those illnesses, which they consider as ordinary, and richer respondents do otherwise. The poor would appear not to benefit from a certain health service but in reality, they fail to see the need for it. These biases, if not addressed, will distort the estimate for benefit incidence. Other data biases root from the sampling design used for the survey. Samples may not be able to capture rare events such as tertiary enrolments or in-patient health visits that estimates for service use is not accurate. Demery (2000) cited university enrolment as an example for this wherein serious underestimation occurs because the students are living outside the sampling frame.

Aside from these data biases, combining unit subsidy estimates based on official statistics and public utilization data obtained from household surveys becomes a concern when data are not consistently disaggregated, i.e., the disaggregation of one data set is different from that of another data set. Data users should be able to match these data sets so as to arrive at an accurate benefit incidence analysis.

B. METHODOLOGY

Step 1. *Estimation of the unit subsidy of providing a certain service based on official reports on public spending on the service in question*

The average unit cost of providing a public service is obtained by dividing government net spending on the service by the total number of users of the service.

Step 2. *Imputation of the unit subsidy to households or individuals identified as beneficiaries of the service*

The unit subsidy derived in Step 1 is simply “attributed” or “imputed” to households or individuals identified as beneficiaries of the service. In this sense, each beneficiary gains an in-kind transfer equivalent to the unit subsidy.

Step 3. *Ranking of individuals or households according to a welfare indicator and aggregation of beneficiaries into sub-groups, oftentimes quintiles, of the population to see distributional impact of government spending/to compare how the subsidy is distributed across such groups*

Individuals or households are arranged from poorest to richest based on a welfare indicator such as household income or expenditure expressed in per capita terms. They are then aggregated into sub-groups (e.g. quintiles or deciles) to get an idea whether public spending is well targeted to the poorest portion of the population. The grouping can be done either across individuals or across households. For example, aggregating individuals by decile (quintile) is done by dividing individuals into ten (five) sub-groups of equal size. The richest 10 percent of the population is found in the top decile while the poorest 10 percent is in the bottom decile. The same procedure can be applied when aggregating across households.

The choice between aggregating by individuals or households depends on the service in question. It should be noted that when dealing with services that are provided to individuals (e.g. education and health services), grouping by individuals is appropriate to use. Otherwise, the results could be misleading. It might appear that a subsidy to a certain service is pro-poor because poorer households tend to have more members than richer households. On the one hand, grouping by households is recommended when dealing with services that are used at the household level (e.g. waterworks system or drinking water services). Nevertheless, the analyst still has the prerogative on what to use but it is worth mentioning that estimating benefit incidence using the two alternative methods of aggregation and comparing the findings gives more insights.

Step 4. *Derivation of the distribution of benefits by multiplying the average benefit calculated previously by the number of users of the service in each income or consumption group*

The assumption here is that the average benefit from or unit subsidy of a service is the same for all income or consumption levels. According to Davoodi et al (2003), this assumption implies two problems: i) the quantity of service may vary across users either because of variation in spending or the cost of producing the service; and ii) the value that users give on certain service may also vary across households.

For illustrative purposes, the procedure on how to estimate benefit incidence is given below:

$$X_j \equiv \sum_{i=1}^{3} E_{ij} \frac{S_i}{E_i} \equiv \sum_{i=1}^{3} \frac{E_{ij}}{E_i} S_i \qquad \text{j = 1,…,10} \qquad (1)$$

where X_j is the value of the total education subsidy or benefit incidence accruing to income group *j;* E_{ij} is the number of enrolled pupils/students in education level *i* from group *j*; E_i is the total number of enrolled students in a certain education level from all income groups; and S_i is government net spending on education level *i* (with fees and other cost recovery netted out). The index *i* ranges from 1 to 4 (i = 1,..,4) denoting the levels of education such as primary, secondary, tertiary, and TVET.

The ratio S_i/E_i gives the unit subsidy or cost per pupil/student of providing education at level *i*. The unit subsidy is the same across income groups but it varies across education levels. Expectedly, it also varies markedly by region because educational services in urban areas usually attract higher subsidies compared to those of rural areas. Moreover, services in the capital city often get better financing than in other urban areas (Demery, 2000). Such variations in unit subsidies result in inequalities in the distribution of benefits. Analysis that includes regional variations provides more insights but this is not always feasible given

limited data. If regional data are not available, Equation (1) becomes the only basis for analysis. Otherwise, Equation (2) can be used as well.

$$X_j \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} \frac{E_{ijk}}{E_i} S_{ik} \qquad (2)$$

where *k* is the index that denotes the region. The share of the total education subsidy (S) accruing to the group is given by:

$$x_j \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} \frac{E_{ijk}}{E_i} \left(\frac{S_{ik}}{S} \right) \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} e_{ijk} s_{ik}$$

The share summarizes the overall inequality in benefit incidence as determined by two factors: the share of the group in total enrollments at each level of education and in each region (e_{ijk}), and the share of each level of education and region in total education spending (s_{ik}). The e's and s's reflect the behavior of households in terms of enrolment decisions and government in terms of budget allocations across regions and levels of schooling, respectively.

APPENDIX

Appendix Table 1. Income Distribution and Subsidy Rates, 1998

DECILES	Household Deciles				Population Deciles			
	Total Subsidy (PM)	Subsidy Rate	% Dist. Subsidy	% Dist Income	Total Subsidy (PM)	Subsidy Rate	% Dist. Subsidy	% Dist Income
Elementary								
1	12,116	0.36	18.47	2.01	9,861	0.39	15.03	1.52
2	10,180	0.20	15.52	3.02	9,131	0.22	13.92	2.45
3	8,757	0.14	13.35	3.77	8,467	0.16	12.91	3.24
4	7,781	0.10	11.86	4.71	7,742	0.11	11.80	4.11
5	6,968	0.07	10.62	5.78	7,139	0.08	10.88	5.15
6	6,178	0.05	9.42	7.13	6,732	0.06	10.26	6.51
7	5,065	0.03	7.72	8.99	5,814	0.04	8.86	8.37
8	4,153	0.02	6.33	11.85	4,755	0.03	7.25	11.16
9	2,971	0.01	4.53	16.46	3,833	0.01	5.84	16.17
10	1,428	0.00	2.18	36.27	2,122	0.00	3.23	41.32
TOTAL	**65,596**	**0.04**	**100.00**	**100.00**	**65,596**	**0.04**	**100.00**	**100.00**
Secondary								
1	2,268	0.07	10.70	2.01	1,723	0.07	8.13	1.52
2	2,490	0.05	11.74	3.02	2,211	0.05	10.43	2.45
3	2,458	0.04	11.59	3.77	2,261	0.04	10.67	3.24
4	2,726	0.03	12.86	4.71	2,429	0.04	11.46	4.11
5	2,673	0.03	12.61	5.78	2,665	0.03	12.57	5.15
6	2,454	0.02	11.57	7.13	2,528	0.02	11.93	6.51
7	2,245	0.01	10.59	8.99	2,508	0.02	11.83	8.37
8	1,754	0.01	8.27	11.85	2,064	0.01	9.74	11.16
9	1,404	0.01	6.62	16.46	1,755	0.01	8.28	16.17
10	729	0.00	3.44	36.27	1,056	0.00	4.98	41.32
TOTAL	**21,201**	**0.01**	**100.00**	**100.00**	**21,201**	**0.01**	**100.00**	**100.00**
College								
1	722	0.02	4.45	2.01	546	0.02	3.36	1.52
2	999	0.02	6.16	3.02	871	0.02	5.37	2.45
3	1,114	0.02	6.86	3.77	1,023	0.02	6.30	3.24
4	1,722	0.02	10.61	4.71	1,187	0.02	7.31	4.11
5	1,702	0.02	10.48	5.78	1,796	0.02	11.06	5.15
6	1,739	0.01	10.72	7.13	1,518	0.01	9.36	6.51
7	2,207	0.01	13.60	8.99	2,086	0.01	12.85	8.37
8	2,302	0.01	14.19	11.85	2,718	0.01	16.74	11.16
9	2,183	0.01	13.45	16.46	2,189	0.01	13.48	16.17
10	1,540	0.00	9.49	36.27	2,297	0.00	14.15	41.32
TOTAL	**16,230**	**0.01**	**100.00**	**100.00**	**16,230**	**0.01**	**100.00**	**100.00**
TVET								
1	112	0.00	6.86	2.01	111.58	0.00	6.86	1.52
2	190	0.00	11.65	3.02	144.64	0.00	8.89	2.45
3	128	0.00	7.87	3.77	105.95	0.00	6.51	3.24
4	287	0.00	17.66	4.71	225.03	0.00	13.84	4.11
5	204	0.00	12.56	5.78	257.27	0.00	15.82	5.15
6	165	0.00	10.12	7.13	201.37	0.00	12.38	6.51
7	152	0.00	9.37	8.99	138.02	0.00	8.49	8.37
8	126	0.00	7.76	11.85	136.92	0.00	8.42	11.16
9	166	0.00	10.21	16.46	163.20	0.00	10.03	16.17
10	97	0.00	5.95	36.27	142.37	0.00	8.75	41.32
TOTAL	**1,626**	**0.00**	**100.00**	**100.00**	**1626.35**	**0.00**	**100.00**	**100.00**
Total Education								
1	15,217	0.45	14.54	2.01	12,241	0.48	11.70	1.52
2	13,858	0.27	13.24	3.02	12,358	0.30	11.81	2.45
3	12,457	0.20	11.90	3.77	11,857	0.22	11.33	3.24
4	12,517	0.16	11.96	4.71	11,583	0.17	11.07	4.11
5	11,547	0.12	11.03	5.78	11,857	0.14	11.33	5.15
6	10,536	0.09	10.07	7.13	10,980	0.10	10.49	6.51
7	9,670	0.06	9.24	8.99	10,545	0.08	10.08	8.37
8	8,336	0.04	7.96	11.85	9,673	0.05	9.24	11.16
9	6,723	0.02	6.42	16.46	7,939	0.03	7.59	16.17
10	3,793	0.01	3.62	36.27	5,617	0.01	5.37	41.32
TOTAL	**104,653**	**0.06**	**100.00**	**100.00**	**104,653**	**0.06**	**100.00**	**100.00**

Appendix Table 2. Income Distribution and Subsidy Rates, 1999

DECILES	Household Deciles				Population Deciles			
	Total Subsidy (PM)	Subsidy Rate	% Dist. Subsidy	% Dist Income	Total Subsidy (PM)	Subsidy Rate	% Dist. Subsidy	% Dist Income
Elementary								
1	12,884	0.34	19.12	2.12	10,072	0.36	14.95	1.58
2	10,674	0.19	15.84	3.11	9,428	0.21	13.99	2.53
3	9,207	0.13	13.66	3.99	8,859	0.15	13.14	3.33
4	8,020	0.09	11.90	4.84	7,913	0.11	11.74	4.20
5	7,019	0.07	10.42	5.91	7,298	0.08	10.83	5.23
6	6,090	0.05	9.04	7.24	6,893	0.06	10.23	6.58
7	5,103	0.03	7.57	9.14	5,835	0.04	8.66	8.47
8	4,136	0.02	6.14	11.97	5,037	0.03	7.47	11.37
9	2,867	0.01	4.25	16.70	3,837	0.01	5.69	16.38
10	1,393	0.00	2.07	35.00	2,222	0.00	3.30	40.32
TOTAL	**67,394**	**0.04**	**100.00**	**100.00**	**67,394**	**0.04**	**100.00**	**100.00**
Secondary								
1	2,531	0.07	10.76	2.12	1,909	0.07	8.12	1.58
2	2,860	0.05	12.16	3.11	2,348	0.05	9.99	2.53
3	2,885	0.04	12.27	3.99	2,574	0.04	10.95	3.33
4	2,912	0.03	12.38	4.84	2,635	0.04	11.21	4.20
5	2,841	0.03	12.09	5.91	2,846	0.03	12.11	5.23
6	2,580	0.02	10.98	7.24	2,716	0.02	11.55	6.58
7	2,526	0.02	10.74	9.14	2,779	0.02	11.82	8.47
8	2,149	0.01	9.14	11.97	2,569	0.01	10.93	11.37
9	1,542	0.01	6.56	16.70	2,004	0.01	8.52	16.38
10	685	0.00	2.91	35.00	1,131	0.00	4.81	40.32
TOTAL	**23,512**	**0.01**	**100.00**	**100.00**	**23,512**	**0.01**	**100.00**	**100.00**
College								
1	572	0.02	3.51	2.12	396	0.01	2.43	1.58
2	1,058	0.02	6.50	3.11	753	0.02	4.62	2.53
3	1,181	0.02	7.26	3.99	1,023	0.02	6.28	3.33
4	1,713	0.02	10.52	4.84	1,255	0.02	7.71	4.20
5	1,859	0.02	11.42	5.91	1,815	0.02	11.15	5.23
6	1,697	0.01	10.42	7.24	1,790	0.02	10.99	6.58
7	2,044	0.01	12.56	9.14	2,075	0.01	12.74	8.47
8	2,216	0.01	13.61	11.97	2,071	0.01	12.72	11.37
9	2,406	0.01	14.78	16.70	2,912	0.01	17.89	16.38
10	1,533	0.00	9.42	35.00	2,190	0.00	13.45	40.32
TOTAL	**16,280**	**0.01**	**100.00**	**100.00**	**16,280**	**0.01**	**100.00**	**100.00**
TVET								
1	109	0.00	5.05	2.12	84	0.00	3.88	1.58
2	178	0.00	8.27	3.11	142	0.00	6.60	2.53
3	142	0.00	6.57	3.99	103	0.00	4.75	3.33
4	171	0.00	7.91	4.84	181	0.00	8.39	4.20
5	391	0.00	18.12	5.91	180	0.00	8.33	5.23
6	343	0.00	15.90	7.24	484	0.00	22.43	6.58
7	239	0.00	11.09	9.14	300	0.00	13.93	8.47
8	240	0.00	11.12	11.97	232	0.00	10.74	11.37
9	273	0.00	12.64	16.70	276	0.00	12.81	16.38
10	72	0.00	3.34	35.00	176	0.00	8.14	40.32
TOTAL	**2,157**	**0.00**	**100.00**	**100.00**	**2,157**	**0.00**	**100.00**	**100.00**
Total Education								
1	16,096	0.42	14.72	2.12	12,461	0.45	11.40	1.58
2	14,770	0.26	13.51	3.11	12,672	0.28	11.59	2.53
3	13,415	0.19	12.27	3.99	12,558	0.21	11.48	3.33
4	12,816	0.15	11.72	4.84	11,983	0.16	10.96	4.20
5	12,111	0.11	11.08	5.91	12,139	0.13	11.10	5.23
6	10,710	0.08	9.80	7.24	11,883	0.10	10.87	6.58
7	9,912	0.06	9.07	9.14	10,989	0.07	10.05	8.47
8	8,740	0.04	7.99	11.97	9,909	0.05	9.06	11.37
9	7,088	0.02	6.48	16.70	9,029	0.03	8.26	16.38
10	3,684	0.01	3.37	35.00	5,720	0.01	5.23	40.32
TOTAL	**109,343**	**0.06**	**100.00**	**100.00**	**109,343**	**0.06**	**100.00**	**100.00**