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PUBLIC SUBSIDISATION OF HIGHER EDUCATION AND EDUCATIONAL INEQUALITY IN MALAYSIA

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ABSTRACT

The paper examines the relationship between the public subsidy to schooling and educational access in Malaysia. Not many studies have been done on related areas, thus the present study relies heavily on methods used by Psacharopoulos (1977a) and Ram (1982). Using the Gini index and the educational inequality index in the form of the coefficient of variation of student enrolment at three levels of education, it has been possible to assess the influence of public subsidization of higher education on the inequality of educational opportunity access in Malaysia. The findings of this study suggests that subsidization at the second (secondary) and the third level (university) of public education in Malaysia does reduce inequality in educational access to higher education.

ABSTRAK

Kertas kerja ini mengkaji perhubungan antara pembiayaan subsidi awam pengajian dengan akses pendidikan di Malaysia. Tidak banyak kajian yang dibuat dalam bidang berkaitan, maka kajian ini menggunakan kaedah-kaedah kajian yang digunakan oleh Psacharopoulos (1977a) dan Ram (1984). Dengan menggunakan indeks Gini dan indeks ketidaksamaan pendidikan dalam bentuk koefisien variasi terhadap enrolmen pelajar pada tiga peringkat pengajian, pengaruh pembiayaan subsidi awam pendidikan ke atas ketidaksamaan peluang akses pendidikan tinggi di Malaysia dapat dinilai. Hasil kajian menerangkan bahawa pembiayaan subsidi pada peringkat pendidikan menengah dan peringkat universiti awam di Malaysia dapat mengurangkan ketidaksamaan peluang akses pengajian tinggi.

INTRODUCTION

Given the recognition that education is an avenue for political, economic and social development of nations through people empowerment, Mark Blaug's

"Economics of Education in Developing Countries: Current Trends and New Priorities" (1987), continues to pre-occupy developing nations. Moreover, it is recognized that access to education, specifically higher education, must be democratized to enable academically prepared graduates of secondary schools from all socio-economic strata to avail themselves of university education. A review of the literature indicates that public financing of education has brought to the fore various issues, problems and opportunities which must be addressed. The California study (Hansen and Weisbrod, 1969) found that a subsidy for higher education was positively related to family income level. The Wisconsin study (Hansen, 1970) found similar results but indicated that subsidization was more egalitarian as the Wisconsin admission system opened access to the less privileged. Windham (1970) studied the estimates of tax incidence in financing higher education in Florida. He found that the cost of public education was distributed among income groups based on socialized share in the federal-state-local taxes paid. A study by Fields (1975) on Kenya revealed that 60 percent of the students at the University of Nairobi were found to come from families in the lowest income bracket; however, this bracket includes 90 percent of the taxpayers.

In relation to the study of the subsidization of public higher education, detailed data in regard to income brackets of the families of those who go to publicly subsidized colleges, and also on the structure of taxes paid by families in the various income groups, are normally lacking in the Less Developed Countries (LDCs) (Ram, 1982). Due to this problem, Psacharopoulos (1977) introduces a method that does not compare the distributions of those enrolled in higher education by family income with the distribution of taxpayers in general by income size as had previously done in Hansen and Weisbrod (1969), Hansen (1970), Windham (1970), Pechman (1970), Judy (1970), Hight and Pollock (1973), Jallade (1974), Crean (1975), Fields (1975), McGuire (1976), James and Benjamin (1988) and Khan (1991). Instead, the equity aspect of public funding of education is measured by relating the degree of subsidization to the inequality of the educational pyramid.

In Malaysia, the question of financing university education is a current concern. Three major phenomena have emerged since the early seventies. First, a national equity policy to democratize access to higher education continues to be a priority as evidenced by the establishment of local universities dispersed throughout the

country. Second, the Seventh Malaysia Plan (1996-2000) has prioritized access to higher education by increasing allocations and placements in local universities. Third, the national government has mandated the full implementation of the corporate mandates of local universities for strategies to generate revenue to meet the increasing demand for higher education.

It has been a quarter century since the New Economic Policy (NEP) was enacted. In view of the time elapsed, it is appropriate to review how far the government has achieved its NEP objectives, particularly through education. The thrust of this study is to find out whether rapid expansion of education, particularly after the implementation of the NEP, has produced a desirable effect on society, in the sense that it can provide greater educational opportunity of access.

Similar to that of Psacharopoulos (1977a), the present paper also focuses on the non-monetary aspect, where the method used explores the unequal access of higher education in the presence of public subsidies. The study is a longitudinal instead of a cross-sectional study. Thus, it is possible to look at the trends in educational development, particularly in relation to the inequality of educational access in the presence of the public subsidization of higher education since the inception of the NEP in 1970.

METHOD

Justifications have to be made to determine how far the subsidization of education affects the inequality of educational access. In order to look at the possible relationship, the subsidy index of the third level (university level) has to be estimated and then related to the inequality of educational access. Since there are not many studies done in this area, the present paper relies heavily on methods used in Psacharopoulos (1977a) and Ram (1982). The derivation of the subsidy index of the third level developed by Psacharopolous is maintained and is denoted as SUBDEX3.[1]

In measuring the degree of educational inequality in the education system of a given country, several methods have been used in previous studies. For example, Psacharopoulos (1977a) and Ram (1982) measured educational inequality in terms of the dispersion of enrolment by school levels by using the coefficient of varia-

tion while Machlis (1971) and James and Benjamin (1988) used the Gini coefficient instead. The index of inequality in educational access proposed by Psacharopoulos is in the form of the coefficient of variation of student enrolment at the three levels of education. The coefficient of variation of enrolment or the educational inequality index (EDNEQ) in Psacharopoulos's study was given as:

$$EDNEQ = [\sum_{i=1}^{3} (E_i - \bar{E})^2 / 3]^{\frac{1}{2}} / \bar{E}$$

Where E_i is the number of students enrolled at the primary (first), secondary (second) and university levels (third) and $\bar{E} = \Sigma E_i / 3 =$. In his study on LDCs, Ram (1982) explains how this inequality measure works. The value of the education inequality index (EDNEQ) would be zero if the enrolment at all three levels are equal, meaning a perfect equality of access exists. When the enrolments at the three levels of education are not the same, the value of the index will be greater than zero. In other words, if there is too much or too little enrolment at any level, relative to the mean enrolment or divergence from the mean enrolment, the value of index will be larger. The index, therefore indicates how unequal enrolments are at the three levels, as reflected by the steepness of the educational pyramid (Ram, 1982). The flatter the educational pyramid, the lower the coefficient of variation of enrolments, and thus the more the educational equality of access would exist in a given country (Psacharopoulos, 1977a).

However, it is worth mentioning that the direction of the effect of increased subsidy to higher education on equality would depend on the existing enrolment structure. For example, if the educational pyramids are steep (small enrolments at the third level relative to the first and second levels), as is probably true of low-income countries, greater subsidy of higher education might reduce inequality (Ram 1982:39).[2]

Another way of measuring educational inequality can be performed by using the Gini index. The Gini coefficient has become one of the commonly used tools in measuring income inequality.[3] Interestingly, this index can be expressed in several alternative but equivalent ways (Myles, 1995). The coefficient can be interpreted in two ways: firstly the coefficient can be seen as a value ranging from 0 to

1, and secondly, it can be seen geometrically in terms of the Lorenz curve (Atkinson, 1983).[4] The lower the value of the coefficient, that is, the closer it is to 0, the greater is the equality. In other words, a complete equality would be represented by a 0 value or 0% and a complete inequality is represented by 1 or 100%. In a study on "The Distributional Effects of Public Higher Education in New York City," Machlis (1971) used the Gini index to measure the inequality of educational opportunity in private and public higher institutions for different income groups. James and Benjamin (1988) used the Gini coefficient to measure educational opportunity in public and private higher education in Japan.[5]

In this paper, both coefficient variation and Gini index are used to measure the degree of educational inequality for the country. The Gini index is calculated using the formula given below:[6]

$$G = 1 + \frac{1}{3} - \frac{2}{3^2 \bar{E}}[E_1 + 2E_2 + 3E_3]$$

Where, G is the Gini index, E_1 is the enrolment at primary level, E_2 the enrolment at secondary level and E_3 the enrolment at third level or the university level. Using the enrolment data provided by the Ministry of Education in the Educational Statistics of Malaysia, it was possible to estimate the educational inequality index and the Gini index for the country. The subsidy index for different levels of education was estimated using data provided by the Ministry of Education and the Annual Reports of the universities.

While Psacharopoulos measured the relationship between inequality of educational access and public subsidy to schooling by using only the subsidy index for higher education (SUBDEX3), a good rationale has been given by Ram (1982) for also including the primary subsidy index (SUBDEX1) and the secondary subsidy index (SUBDEX2). His argument is that it is not only the subsidy at third level that is relevant to the degree of inequality but also the public subsidy at other levels of education. The public subsidy at different levels of education can affect its enrolment separately and thus it should affect the inequality index. The relevance of the subsidy at the first and second levels to the educational inequality

index (EDNEQ) has important statistical implications and if only the subsidy index for the third level is included in the regression function, it is likely that we will get a biased estimate of the effect of that subsidy. Therefore, it is appropriate to include the public subsidy at the three levels of education in the regression function (Ram, 1982). Furthermore, the entrance to the second level of education is determined by the first level of education, and similarly entrance to the third level of education is determined by the second level of education. Thus, in Ram's study, the subsidy indices for first and second levels of education were included in the regression function. In his study the subsidy indices at primary level and secondary level were defined as:

$$SUBDEX\ 1 = REP_1 \div [GNPC/6] \quad (1)$$

$$SUBDEX\ 2 = REP_2 \div [GNPC/2] \quad (2)$$

where, REP_1 and REP_2 are the recurrent expenditure per pupil at the first and second levels of education, respectively. The GNPC is the per capita GNP and the denominators measure the earnings foregone for each level of education.

However, the estimation of SUBDEX1 in Ram (1982) was a little vague and questionable in validity. The calculation of SUBDEX1 was made possible only because he arbitrarily set the earnings foregone at primary level as one-sixth of the per capita GNP (GNPC). In addition to that, Ram also arbitrarily set the earnings foregone for the secondary level of education as one-half of the GNPC. In determining the foregone earnings at the primary level, one needs to know the minimum wage set in the labor market. In other words, we need to know the earnings of an individual if the person has not gone to school at least at primary level. For the case of Malaysia, there is no minimum wage rate set in the labor market and thus it is difficult to determine the earnings foregone at the primary level of education.

Furthermore, there is evidence that the country is reaching a complete universalization of primary education. It was recorded that the enrolment rate at this level of education was 99.8% in 1990. Practically, this means that the opportunity cost in terms of foregone earnings does not exist at the primary level of education. Thus the earnings foregone for having primary education cannot simply be set as had been done in Ram (1982).[7]

In the present paper, since data on the government starting salary for all levels of education are readily available, they can therefore be used directly. This information is produced in government publications on various government salary schemes.[8] This is deflated into real values to give the subsidy index for university and secondary levels of education. The subsidy index at secondary level (SUBDEX2) and the third level (SUBDEX3) in this study are defined as:

$$SUBDEX\ 2 = REP_2 \div Y_1 \quad (3)$$

$$SUBDEX\ 3 = REP_3 \div Y_2 \quad (4)$$

where REP_2 is the recurrent expenditure per capita at secondary level and REP_3 is the recurrent expenditure per capita at university level. Y1 and Y2 are the starting salaries at the primary and secondary levels of education, respectively. Y1 is also a measure of earnings foregone for having secondary education and Y2 is a measure of earnings foregone at the third level of education.

In the regression function, the study also includes the per capita GNP (GNPC) variable in the equation as a proxy for the general level of demand. The plausible specifications of the relationship between public subsidy to schooling and inequality of educational access can take either of the following forms:

$$EDNEQ = f([REP2/Y1], [REP3/Y2], GNPC) \quad (5)$$ or,

$$GINI = f([REP2/Y1], [REP3/Y2], GNPC) \quad (6)$$

where REP2/Y1 is the subsidy index at secondary level or SUBDEX2, and REP3/Y2 is the subsidy index at university level or SUBDEX3. Y1 and Y2 are the measures of the opportunity cost at the secondary and university levels, respectively. Another related point which needs to be mentioned here is that since this study is a time-series study, and the variables in [eq.5] and [eq.6] are compared over time, a proper analysis of the trend study should be made by deflating the values over time.

Thus a linearized version of [eq.7] and [eq.8] can take the following forms, where U is a random disturbance term.

$$EDNEQ = \beta_0 + \beta_1 SUBDEX2 + \beta_2 SUBDEX3 + \beta_3 GNPC + U \quad (7)$$

$$GINI = \beta_0 + \beta_1 SUBDEX2 + \beta_2 SUBDEX3 + \beta_3 GNPC + U \quad (8)$$

RESULTS

As mentioned before, the higher the value of EDNEQ (above 0), the greater the inequality of educational opportunity, which is reflected by the steepness of the educational pyramid. From the trend study, the calculated value of EDNEQ in Table 1 indicates that the education inequality was quite high in the early 1970s (1970 - 1972) when the value ranged from 0.90 to 0.93. However, the value of EDNEQ kept on decreasing every year and reached 0.75 in 1993. This indicates that the degree of education inequality has become less severe every year, implying that the opportunity of educational access has improved over the years.

The calculation of the Gini Index also shows a similar result thus confirming the findings of the first approach of EDNEQ. The Gini index indicates that educational opportunity access has improved every year. The closer the coefficient is to 0, the greater the equality in educational opportunity. The results of this study show that the value of the Gini index decreased from 0.50 in 1970 to 0.41 in 1993. In other words, the inequality of educational opportunity kept on decreasing, indicating greater access to education in the country.

Table 1 also shows the values of SUBDEX2 and SUBDEX3. Although there is some fluctuation in the values of the subsidy indices, they are however on an increasing trend. This indicates that more subsidy is being allocated to increase enrolment at each level of education. In particular, the subsidy index at the higher level has increased significantly over the years from 0.77 in 1970 to almost 5.0 in 1990. This result broadly corresponds to the tremendous increase in student enrolment at this level of education as already explained in the previous section. The subsidy index at the second level also shows some increase, although at a very slow rate, increasing from 0.10 in 1970 to 0.56 in 1993. The trend in the second level subsidy index corresponds with the enrolment trend at this level of education where both variables increase, but at a much slower rate. Referring to the type of enrolment structure given in Table A.1 in Appendix 2, the Malaysian educational pyramid fits the description of enrolment Structure II. Thus an in-

crease in subsidy at the third level of education should result in an increase in enrolment at this level of education and thus reduce the inequality in the education system. The results of this study thus fit the description made by Ram that the high subsidy index at the third level actually reduces the educational inequality.

Table 1
Education Inequality Index and Gini Index 1970-1993

Year	EDNEQ	GINI	SUBDEX2	SUBDEX3
1970	0.93	0.50	0.10	0.77
1971	0.92	0.49	0.13	0.81
1972	0.90	0.48	0.14	1.01
1973	0.89	0.48	0.18	1.34
1974	0.83	0.45	0.24	1.87
1975	0.83	0.45	0.24	2.09
1976	0.82	0.45	0.20	1.69
1977	0.77	0.42	0.21	1.78
1978	0.78	0.42	0.26	2.27
1979	0.77	0.42	0.32	2.71
1980	0.79	0.43	0.22	2.66
1981	0.77	0.42	0.30	3.66
1982	0.77	0.42	0.32	4.08
1983	0.77	0.42	0.34	2.57
1984	0.76	0.41	0.37	3.38
1985	0.76	0.41	0.36	4.03
1986	0.76	0.41	0.34	4.03
1987	0.76	0.41	0.35	3.99
1988	0.76	0.41	0.34	3.79
1989	0.77	0.42	0.36	3.66
1990	0.77	0.42	0.41	4.96
1991	0.77	0.42	0.50	3.99
1992	0.77	0.42	0.60	3.29
1993	0.75	0.41	0.56	3.41

Source: from the study calculations.
Legend: EDNEQ is the Education Inequality Index.
GINI is the Gini Index.
SUBDEX2 is the subsidy index at the second level of education.
SUBDEX3 is the subsidy index at the third level of education.

With the values of these two inequality indices (EDNEQ and GINI), it is possible to look at the relationship between these two indices and public subsidy at the different levels of education represented by the subsidy indices (SUBDEX2 and SUBDEX3). Using data from 1970 to 1993, the estimation is done by ordinary least squares (OLS) on the basis of the full specification mentioned in [eq.7] and [eq.8]. The results are shown in Table 2.

Table 2
Educational Inequality Equations

	β0(C0)	β1(S2)	β2(S3)	β3(G)	R^2	Multiple R	F	DW
R.1	.9821	-.3880 (-4.086) [.1672]	-.0226 (-3.439) [.3930]	.0345 (3.718) [.2823]	.8398	.9172	35.0	1.60
R.2	.5233	-.1808 (-3.834) [.1672]	-.0123 (-3.753) [.3930]	.0166 (3.599) [.2823]	.8412	.9164	35.3	1.68

Figures in ( ) are t-values significant at .0005 level.
Figures in [ ] are tolerance statistics.
Legend: R.1 = Regression function on EDNEQ
R.2 = Regression function on GINI
S2 = Subsidy index at secondary level or SUBDEX2
S3 = Subsidy index at university level or SUBDEX3
G = Per capita GNP or GNPC

Table 2 compares the results of regression analysis using the EDNEQ, denoted by R.1, and the Gini coefficient, denoted by R.2. An inspection of the two results reveals that there is practically no difference between them with regard to the signs, relative magnitudes of the coefficients, and relative levels of significance (F-values). The results of R.1 and R.2 show that 84% of the observed variability in educational inequality is explained by the three independent variables. The Multiple R value on both regression functions is quite large (.92 on both R.1 and R.2) indicating good explanatory power. The F values for both R.1 and R.2 show that there is a linear relationship between the dependent variable and the three independent variables (significant at .0001). The values of Durbin-Watson (DW) indicate no autocorrelation in the time series.

With the result of the regression analysis, it is found that subsidies at the second and third levels of education have an equalizing effect on the public education system. It shows that the higher the subsidy index (indicating higher subsidy at a particular level of education), the lower the inequality of educational opportunity explained by the coefficient variation of the EDNEQ and the GINI index. As mentioned earlier, the direction of the effect of increased subsidy for higher education on inequality would depend on the existing enrolment structure. The Malaysian educational pyramid fits the description of Enrolment Structure II, as explained earlier, with a broad-based and narrow-peaked education system. Because of the type of enrolment structure, and the increase in subsidy to the higher level (and thus the increase in enrolment), the inequality of educational access will decrease. The regression results lend support to the thesis that both the subsidy index of the second and the third level have an equalizing effect. The equalizing effect is more prominent at the second level of education (.3880) than at the third level of education (.0226). This may be because the enrolment at the second level of education is always greater than at the third level, as reflected by the educational pyramid. Thus an increase in subsidy at the second level of education would result in a greater increase in its enrolment.

The per capita income of GNP (GNPC) is included in the regression equation as a summary measure of demand for education; as income increases, demand will also increase. However, given the limited places especially at the higher level, an increase in income will further exacerbate the inequality of educational access. The regression results of R.1 and R.2 on GNPC show a positive sign indicating inequality of educational access increases as income increases.

SUMMARY

The paper revealed the relationship between public subsidization and educational inequality. The inequality of educational access is measured by using the Gini index and the inequality index in the form of coefficient variation of students enrolment at three levels of education. The degree of subsidization is measured by the ratio of per capita direct recurrent cost to earnings foregone. For example the subsidy index for the third level is estimated by taking the ratio of the per capita recurrent cost of university education to earnings foregone for having university education. Similarly, the subsidy index at the second level of education is

measured as the ratio of per capita recurrent cost to earnings foregone at this level of education.

The previous studies done by Psacharopoulos (1977a) and Ram (1982) were done on a cross-sectional basis and their findings were thus limited to a particular year. From these, no comparison can be made to show whether or not the educational system has improved in providing equal opportunity of educational access in a given country.

For the case of Malaysia, the time series study in this area is most appropriate since what is of interest is the outcome of the New Economic Policy (NEP) or the credibility of the government in achieving its NEP objectives, particularly with regard to providing greater educational opportunity among its people. In other words, from EDNEQ and Gini Index trends, it is possible to find out the degree of inequality of educational access that exists in the country over time, and the effect of subsidies and income changes. The regression results of this study reveal that both subsidy indices show some equalizing effect on the public education system in Malaysia. However, the equalizing effect is stronger at the second level than at the third level of education.

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APPENDIX 1

In his study, Psacharopoulos (1977a) developed an index showing the public subsidization of higher education and related it to an index of inequality in the distribution of enrolments within countries and also within Developed Countries (DC) and LDC country groups. The index is called the subsidy index of the third level of education and is defined as C_3 / Y_2, where C_3 is the recurrent expenditure per

student and Y_2 is the earnings foregone while undergoing university education. The derivation of this index was abstracted from many refinements[9] and these refinements did not affect the derivation of the private rate of return for a four-year unsubsidized university education r_u and the private rate of return for the subsidized four-year university education r_s. This derivation was further clarified in Ram (1982).

The private rate of return for a four-year unsubsidized university education (r_u) is given as:

$$r_u = \frac{Y_3 - Y_2}{4(C_3 + Y_2)}, \qquad \text{(A1)}$$

where, Y_3 and Y_2 are the earnings foregone at the higher (third) and the secondary (second) levels, respectively. The difference between these two earnings foregone measures the benefit of education. C_3 is the student's direct cost.

On the other hand, the private rate of return for the subsidized four-year university education , (r_s) is given as:

$$r_s = \frac{Y_3 - Y_2}{4Y_2}. \qquad \text{(A2)}$$

Notice that the denominator of r_u includes $C_3 + Y_2$. This is to explain that in unsubsidized university education the students not only incur the direct costs of C_3 but also the earnings foregone (i.e.Y_2) while at university. Thus the cost for having university education is made up of two types of costs: the direct cost, C_3, and the earnings foregone, Y_2. On the other hand, the cost for having subsidized university education is only earnings foregone Y_2 since C_3 is equal to zero (in the case of free education).

Normally, students will apply for admission for university education when the rate of return of unsubsidized university education (r_u) is greater than the rate of return of alternative investment venture (r_a). The greater the r_u with respect to r_u the greater the demand for higher education. Evidence shows that many of the

countries experience higher private rates of return to higher education (r_p) than returns to alternative investment ventures (Psacharopoulos, 1977a). This further increases the demand for higher education regardless of whether or not the education is being subsidized. However, if education is being subsidized this will generate extra demand since there will be no direct cost incurred by students. In other words, if $r_s > r_u$ there will be an excess demand for higher education.

Given that a simple behavioral model of demand for higher education (D_3) is a positive function of the difference between the private rate of return to education (r_p)and the alternative rate of interest (r_a), the formal relationship can therefore be stated as:

$$D_3 = f(r_p - r_a).$$

Thus, since the supply of university places (S_3) is normally fixed,

$$S_3 = \overline{S}_3.$$

Given that $r_p > r_a$, an excess demand for higher education can be given as:

$$\Delta = D_3 - S_3$$

For unsubsidized university education (u subscript), the excess demand is given as:

$$\Delta_u = f(r_u - r_a) - \overline{S}_3,$$

and the subsidized university education (s subscript), the excess demand is given as:

$$\Delta_s = f(r_s - r_a) - \overline{S}_3.$$

Given the fact that r_a and S_3 are constant, the additional demand created by the government policy of free education is thus given as:

$$\Delta\Delta = \Delta_s - \Delta_u = f(r_s - r_u). \qquad \text{(A3)}$$

Substituting [1] and [2] into [3], will result in the following:

$$\Delta\Delta = f[r_u(\frac{C_3}{Y_2})], \qquad \text{(A4)}$$

where the excess demand generated by subsidized education is a positive function of:

a) the unsubsidized rate of return (r_u) which is determined by the labour market conditions affecting relative earnings (Y_2 and Y_3) and the direct cost of schooling (C_3), and b) the ratio of direct cost to foregone earnings ($\frac{C_3}{Y_2}$). The ratio ($\frac{C_3}{Y_2}$), is called the subsidization index of the third level of education.

The difference between the two private rates of returns in [eq.A3] also gives an indication of the degree of subsidization within a given country. The ratio explains that the higher the direct cost of education to foregone earnings (the higher the index), the higher the effective government subsidy when higher education is provided free of charge.

APPENDIX 2

Table A.1

Hypothetical Enrolment Distribution with Different Inequality Indices

Enrolment Structure	E1 (1)	E2 (2)	E3 (3)	$\overline{E}$ (4)	EDNEQ (5)
1	100	100	100	100	0.00
2	100	90	110	100	0.08
3	100	80	120	100	0.16
4	90	80	130	100	0.22
5	80	70	150	100	0.36
6	300	0	0	100	1.41
7	250	40	10	100	1.07
8	200	80	20	100	0.75
9	150	100	50	100	0.41
10	120	100	80	100	0.16

Source: Ram (1982)

Legend: E1 is the enrolment at the first level of education.
E2 is the enrolment at the second level of education.
E3 is the enrolment at the third level of education.
$\overline{E}$ is the mean enrolment.
EDNEQ is the inequality index.

Referring to Table A.1, the mean enrolment at the three levels of education is set constant in order to make the trends clearer. Thus a change in enrolment at any level of education is a result of trade-off between the three levels. Note the enrolment structure from lines one to 10; lines one to five will be categorized as Enrolment Structure I and lines six to 10 as Enrolment Structure II. Suppose that higher education is being subsidized, this will result in an increase in enrolment at this level of education and the greater the magnitude of subsidy, the greater the increase in enrolment at this level. This is shown in column three of E3 for both structures. However, notice the value of EDNEQ in column five of the table. For Enrolment Structure I, as subsidy increases at the third level portrayed by the increment in enrolment, the value of EDNEQ increases. This indicates that the degree of inequality in the education system increases as a result of an increase in subsidy at the third level. On the other hand, for Enrolment Structure II (from lines six to 10), an increase in subsidy at the third level (which causes the enrolment to increase at this level of education), produces a decreasing value of EDNEQ indicating a reduction in inequality in the education system. Thus, there are two outcomes as a result of an increase in subsidy; i) an increase in subsidy at the third level may increase inequality and ii) an increase in subsidy at the third level may also decrease inequality. The first outcome happens if Enrolment Structure I exists in the education system and the second outcome happens if Enrolment Structure II exists in the system.[10] It is probably true that in many developed countries the educational system is portrayed by a broad based and wide peaked educational pyramid, and in LDCs, the educational system is normally portrayed by a broad based and narrow peaked educational pyramid. To support that the above two conditions can affect the inequality index, the relationship between subsidy and educational inequality had been tested in Ram (1982). The result confirmed that the subsidy to higher education has a disequalizing effect in the less developed countries and a very negligible disequalizing effect in the developed countries. In his study, Ram (1982) concluded that the extent to which the third level subsidy would affect enrolment equality would depend on the existing education structure as reflected by their educational pyramids.

Endnotes:

1. See Appendix 1 for the derivation of SUBDEX 3 as proposed in Psacharopoulos (1977a).

2. To explain this effect, Ram's table of a hypothetical enrolment distribution is reproduced and is shown in Table A.1 in Appendix 2.
3. The Open University (1976) Inequality Within Nations: Income and Inequality, The Open University Press.
4. The Lorenz curve will not be used in this study since the Gini coefficient itself is sufficient to show the inequality of education opportunity.
5. James, E. and Benjamin, G. (1988) Public Policy and Private Education in Japan, Macmillan Press.
6. Myles, G.D.(1995) Public Economics, Cambridge University Press.
7. However, the subsidy index for primary education as calculated by Ram may be applicable in other LDC countries where child labor has become a great phenomenon.
8. During the period of 1970 to 1993, the government's salary scheme has been revised several times. Thus the study will follow the following salary schemes: For 1970- 1975 the "Suffian Perkhidmatan Pekeliling, Bil. 7/1970." For 1976-1979 the "Jawatan Kuasa Kabinet I, Perkhidmatan Pekeliling Bil.2/1977." For 1980-1987 the "Jawatan Kuasa Kabinet II, Perkhidmatan Pekeliling Bil. 9/1980." For 1988-1990 the "Perkhidmatan Pekeliling, Bil. 5/88" and starting in 1990 the government launched a new government salary scheme called the "Sistem Saraan Baru" or the SSB.
9. Examples are the differential taxation rates, ability, finite life horizon, economic growth and concave age-earnings profiles (Psacharopoulos, 1977a).
10. However, this study does not agree with the example of the enrolment structures given in Table A.1. The argument is that the enrolment at the third level of education is always less than E_1, or $E_3<E_2<E_1$.

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