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EDUCATION, INCOME AND EQUITY IN MALAYSIA

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ABSTRACT

This paper estimates the returns to educational investment in Malaysia, their implications for public sector resource allocation policies, and the distributional aspects of public investment in education. Returns to secondary education are substantially higher than those to either primary or tertiary schooling; returns to the economy for the latter two are beneath the estimated marginal productivity of capital, but private returns (for all three levels) are much higher in consequence of public subsidies to schooling. The whole structure of returns differs significantly for urban residents (who are mainly Chinese) and for rural dwellers (who are mainly Malay); the latter not only receive less education, but also markedly inferior returns on equivalent years of schooling. The study concludes that Malaysia is, or soon will be, overinvesting in post-primary education from the standpoint of maximizing returns on total public investment, but that potential distributional gains (in the countryside) and other social benefits justify at least part of the "overinvestment".

EDUCATION, INCOME AND EQUITY IN MALAYSIA

by O. D. Moerr

Introduction

This paper will examine the returns to educational investment in Malaysia, and their implications for public-sector resource allocation policies. Since these policies largely define the accessibility of educational facilities for most groups in Malaysian society, and since the resultant pattern of educational attainment impinges directly on personal incomes, a public schooling policy is inevitably an incomes policy. Hence attention will also be given to the distributional aspects of public investment in education.

The focus of the latter will be upon urban-rural divergences which, in Malaysia, touches directly on the question of racial equity. The indigenous Malays now constitute exactly one-half the total population, but four-fifths of all rural residents; the Chinese account for just over a third of the total population, but two-thirds of all urban residents are Chinese. (The remainder of the population is mainly of south Indian extraction, and not notably concentrated.) A locational breakdown--if employed with proper caution--can therefore serve as a simple proxy for racial

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[1]This paper is part of a larger study on Malaysian education, a portion of which was supported by a grant from A.I.D. (Contract CSD-1543) through the Development Advisory Service of Harvard University. The views here are not necessarily those of A.I.D.

Unless otherwise stated, Malaysia refers to peninsular Malaya, i.e., West Malaysia.

differences. This is the basic reason why existing economic imbalances in Malaysia are so keenly felt: urban-rural disparities are popular nowhere, but fairly extreme ones have been tolerated over long periods of time; racial disparities are -- with good cause -- universally regarded as more oppressive, less tolerable. The coincidence of economic imbalances by location and by race does not simply complicate the regional problems which Malaysia shares with virtually every nation in the world, it adds a whole new dimension.

While the data are far from satisfactory, some recent studies[1] serve to flesh out the conjecture on the size of interracial economic disparities. Per capita incomes by state (see Appendix Table 1) reflect very clearly the lagging economies of the (less urbanized) areas where the Malays are concentrated. Malays outnumber non-Malays by 4-1 in the poorer northern states (M$459 per capita, 7% urbanized),[2] and these states contain 40% of the total Malay population in West Malaysia; on the other hand, some two-thirds of all non-Malays inhabit the rich western states (M$1,085 per capita, 36% urbanized). Data on productivity by industry and race (see Appendix Table 2) shows that non-Malays predominate in modern sector industries, while Malays are largely relegated to traditional activities, (particularly agriculture), where value added per worker is less than half that in the non-Malay dominated industries. Aggregatively, the income disparity ratio between Malays and non-Malays appears to be around 7-4, or M$1,250 per worker in absolute terms.

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[1]The Economic Planning Unit and the Department of National Unity have collaborated to assemble these data.

[2]M$1.00 = US$0.33

This urban-rural cum racial economic imbalance is paralleled by a similar one in school enrolments. (See Appendix Table 3.) While there is a discernible tendency for Malay enrolment ratios to lag slightly behind those of non-Malays,[1] whether urban or rural, it does not approach the gap in ratios between total urban and rural enrolments, of whatever race. And the quantitative gap is further exacerbated by a qualitative one in the form of a concentration of scientific-technical facilities in the urban areas.[2] If allowed to persist, these discrepancies in educational opportunity will effectively translate into further income inequalities between Malays and non-Malays. The chain is of course much more subtle and complex, but it exists.

The educational gap, per se, has in fact been closing in recent years. But the structural nature of the underlying economic imbalance makes obvious that this imbalance cannot be rectified quickly (if indeed the problem can be solved at all, for the richest nations in the world continue to be plagued by urban-rural income disparities). Education, just as it can reinforce existing economic imbalances, can also play an important role in redressing them. It can do this principally by galvanising the development process in the countryside, but also by equipping at least some rural dwellers (i.e., Malays) to function efficiently in modern sector activities there and elsewhere. This paper will be less concerned with the former than

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[1]This lag, like the much more substantial gap between male and female enrolment ratios, is in part attributable to custom rather than differing access to facilities. The Chinese in Malaysia have long displayed a relatively stronger interest in -- and willingness to finance -- education than the Malays (while both are less concerned with education for females). See Chai Hon-Chan, The Development of British Malaya, 1896-1909, Kuala Lumpur, Oxford University Press, 1964.

[2]Ministry of Education (EPRD), Educational Statistics of Malaysia, 1938-67, Dewan Bahasa dan Pustaka, Kuala Lumpur, 1969.

with the latter and how it relates to equity, for it must be recognized that rural incomes will continue to lag behind urban ones into the indefinite future, even under the most hopeful hypotheses for rural economic growth. Further the social context is such that a virtual monopoly of the higher paid modern sector jobs by a minority group (albeit large) is politically intolerable to the majority.

But before anything can be said with confidence about education's potential contribution to greater racial equity in Malaysia, much more must be known of the relationship between educational attainment and income levels there, and to whom the costs and benefits accrue from this investment.[1]

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[1] This "rate of return" analysis is subject to the usual caveats associated with less than realistic assumptions on substitutability among different skills, and on the relationship between wages and marginal productivity. A catalog of most of the shortcomings of the approach is found in Stephen Merrett, "The Rate of Return to Education: A Critique", Oxford Economic Papers, November 1966, pp. 289-305. Most of the rebuttals can be found in Mark Blaug, "The Rate of Return on Investment in Education in Great Britain", Manchester School, September 1965, pp. 205-261.

Education and Income

The basic data for the first half of a benefit-cost analysis of education are provided by the "Malaysia Socio-Economic Sample Survey of Households, 1967-68." This survey by the Department of Statistics, which covered 30,000 households in three nationwide rounds, assembles for the first time reliable information on income, education levels, and a wide variety of other particulars relating to occupation and family situation. However, the available frequency distributions limit us to relating income to age and years of schooling, with the possibility of breaking these into four sub-groups distinguishing sex and urban-rural residence.[1]

The meaning of educational attainment as an explanatory variable is at least intuitively clear, but age and the sex-residence breakdowns are all proxies. Age is something of a misnomer; the effect of "experience" is a closer description of what is being measured, and whatever importance it has is due chiefly to the element of informal, on-the-job training which it includes.[2] Sex and urban-rural residence

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[1] Urban areas are defined as communities (administrative areas) having either (1) population over 7670 in 1967, or (2) urban "characteristics," with more than 60% of the inhabitants engaged in non-agricultural pursuits. All other observations are rural. This results in urban-rural population proportions of about 40-60, of which it will be recalled that urban "equals" Chinese, with two-thirds probability, and rural "equals" Malay with four-fifths probability.

[2] This will be treated more specifically below.

undoubtedly measure discriminatory wage policies to some limited extent, but they are much more important as representatives for differing occupational structures between men and women, and between urban and rural residents.

Since the two basic variables--age and education--will not have the same explanatory value singly and combined, or in different types of functions, a number of possibilities have been explored. The method of estimation was ordinary least squares, with the grouped observations weighted by the square root of their raw frequencies.

The "best," and least complicated, expression found is

$$Y = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 X_1 + \beta_4 X_2 + u \qquad (1)$$

where

Y = annual cash income in Malaysian dollars

D_1 = a dummy variable for urban residence, equal to 1 when the characteristic is present in an observation, and zero when absent

D_2 = a dummy variable for male sex, equal to 1 when the characteristic is present in an observation, and zero when absent

X_1 = years of age

X_2 = years of education, squared

u = a random disturbance term

The summary regression, in which the dummies specified make rural-female the "base condition," has the following values:

$N = 186$ (weighted) $\quad \bar{R}^2 = .705 \quad F = 179.9$

$$Y = -1488 + 649D_1 + 389D_2 + 32X_1 + 34X_2 + e \qquad (2)$$
$$\qquad\quad (218) \quad (115) \quad (130) \quad (4) \quad (1)$$

All of the estimated parameters are significant at the .01 level.[1]

The usual test for independence among the residuals, the Durbin-Watson statistic, is a rather poor 0.90, indicating positive autocorrelation. (A "nondecisive" value of d, at the 5% level, would have to exceed 1.53; acceptance of the null hypothesis--no autocorrelation--would necessitate a value approximating 1.70 - 2.30.)[2] The effort at patching up this problem is compromised somewhat from the outset since we are unable to test the nature of the misspecification: lacking data for other possible explanatory variables aginst which to regress, we are obliged to focus upon the possibility of time-related errors. This possibility is a realistic one in the present case, but relevant variables clearly have been omitted. The time-transformation which follows[3]

$$N = 166 \text{ (weighted)} \qquad \bar{R}^2 = 0.62 \qquad F = 68.2$$

$$Y' = -245 + 781D_1' + 429D_2' - 4X_1' + 45X_2' + e \qquad (3)$$

$$\qquad\qquad (608) \quad (252) \quad (284) \quad (10) \quad (3)$$

is arguably, if unavoidably, premature in its application, but the results are quite striking and the Durbin-Watson statistic of 2.26

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[1] The possibility of multicollinearity should be treated if we are to have confidence in the efficiency of the customary OLS test procedures, but neither the correlation matrix nor the other common tests suggest that multicollinearity is a problem among the explanatory variables measured here. (See D. E. Farrar and R. R. Glauber, "Multicollinearity in Regression Analysis: The Problem Revisited," Review of Economics and Statistics, V. 49 (1967), pp. 92-107; and William J. Raduchel, "Multicollinearity in Regression Analysis," (Xerox), Project for Quantitative Research in Economic Development, Harvard University, Cambridge, October 1969.) Multicollinearity among the measured and unmeasured but relevant variables will be considered later.

[2] The Durbin-Watson table extends only to 100 observations, and extrapolation to n = 181 would be difficult. Hence, the confidence limits must be approximative.

[3] The transformation of the data is from J. Durbin, "Estimation of Parameters in Time-Series Regression Models," Journal of the Royal Statistical Society, v. 22, No. 1, 1960, pp. 139-153.

now falls in the acceptable range. As concerns heteroscedasticity, whose presence is suggested by the pattern of the residuals, the test employed is due to Goldfeld-Quandt.[1] The critical values for the null hypothesis for homoscedasticity with the present data would be (ratios of) approximately 1.56 and 1.87 at 5% and 1% levels of significance, respectively. If our data are unweighted, the actual ratio is 35.4 to 1, indicating extreme heteroscedasticity; but once weighted by their frequencies, the ratio drops to 3.5 to 1, i.e., the variance is still not homoscedastic, but the problem is greatly reduced.[2]

Before examining the transformed regression and constructing life-time income profiles, it is of interest to drop our abstraction on the removal of sex and locational income effects. If we simply look at what happens to separate regressions in the four sub-groups distinguished, it is at once evident that the education coefficients are, with the exception of rural females, not appreciably different. This is seen most clearly in column 5 of Appendix Table 4, which gives the incremental (annual) value of completing lower secondary school (9 years) as opposed to primary (6 years) only. Nonetheless, average incomes still vary by a factor of 7 due to (1) differences in the (intercept, or) starting salary, and (2) divergences in educational achievement among the groups. The latter is clear enough, and the former--which presumably

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[1] S. M. Goldfeld and R. E. Quandt, "Some Tests for Homoscedasticity," Journal of the American Statistical Association, v. 60, 1965, pp. 539-547.

[2] The heteroscedasticity could be eliminated by the usual transformation when the variance is roughly proportional to the explanatory variable (viz., dividing through by that variable), but this transformation does not appear justified. Unlike the problem with autocorrelation which could reasonably be attributed to time-related errors, and thereby transformed in those terms, the problem here is almost certainly due to omitted variables--and cannot meaningfully be "transformed." In any case, proper weighting of the observations reduces the influence of the non-homogeneous variance, so it will not appreciably effect the efficiency of the customary OLS tests of significance.

reflects productivity differences--is best understood as another aspect of differing occupational structures.

Turning now to (transformed) regression (3), we may note that its contrast with (2) is very marked: the intercept has risen by more than a thousand dollars, both dummy variables are somewhat higher, and the coefficient for education is more than a third higher. But the most significant change is in the coefficient for age. Not only has its magnitude fallen all the way from $M31.82 to -$M3.86, its "explanatory" value has fallen from just under 10% (of the variance) to an infinitesimal level. In effect, once the prop of autocorrelation is removed, age collapses as an explanatory variable. The primary reason it is such a trivial part of the "explanation" of income is because its main productivity effect, operating through on-the-job training, is itself captured by the education variable, i.e., varies directly with educational attainment.[1] This can be demonstrated by taking the regression coefficients (slopes) for income on age--with education held constant--and regressing them against years of education. The result is an excellent fit of the form

$$\log bX_1 = a + bX_2 + e \qquad (4)$$

with a correlation coefficient of 0.98, and an R^2 of 96.4%. This implies that the more schooling one has, the more valuable to him will be each year of age/experience--not simply absolutely, but relatively also as we are dealing with rates of change.

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[1] It would seem that this was not reflected in our measurements of multicollinearity because the relationship is not linear. The conceptual explanation of the correlation is that one of the principal functions of "education" is to produce receptivity to further education, or more properly, training in a production-oriented environment.

In addition to eliminating the utility of age as an independent variable, the transformed regression (3) also reduces the explanatory value of the dummy variable for sex to negligible proportions, its t-ratio being significant only at the 15% level. A more reliable expression[1] of income determination, therefore, is

$$N = 166 \text{ (weighted)} \quad \bar{R}^2 = 0.62 \quad F = 134.9 \quad D\text{-}W = 2.21 \qquad (5)$$

$$Y = -161 + 770D_1' + 46X_2' + e$$
$$\quad\quad (202) \quad (252) \quad (3)$$

However, the elimination of age from the regression means it can no longer be used to construct a working-life profile of income for different education levels, which was our original aim. In consequence, it becomes necessary to fall back on Y = f(age), with education held constant. The function, by itself, has no real meaning since we know age (or experience) is a poor "explanation" of income. Rather it derives its meaning from the fact that the lifetime stream of income can be constructed by lifting the appropriate age-income points off a cross-classification of the data which makes income a function of education, with age held constant.[2]

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[1] The income averages do not, in fact, vary significantly from those in equation 3 or in Appendix Table 4.

[2] While, nominally, one of the arrangements of the data has meaning and the other does not, they are in fact logical equivalents. If the fits were ideal, a regression run on the ten age-income points of Y = f(education) would produce exactly the same values as one run on the observations from the seven educational levels distinguished in the cross-classification, Y = f(age). But the imprecision of the present fits means there would actually be some variation in the results of the two measurements. We would not wish to use the original observations, hence we will begin with Y = f(education) and from there construct

The results of the regressions for the various levels of education, which are shown in Appendix Table 5, are for the most part predictable: starting salaries rise steadily with education, as do the annual increments, though the latter is somewhat complicated by the second term in the function which represents the eventual decline in output and earnings. Similarly, the plotting of the age-income profiles in Figure 1 reflects the same general pattern found by investigators in other countries:[1] (1) a moderately flat curve for those with lesser education, but becoming increasingly steep with greater educational attainment; (2) earnings which peak earlier for the poorly educated, later for highly educated; (3) a rate of decline in later working life income which varies directly with education levels.

Thus far we have implicitly assumed that "education" was a homogeneous input to the explanation of income, which of course it is not. This is simply another way of saying that the aforenoted

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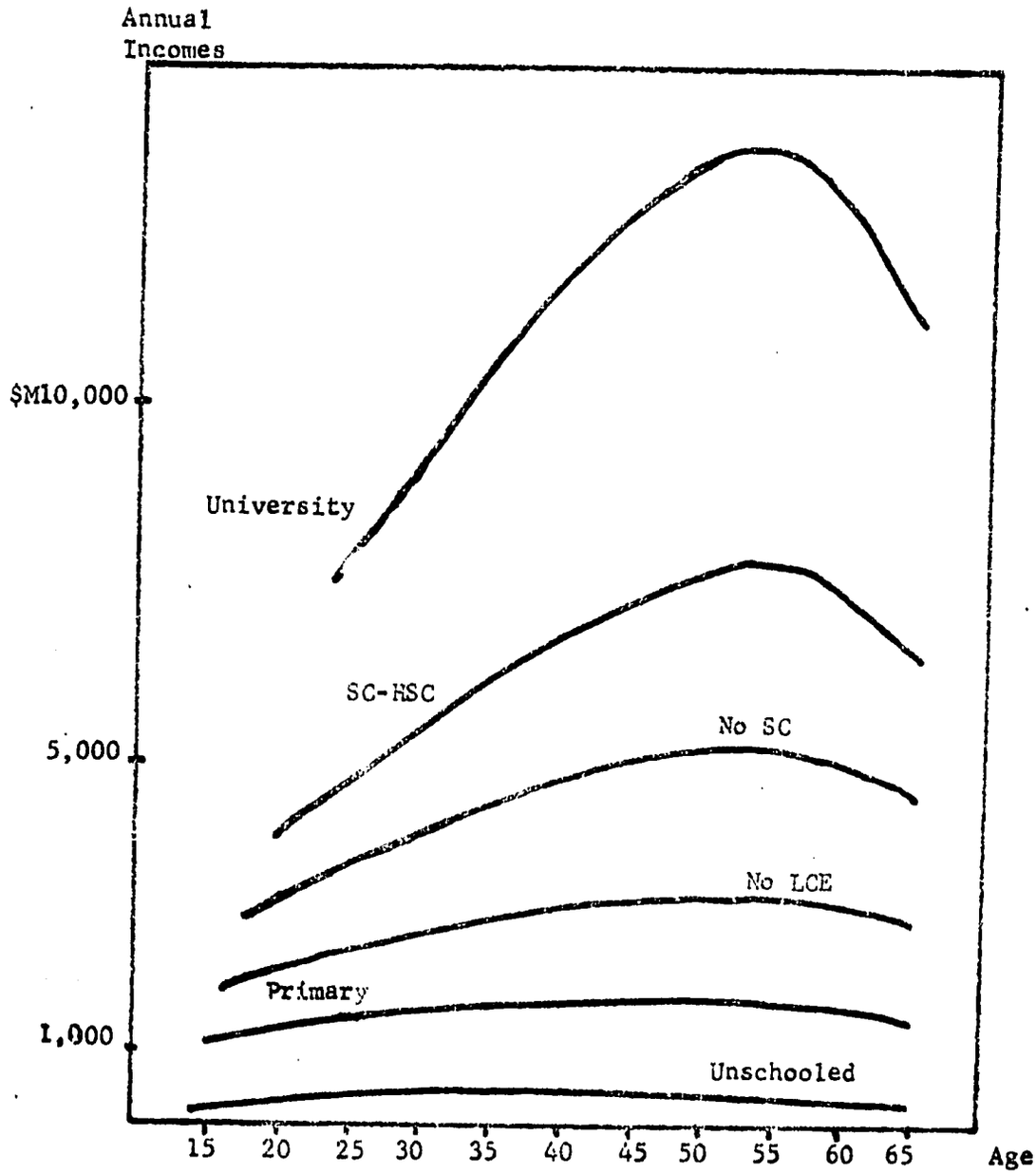
Y = f(age). While it would be possible to plot the transformed observations directly, the variability in the data makes it more desirable to regress income on age, then use the computed rather than actual values for the time stream. We have already noted that the age profile of income is non-linear, so the function employed in the final calculation is $Y = \alpha + \beta_1 X_1 + \beta_2 X_1 + \varepsilon$.

[1] Among many examples are Henry J. Bruton, "The Productivity of Education in Chile," Research Memorandum No. 12, Center for Development Economics, Williams College, Williamstown, July 1967, p. 11a; Kim Kwang Suk, "Rates of Return on Education in Korea," AD/EAP, USAID/K, Sept. 1968, p. 6; A. M. Nalla Gounden, "Education and Economic Development," (unpublished Ph.D. dissertation, Kurukshetra University, November 1968), etc.

Figure 1

Lifetime Income Profiles by Education Level
West Malaysia, 1967



Source: Appendix Table 5

heterogeneous occupation structure for the groups distinguished--with significant income differentials for jobs requiring the same years of schooling--has at least a partial counterpart in differentiated education streams. The present data permit us to treat separately graduates of teacher training colleges, and four types of university graduates: engineering, medicine, agriculture, and "all other."[1]

The main factors affecting teacher income levels will be entry qualifications and experience, and the non-quality factors of sex (since women are paid less than men), service schemes (since terms of employment differ among them), and level of schooling taught (since higher grade teachers receive greater pay). If these non-quality effects are randomly distributed, the independent variables should "explain" income quite well, with the dummy variable serving principally as an indicator of quality differences between the groups. The values of the regression for teacher training graduates are estimated as[2]

$$N = 33 \text{ (weighted)} \quad \bar{R}^2 = 0.57 \quad F = 14.9$$

$$Y'_{tt} = \underset{(828)}{876} + \underset{(490)}{1342}D'_1 + \underset{(21)}{121}X'_1 + e$$

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[1]The survey also distinguished "religious education," but its definition and enumeration is so ambiguous as to make the date useless.

[2]Note that, unlike our other age-income functions, the one for teacher training graduates is linear. Testing determined this produces a superior fit, which is primarily a reflection of the fact that their output and income typically do not decline in later working life, nor are early retirements (and changes in sample composition) as common here as with other groups having comparable educational attainments.

The fit above is not really good enough to suggest that relevant but non-specified variables are unimportant, i.e., that entry qualification and experience are sufficient explanation. Further, the statistically significant (1% level) residence dummy cannot be taken as an unambiguous indication of quality differences--though it is a suggestion--since at least one of the non-quality factors imparts a systematic bias, viz., the concentration of (better paid) secondary and higher education teachers in urban areas. The principal conclusion that emerges with some assurance is that teachers in Malaysia are (relatively) less well off financially than their counterparts elsewhere; their income profile lies generally below the average of people with similar (or even inferior) educational attainments who pursue other occupations.

At the university level we are, nominally, able to distinguish four separate groups of graduates. But the number of observations is very small, hence the data underlying the distinctions are quite poor. We can estimate the first few values of the age-income profiles, and little more. However, if we can assume that the shape of the profile for each group is the same as the university average, we can link them together to get a rough indication of the total stream. Effectively, the intercept varies while the slope coefficients remain the same in all streams.[1] The estimates of starting salary (at age 23) for the graduates are:

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[1]Alternatively, we could have made use of the fact that the separate streams are of varying length, and simply estimated them directly as a function of training time. The results produced in this fashion appear less realistic.

the accuracy of the income estimates from the Survey, the minor difference also suggests there is little point in attempting to adjust for cash versus total incomes in Malaysia, (particularly since the relationship of education to subsistence income levels is a very moot point).

The second question is conceptually difficult, and concerns adjusting the income streams to remove the effects of explanatory variables other than education. Like the related controversy on manpower requirements versus rate-of-return, this question has also been discussed extensively in the literature--again inconclusively.[1] In the strictest sense it is not altogether certain how educational attainment operates on income, though skill acquisition is a shorthand term for what we want to measure.[2] Insofar as skill acquisition, or "learning," is not closely correlated with educational attainment, (and it will not be if there are substantial quality differences in the educational system), the explanatory usefulness of education for income will be reduced. It may also be argued that such explanatory value as education has is due primarily to its intercorrelation with some of the other independent variables noted earlier.[3] The theoretical importance of this point is very considerable, but its significance

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[1] A good summary of the scope of this debate is found in Samuel Bowles, Planning Educational Systems for Economic Growth, Harvard University Press, Cambridge, 1969, pp. 14-28. Some of the complexities of measurement are discussed in Morgan and David, "Education and Income," Quarterly Journal of Economics, August 1963, pp. 423-437.

[2] This is very much a shorthand term since absorption of a disciplined, production-oriented value system and receptivity to on-the-job training are probably at least as important as any specifically vocational skills acquired in school.

[3] W. Lee Hansen, Burton A. Weisbrod and William J. Scanlon, "Schooling and earnings of low achievers," American Economic Review, June 1970, vol. LX, no. 3, pp. 409-418.

for policy formulation appears to be less for this study than ones which focus on societies where educational opportunity is much more widespread. Principally, this is because limited access means poorer correlation between educational attainment and ability, motivation, etc., i.e., poorer correlation between scholastic potential and realized schooling.[1] Further, LDC's typically attach more significance to formal schooling attainment--as it is still relatively scarce--than do employers in developed countries where schooling is better recognized as an imperfect guide to the individual's productivity. In this limited sense, these factors in combination mean that education is a better explanation of income levels in Malaysia than in more developed countries.

Nonetheless, we have already noted the omission of several important variables which impinge in some fashion on income determination. Whatever the means by which they operate, we could of course isolate their individual effects if we standardized for enough variables. Lacking this breadth of data, we can at best hope to identify (then eliminate) the grosser effects of determinants unrelated to schooling which mask a residual termed "education." To ignore the problem, as many investigators have done, results in the postulation of relationships which are not only imprecise, they will often

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[1]This assertion, which is discussed below in conjunction with heteroscedasticity in the regressions, cannot be conclusively demonstrated with the present data. But it is consistent with the data, in addition to the prima facie evidence. This is important not only to the discussion at this point, but also to that on the distributional effects of access to education, for it would be much harder to argue in favor of extending educational opportunities in the countryside if scholastic potential and actual enrolments were already highly correlated.

mislead badly in social resource allocation decisions, (as will be seen later). In any case, the notion of an adjustment has strong intuitive appeal, and there is a concensus that the income stream needs to be factored in an exercise of this type; what is not clear is by how much. For example, Dennison[1] suggests reducing the differences between income streams (for varying educational attainments) by 40 per cent, but admits he has no statistical basis; Weisbrod and Karpoff,[2] examining only secondary-university differences, recommend a reduction of around a quarter; while Becker[3] surveys studies which suggest a reduction in overall returns by 12-20% at the university level, and 25-35% for secondary education; Bowles[4] concluded that education explains only 35 per cent of the variance in Greece, and Hanoch[5] arrives at a similar result for the United States using 1960 census data. However, these conclusions are more reconcilable than they at first appear, once they are set within a common framework.

In the absence of any specific data on the influence of ability and other relevant factors in Malaysia, we have noted that "education" appears to account for just under 60% of unadjusted cash incomes.

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[1]Edward E. Dennison, "Measuring the Contribution of Education (and the Residual) to Economic Growth," in The Residual Factor and Economic Growth, O.E.C.D., Paris, 1964, p. 27.

[2]Burton A. Weisbrod and Peter Karpoff, "Monetary Returns to College Education, Student Ability, and College Quality," Review of Economics and Statistics, Vol. 6, No. 4, November 1968, pp. 491-498.

[3]G. S. Becker, Human Capital, N.B.E.R., New York, 1964.

[4]Bowles, op. cit.

[5]Giora Hanoch, "Personal Earnings and Investment in Schooling," reported in Bowles, op. cit.

(This will fall sharply when we correct for participation and employment rates.) If there were no intercorrelation among any of the variables known to affect incomes--or even if collinearity were absent between education and each of the (missing) relevant variables--the regression coefficient would tell us something specific about education's role in determining incomes; but (even in the absence of sampling error) the combined coefficients of incremental determination would be less than unity due to the effects of the missing explanatory variables. If, on the other hand, there were perfect intercorrelation among all the variables, the R^2 would also be perfect, but the regression coefficient would tell us nothing about education's singular contribution. In between these extremes--where reality lies--we may speculate that when intercorrelation (and explained variance) have fallen from unity and the regression coefficient for education has taken on some meaning, explained variance will (if there is no sampling error) tell us something of the effects of the omitted variables, i.e., it will not simply reflect quirks of multicollinearity but will suggest something about the explanatory power of education alone for income determination. While this proposition cannot be rigorously proven with the available data--and indeed, hypothetical cases can be constructed easily where it is misleading--the use of $R^2_{Y.X}$ as a correction factor in the present case gives results very similar to those in the studies cited above which had the benefit of many more explanatory variables. Whether this is significant or merely coincidence, the operational

conclusions for the size of the adjustment are the same.[1]

A final pair of adjustments is needed to allow for the fact that some educational investment is never, or only partially, utilized. Viewed broadly, this question opens a Pandora's box of unmeasured and unmeasurable underutilization. But the present adjustments will be limited ones relating to labor force participation rates, and unemployment.[2] We know that participation rates are themselves affected by education levels,[3] (and also by the employment situation),[4] tending to rise alongside education; this is particularly true in the case of older workers and married women, though the effect is generally less marked after completion of primary schooling. In any case, data on rates by education level do not exist for Malaysia, hence the factoring of the income stream will be done only with age, sex and location-specific rates. (See Appendix Table 6.) The adjustment for employment

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[1]Since the plausibility of the approach used would have suffered if the results had not approximated those of an adjustment based on experience elsewhere, (but arbitrary in the Malaysian context), this approach must of course be treated with caution.

[2]We might also have adjusted for mortality since the size of the age cohort is almost halved between 15 and 65. However, the (cumulative) effect is marginal until later working life, when incomes are heavily discounted in any case, hence the net influence of mortality on the income stream is negligible. (All of these adjustments, incidentally, could also be made--with equivalent effects--to the cost stream instead.)

[3]W. G. Bowen and T. A. Finnegan, The Economics of Labor Force Participation, Berkeley, University of California Press, 1969

[4]Arthur M. Okun, "Potential GNP: Its Measurement and Significance", (Appendix), The Political Economy of Prosperity, Norton, New York, 1969

proportion varying inversely with educational attainment. Not more than this part of income determination can be assigned to education alone; the remainder must be attributed to ability, family status, occupation and the like--and it should be understood that the technique employed is more likely to overestimate than understate education's contribution.

Educational Costs in Malaysia

The two main components of direct costs are budgetary expenditure on the formal schooling system, and the students' out-of-pocket costs for transport, incidental fees, books, etc. The Malaysian government will spend in excess of M$600 million on public schooling in 1970, or more than 5% of GNP, and direct expenditure on private schools will add at least another M$25-30 million. Out-of-pocket costs will apparently more than double these outlays, representing in the process a sharp qualification to the general assumption of "free" primary (and Malay lower secondary) education. Also of particular interest in Table 2 is the sharp rise in direct costs between secondary and higher education. The ratio of these costs averages about 3-1 in a cross-section of other countries, developed and developing,[1] as contrasted with 6-1 in Malaysia.

The next cost element estimated is "wastage" at the various levels, for students who eventually drop out add to the cost of a given level during their attendance, but can only be counted as outputs at the next lowest level, i.e., the one they actually completed. In the present case these costs appear significant only at the primary level, where nearly 15% of the initial enrolments are lost during the six-year period of schooling. The low wastage at other levels does not warrant any

[1] O.E.C.D., Targets for Education in Europe in 1970, Policy Conference on Economic Growth and Investment in Education, O.E.C.D., Paris, 1962, p. 126; and UNESCO, World Survey of Education, 1964, Paris, 1965

adjustment, (though university dropouts might well have proved significant if more data were available). Since the average dropout remains for approximately half the duration of the school segment, (6 years), he raises effective costs per completing student by a factor of [1-(F/2)]/(1-F), where F is the failure rate.

Table 2

Average Social Costs per Student by Education Level

West Malaysia, 1967

	In-School Costs	Student-Borne Costs	Wastage	Income Foregone	Total*
Primary	172	169	31	--	372
Lower Secondary	232	292	--	--	524
Forms III and IV	248	333	--	794	775
SC - HSC	415	427	--	426	1268
University	2780	1640	...	1070	5490
Engineering	4200	"	"	1148	6988
Medicine	5300	"	"	1226	8166
Agriculture	4200	"		1148	6988
All other	1960	"	"	1070	4670
Teacher Training	2650	200	--	446	3296

Sources: Ministry of Education (EPRD), Educational Statistics of Malaysia, 1938-67, Dewan Bahasa dan Pustaka, Kuala Lumpur, 1969, pp. 157, and unnumbered memoranda of the Economic Planning Unit. The University breakdowns are rough estimates of the Vice-Chancellor's Office.

* Some of the totals are slightly overstated due to the use of "average" income foregone estimates.

The last cost directly associated with formal schooling is its "opportunity cost", viz., the income foregone by virtue of school attendance rather than employment. This is estimated as the average income stream of an individual in the same age cohort who worked rather than continued at school, i.e., of a cohort member with the next lowest level of educational attainment. The income stream is of course factored for labor force participation and employment rates, and non-educational income determinants also. The latter adjustment is somewhat artificial since the student foregoes a "total" income, but is necessary to maintain consistency in the subsequent comparison with net education-associated income increments. The result of the three adjustments listed above is to roughly triple the in-school costs of education.[1]

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[1]The above represents the total costs of formal education, but we have noted earlier the income effects of subsequent on-the-job training. It is therefore desirable to estimate the costs associated with this form of further training. In a study of the U.S. economy Jacob Mincer, ("On the job training: costs, returns, and some implications", Journal of Political Economy, Vol. LXX, October 1962, Part 2, pp. 50-79), following Becker ("Investment in Human Capital A theoretical Analysis", Journal of Political Economy, Vol. LXX, Part 2, October 1962, pp. 9-49), assumes that (1) most O-J-T is general (i.e., utilizable outside the firm where it is received), rather than specific, and (2) firms cannot capture the gains in productivity, hence the cost of the O-J-T will inevitably be borne by the trainee--in the form of earnings foregone. He subsequently attempts some rough measurements of specific, firm-financed training, and concludes the aggregate amount is much smaller than the value of income forgone, but together they approach the amount spent on formal schooling. His calculations are based on the marginal rates of return to formal schooling which means that, insofar as his conclusions are correct, returns will vary directly with the level of estimates for formal training. His calculations also suggest that investment in O-J-T shifts over time relative to formal schooling--apparently down, then up--and in terms of the proportions invested at various skill levels. Under these circumstances, it is impossible to generalize his findings to Malaysia, beyond noting that our cost estimates contain this significant omission.

Economic Returns to Malaysian Education

The first results of this benefit-cost analysis, net social returns to educational investment, are set out in Table 3 (and Figure 2). The most striking feature is the contrast in social profitability between secondary education and all other levels. Incremental returns to secondary schooling are 2-3 times higher than elsewhere[1] and well above the estimated opportunity cost of capital.[2] The returns to primary and tertiary education, on the other hand, are actually beneath capital's presumed marginal productivity.

However, it is important to consider the sensitivity of these rate-of-return estimates both to some of their assumptions and to changes in some of their component parts. If the marginal productivity of capital (or more meaningfully, the social time preference rate[3]) is only 5%, all levels of education are interesting investments. But if the

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[1]This is the strongest reply yet to continuing criticism of the government's 1965 decision to open lower secondary education to all who wish to attend. The decision was not made primarily on economic grounds, but it is now seen to have had merit there as well as in terms of socio-political considerations.

[2]The Economic Planning Unit's estimate of the public opportunity cost of capital is 10% for West Malaysia, but the stream of net educational benefits has also been discounted at rates above and below this figure to give some notion of the assumption's importance to the results.

[3]No attempt has ever been made to estimate social time preference in Malaysia, and the literature does not suggest it would be an especially rewarding experience. For a good survey, see P.D. Henderson, "Investment criteria for public enterprises", in R. Turvey (ed.), Public Enterprise, Penguin, London, 1968, pp. 86-172.

Table 3

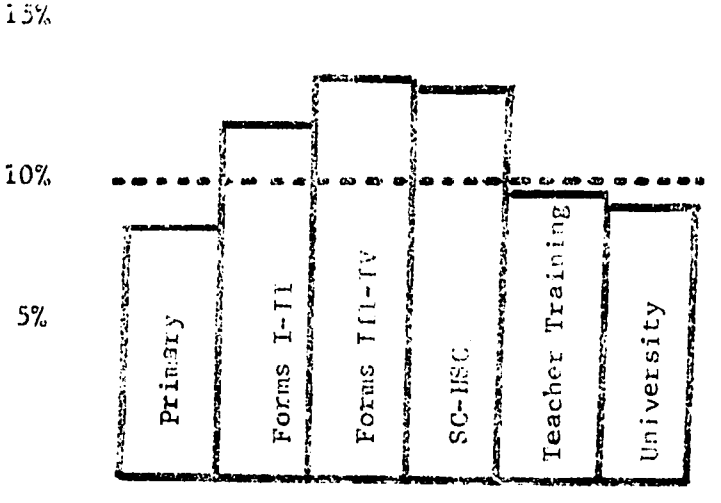
Social Benefit/Cost Ratios in Education
West Malaysia, 1967-68

	Marginal			Cumulative		
	Discount Rates			Discount Rates		
	5%	10%	15%	5%	10%	15%
Unschooled	1.96	0.71	0.34			
Primary	5.46	2.15	1.07	1.96	0.72	0.34
Forms I-II	4.95	2.02	1.06	2.93	1.06	0.49
Forms III-IV	3.37	1.41	0.75	3.48	1.28	0.59
SC-HSC	1.14	0.59	0.37	3.45	1.31	0.62
University	1.57	0.78	0.54	1.99	0.92	0.50
Teacher Training*				2.67	1.12	0.59

*As compared with SC-HSC

Figure 2

Cumulative Internal Rates of Return[1]



[1]Here, as elsewhere, the internal rate of return is employed for its convenience in illustration. Its shortcomings as a decision rule in resource allocation are well known, and it is not intended to be used as such.

rate is in fact 15%, only Forms I-V remain interesting--and they are marginal. Government has the possibility of influencing these returns through several instrument variables. The most obvious ones on the benefit side are labor force participation and employment rates. But even if rural participation rates after the end of schooling years could be raised to urban levels, and female rates could be shifted (marginally) upward to, say, half those of males, the results would have a negligible effect on the benefit stream. Similarly, plausible reductions in unemployment for the age group 15-24 would have only marginal effects. In any case, participation rates--rural or female--cannot be raised without a prior decline in unemployment rates, and the intermediate term prognosis for Malaysia is increase, not decline. On the cost side the only real possibilites are marginal reductions in wastage and in-school costs, and the results here would also be insignificant--except at the university level: if the direct cost spread between secondary and higher education in Malaysia could be brought approximately in line with those elsewhere, the result would be to raise university benefit/cost ratios to around 2.4, 1.2, and 0.9 when discounted at 5%, 10%, and 15%, respectively.

A transition from social to private accounting substantially alters the above picture. The use of private costs--essentially this means dropping in-school and wastage costs from the total--cuts expenses in half for most levels, and markedly raises benefit/cost ratios for the individual. (See Appendix Table 9.) All levels and types of education --

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[1] As in the case of the income streams, total returns can be broken down into four subsets distinguished by sex and residence. The variable

with the possible exceptions of university "agriculture" and "all other"--then give returns in excess of 10%, with returns to secondary running about twice the estimated marginal productivity of capital. But student perception of the economic returns to education will almost inevitably be even more optimistic (and less rational) than the foregoing: in most cases it will consist simply of a rough weighing of private costs against expected gross income, with no factoring for non-educational determinants or for the probability of actually achieving that income. In these beguiling terms, the returns to education appear little short of phenomenal (see columns 3 and 6 of Table 4). And the attractiveness of this investment for the individual is further enhanced by non-economic benefits such as status, student lifestyles, etc.

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factors are participation and employment rates, and (education-associated) income foregone. The last two make negligible differences in the subsets, and participation rates do not have large urban-rural income effects; but there are significant male-female differences (see Table 6). These are not operationally important for net social returns, since the government is not going to introduce discrimination by sex into its schooling policies simply because female rates of return are inferior to those for males; but the differences are meaningful for the net private returns, since they will/should affect students'

Male-Female Differences in Education/Associated Income

	Years of Schooling	6	8	10	12	16
Incremental Internal Rate of Return	Male	15.0	24.6	24.4	19.8	15.2
	Females	10.8	17.4	16.8	13.2	7.6

perceptions of the probable reward to continued schooling at any particular level.

Table 4

Internal Rates of Return to Education
West Malaysia, 1967-68

	Marginal			Cumulative		
	Net Social	Net Private	Gross Private	Net Social	Net Private	Gross Private
Unschooled	8.2	12.9	29.5			
Primary	15.6	21.1	61.5	8.2	12.9	29.5
Forms I-II	15.3	18.9	65.0	11.9	17.0	45.5
Forms III-IV	12.8	15.6	55.3	13.0	17.6	52.0
SC-HSC	5.8	11.4	37.2	13.0	17.1	52.8
University	6.0	49.8	n.a.	11.6	16.0	49.7
Teacher Training*				11.6	23.6	n.a.

*As compared with SC-HSC

Impressive private returns notwithstanding, we have seen the estimates of social profitability to be much more modest; and it is necessary to keep in mind the implications of recent enrolment trends for these returns. The rate of expansion in primary education has reflected only population increase for a decade, since the enrolment ratio approximates "universal" primary schooling; there is reason neither to expect it to change nor to attempt significant change, hence there is no expectation of a supply-induced shift in returns in the foreseeable future. But the situation is very different elsewhere. At the secondary level there has been a

recent, rapid expansion of enrolments, (they doubled during 1962-67), one which is not yet finished. Further, the highest unemployment rates, already in 1962 but increasingly in 1967, are clustering around those with approximately an LCE level of education.[1] Given the undifferentiated nature of skills at this level, the combination of high returns and high unemployment is inherently unstable. The probability of declines in social profitability is of course greatly reinforced by continuation of this expansion--which also has implications for returns elsewhere. The lesson of other countries is that significant expansion at any level creates inexorable social pressures for expansion at the next highest level. Hence the situation is even less promising at the university level for social returns are already mediocre, recent expansion has been rapid, (enrolments tripled during 1962-67), and will undoubtedly accelerate with the opening of the university college at Penang and the new National University. Even a dynamic economy rapidly deepening its technological base could not readily absorb supply changes of these magnitudes.

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[1]The data available at present are very unsatisfactory, but there is little doubt on the conclusion above.

	Unemployment Rate 1962	% Growth in Absolute Numbers Unemployed, 1962-1967
No formal	3.8	- 8
Primary only	7.9	75
LCE, less than SC	17.4	131
SC and above	9.8	50

Source: Socio-Economic Survey (Provisional data)

Summary and Main Conclusions

In recapitulating the various elements of the data examined above, we will also note some of their main implications. The transformation of the income-education data to remove autocorrelation effects in the regressions also reduced the estimated income differentials between urban and rural areas, and between males and females. By international standards, the disparities which remain are not at all extreme, particularly the urban-rural one. A small subsistence sector, the continuing importance of Malaysia's principal export (rubber) to rural incomes, government transfer payments, etc., all combine to hold the differential somewhat below those found in other countries. But the racial situation is such that these (relatively small) urban-rural income level imbalances are not considered tolerable, even in the short run.

The transformation had the further effect of eliminating age/experience as a significant explanatory variable. It was then shown that the income effects of age/experience were, in any case, highly correlated with the individual's educational attainment. This direct relationship has important social implications, given its meaning for the individual's economic prospects: not only do the less educated commence employment at lower salaries than the better educated in their age cohort, their incomes rise more slowly both absolutely and relatively. Non-educational factors apart, the main reason for this is a reinforcement of existing educational discrepancies by on-the-job

training programs whose intensity varies directly, not inversely, with prior scholastic attainment.[1] Since O-J-T is not, by and large, remedial training in distributional terms, it is unsurprising that individual incomes never recover, ceteris paribus, from the effects of early educational deprivation. This implies that even if intelligence, motivation (and similar characteristics presumably important in shaping the effects of experience on income) are not perfectly correlated with school attainment--and they certainly are not in any country with the urban-rural discrepancies in opportunity which exist in Malaysia--they cannot overcome the (O-J-T reinforced) income effects of educational deprivation. These conclusions cannot be turned into an economic justification for broadening educational privilege without also considering costs, but their importance to distributional questions is already evident.

The test for homogeneity of variance proved negative as it is possible to observe in the unweighted pattern of the error terms a strong heteroscedastic condition in which variance increases with years of education. (When weighted by frequency, the importance of this variance largely disappears.) This implies that while the residual variable education is a good "explanation" of cash income levels for those with little education, it is insufficient for those with relatively more.[2] The inclusion of age/experience as an independent variable

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[1] Jacob Mincer, "On-the-Job Training."

[2] This may also be seen in the pattern of $\bar{R}^2$'s when income is regressed on age for the different levels of education, i.e., they are seen to vary inversely with education.

does not alter the situation, which simply confirms again that important explanatory variables have been omitted. While it would be more than presumptuous to state how the effects of unknown variables are distributed, the pattern of variance does suggest these effects are positively correlated with educational attainment, i.e., intelligence, motivation, etc., do not appear to be randomly distributed among people with differing educational attainment. But--and this is more important to the present analysis--the heteroscedastic condition is common to all the sub-groups we distinguish. In other words, the (effects of the) omitted variables do appear to be randomly distributed by sex and urban-rural residence, (for the latter read Chinese-Malay). Extending this analysis further, it may be argued that education "explains" income so well at the lowest levels of attainment in part because of high intercorrelation among all relevant explanatory variables here, but mainly because this is a group whose occupational options are very limited, and in these terms extremely homogeneous.[1] This points to the importance of occupation as an explanatory variable for income, at least in LDC's like Malaysia where there is a sharp urban-rural dichotomy in occupational structures.[2]

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[1]It would be difficult to explain this as a quirk of multicolinearity, since primary education is so widely held.

[2]The work force does not, in other words, constitute the perfectly competitive, homogeneous group assumed by the rate of return approach. For an illustration of the effect of occupation on income (with education held constant) in a low income country, see K. H. Stroup and M. B. Hargrove, "Earnings and Education in Rural South Vietnam," Journal of Human Resources, vol. IV, no. 2, pp. 215-225.

The effects of occupational differences are captured in part by the dummies for residence and sex--which otherwise have little meaning--though not with precision or in detail.[3]

The series of regressions without dummy variables showed that the education-income coefficients for different sex and residence groups were really very similar, but that average incomes in the four groups nonetheless varied by a factor of 7 from highest to lowest. The wide range is attributable in part to differing (average) education levels, and in part to divergent occupational structures which have dissimilar productivity. While the latter could also imply quality differences stemming from the education given the workers, the only such difference we have identified explicitly--differences in course offerings--would have its principal effect on occupation pursued, rather than upon intraoccupation productivity. In any case, even if the incremental value of a year of education is not much less for rural dwellers than for urban ones, it is less and offers no promise by itself of reducing the income gap. In consequence, rural

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[1]The increased variance at higher levels of education, insofar as it is not attributable to the effects of O-T-J and declining intercorrelation, also reminds us that higher education enables these people to transcend the stochastically explanatory power of education alone, to take advantage of income differentials (in occupations requiring the same amount of schooling) which are taste-dictated--as well as those resulting from outright market imperfections. But this is not the same thing as agreeing with the common practice of ascribing the ability to take advantage of these differentials essentially to

dwellers (and females) find themselves disadvantaged educationally and occupationally, commencing employment at wages inferior to urban ones for comparable education, and falling increasingly further behind over time--as the subsequent regressions of income on age graphically demonstrate.

The data on labor force participation rates serve to reinforce a number of points made earlier. The age group 15-19 reflects the higher school enrolment ratios of urban areas; and the relatively sharper drop in urban participation between 55-59 and 60-64 is due to decreasing activity in this more affluent group--a luxury rural workers can less afford. The fact that better educated urban females have generally lower participation rates than their rural counterparts also suggest that--in Malaysia--the "economic whip" is still a more powerful influence than the "women's liberation" movement.

The data on unemployment make clear that rates are consistently higher for younger people, whatever their educational attainment. (In a soft labor market, the first job is especially difficult to obtain.) Equally important, the highest rates seem to

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the relatively greater occupational flexibility of the more highly educated. Flexibility does not vary directly, but inversely, with specialization, which in turn tends to vary directly with educational levels, i.e., flexibility tends to vary inversely with education. This is the basic explanation of the relative smoothness in the Malaysian market for poorly educated people whose undifferentiated skills are readily substitutable. Once the tasks and skills become differentiated, i.e., increase in complexity, substitutability decreases and market imperfections inevitably accompany this increased complexity. Concomitant with these market imperfections is the increased variance noted.

cluster around the middle of secondary education. Unlike the pattern in developed countries where there is a reasonably linear, direct relationship between education levels and employment rates, this is the familiar bulge of unemployed which typically works its way from bottom to top in the education system--in lagged response to the rapid expansion of enrolments at a given level. The frequency of this phenomenon throughout the third world is due less to a near-universal mismatching of supply and demand for various levels of training, than to slow adjustments in the employment expectations of individuals; job expectations tend to reflect the experience of the previous rather than the present generation of students, and when expansion is rapid these expectations cannot realistically coincide. The location of the bulge in Malaysia takes on added significance since it predates the really rapid expansion of secondary enrolments that occurred in the middle 1960's; further, it coincides with the level of education for which the greatest latent demand (social, not economic) exists at present. We may also note that rates by age group run slightly higher for women than men, but climb to 2-3 times as high in the breakdown by education level. Together these facts imply that there are relatively few educated women seeking employment, and those who do seek it encounter far greater difficulty than men (with predictable implications for the economic return on investment in educating women).

The section on educational costs made clear that "free" (primary) education is not free at all, due to inevitable out-of-pocket costs for transport, uniforms, minor fees, etc. Their magnitude is not fully appreciated in a country grown accustomed to regarding the first nine years of education as essentially free, but the relatively greater burden these costs impose on the poor explains at least part of the (volitional) lag of rural behind urban enrolment ratios, particularly for girls where the probability of some economic payoff is thought very low. The other notable finding of this section is the leap in direct per-pupil costs between secondary and tertiary level schooling. The relative costliness of higher education does not have straightforward distributional effects since half the students--and virtually all Malays--are on scholarships, but this spread does suggest considerable scope for economies in Malaysia. The most likely area is in residential facilities, which now house virtually all students.[1]

In combining discounted benefits and costs we learned that returns to secondary education are substantially higher than those to either primary or tertiary, and that social returns to the latter two are beneath the estimated marginal productivity of capital. The policy of universal primary schooling implies, therefore, an economic "misallocation"

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[1]At the same time, it should be recalled that the omission of O-J-T costs means that total expenses have been systematically understated throughout, but particularly for university graduates.

of resources of about M$65 million (in 1967), or just under 3% of the government budget. The amount is substantial and there are recurring attempts to economize, but there is no question of the government's willingness to continue foregoing significant financial returns for the social benefits it perceives in universal primary education. Since the first six years of education can effectively be treated as sunk costs, both marginal and cumulative returns would recommend continuing the individual's education up to the university level, at which point the marginal return declines so precipitously that the cumulative benefit-cost ratio (at 10%) falls beneath one. If the appropriate discount rate were in fact only 5%, all levels of education would offer attractive investments. But--in the more likely case--if the rate is nearer 15%, only Forms I-V remain interesting--and they are marginal, the subsidy for Standards 1-6 becomes a much more costly drain ($M145 million annually), and university training a very questionable investment.

When this social accounting is converted to a private basis--by omitting costs paid by the state--the rates of return nearly double and the individual who remains in school through the completion of primary, as the vast majority do, is given a strong incentive to remain right up through Sixth Form (13 years). The distributional impact of public enrolment policies is immediately apparent, for government is subsidizing willy-nilly the return to a restricted group of continuing students--whose overall numbers presumably have been limited in the interests of an economically rational allocation of public resources. Equity factors would

recommend a much more explicit treatment of such a crucial matter than merely having a general government policy of gradual improvement in accessibility to secondary school facilities in the countryside.

When private costs are weighed against the gross benefit stream, as some planners and most individuals would do, the apparent returns become quite extraordinary. Education emerges as the most attractive investment virtually any individual could contemplate, particularly since the return on an alternative investment may well be only 5-10% for most people. The employed person would, on the average, recoup his entire outlay on primary schooling in less than three years, and the returns are roughly twice as high for secondary schooling. Even the incremental cost of university education could be paid off in little more than two years. While the individual would not be expected to have a detailed picture of these prospects, even a rough outline is sufficient to explain the aggressive popular demand for a continued rapid expansion of post-primary educational facilities.[1]

But despite the frequency with which such a formulation of costs and benefits is employed by planners, it remains an imprecise (and misleading) statement of the relationship between education and income, and has very little

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[1]Government is pushed further in the direction of expansion by considerations of external economies to educational investment. Non-monetary and spill-over benefits, Weisbrod's "avoidance costs," the utility of an informed electorate, etc., are among these. (See B. A. Weisbrod, External Benefits, which considers such things as decreased costs of protection against crime, disease, and the like.) In addition, the schools--as one of the two main tutors in the socialization process--are of critical importance in the future maintenance of racial tolerance in Malaysia. Alternatively, the schools can also inculcate racial disharmony, disdain for manual labor, create a revolution-minded elite, etc. (See T. Balogh and P. P. Streeten, "The Coefficient of Ignorance," Bulletin of the Oxford University Institute of Economics and Statistics, May 1963, pp. 99-107.)

relevance for public resource allocation decisions. The operationally relevant set of returns in the present context, net social returns, is much lower and is threatened with the strong probability of near-term declines in consequence of the continuing, rapid expansion of both secondary and tertiary level enrolments. In fact the whole structure of social returns will very probably lie beneath the estimated marginal productivity of capital in the near future.

The principal implications for policy which emerge from this consideration of economic demand for educational investment are as follows:

1) The social return to primary level schooling is quite probably beneath the marginal productivity of capital, but the implied subsidy is not extreme for a developing country which has achieved nearly universal primary education--and there is no expectation of a supply-induced depression in the return. Beyond a continuing search for more efficient means of student production, no changes in current policies appear compelling in economic terms (much less in joint socio-economic ones).

2) The present high social returns to secondary education appear unstable, and a diminution in the rate of expansion is in order--particularly since expansion here inevitably creates public pressure for expansion at higher levels. (If the government's commitment to unrestricted entry for lower secondary is considered inviolable at present--and marginal returns are highest here in any case--school fees could be raised selectively.) At the same time, private returns will remain high and equity would suggest redistribution of a stabilizing

level of resources toward the educationally underprivileged. In short, the reduced medium-term increments in public secondary schooling might cater almost entirely to the rural school population, particularly the growth in scientific/technical schooling. Insofar as rural enrolment ratios lag because these (poorer) areas have less capacity for absorbing routine "out-of-pocket" costs, such expenses could be subsidized. (One result of all this would undoubtedly be expansion of private, urban secondary facilities. This too could be encouraged on the same general--but admittedly rougher--equity grounds, as could the provision of more training by modern sector firms benefitting from publicly financed vocational schooling.)

3) The social return to university education is already poor, and there is good reason to expect it will deteriorate further during the next few years in the face of rapidly expanding enrolments. Selective expansion (i.e., certain scientific faculties) could continue, but humanities enrolment should be curtailed; and the analysis suggest that any general expansion of enrolments should be permitted only within the framework of constant total costs, i.e., with declining unit costs. Again (private returns and) equity considerations suggest discrimination in favor of the rural population, principally in scientific/technical faculties where they have been systematically handicapped by the urban concentration of such secondary level facilities. As in the case of secondary schooling, efforts should be made to shift a greater part of costs to individuals who can afford it by simultaneously manipulating fees and scholarships.

The main thrust of a general strategy for educational investment at this juncture should flow from the realization that Malaysia is, or soon will be, overinvesting in education from an economic point of view. Some part of the overinvestment in post-primary education may be justified in wholly non-economic terms, but its principal rationale will remain distributional economics since (gross) private returns are so much higher than (net) social ones. However, this combination suggests government should examine carefully its role in the financing of educational investment in an effort to insure that private returns do not greatly exceed social ones except where this income transfer is sought explicitly--and in practice this will mean in the countryside. Simultaneously, government should be striving to restructure the economy itself in a way that reduces the regional cum racial imbalance. In the context of this paper that means reducing the discrepancies in returns attributable to non-educational income determinants other than ability, for the main such discrepancy measurable at present is the "residence effect," which is basically a proxy for differences in urban-rural occupational structures--with a socially corrosive racial correlation. Widened educational opportunity is of course a necessary (but not sufficient) condition for this restructuring of the economy. However, the primary effect of the widened opportunities will not be upon economic growth--which it may even slow--but upon individual economic opportunity and equity. This is the principal conclusion of the paper.

APPENDIX Table 1

GDP BY STATE AND POPULATION BY STATE AND RACE, WEST MALAYSIA 1965

	Malay share of population (in %)	GDP per capita ($)	Population by race (in thousands				
			Malay	Chinese	Indian	Other	Total
FOUR NORTHERN STATES	80	459	1688	269	103	40	2100
Trengganu	92	449	350	23	5	1	378
Kelantan	91	369	620	38	8	13	679
Perlis	76	536	91	21	2	4	118
Kedah	68	518	627	187	88	23	925
THREE SOUTHERN STATES	51	762	1095	833	161	44	2133
Pahang	55	985	243	146	31	5	425
Johore	50	729	645	525	97	31	1298
Malacca	50	638	207	162	33	8	410
FOUR WESTERN STATES	35	1085	1510	2014	681	103	4308
N. Sembilan	42	901	216	204	77	13	510
Perak	40	891	658	713	240	26	1637
Selangor	30	1493	419	668	274	48	1409
Penang	29	870	217	429	90	16	752
TOTAL WEST MALAYSIA	50	850	4293	3116	945	187	8541

Appendix Table 2

VALUE ADDED AND EMPLOYMENT BY INDUSTRY AND RACE IN WEST MALAYSIA 1967

Industry (Activity)	ALL RACES COMBINED			EMPLOYMENT					
				Malays		Chinese		Indians	
	Value added ($ million)	Total Employment (000)	Value added per worker ($)	in thousands	in % of all employed	in thousands	in % of all employed	in thousands	in % of all employe
Forestry, Agriculture and Fisheries	2,155	1,426	1,500	967	68	301	21	146	10
Forestry	117	37	3,200	16	43	21	57	-	-
Rubber estates	665	232	2,900	62	27	67	29	100	43
Rubber smallholdings	444	503	900	318	63	152	30	33	7
Other agriculture and livestock	771	592	1,300	525	89	15	8	13	2
Fishing	188	62	3,000	46	74	16	26	-	-
Mining, Manufacturing and Construction	1,762	358	4,900	82	23	245	68	27	8
Mining and quarrying	562	69	8,100	20	29	41	20	7	10
Manufacturing	860	222	3,900	42	19	161	72	17	8
Construction	340	67	5,100	21	31	43	64	3	4
Commerce	1,249	388	3,200	69	18	246	63	65	17
Public Administration and Defence	505	207	2,400	158	76	21	10	23	13
All Other Activities	1,438	419	3,000	138	33	192	46	78	19
Electricity, water and sanitary services	160	23	7,000	9	40	6	26	7	30
Transport, storage and communication	268	92	2,900	38	41	34	37	19	21
Other services	1,010	304	3,300	91	30	152	50	52	17
All Industries	7,109	2,798	2,500	1,415	51	1,005	36	342	12
Malay dominated industries: (rubber smallholdings, non-rubber agriculture, livestock and fishing; public administration and defence)	1,878	1,364	1,400	1,048	77	234	17	72	5
Non-Malay dominated industries: (all other)	5,231	1,434	3,600	367	26	771	54	270	19

Appendix Table 3

Public School Enrolment Ratios
- 1967 -

		Malay		Other		Total	
		M	F	M	F	M	F
Primary	Urban	95.0	92.0	96.8	88.1	96.2	89.3
	Rural	80.7	73.4	87.1	75.1	82.1	73.8
	Total	85.4	79.3	94.7	85.3	89.8	82.1
Lower Secondary	Urban	65.2	45.6	74.7	54.3	71.7	51.5
	Rural	50.4	32.2	58.3	36.4	52.3	33.2
		55.3	36.5	71.0	50.1	62.8	43.0
Upper Secondary	Urban	26.1	22.3	21.3	24.8	22.8	24.0
	Rural	14.1	9.4	15.3	16.5	14.4	10.9
	Total	18.1	13.5	20.0	23.1	19.0	18.0
Sixth Form	Urban	2.3	1.4	2.6	1.7	2.5	1.6
	Rural	1.4	0.5	1.7	0.7	1.4	0.5
	Total	1.7	0.8	2.4	1.6	2.0	1.2

Sources: All population data are from specially prepared estimates of the Department of Statistics. All enrolment data are from special tabulations of the EPRD, Ministry of Education. But the reliability of the two sets of data from which the ratios are derived is rather uneven. The enrolment data are undoubtedly the most reliable of the lot and are, even in an absolute sense, probably quite good. The total population estimates are thought reliable, but the size of the Malay age cohorts appears consistently underestimated in 1967, which means the relative enrolment position of the Malays is consistently overstated, and very probably the aggregate ratios as well.

Appendix Table 4

Income Differences by Sex and Location
West Malaysia, 1967-68

	(1) N	(2) $\bar{R}^2$	(3) F	(4) Education Coefficient	(5) Income Increment 6-9 years	(6) Intercept	(7) Av. Ed.	(8) Average Income
Urban Males	45	0.57	58.8	48.75 (6.36)	2193.75	650.16 (477.60)	6.0	2405.16
Urban Females	41	0.40	27.9	41.64 (7.88)	1873.80	238.32 (525.60)	3.2	664.71
Rural Males	45	0.70	105.3	46.41 (4.52)	2088.45	-128.52 (256.80)	6.0	1542.24
Rural Females	35	0.41	24.4	36.05 (7.28)	1622.25	38.64 (326.40)	3.0	363.09
Grand totals	166	0.60	247.8	48.39 (3.07)	2177.55	70.97 (193.20)	6.0	1812.96

Appendix Table 5

Age-Income Regressions by Education Level

	Constant[1]	Age	Age^2	n	$\bar{R}^2$	F
Unschooled (3 years)	244.30 (42.38)	3.98 (1.95)	-0.06 (0.03)	40	0.36	3.53
Primary (6 years)	1230.75 (1870.44)	35.65 (4.90)	-0.36 (0.06)	40	0.92	54.2
No LCE (8 years)	1813.30 (245.80)	129.83 (9.63)	-1.35 (0.12)	40	0.97	146.3
No SC (10 years)	2521.35 (837.93)	260.62 (55.22)	-2.77 (0.68)	40	0.80	19.4
SC-HSC (12 years)	3367.30 (1200.03)	410.72 (94.61)	-4.34 (1.20)	40	0.80	19.2
Post secondary (14 years)	4081.15 (3362.87)	636.86 (176.20)	-6.79 (2.18)	40	0.68	10.6
University (16 years)	5618.30 (6614.42)	820.67 (285.20)	-8.79 (3.47)	40	0.54	6.2

[1]To facilitate comparison, the constant has been moved from the intercept to age 15, i.e., to "starting salary," and the standard error appropriately adjusted by the t-ratio. The comparison is of course artificial for people with more than 10 years of schooling.

Appendix Table 6

Labor Force Participation Rates
West Malaysia, 1967/68

	Urban			Rural			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
15-19	.514	.332	.423	.633	.388	.511	.580	.368	.471
20-24	.901	.468	.684	.933	.458	.696	.922	.461	.684
25-29	.981	.348	.664	.969	.434	.702	.974	.403	.679
30-34	.984	.288	.636	.969	.512	.741	.974	.439	.700
35-39									
40-44	.975	.284	.630	.957	.546	.752	.963	.462	.713
45-49									
50-54	.878	.253	.566	.860	.440	.650	.866	.378	.630
55-59									
60-64	.650	.191	.420	.723	.287	.505	.699	.255	.494
All Ages	.837	.326	.582	.870	.455	.663	.859	.413	.633

Source: Department of Statistics, Malaysia Socio-Economic Sample Survey of Households.

Appendix Table 7

Estimated Unemployment Rates by Age, Sex and Education
West Malaysia 1967

	Unschooled			Primary			No LCE			No SC			SC-HSC			University			Teacher			All Levels		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
15-19	7.8	11.1	9.9	16.9	19.7	17.8	24.3	55.1	32.1	33.2	63.9	45.2	50.1	64.7	54.9	-	-	-	Negligible			18.2	20.2	19.1
20-24	5.1	5.7	5.5	6.4	15.0	8.5	10.3	24.2	13.1	18.2	30.0	21.5	25.6	25.4	25.5	3.1	4.4	3.?	"			8.4	12.3	10.1
25-29	4.1	5.5	4.8	3.6	8.1	4.4	5.0	17.4	6.5	4.5	12.5	6.7	5.4	7.0	5.3	3.0	2.2	2.9	"			4.0	6.6	5.1
30-34	2.4	4.0	3.3	2.6	6.8	3.1	4.2	18.8	5.5	4.2	6.6	4.5	2.4	7.0	3.0	0.4	-	0.4	"			2.6	4.5	3.4
35-39	2.4	4.0	3.3	2.6	6.8	3.1	4.2	18.8	5.5	4.2	6.6	4.5	2.4	7.0	3.0	0.3	-	0.3	"			2.6	4.5	3.4
40-44	2.2	3.5	2.9	2.2	6.5	2.5	5.2	16.1	5.5	5.0	4.2	5.5	2.4	-	0.2	-	-	-	"			2.3	3.7	3.0
45-49	2.2	3.5	2.9	2.2	6.5	2.5	5.2	16.1	5.5	5.6	4.2	5.5	2.4	-	0.2	-	-	-	"			2.3	3.7	3.0
50-54	3.2	3.3	3.?	2.9	2.2	2.9	7.8	39.6	8.3	8.7	-	0.9	4.8	11.0	5.0	0.1	-	-	"			3.3	3.3	3.3
55-59	3.2	3.3	3.2	2.9	2.2	2.9	7.8	39.6	8.3	8.7	-	0.9	4.8	11.0	5.0	0.1	-	-	"			3.3	3.3	3.3
60-64	5.5	4.2	5.1	2.0	-	0.2	14.3		1.4	9.8		1.0	8.9		0.9	-	-	-	"			4.5	4.1	4.4
All Ages	3.4	4.7	4.1	5.8	14.1	7.3	10.3	34.9	14.0	12.0	32.2	16.3	13.3	25.1	15.4	n.a.			"			5.7	8.7	6.9

Appendix Table 8

Retention Rates by Education Level and Medium
West Malaysia, 1960-67

	Malay			English			Chinese			Tamil			Total		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Primary	87.7	80.1	84.0	98.5	98.6	98.5	98.2	74.0	81.2	72.9	53.1	62.2	89.7	80.8	85
Forms I-II	95.6	96.6	96.0	97.8	100	98.8	-	-	-	-	-	-	97.0	98.6	97
Forms III-IV	(negligible dropouts)			(negligible dropouts)			-	-	-	-	-	-	(negligible dropouts)		
SC-HSC	"			"			(negligible dropouts)			(negligible dropouts)			"		
University	-			n.a.			-			-			n.a.		
Teacher Training	(negligible dropouts)			(negligible dropouts)			-			-			(negligible dropouts)		

Source: Ministry of Education (EPRD), Educational Statistics.

Appendix Table 9

DISCOUNTED PRIVATE BENEFITS AND COSTS (INCREMENTAL)
West Malaysia, 1967/68
(Malaysian Dollars)

		5%	10%	15%	Internal Rate of Return
PRIMARY	- Benefits	3703	1159	474	12.9%
	Costs	858	736	640	
	Ratio	4.3	1.6	0.7	
FORMS I-II	- Benefits	3971	1108	395	21.1%
	Costs	405	287	205	
	Ratio	9.8	3.9	1.9	
FORMS III-IV	- Benefits	4812	1250	415	18.9%
	Costs	657	419	273	
	Ratio	7.3	3.0	1.5	
SC-HSC	- Benefits	4889	1197	370	15.6%
	Costs	974	571	343	
	Ratio	5.0	2.2	1.1	
UNIVERSITY	- Benefits	9775	2524	819	11.4%
	Costs	4354	2183	1131	
	Ratio	2.3	1.2	0.7	
Engr.	- Benefits	15610	3920	1220	13.4%
	Costs	5670	2780	1410	
	Ratio	2.8	1.4	0.9	
Med.	- Benefits	21470	5020	1450	12.4%
	Costs	8130	3820	1870	
	Ratio	2.6	1.3	0.8	
Agri.	- Benefits	10580	2630	820	9.8%
	Costs	5670	2780	1410	
	Ratio	1.9	0.9	0.6	
All Other	- Benefits	5350	1340	430	6.3%
	Costs	4350	2180	1130	
	Ratio	1.2	0.6	0.4	
TEACH.TNG	- Benefits	5622	1561	623	49.8%
	Costs	691	387	221	
	Ratio	8.1	4.0	2.8	

Appendix Table 10

CHOOL ENROLMENT INCREASES, 1962-67
West Malaysia - Public and Private

	1962	1967	Percent Increase 1962-67
Primary	1,160,243	1,323,924	14
Lower Secondary	157,935	370,062	134
Upper Secondary	40,211	86,638	115
Colleges			
Form Six	2,095	6,209	196
Teacher Training	7,444	9,939	34
Technical	509	752	48
Agricultural	82	437	433
MARA	153	551*	260
University	1,341	4,560	240
Engineering	226	327	44
Medicine	---	389	∞
Agriculture	74	202	173
All Other	1,041	3,642	250

*1966

Source: Ministry of Education (EPRD), Educational Statistics of Malaysia, 1938 to 1967, Dewan Bahasa dan Pustaka, Kuala Lumpur, 1969,