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General Versus Vocational Secondary Education
in Developing Countries:
A Review of the Rates of Return Evidence

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Preliminary material and interim research results circulated to stimulate
discussion and critical comment

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**GENERAL VERSUS VOCATIONAL SECONDARY EDUCATION IN DEVELOPING
COUNTRIES: A REVIEW OF THE RATES OF RETURN EVIDENCE**

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I. INTRODUCTION

The 1995 World Bank Education Sector Review reaffirms the Bank's policy commitment to general (academic) education at both the primary and lower secondary levels and its policy aversion to supporting school-based vocational education in either its pure or diversified forms. The Review states that "comparative evaluations of earlier, more differentiated, general and vocational secondary curricula indicated clearly that the rate of return was much higher to investments in general than in vocational secondary education." (IBRD,1995:8). George Psacharopoulos' 1987 article, "To vocationalize or not to vocationalize? That is the curriculum question" is cited as the key supportive reference for this emphatic and authoritative statement (see Psacharopoulos, 1987).

It is clear that, as a high profile, quasi-political policy document, a key objective of the Review is to provide intellectual justification for the Bank's current set of lending priorities for the education sector. With respect to vocational education and training (VET), the prevailing orthodoxy is that this is best delivered to workers once in employment by enterprises themselves (ie. on the job training) with private (rather than public) sector training institutions taking the lead in providing formal, off the job training where this is necessary. It is well to recall, however, that as recently as the late 1970s, Bank funding for VET projects exceeded that for both primary and secondary schooling, accounting for nearly 30 percent of total lending to the education sector. However, with the fairly decisive shift in Bank education lending priorities that occurred from the early 1980s onwards, support for VET tailed off quite rapidly. Thus, by 1990-94 the share of VET in total education sector lending had fallen to little more than five percent. Furthermore, with the Bank playing an increasingly dominant "leadership role" (*ibid*:112), support for VET from many of the other major aid donors has also declined.

Very similar, albeit more qualified, conclusions about school-based vocational education are reached by the principal authors of the World Bank's 1991 Sector Policy Paper on VET. "A large empirical literature has developed over the last twenty-five years arguing strongly against vocational schooling on cost-benefit grounds. This literature, which compares labour market outcomes in earnings and employment of vocational schooling with general schooling, mainly at the secondary level, has been extensively reviewed by Zymelman (1976), Psacharopoulos

(1987) and Tilak (1988)" (Middleton et al, 1993:50). While accepting that, when "certain favourable conditions" exist, vocational education can be more socially profitable than general education, "more frequently" these conditions do not prevail in most developing countries. Consequently, "strengthening general education at primary and secondary levels is the first priority for public policies to improve the productivity and flexibility of the workforce" (ibid:202).

The purpose of this short article is to examine critically the current orthodoxy concerning social rates of returns to general and vocational secondary education in developing countries. Since George Psacharopoulos has been the prime mover in establishing this orthodoxy, we shall focus in particular on the rates of return (henceforth ROR) evidence that he has brought to bear in support of the basic proposition that the social profitability of vocational secondary education is generally lower than for general secondary education. In addition, however, the evaluations of Zymelman and Tilak will also be scrutinised (in chronological order) as well other, generally more recent comparative ROR studies that either were not or could not have been included in these three evaluations.

It must be emphasised at the outset that the main objective of this paper is to review research that makes explicit comparisons between the costs and benefits of (specialist) vocational and general secondary education in any one country. There are many other studies of school-based vocational education in its wide variety of forms in developing countries which do not, however, attempt to compare in a systematic and rigorous manner the relative social profitability of general and vocational secondary education. Thus, while some of these studies do derive social and/or private RORs to specialist vocational secondary education (see, for example, Bennell, 1993 (Zimbabwe); Grootaert, 1988 (Cote d'Ivoire); Paul, 1990 (Togo and Cameroon); IBRD, 1990 (Bangladesh)), no equivalent RORs to general secondary education are presented. As will be discussed in more detail below, it is methodologically incorrect to use these ROR estimates in any comparative overview.

II. ZYMELMAN

In his 120 page World Bank monograph, "The Economic Evaluation of Vocational Training Programmes," Manuel Zymelman is unable to arrive at any firm conclusions concerning the relative efficiency and effectiveness of general and vocational secondary schooling. More specifically, his review of the five relevant comparative studies in the United States concluded that their findings were "contradictory" (Zymelman, 1976:107). While RORs to vocational

secondary education were higher in two of the studies, two others reached diametrically opposite results, and the remaining study found no difference in RORs.

Zymelamn was able to locate only two comparative ROR studies for developing countries, namely Jordan and Malaysia. The Jordanian study by Al-Bukhari is based on cost and benefit data from just two industrial schools for the period 1962-65. While 86 percent of the 360 graduates were successfully located, only 90 were "accessible" and were able to be interviewed. Sample selectivity bias is likely, therefore, to be a major problem.¹ Al-Bukhari derives benefit-cost ratios that are highly favourable for general academic schooling. However, quite unjustifiably, he excludes all opportunity costs in calculating these ratios. When these are included, the RORs (based on the shortcut method) are virtually identical for the two types of schooling.

Lourdesamy's follow-up study of graduates of vocational schools in Malaysia provides more conclusive evidence in favour of academic schools (see Lourdesamy, 1972). The average starting salaries of graduates from the latter schools were higher, but unemployment rates and total costs were lower. However, the findings of just one study hardly provide strong evidence against school-based vocational education. Indeed, Zymelman himself admits that "the survey raised more questions than it answered" (*ibid*:5). In short, therefore, any reference to this particular evaluation in support of the proposition that vocational education is less socially profitable than general secondary schooling is quite unacceptable.

III. PSACHAROPOULOS

(i) Establishing the Orthodoxy

It is interesting to chart the development of George Psacharopoulos' (GP) views concerning the relative social profitability of general and vocational secondary education. In his first comprehensive international review of ROR research in 1973, he was only able to locate three country studies with social ROR estimates (Colombia (Schultz, 1968); Philippines (DeVoretz, 1969); and Thailand (Blaug, 1971)), the results of which were "conflicting" (Psacharopoulos, 1973:70). He concluded, therefore, that "the scarcity of case studies on this subject deters us from drawing any overall conclusions regarding the economic choice between secondary general and secondary vocational schooling" (*ibid*:70).² By the time of his 1985 Review, however, GP was able on the basis of evidence from just seven countries (Colombia, Cyprus, France, Indonesia, Liberia, Taiwan, and Tanzania) to reach the following unambiguous

conclusion: "Returns to investment in academic (general) curricula are greater on average than returns to specialised subjects" (Psacharopoulos, 1985:589). Aggregate RORs to these two types of education were reported as being 16.0 percent and 12.0 percent respectively.³

This conclusion was reaffirmed in GP's much cited 1987 article "To vocationalize or not to vocationalize? That is the curriculum question". In addition to the social ROR estimates discussed in the 1985 review, GP very briefly summarises the main findings of a number of other country evaluations. Among these is the Al-Bukhari study in Jordan with its problematic methodology and data. GP states that this study found that: "the vocational streams cost ten times more per pupil than academic schooling and that the cost benefit ratio for vocational graduates was 2:1 while for academic secondary graduates the ratio was 3:1. Other studies of vocational school programmes in Sri Lanka (Wijemanna and Welkala, 1975)⁴, India (Fuller, 1976), Barbados (Oxtoby, 1977), and Swaziland (Sullivan, 1981), **have shown similar results**" (op.cit.:1987) (bold added). An examination of these studies indicates, however, that none of them present any cost and benefit data for both vocational and general secondary education which could be used to compute ratios of this kind. Out of the total of 10 or so developing country studies referred to by GP that deal specifically with specialist (as opposed to diversified) vocational secondary education,⁵ apart from his own research in Colombia and Tanzania and the flawed Jordanian study, only one other publication from Mexico (Izquierdo and Rodriguez, 1980) actually uses cost-benefit analysis. It is significant to note also that, like Schultz before him, GP found no significant differences in social RORs between the two types of secondary education in Colombia.

(ii) The 1993 Global Update

In his most recent 1993 "global update", GP presents 32 sets of private and/or social RORs for academic/general and technical/vocational education from 24 countries which, he argues, "confirms the earlier (counter-intuitive) finding that the returns to the academic/general secondary school track are higher than the vocational track. The difference between the profitability of the two subjects is more dramatic regarding the social returns because of the much higher unit cost of vocational/technical education" (Psacharopoulos,1993:15). The aggregate social RORs to general and technical secondary education are reported in the text as being 15.5 percent and 10.6 percent respectively.⁶

As can be observed in Table 1, GP derives these aggregate social RORs to general and vocational secondary education simply by summing every available estimate and calculating the means. This is not methodologically acceptable for the following reasons:

(a) Social RORs to **both types of secondary education** are only available in seven out of the 22 developing countries listed in Table 1 (Botswana, Colombia, Indonesia, Liberia, Taiwan, Tanzania, and Venezuela). Including single (ie. isolated) estimates for any one country runs the grave risk of seriously biasing the means. For example, the social RORs to vocational secondary education in Cameroon, Cote d'Ivoire and Togo are relatively very low (6.9 percent, 3.9 percent, and 4.0 percent respectively). Simply excluding these three country estimates increases the aggregate social ROR to vocational secondary education from 11.7 percent to 12.9 percent. Since no corresponding social RORs to general secondary education are available for these countries, it is not possible to say how their inclusion would have affected the aggregate ROR figure for this type of education.

(b) GP includes multiple ROR estimates for single countries. Indonesia with five pairs of social RORs based on data spanning a 15 year period is the most notable example. Table 2 shows that using only the most recent estimates from the seven country studies that have social RORs to both general and vocational secondary education reduces the aggregate social ROR differential between them to barely two percentage points. Given the enormous margins of error involved in calculating RORs, this gap is simply too small to draw any firm policy inferences.

(c) The ROR estimates have been calculated using both the full method (Botswana, Indonesia, Taiwan, Venezuela) and short cut methods⁷ (Colombia, Liberia, Tanzania). Since they are not, therefore, strictly comparable, this undermines the overall validity of the aggregation process. Similarly, the extent to which individual incomes are adjusted to take into account a variety of other factors (besides the type and years of education) that have been found to have powerful independent effects on income determination varies considerably from one study to another. For example, the RORs in Botswana are largely unadjusted whereas those in Tanzania (computed by GP himself) have been adjusted downward to take into the independent influences of ability, socio-economic background and work/employment characteristics. Again, therefore, this renders the studies largely incomparable.

Table 1: Returns to secondary education by curriculum type

Country	Year	Academic/General		Technical/Vocational	
		Social	Private	Social	Private
Argentina	1989		12.3		11.0
Bolivia	1989		6.6		10.4
Botswana	1986	35.0		25.0	
Brazil	1980		12.0		10.0
Cameroon	1985			6.9	9.9
Canada	1980	9.5		2.0	
Chile	1989		9.4		13.1
Colombia	1981	9.1		10.0	
Costa Rica	1989		11.8		12.3
Cote de'Ivoire	1985			3.9	15.8
Cyprus	1975	10.5		7.4	
Cyprus	1979	6.8		5.5	
Dominican Rep.	1989		10.8		10.3
France	1970	10.1		7.6	
France	1977	8.1		5.4	11.0
Honduras	1989		19.8		28.1
Indonesia *	1978	32.0		18.0	
Indonesia	1982	23.0		19.0	
Indonesia	1986	19.0		6.0	
Indonesia	1986	12.0		14.0	
Indonesia	1986	11.0		9.0	
Liberia	1983	20.0		14.0	
Mexico	1984		12.4		12.3
Panama	1989		15.0		9.9
Peru	1985		6.0		5.9
Peru	1990		4.0		6.4
Taiwan	1970	26.0		27.4	
Tanzania	1982	6.3		3.7	
Togo	1985			4.0	6.3
Uruguay	1989		8.2		10.2
Venezuela	1975	14.3		17.6	
Venezuela	1984	10.5		12.0	
Venezuela	1989		8.9		13.1
Mean		15.5	10.6	11.7	10.5

Source: Psacharopoulos, 1993.

Notes: * Interestingly, Psacharopoulos excludes his own 1978 ROR estimates for Indonesia (see Psacharopoulos, 1984) which indicate that the social RORs to vocational education (at the upper secondary level) are 23.6 per cent compared with 19.0 per cent for general education.

Sample selectivity bias is another major concern which is likely to under-estimate the social and private RORs to school-based vocational schooling. In particular, where secondary enrolment ratios are low, more able students are usually attracted and are able to gain admission to general academic schools while less able, often poorer students are either streamed into vocational education or vocational education schools are chosen very much as a second best option. Thus, it is obvious that simply comparing the RORs of these two groups of individuals without explicitly controlling for background differences is likely to result in RORs to general secondary education that are biased upwards. Needless to say, almost all the ROR studies that have been undertaken are based on unadjusted comparisons of this kind.

Table 2 : Social RORs to general academic and vocational secondary education in developing countries (latest years)

Country	Year Data	Rates of Return	
		Academic	Vocational
Botswana	1986	35.0 (20.0)	25.0 (26.0)
Colombia	1981	9.1	10.0
Indonesia *	1986	12.0	14.0
Liberia	1983	20.0	14.0
Taiwan	1970	26.0	27.4
Tanzania	1982	6.3	3.7
Venezuela	1984	10.5	12.0
Mean:		17.0(14.8)	15.2 (15.3)

Source: Extracted from Psacharopoulos, 1993.

Notes: Shaded countries are where social ROR to general secondary education is not significantly greater than vocational secondary education (i.e. more than two percentage points).

Figures in parenthesis are corrected for mis-reported Botswana ROR estimates.

* Indonesia estimates are for males at the senior secondary level. Vocational education enrolments at the junior senior secondary level are insignificant (at 1.5 per cent of total enrolments).

A closer examination of Table 2 shows that taking the figures presented by GP at their face value, the RORs to vocational secondary education are higher in all four of the non-African countries (Colombia, Indonesia, Taiwan and Venezuela). The RORs for Liberia are based on very poor data collected during a short USAID evaluation mission in the early 1980s and

should, therefore, be treated with extreme caution (See USAID, 1983). The Botswana data are of a better quality but GP has incorrectly taken the ROR to upper secondary education (at 35 percent) as the comparator instead of junior secondary education (at 20 percent). Up until the mid 1980s when the Botswana study was undertaken, primary school leavers comprised the bulk of the intakes into the Brigades which have responsibility for vocational education. As Keith Hinchliffe, the author of this study points out, "the training alternative to junior secondary schooling is the Brigades" (Hinchliffe, 1990:403). Adjusting also for relatively low rates of unemployment (*vis-à-vis* school leavers) among Brigades graduates (which GP ignores) increases the RORs to vocational secondary education to 26 percent. Correcting this error and omission, the aggregate social ROR to vocational secondary education is 14.8 per cent, only fractionally less than the ROR to general secondary education at 15.5 per cent. Even more significantly, in only two (African) countries (Liberia and Tanzania) are the RORs to general secondary education significantly higher (ie. by more than two percentage points) than vocational secondary education.

Only GP's own study of vocational and diversified secondary education in Tanzania uses reliable, fully adjusted cost and benefit data. However, in the absence of full age-income profiles for secondary school graduates, the RORs are calculated using the very crude short-cut method. Once again, therefore, the margins of error are likely to be far too large to be able to place much confidence in what are, in absolute terms, quite small ROR differentials between the different types of secondary education. It is also noticeable that all the RORs for secondary education in Tanzania were well below the social opportunity cost of capital. In other words, while the ROR to general secondary was slightly higher, no type of secondary education was socially profitable.

IV. TILAK

Jandhyala Tilak's 1988 article "The Economics of Vocationalisation: A Review of the Evidence" relies mostly on the social RORs to general and vocational secondary education presented by GP in his 1973 and 1985 reviews (Tilak, 1988). In addition, he includes the Jordan and Malaysia studies that were discussed earlier as well as studies from Brazil and South Korea⁸ (see Table 3). Taking these estimates at their face value, RORs to general secondary education would appear to be significantly higher (ie. more than two percentage points) in seven out of the 11 studies for developing countries (namely, Brazil (de Moura Castro, 1979); Indonesia (Clark, 1983); Jordan (Al-Bukhari, 1968); Liberia (USAID, 1983); Philippines (DeVoretz, 1969); Tanzania (Psacharopoulos and Loxley, 1985), and Thailand (Blaug, 1971)).

The limitations of the Liberia, Jordan and Tanzania studies have already been discussed. In addition, as noted earlier, the Thailand ROR estimates (which were originally presented by GP in his 1973 review) are, in fact, 10.0 percent and 8.0 percent to general and vocational secondary education respectively (and not 9.0 per cent and -6.0 per cent) (See Blaug, 1971). It is also clear that little confidence can be placed in the RORs for Brazil mainly because of very poor data quality. Vocational secondary school graduates working in just two enterprises were sampled by de Moura Castro. The RORs he calculated ranged from 27-60 percent depending on which cost assumptions were adopted, and some vocational courses (such as electronics and electricity) had higher RORs than for general academic schooling. De Moura Castro himself concludes that "vocational education is a sound investment, that its graduates tend to stick to the occupations for which they were trained and, whenever, they do change, their specialised training is a help rather than a hindrance to them in learning a new job" (de Moura Castro, 1979: 628).

Table 3: Social RORs to general and vocational secondary education presented by Tilak

Country		General	Vocational/ Technical	Source
Colombia	Males	26.5	35.4	Schultz (1968)
	Females	13.5	39.8	
Colombia	INEM schools	7.7	8.8	Psacharopoulos & Loxley (1985)
	Control schools	9.3	8.3	
Philippines		21.0	11.0	DeVoretz (1969)
Indonesia		32.0	18.0	Clark (1983)
Thailand		9.0	-6.0	Blaug (1971)
Jordan †		6.7	1.6	Al-Bukhari (1968)
Brazil		23.0	13.0	Castro (1979)
Tanzania		6.3	3.4*	Psacharopoulos & Loxley (1985)
Rep.of Korea**		9.0	8.1	Kim (1968) for general, Lee (1985) for techn.
Liberia		20.0	14.0	USAID (1983)
Taiwan		26.2	27.4	Juang (1972)

Source: Tilak, 1988.

Notes:

* average of agricultural, commercial and technical.

** refer to different time periods.

† cost-benefit ratios.

Consequently, of the 11 developing country studies reviewed by Tilak, it is only possible to conclude with any degree of confidence that the ROR to general secondary education is significantly higher in three developing countries - Indonesia, Philippines,⁹ and Tanzania. David Clark's study of secondary school leaver outcomes during the late 1970s in Indonesia did find (using the short cut method) that the RORs to general secondary education were appreciably higher. Even so, he notes that "there are probably some locations where one (or more) of the specialised schools deserve an even higher priority" (*op.cit*:48).

V. OTHER RESEARCH

There is a growing (albeit still quite limited) body of research evidence that indicates that vocational secondary education frequently has higher social RORs than general secondary education, in particular in middle income, industrialising countries. The authors of the World Bank's 1995 Education Sector Review are either not aware or have chosen to ignore these research findings and prefer instead to rely on the generally very out of date and methodologically flawed aggregate ROR estimates produced by GP to support the Review's strident recommendations against school-based vocational education as an educational priority. Similarly, in his 1993 global update, GP himself does not discuss any of the more recent comparative ROR research which, in general, is more supportive of school-based vocational education. Both sets of authors are guilty, therefore, of what could be termed omitted study bias!

(i) Matched Education-Occupation Studies

Adrian Ziderman, who until recently was a senior economist at the World Bank, has been a key contributor to what he and his erstwhile Bank colleagues, John Middleton and Arvil van Adams have explicitly referred to as a "new wave" of research on the economics of school-based vocational education (Middleton, et al., 1993:50). While much of this research has been based on US data, it is slowly being extended to developing and other "non-rich" countries.

In their evaluation of vocational high schools in Israel, Neuman and Ziderman stress the need to widen the scope of cost-benefit research on vocational schooling. Only in this way is it possible to obtain "a proper understanding of labour market outcomes of vocational schooling" (Neuman and Ziderman, 1991:272). Using high quality data from the 1983 Census of Population and Housing, they compare the earnings of graduates from vocational high schools who are in training-related (ie. matched) occupations with those of individuals who

studied at academic schools. Even though the students at the latter schools have generally higher ability levels and come from more privileged socio-economic backgrounds, the results of the comparative earnings function analysis show that: (a) vocational school graduates in directly matched occupations (who comprise around 40 percent of the total) earn between 8-10 percent more than their academic school counterparts; (b) there are no significant earnings differences between vocational school graduates in unmatched occupations and academic school leavers; and (c) in overall terms, the net present value of vocational high school education is considerably higher than academic schooling.

Two other studies have utilised the same or very similar matched education-occupation methodology. In Brazil, Arriagada and Ziderman found that the earnings of vocational school graduates in matched occupations were 16-28 percent higher than those of academic school leavers (see Arriagada and Ziderman, 1992), and in Hong Kong, Chung also concludes that "the 'users' of the vocational and technical education have higher earnings than the general education group" (Chung, 1990:349). However, because both these studies rely exclusively on Mincerian earnings function analysis, they do not present full method social RORs that include all direct costs of each type of education. It is not possible, therefore, to say whether vocational education is more socially profitable in these two countries.

(ii) Other Standard Methodology Studies

Another four country studies using conventional cost-benefit methodologies to assess the relative value of general and vocational secondary education have also been published during the last five years, on Chile, Indonesia, Peru, and Thailand. Interestingly, the authors of these studies are all World Bank economists.

In three of these studies, the social RORs to vocational secondary education are not significantly lower than for general secondary education. Utilising good quality earnings data from Peru dating from the mid 1980s, Bellew and Mook found that, "the returns to investment in vocational and technical education are comparable to the returns to investment in general education...In most other studies, the cost of VET exceeds the costs of general education. In Peru, no such cost differential is clearly evident" (Bellew and Mook, 1990:370). The authors of the 1990 World Bank report, "Thailand's Education Sector at the Cross-roads" calculated that social rates of return to secondary vocational education was 11.4 percent compared with 6.7 percent for general secondary education (see IBRD, 1990). And finally, the 1995 Education Sector Review itself refers approvingly to a study of vocational schooling in rural Chile (see IBRD, 1994) that "found that the returns to agricultural training,

industrial skills and commercial skills are all currently higher than to general secondary education" (op.cit.:66). Thus, while "in general", general secondary education is the Bank's preferred investment, even the Review concedes that " there are countries where the returns to some types of specialised vocational education have been found at times to be higher than those to general secondary education" (ibid:66).

The 1995 World Bank report of "Training and the Labour Market In Indonesia" is the only recent developing country study (which has yet to be published) that comes out unequivocally against vocational secondary education. The Report concludes that school-based VET "is considerably more expensive than general education, its labour market outcomes are no better than those from general education, and its effects on equity adverse" (IBRD, 1995b:78)

VI. CONCLUSION

On the basis of this examination of the Zymelman, Psacharopoulos and Tilak reviews as well as more recent ROR country studies, it is clear that no convincing evidence exists that supports the current orthodoxy (that has been largely initiated and sustained by World Bank economists) that the social RORs to vocational secondary education are generally lower than those to general secondary education. Among the 15 country studies that rely upon reasonable quality data, only four of them (Indonesia (1983), Indonesia (1995), Philippines (1969) and Tanzania (1985) arrive at RORs to general secondary education that are significantly higher than to vocational secondary schooling.

Much of the concern about school-based vocational education has rightly focused on its inefficient and ineffective provision in Sub-Saharan Africa (see Bennell, 1994; Grootaert, 1990; Mingat et al, 1989; Paul, 1990; Rasera, 1988). However, in other developing countries outside of Africa, specialist vocational secondary education does not appear to have social RORs that are consistently lower than those to general secondary education. A crucial difference between Sub-Saharan African and other developing countries is that not only are cost differentials between vocational and general schooling usually much greater in African countries, but also placement rates for vocational school graduates (both in wage employment as a whole but especially in matched occupations) are typically very low in Africa. But it is clearly unwise and certainly misleading to make universal policy recommendations about vocational secondary education on the basis of investment outcomes in one continent where prevailing labour market and other conditions are, in many key respects, quite exceptional.

END NOTES

1. Nearly 10 percent of the industrial school graduates in Jordan had relatively much higher paying jobs overseas. Had they been accessible for interview, the social ROR to vocational secondary education would probably have been higher than to general secondary education.
2. These three studies were not included in subsequent reviews. It is also interesting to note that in the Colombia and Philippine studies, RORs to primary education are the lowest among the three main education levels. The Thailand social RORs of 9.0 percent to general and -6.0 percent to vocational secondary education were "preliminary results" from a study by Blaug. In fact, the final results (published in 1971) show that these RORs were 10.0 and 8.0 percent respectively. Thus, in only one of the three studies (Philippines) was the social ROR to general secondary education significantly greater (ie. more than two percentage points) than vocational greater education.
3. GP did not actually present the ROR estimates for each of these countries in the 1985 Review but these are available on request from him.
4. Since GP does not provide the full reference to this study, it is not possible to state whether or not cost:benefit ratios have been calculated.
5. These countries are Colombia, Tanzania, Mexico (2 studies), Barbados, Somalia, India, Swaziland, Nigeria, Jordan and possibly Sri Lanka.
6. In Table A-5 in the 1994 update, the mean social ROR to technical/vocational education is correctly calculated as 11.7 per cent. The lower figure of 10.6 per cent reported in the text and figure 7 is, in fact, the aggregate private ROR to secondary vocational education.
7. ROREs can be derived using one of three basic methodologies. When individual earnings data are available (usually from Labour Force or Household Surveys or Population Censuses) to construct age-earnings profiles for each level of education, the standard internal rates of return equation can be used. The internal rate of return for a particular education or training investment is that rate of return that equalises the present value of expected benefits with the present value of costs or alternatively the rate of interest at which the difference between discounted benefits and costs is zero.

$$\sum_{t=0}^{t=n} \frac{Bt}{(1+r)^t} = \sum_{t=p}^{t=0} \frac{C^t}{(1+r)^t}$$

where n is the number of years of post-education working life; and p is the number of years of education.

The short cut method is employed when the only earnings data available are average incomes by level of education. RORs are derived using the following equation:

$$r_s = w_s - w_{s-1} / t_s (c_s + w_{s-1})$$

where r_s is the rate of return to educational level s over education level $s-1$ as the control group; w_s and w_{s-1} are the mean annual salaries of graduates with s and $s-1$ level of education, respectively; c is the annual cost of per student of educational level s , and t_s is the number of years for educational level s . It is argued that this method gives reasonably accurate ROREs when the post-education period is relatively long (at least thirty years) and where the pre- and post-education differentials remain relatively constant over time (see Psacharopoulos, 1982).

The basic Mincerian earnings function method takes the following form.

$$\ln y = b_0 + b_1s + b_2e + b_3e^2$$

where y is individual income; s is years of schooling; and e is years of work experience.

The extended earnings function method is used to estimate RORs by level of education by converting the continuous years of schooling variable into a series of dummy variables for each educational level. Additional independent variables such as ability, socio-economic background, and work characteristics can also be included in the earnings function.

8. The figures presented for South Korea are from two studies separated by nearly 20 years. However, social RORs to upper secondary education in South Korea for the early-mid 1980s are reported by two other studies to be in the region of 7.2 - 8.8 per cent (see Park and Park (1984) and Ryoo (1988)).

9. Even for the Philippine study, the survey data are from the early 1960s and the RORs are largely unadjusted.

REFERENCES

- Al-Bukhari, N.M.A. 1968. **Issues in Occupation and Training: A Case Study of Jordan.** Stanford International Development Center, Sub-Series on Occupational Education and Training Number 3. Stanford.
- Arriagada, A-M and A. Ziderman. 1992. **"Vocational Secondary Schooling, Occupational Choice, and Earnings in Brazil."** World Bank WPS 1037, Population and Human Resources Department, Washington, D.C.
- Bennell, P.S. with D. Nyakonda. 1992. "The Vocational School Fallacy Revisited: The Employment Experiences of Secondary Technical School Graduates in Zimbabwe." **Education With Production** 9(1):53-67.
- Blaug, M. 1971. **Summary of the Rate of Return to Investment in Education in Thailand. A Report to the National Education Council on the Third Educational Development Plan.** Ford Foundation: Bangkok.
- de Moura Castro, C. 1979. "Vocational Education and the Training of Industrial Labour in Brazil." **International Labour Review** 118(5):617-29.
- Chung, Y.P. 1990. "Educated Misemployment: Earnings Effects of Employment in Unmatched Fields of Work." **Economics of Education Review** 9(4):331-42.
- Clark, D.H. 1983. **How Secondary School Graduates Perform in the Labour Market: A Study of Indonesia.** World Bank Staff Working Papers Number 615. Washington, D.C.
- Cox Edwards
- De Voretz, D. 1969. "Alternative Planning Models for Philippine Educational Investment." **The Philippine Economic Journal** 7(2):99-116.
- Fuller, W.P. 1976. "More Evidence Supporting the Demise of Pre-employment Vocational Trade Training: A Case Study from a Factory in India." **Comparative Education Review** 20(1):30-41.

Grootaert, C. 1990. "Returns to Formal and Informal Vocational Education in Cote d'Ivoire: The Role of the Structure of the Labour Market." **Economics of Education Review** 9(4):309-19.

Hinchliffe, K. 1990. The Returns to Vocational Education in Botswana: A Research Note." **Economics of Education Review** 9(4):401-4.

IBRD. 1995a. **Priorities and Strategies for Education:A World Bank Sector Review.** World Bank Education and Social Policy Department. Washington, D.C.

IBRD. 1995b. "**Training and the Labor market in Indonesia: Policies for Productivity Gains and Employment Growth.**" World Bank Population and Human Resources Division, Country department III, East Asia and Pacific Regional Office.

IBRD. 1994. **Chile: Strategy for Rural Areas-Enhancing Agricultural Competitiveness and Alleviating Rural Poverty.** Report 12776-Chile. World Bank, Washington, D.C.

IBRD. 1991. **World Bank Policy Paper:Vocational and Technical Education and Training.** World Bank. Washington, D.C.

IBRD. 1990a. "**Bangladesh: Vocational and Technical Education Review.**" World Bank. Washington, D.C.

IBRD. 1990b. "**Thailand's Education Sector at the Crossroads:Selected Issues.**" World Bank: Washington, D.C.

Lourdesamy, I., 1972, "**Vocational Education in Malaysia: A Case Study in Development Administration**" Ph.D. dissertation, University of Pittsburgh.

Middleton, J., A. Ziderman and A. van Adams. **Skills for Productivity: Vocational Education and Training in Developing Countries.** New York:Oxford University Press.

Mingat, A., J-P. Jarousse and M. Richard. 1989. **L'enseignement technique court u Niger:Une evaluation par le marche.** Dijon Cedex: Institut de Recherche sur l'Economie de l'Education.

- Moock, P. and R. Bellew. 1997. "Vocational and Technical Education in Peru." **Economics of Education Review** 9(4):365-375.
- Munoz Izquierdo, C. and Rodrigues, P. 1980. "La Ensenanza Tecnica: Canal de Movilidad Social para los Trabajadores?" **Revista Latinoamericana de Estudios Educativos** 10(3):1-28.
- Neuman, S. and A. Ziderman. 1991. "Vocational Schooling, Occupational Matching, and Labour Market Earnings in Israel." **The Journal of Human Resources** 26(2):256-81.
- Oxtoby, R. 1977. "Vocational Education and Development Planning: Emerging Issues in the Commonwealth Caribbean." **Comparative Education** 13(3):223-43.
- Park, F., and S. Park, 1984, **Wage Structure in Korea**, Korea Development Institute.
- Paul, J-J. 1990. "Technical Secondary Education in Togo and Cameroon- Research Note." **Economics of Education Review** 9(4):405-9.
- Psacharopoulos, G. 1994. "Returns to Investment in Education:A Global Update." **World Development** 22(9):1325-43.
- Psacharopoulos, G. 1984. "**Indonesia: Manpower Considerations in the Energy Sector and Elsewhere**". World Bank. Washington, D.C.
- Psacharopoulos, G. 1987. "To Vocationalize or Not to Vocationalize?: That is the Curriculum Question." **International Review of Education** 33(2):187-211.
- Psacharopoulos, G. and W. Loxley. 1985. **Curriculum Diversification in Colombia and Tanzania:An Evaluation**. Baltimore: John Hopkins University Press.
- Psacharopoulos, G. 1985. "Returns to Education: A Further International Update and Implication." **The Journal of Human resources** 20(4):583-97.
- Psacharopoulos, G. 1973. **Returns to education: An International Comparison**. San Francisco: Elsevier, Jossey-Bass.

Rasera, J-B. 1988. **Les enseignement moyens general et technique au Benin: Devinir des diplomes, couts et rendement internes des etudes.** Dijon: IREDU.

Ryoo, J-K, 1988, "**Changes in Rates of Return to Education Over Time: The Case Study of Korea**". Ph.D. dissertation, Stanford University.

Schultz, T.P. 1968. **Returns to Education in Bogota, Colombia.** The Rand Corporation Memorandum RM-5645-RC/AID: Santa Monica.

Sullivan, G. 1981. "Secondary School Leavers and the Labour Market in Swaziland." **International Journal of Educational Development** 1(2):20-43.

Tilak, J. 1988. "Economics of Vocationalization: A Review of the Evidence." **Canadian and International Education** 17(1):

United States Agency for International Development (USAID). 1983). **Liberia: Education, Training and Human Resource Assessment.** USAID: Washington, D.C.

Zymelman, M. 1976. **The Economic Evaluation of Vocational Training Programs.** Baltimore: John Hopkins University Press.

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