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Education and The Economy

The External Efficiency of Education

Walter W. McMahon
and Boediono, Editors

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Preface

The problem of external inefficiency in education, students who cannot get jobs, or do not relate well to the changing needs of job markets, is a common one. It is not unique to Indonesia, but is widely discussed in the developing countries and in the U.S., U.K., and other industrialized countries as well.

However, problems with "external inefficiency" (or with exchange efficiency in the economists jargon) were explicitly recognized by the authors and several others in Indonesia several years ago. This led to the series of research studies that comprise this volume, supported by phase II of the Educational Policy and Planning Project (USAID) and the Government of Indonesia. The studies were motivated by the desire to identify the major sources of this external inefficiency in the education system, and then to suggest what is hopefully a creative solution to this problem based on its several "causes", including means of adaptation to technical change, and consideration of the future of the economy (industrialization). Most (but not all) of the data is for Indonesia, but we have sought to keep one eye on this same problem in other developing countries. Since the sources of the problem are also generic, although differing in degree of intensity from place to place, we hope that the techniques of identification, and the proposed solutions, have more general relevance throughout the developing world.

The authors wish to express their deep appreciation to several persons who have provided close-in support and inspiration in various ways. These include Dr. Moegiadi, who has been a very supportive sounding board and source of assistance throughout. Dr. Norman Rifkin clearly perceived the problem early on, and his sustained assistance has also been a vital element.

These research studies grew out of earlier work with Improving the Efficiency of Educational Systems in Indonesia and elsewhere, for which Douglas Windham, Robert Morgan, and Jack Bock deserve great credit. Major contributions were made by Dr. Michael Morfitt who initiated the EPP Project, by Ron Bonner who supported it in key ways in its early years, and by Richard Pelczar who provided vital close-in support in Jakarta, and then later in Washington. Don Adams helped to identify the problem, and Avril Van Adams and others at the World Bank and Yudo Swasono at the Ministry of Manpower have had important influence on the authors when developing the market signaling strategies. The tracer studies conducted by Jerry Strudwick, Ade Cahyana, and Reta Dewi have also been helpful.

There are many within the Office of Research and the Center for Informatics who participated in different aspects of each study, as noted in each chapter below. Their participation and assistance are also deeply appreciated. We would also like to thank Jerry Messec, and his staff at Florida State University who were very helpful in making the translations into Ventura and with the publication process.

Walter W. McMahon, Urbana
Boediono, Jakarta
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Volume II

EDUCATION AND THE ECONOMY

The External Efficiency of Education

Walter W. McMahon and Boediono, Editors

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I

Overview: Findings and Their Implications for Policy

This volume focuses on the problem of external inefficiency in education--a poor match between both school and college graduates and the changing needs and changing technologies of job markets. It includes the inefficiency that arises when there are too few graduates at one level, and too many at some other level, as well as too little (or too much) human resource development overall.

This problem of external inefficiency in education is not unique to Indonesia, but is a common one in many developing countries. In this volume we present a diagnosis of the major sources of external inefficiency, together with policy options that are offered relating to each source of the problem.

The analysis is based on data for Indonesia, but also brings insights from studies in other countries to bear, and includes many comparisons to the experience of other developing countries. Although the specifics relate to solving this problem in Indonesia, the major sources of external inefficiency are generic, and so the policy options discussed also have a more general application.

There have been enormous, and truly remarkable accomplishments in Indonesian education in the last 25 years. Nothing in the analysis that follows should be misinterpreted as in any way minimizing that. Probably none of the lower income developing countries, and only a few of the newly industrializing countries, can say that they have achieved all of the following:

- Achievement of universal primary education, with access rising from a net enrollment rate of 50 percent in 1968 to 91 percent today,
- A fourfold increase in secondary education, rising from 10 percent net enrollment rates in 1968 to 41 percent today,
- Over 600 percent expansion of higher education, from only a few colleges in 1968 to over 800 today,
- Stabilization of population growth, slowing to 2.1 percent currently, by noncoercive (educational) means, and
- Roughly co-equal education of women,

to cite a few of Indonesia's accomplishments.

We wish to stress, therefore, that we are not being critical in this chapter, or anywhere in this volume, of the system or of the record. Instead, the objective is to get a realistic diagnosis of a problem that is not unique to Indonesia, but that is common in both developing and industrialized countries in differing degrees.

I. STYLIZED FACTS

There are several symptoms of external inefficiency which any analysis of the sources must be able to explain.

In Indonesia, for example, job markets at the junior secondary level are very tight, with low levels of unemployment at all ages, short job-search times, and high real rates of return at this level.

Unemployment, however, among the senior secondary vocational and senior secondary general school graduates is a high 36 percent to 40 percent respectively at the school leaving ages (18-22), even though the real rates of return are high. Among college and university graduates, unemployment is also high, 29 percent and 53 percent respectively four years later (ages 22-26).

The pattern, however, is typical of that found in many developing countries, i.e.,:

- It is focused on the school-leaving age. After age 27, and throughout the remainder of the life cycle, unemployment is below 3 percent for high school and college graduates, and after age 30, a remarkably low 0·1 percent.
- Underemployment is highest in the rural areas and among those with less education.
- The real rates of return to investment in human capital at the senior secondary level are significantly higher than real rates of return to investment in physical capital (11-14% compared to a 9.4% average for 1982-91 respectively).
- But rates of investment in human capital have been low (at 2.95% of GNP) relative to that by nearby competitors, and rates of investment in physical capital have been at a sustained relatively high level (at 30.17% of GNP).

There is a lot of anecdotal evidence, some of it backed up by tracer studies. Employers are frequently very dissatisfied with the quality of the education received by the graduates they employ. They want effective, problem solving, creative, managers and leaders, accountants, and engineers. They tend to regard persons who have only a primary education not as "cheap labor," but instead as so costly to train in the basics that it is cheaper to import labor from the Philippines.

There is some evidence that college students are taking 61/2 or more years to finish a bachelor's degree (which runs up the costs, and depresses the rates of return), and that college faculty are "moonlighting" (out of necessity) in ways that do not enhance their skills. Job search times from tracer studies (in Sumatera at least) are enormous, often running into several years. There appears to be an interdependence between the insufficient quality of the education (which in turn is adversely affected by the lack of internal cost effectiveness) and the employability of the graduates.

II. NEW FINDINGS CONCERNING SOURCES OF EXTERNAL INEFFICIENCY

Chapters II through VIII that follow document in depth major sources of the external inefficiencies suggested above. Many of these are new findings, at least as of the time each study was first released.

Very briefly, our findings of the major sources of external inefficiencies include:

- **Underinvestment in secondary education,** especially in junior secondary schools, in relation to physical capital (Chapter II),
- **The need to move to greater use of market signals for both planning and annual budgeting decisions** (Chapters III and IV). This includes:

  Decentralization of allocation decisions among career fields to Vice Rectors, schools, and students (Chapters VII and VIII). This requires permitting students to change fields, and

  Development of the infrastructure for effective decentralization of decisions including EMIS systems changing to a system of course credits, job placement counsellors in the schools, and new college placement offices (Chapter VIII).

- **Excess "social demand" for higher education and insufficient resource recovery** contributing to inadequate quality, given the numbers of students, which in turn leads to reduced marketability of graduates (Chapter VII). This is based on an in-depth analysis of:

  Why families invest in education (Chapter VII), and

The economics of school expansion (Chapter VI).

- **Selection criteria that do not reflect accurately either success in college or productivity** in jobs later (Chapter VII). Criteria are needed that would contribute significantly to:

  Regional development,

  Cultural diversity in the public universities,

  Employability and productivity of graduates (external efficiency).

- **Methods of financing** that result in internal inefficiency (thereby raising the costs and limiting quality improvements), and also do not provide adequately for equity among students (Chapters V and VII). Policy options include:

  Reform of the financial transfer mechanism managing and funding for primary and secondary schools (Chapter V).

  Internal arrangements within universities that facilitate resource recovery from private sources, from work study, from parents, and from alumni (Chapters V and VII).

  An objective nationwide financial need-analysis system as a basis for awarding tuition waivers or other financial aids to admissible students based on need (Chapter VII).

These three financing policy options should help to improve equity, while simultaneously providing funds for improving quality and hence external efficiency.

III. IMPLEMENTATION

Many policy options are discussed throughout Chapters II-VIII in addition to those hinted at above. Before objections are raised, it is important to consider carefully whether or not the diagnosis of the sources of external inefficiencies is correct. If it is, then there are these and other policy options that can be developed for accomplishing the same objective.

For implementation of each, an implementation design plan must be drawn up. For the policy options discussed in Chapters II-VIII there are normally brief implementation designs offered. The more developed implementation designs included in this volume are for the market signals strategy (Chapter IV), for a financial need analysis system (Chapter VII), and for establishment of placement offices (Chapter VIII). Financial transfer mechanisms will be developed in a later volume.

IV. CONCLUSION

The contribution of education to economic growth, as well as to reducing inequality, can be very substantial. But this requires continuing improvements in the external (and internal) efficiency of education and the human resource development system.

Indonesia has enormous potential for rapid economic growth. Perhaps the major impediment to achieving its full potential are the limitations in the quality and quantity of its human capital developed thus far through the education system. The studies in this volume seek to address this major obstacle, and by improving the external efficiency of the education system, help Indonesia to achieve its true potential.

II

ABSTRACT

Universal Basic Education: An Overall Strategy of Investment Priorities for Economic Growth

Walter W. McMahon and Boediono

This chapter is an example of a policy analysis. It presents a summary of research on key aspects of the indirect effects of expanding education from grade 6 through grade 9 followed by a comprehensive analysis of social rates of return to investment in all levels of education in Indonesia and underemployment in urban and rural areas. The latter analyzes the 1982 and 1986-89 nationwide SUSENAS data on individuals including earnings, level and type of education, and hours worked. But to be relevant to policy, it is necessary to consider indirect effects (e.g., on population growth) effects on productivity in agriculture, and the effects on pupil and intergenerational equity.

The analysis finds that consistently relatively high social rates of return are available to investment in expanding junior secondary general education (grades 7-9). Rates of return to senior secondary general and vocational education are also high, but falling. Underemployment is highest among illiterates, but virtually all males and females now finish grade 5.

The paper suggests an investment strategy to achieve greater external efficiency that would make the fastest percentage increase in the amount invested in junior secondary general education since it contributes the most to both growth and equity goals.

II

Universal Basic Education: An Overall Strategy of Investment Priorities for Economic Growth

Walter W. McMahon and Boediono*

This chapter is an economic analysis of alternative budget strategies involving human resource development for the achievement of faster per capita economic growth, and greater equality in the income distribution. It focuses particularly on the costs relative to the potential returns to be realized from attaining universal basic education, defined here to include co-equal education of males and females through grade 9, relative to the alternatives. It also considers the relative rates of change in budget levels over time, with particular reference to the time frame for attainment of universal basic education.

Prior work has not developed separate cost/benefit measures for junior secondary education which is of strategic importance for Indonesia at this stage in that universal education through grade 6 for both males and females has existed there for some time. This prior work includes rate of return estimates for 1976 by Simanjuntak (1981), for 1977 by Hallak and Psacharopoulos (1979), for 1978 by Psacharopoulos (1981, 1982), and for 1978 by Clark (1983). The only other rate of return analysis that has been done is for 1982 in the "Economic and Financial Analysis" of the "IEES Education Sector Review" by McMahon, Millot, and Eng (1986b, 406 pp.). It provides a basis for comparison of 1982 with the new 1986-89 results presented below in that the same methods were used. Also a major analysis of unit costs and cycle costs at all education levels was done by Gweneth Eng at that time (ibid., pp. 248-405).

This study also is new in that it is an example of what is required in a policy analysis in an LDC that is designed to provide relevant input into policy decisions. As such it is important to include not all original work but instead brief surveys of the work of others on the returns to education in agriculture where large percentages of the population are, of nonmonetary effects on net population growth rates, and of effects on achieving greater equality in the income distribution. All are measurable in terms of direction and sometimes approximate size of the effects, even though nonmarket effects are very difficult to value.

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* This chapter is adapted from Walter W. McMahon and Boediono, "Universal Basic Education: An Overall Srategy of Investment Priorities for Economic Growth," *Economics of Education Review*, Vol. 11, No. 2 (1992). The authors both would like to express appreciation to Dr. Moegiadi, Associatae Director of the Office of Educational Research and Development, MOEC, and to the IEES/USAID project both for support of this work and for willingness to allow publication of the results, as well as to the central Bureau of Statistics (BPS) for use of the data. Responsiblity for any conclusions reached and all errors however remain exlusively with the authors.

In what follows, Part I first considers some of these nonmonetary returns. Part II considers the relation of potential expansion in grades 7-9 (which had been attained or exceeded by only 13% of the labor force) to the existing educational attainments. Part III considers net earnings differentials and presents new cost/benefit, unemployment, and underemployment analyses by education level. Part IV summarizes the conclusions.

I. NON-MONETARY RETURNS TO INVESTMENT IN BASIC EDUCATION

It is important to this analysis to stress that education expenditures are an *investment* that yield returns reasonably quickly after individuals leave school and also later throughout their working lives. That is, education is *not* merely a welfare or consumption benefit given to the families involved. Also a nation does *not* have to wait many years before the first returns from the investment begin to be realized.

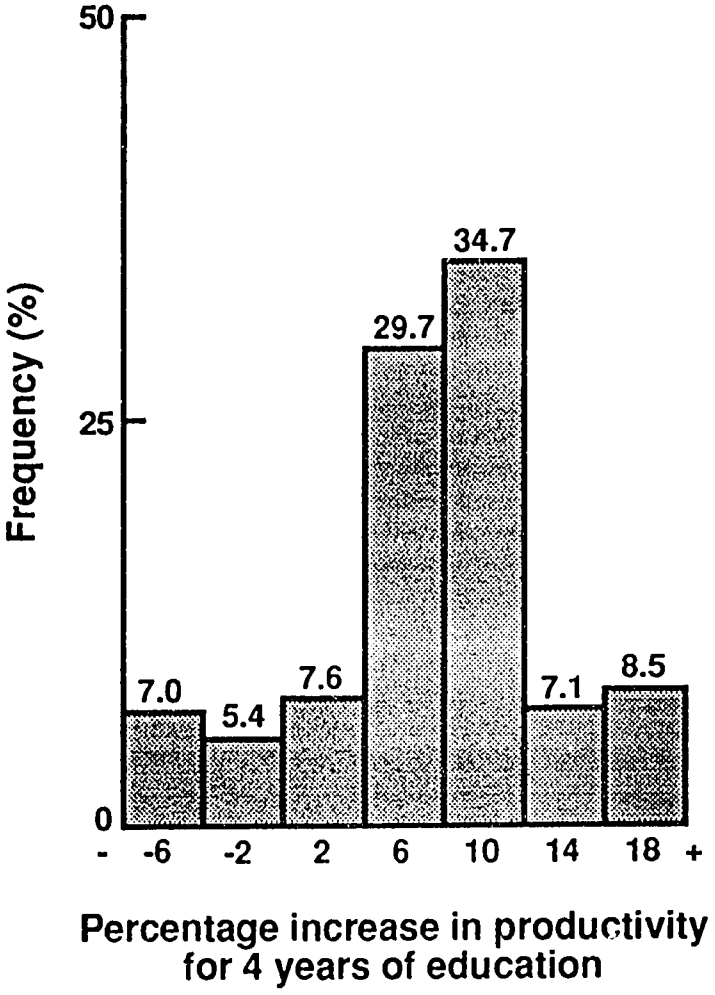
The economic productivity to education is both direct, through increments to earnings or National Income per person employed (NIPPE, and hence to GDP), and indirect through effects on population growth rates and hence GDP per capita. The latter includes the better health of children and lower fertility rates, both of which are important in LDC's. There are also effects on the degree of equality in the income distribution since universal basic education facilitates wider effective participation in the labor force and hence in earnings later and also provides a more adequate basis for democracy. Each of these therefore is considered below. Although the direction of each effect can be measured, as can the order of magnitude of its impact, given the current state of the art, it is not possible to satisfactorily measure the value of the non-market returns. Even with earnings, which are determined in the market, there is a margin of error, depending on how narrowly (or broadly) the returns are defined and on the controls employed (sometimes inappropriately), which can bias the results. But even at the extremes, the margins of error in rates of return are probably not more than a few percentage points, which means that the empirical results can be useful if interpreted judiciously.

The Returns to Education in Agriculture

Since over 54 percent of Indonesia's employment, and a larger percent of the population, are in agriculture, the returns to education in agriculture are very important to consider. Many farmers do not receive wages and salaries, and grain prices can be distorted by government policies (or the dumping of U.S. grain on world markets subsidized under PL 440). So increments to farmers' earnings are not a good measure of the contribution of their education to their productivity. Instead Jamison and Lau (1982), Lockheed (1987), Pudisani (1987), Yamada and Ruttan (1980) and many others have first controlled for the other more significant effects on output and then measured the increments to output in physical terms (e.g., bushels of rice) attributable to increased basic education. They find that each additional year of basic education raises physical output an average of 3.05 percent per year, which works out to a rate of return of about 25 percent or 26 percent in wet rice cultures when the total costs of the education are considered and the output is valued at world market prices (Jamison and Lau, 1982, p. 225).

There are not good studies on the returns to education within agriculture in Indonesia. But there are studies of the relation of basic education to agricultural output in the similar wet rice cultures of Malaysia, Thailand, Korea, and Nepal. As shown in Figure 1, 31 studies (or 34.7 when weighted by their standard error) reveal that the most frequently occurring result is a 10 percent increase in output for each farmer who receives four additional years of basic education. This would be approximately the amount of additional education that would be involved if Indonesia invests enough in rural education to encourage children to finish sixth grade (where the dropout rates are high) plus complete grades 7-9 or junior secondary general education.

Figure II.1
Results of Studies Relating Schooling to Agricultural Productivity
(Weighed by Reciprocal of the Standard Error)*



*Mean 7.4 percent; standard deviation 6.8; total data sets = 31

Source: M. Lockheed, (1987, p. 115)

The effects of education are known to be larger in "modernizing" agricultural environments, where fertilizers and new technologies are becoming available, and smaller in "traditional agriculture." The effects of education result from more intelligent use of fertilizer (rather than wasting it on hectares where soil tests show it is not needed), intelligent use of hybrid seed (such as shifting to disease resistant strains in the season following plant disease to avoid getting wiped out), the use of animal genetics and veterinary advice (to maintain the health of animals and meat production), the capacity to read directions on how to repair machinery, the capacity to read about and understand successful grain storage and marketing advantages, and other ways that keep the farmer alert to management advantages, bookkeeping, and agricultural technologies.

In nonmodernizing agricultural environments such as is typical of parts of Java, Sulewesi, and most of the poorer eastern islands the impact of increased education is less dramatic but nevertheless substantial. Pudisani (1983), and Dhakal, Grabowski, and Belbase (1987) control for land areas in crops, raw labor inputs, bullock days, and fertilizer use to estimate the net marginal productivity of basic education in Nepal's hill country traditional agriculture. They estimate separate effects as shown in Table II.1 on worker productivity, more efficient input selection, and more efficient input allocation, and find highly significant impacts of education within traditional agriculture in all areas.

Much of Indonesia's agriculture is in a "modernizing" environment however. Therefore rates of return to basic education in rice production in nearby countries which also have modernizing environments are probably close to those in Indonesia. In Malaysia, the social rates of return to education in rice production are 24.4 percent, and in Thailand 23.2 percent (Jamison and Lau, 1982, p. 225). This return to basic education in the rural areas is higher than the 13 to 14 percent real rates of return to basic education in the urban areas in Indonesia reported in Table II.7 below.

Table II.1
Effect of An Additional Year of Education In Traditional Agriculture
One Year for Each Family Member

Effect on Output Per Year[a]	**1977 Rupees Per Year**	**For 40 Year Working Life**
Worker effect	19.9	(Discounted at 8%)
Input selection	159.6	
Input allocation	286.0	
Total Education Effect	465.5	5,551 Rp.
Educational Costs,[b] 1977		
Direct Costs (Unit Costs)	94.9	
Foregone Earnings Costs	526.5	
Total Costs, 4 family members	621.4	2,485 Rp.

Sources:
a)Dhakal, et. al. (1987), p. 33).
b)McMahon, Salkin, and Manandhar (1988, p. 2-126 for direct costs, pp. 2-8 and 2-13 for foregone earnings costs based on GDP per worker in agriculture of 2,106 Rp. Foregone earnings at ages 7-10 are taken to be about 25 percent of these average foregone earnings.

The Contribution of Education to the Process of Industrialization

Junior secondary education (grades 7-9) also provides the basis for learning on the job in small and medium sided enterprises in the provincial towns. There is underutilized surplus labor in agriculture, where productivity is relatively lower, and this migration is inevitable as industrialization occurs. The small and medium size enterprises (SME's) have large labor absorption rates as they grow, in contrast to the more physical capital intensive labor-saving higher technology industries. The question is whether the young people from the rural areas can read, write, solve problems, and learn effectively on the job. As has been developed by M. J. Bowman (1974), Mincer (1974), T. W. Schultz (1975, 1981), and others, there is a high positive correlation between the amount of prior formal schooling and the amount of learning that occurs on the job, and capacity to adapt later. Education also facilitates the movement of underutilized labor from low productivity industries (such as agriculture, even though productivity *growth* in agriculture is high) into higher productivity SME's. This helps to broaden the base of industrialization and widen the percentage of the population receiving earnings and participating in the growth process.

Indonesia's 1984-89 (Repelita V) *per capita* growth rate was 1.7 percent, or a 3.8 percent growth in real GDP less a 2.1 percent population growth rate, somewhat below its 25 year average of 4.5 percent (see World Bank, 1989, p. 164). This compares to the real per capita growth rates over the last 25 years in Taiwan of 4.7 percent, Hong Kong 6.2 percent, Singapore 7.2 percent, and South Korea 6.4 percent, as shown in Table II.2. Indonesia seeks to "take-off" into fast per capita growth, joining these countries in this respect within the next ten years while also replicating their experience of *declining* inequality in the income distribution as faster per capita growth occurs. (See the key pillars of Pancillisa, and Repelita IV and V goals.)

Comparisons of the strategies in Indonesia with the strategies of investment in physical capital and investment in human capital in these five fast growing countries on the Pacific Rim, plus the U.S. and Pakistan, are also shown in Table II.2. It will be noticed that all of the fastest growing countries including Indonesia are saving and investing 25 to 30 percent of their GDP in physical capital. But all of the fastest growing countries are also spending a larger percentage of their budgets on education than is Indonesia, i.e., Singapore 18.2 percent, South Korea 18.3 percent, Hong Kong 20 percent, Taiwan 18 percent, and Japan 12 percent compared to Indonesia's 8.8 percent. Pakistan with three-fourths of its labor force illiterate as shown in Figure II.2 and most children still not enrolled in primary school is way behind also in its educational effort, which is only 2.6 percent of its budget as shown in Table II.2. These comparisons suggest that education is a necessary (but not a sufficient) condition for sustained fast *per capita* growth. Table II.2 also suggests (since in slower growing and poorer countries the lowest 40 percent of the population usually receives only 10-12 percent of the income or less), that with the appropriate policies, less income equality and fast per capita growth can be achieved simultaneously.

Education's Contribution to Technology Transfer and Diffusion

In "Why Isn't the Whole World Developed," Richard Easterlin (1981) stresses that the spread of modern economic growth has depended chiefly on the diffusion of production technologies, whose use in turn has only been possible as the result of formal schooling. He says that it is only "since World War II (that) ... modern education systems have been established almost everywhere, and the spread of modern economic growth (in these places) has noticeably accelerated" (Easterlin, 1981, p. 1).

Table II.2
Rates of Investment in Human Capital and Physical Capital
Rank Ordered by Per Capita Growth Rates

	Average Annual aPer Capita Growth 1965-87	Percent of Labor Force Illiterate 1986-87	Percent Not Enrolled in Primary 1965	1987	Education Investment as a % of Central Govt. Budget 1987	Physical Cap. Investment as a % of GDP 1987	Distribution: Income Received By Lowest 40% 1987
Singapore	7.2%	0%	0%	0%	18.2%	39%	n.a.
South Korea	6.4%	0%	0%	0%	18.3%	29%	16.9%
Hong Kong	6.2%	0%	0%	0%	(20%)	25%	16.2%
Taiwan	4.7%	1%	1%	0%	18%	28%	21.9%
Indonesia	4.5%	16.2%	28%	0%	8.8%	29%	14.4%
Japan	4.2%	0%	0%	0%	12%	30%	21.9%
Pakistan	2.5%	74%	60%	56%	2.6%	17%	--
U.S.A.	1.5%	--	0%	0%	S & L	16%	17.2%

Source:Data from *The World Development Report*, The World Bank, 1989, Statistical Appendix, and S. Kuo, G. Ranis and J. Fei, *The Taiwan Success Story*, Westview Press, Boulder, CO, 1981, p. 40.

Economists widely recognize technology as a major engine of economic growth. Education enables capacities to learn and adapt to new skills to be embodied in persons, essential if large numbers of people are to be able to adapt to the technologies used in production.

Higher education provides a cutting edge for technology transfer. But once transferred the technology has little or no effect if it is not diffused and put into wider use. It must be adapted to local conditions, since it is often developed in industrialized countries where capital is cheap, and therefore it is too capital-intensive (i.e., uses too much scarce capital and displaces too much labor). Policies that subsidize physical-capital-intensive modes of production can be counterproductive if they drain other sectors such as agriculture and the SME's of scarce capital, displace too much labor, and lead to falling labor absorption rates such as those that are now beginning to be observed in Pakistan and Indonesia. Countries like Indonesia where capital is expensive, relative to labor, do not have a comparative advantage in highly capital intensive labor-saving modes of production in competition with countries where capital is cheap. The odds are not good in export markets using this strategy. The industrialized countries with relatively cheaper capital and expensive labor are better adapted to labor-saving capital intensive technologies. Instead if in Indonesia the technology is *adapted* to somewhat less capital intensive approaches, and then *diffused* and *applied* through investment in human resource development (and built-in to appropriate machines) then a true comparative advantage exists and this strategy is very likely to be successful. Following technology transfer is in this relation ofeducation to the embodiment, adaptation, and diffusion of technology within Indonesia that is likely to be education's most economically strategic role for some time to come. (See also Solow 1957, 1959, McMahon 1984c, 1987a, and Mankiw, Romer, and Wail, 1990).

Education's Contribution to Slower Population Growth

Given that universal primary education of both males and females through grade 6 has existed in Indonesia for some time, the extension of universal education of women to grade 9 can be expected based on international research such as that shown in Table II.3 to have a significant effect in lowering fertility rates and, as a result of this, lower population growth rates further. Slower population growth in turn will have positive effects on *per capita* economic growth rates, both in the short run (fewer children) and by aiding capital deepening and hence productivity growth in the long run (e.g., McMahon, 1987a), as well as on reducing inequality in the income distribution.

Table II.3
Correlation Between Basic Education and Population Growth
94 Countries

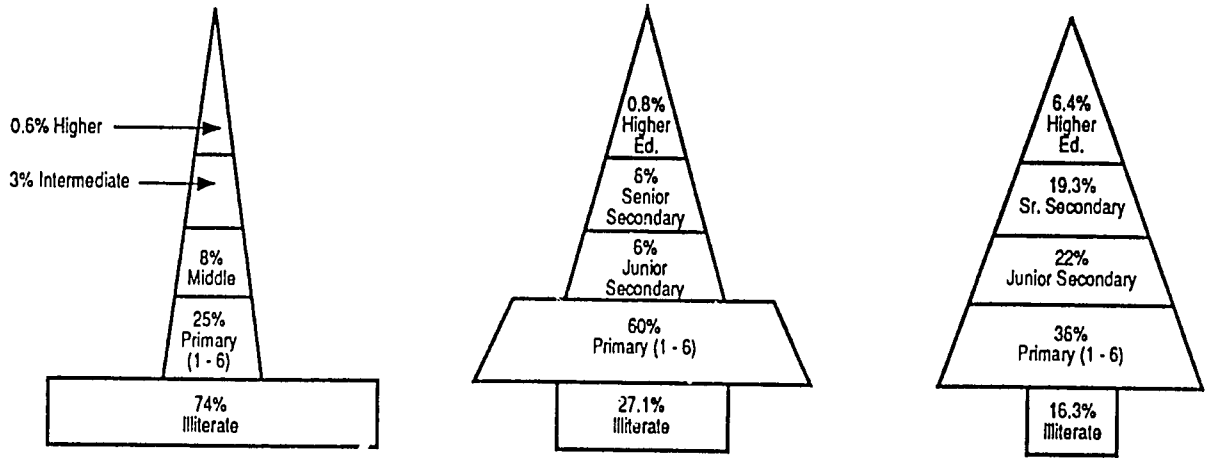
	Population Growth 1970-80	Per Capita GNP Growth
Female School Enrollment Rates, Ages 10-14	-.31	+.49
Literacy Rate	-.47	+.54

Source: Rosenzweig (1987, Table 1)

A negative correlation of -.31 between female school enrollment and population growth rates across 94 countries is shown in Table II.3 below, as well as a positive +.49 correlation between female school enrollment and *per capita* growth. Population growth in Indonesia has slowed from 2.3 percent in the 1970's to 2.1 percent in the 1980's. This may be compared to 3.1 percent in Pakistan (where 96% of the rural females are illiterate), and 2.7 percent in Nepal (where 94% of the population has no junior secondary education). A very favorable stage is being approached in Indonesia however. To the extent that the results of international research applies here, the education of women up through sixth grade results in children that are healthier, reducing child mortality. But six years of education alone does not lower fertility rates enough, and so better health has the initial effect of increasing population growth rates. This process is underway in Pakistan, Bangladesh, Nepal, and Sub-Saharan Africa. However education through 9th grade in Indonesia given that six years are now universal will give women alternative economic options to working in agriculture. It should result in them marrying 2.2 years later, having children that are healthier, and in spite of more of their children surviving, the total number of children women choose to have throughout their child bearing years is likely to fall sharply (see McMahon, Salkin, and Manardhar, 1988, pp. 2-163-4). The result is slower population growth. The education of males appears to be largely irrelevant to this process. The main reason that women make these choices (see T. W. Schultz (1974, pp. 3-22) is that with more basic education they then have economic options available to them in the villages other than just having more children.

The economic significance to education of this effect of slower population growth as the education of all women expands to nine years is further that less pressure is put on public budgets to build more schools just to keep up with the population growth, a pressure that is limiting improvements in school quality.

Figure II.2
Educational Attainment of the Labor Force
Pakistan Surpassed by Indonesia, and S. Korea (as it began rapid growth)



In summary, rising *per capita* growth rates which is a key goal of Repelita V, are calculated by subtracting the population growth rate from the economic growth rate. *Per capita* growth thereby is increased directly as population growth slows, and eventually, as at a given level of saving and investment there is capital deepening with both more human and more physical capital per worker.

Effects of Universal Education Through Grade 9 on Income Inequality

Basic education distributed widely and equitably contributes to the growth of a middle class, reducing the polarization in the income distribution that is characteristic of the poorest of the developing countries (Psacharopoulos, 1977). The main evidence is however that more education for those already getting the most education does not have the effect of increasing the degree of equality in the income distribution (except perhaps in the very long run where it causes wage and salary income to become more important relative to property income, given that property income is distributed more unequally). What is more important is that *who gets* the education, i.e., the inequality with which the education is distributed, *does* have a major effect on the income distribution later because it is a very important determinant of who receives the earnings. Therefore universal basic education through grade 9 can be expected to broaden the access to earnings at this level considerably, and bring a larger percentage of the poor into the earnings stream. With only 12.4 percent of the labor force in 1986 having completed junior secondary or above in Indonesia, if eventually the remaining 88 percent attain this level, it can be anticipated that inequality will be substantially reduced by this policy.

Indonesia's record in the 1980's in reducing inequality is remarkable, especially since in most of the low income countries in Sub-Sarahan Africa and Latin America inequality increased. A recent major World Bank (1990) study shows that a reduction in the GINI coefficient from 1984 through 1987 occurred both in the urban, and especially in the rural areas as is shown in Table II.4. The World Bank team attributes this primarily to the Government's support of progress in the agricultural sector, and to the "concerted effort to improve the availability of education, ... since the nearly complete coverage of primary education leaves little room for differentials to enrollment by income class" (ibid., p. xiii), although there are of course other factors. This inclusion of the poor is a frequently articulated national goal, although the inequality that remains is substantial.

It is important to stress that the policy of seeking universal access through grade 9 and improving quality in the primary schools (especially in the poor areas) is quite compatible with achieving faster per capita growth. As shown below, the rates of return to investment in education at the junior secondary level are consistently the highest. So in this case the investments that advance efficiency and aid growth also are effective in reducing inequality.

II. EDUCATED MANPOWER DEMANDS AND SUPPLIES

The educational structure of the labor force in Indonesia in 1986 that shows the supplies of educated manpower in use during Repelita IV is illustrated on the left in Figure II.3. The current supply can be compared to the amounts of educated manpower at each level employed in Korea just after it reached the fast-growth takeoff stage in 1975 as shown beside this. The net difference between current supplies of educated manpower and the structure that was needed for fast growth in Korea are the differences shown next. Since excess supplies tend to hold earnings down, and excess demands (or shortages) to pull earnings up, it is suggestive that the social rates of return (which reflect the full cost of the investment to the society) are likely to be highest at the levels where the shortages that arise out of this comparison are the greatest. They suggest lack of a sufficiently large "middle class." The real social rates of return at these levels (that are discussed further below) are, in fact, high. They are, respectively, 16 percent to investment that increases the number that finish sixth grade in 1986, a 14 percent return to investment in junior secondary general education, and 16 percent for expansion of

Table II.4
Lorenz Curves and Gini Coefficients
1984 and 1987[a]

Poorest Percent of Population	Cumulative Percentage of Total Expenditures			
	Urban		Rural	
	1984	1987	1984	1987
10	3.23	3.46	3.77	4.26
20	7.88	8.15	8.99	9.81
30	13.54	13.84	15.18	16.21
40	20.15	20.54	22.25	23.42
50	27.76	28.05	30.28	31.46
60	36.46	36.74	39.35	40.44
70	46.51	46.81	49.65	50.59
80	58.38	58.69	61.50	62.25
90	73.47	73.58	76.06	76.42
100	100.00	100.00	100.00	100.00
Gini	0.333	0.329	0.293	0.277

[a]The Lorenz Curve is based on the deflated SUSENAS expenditure data and differs slightly from that obtained at nominal prices.

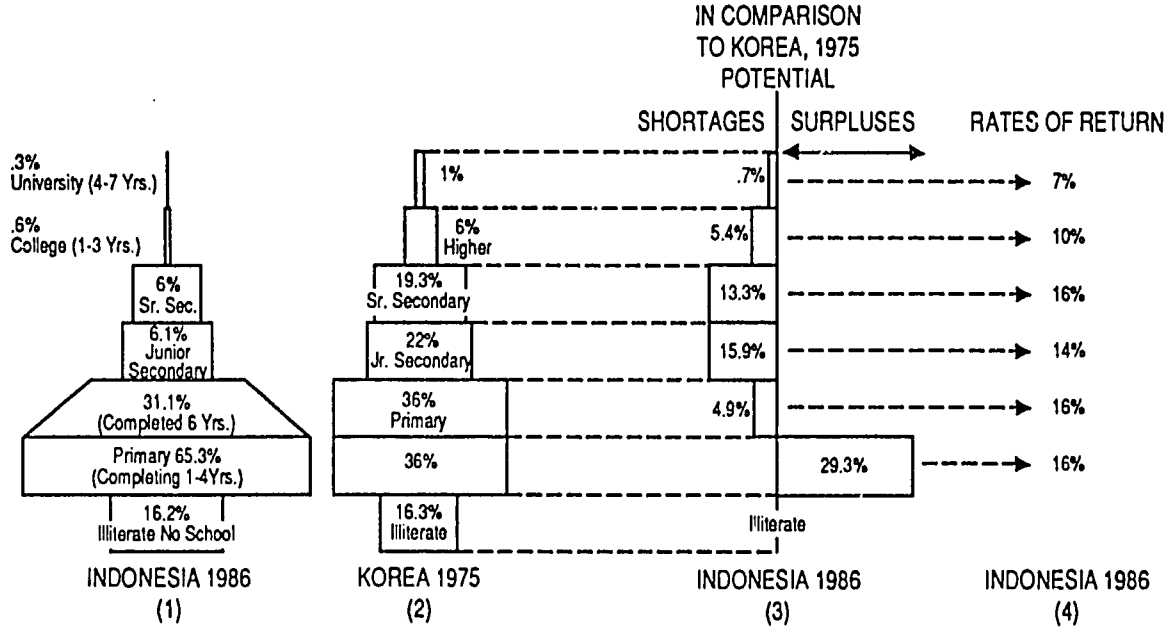
Source: World Bank staff calculations from 1984 and 1987 SUSENAS surveys; see Ravallion and Huppi, 1989. *Pengeluaran Untuk Konsumsi Penduduk Indonesia 1987*, Book 1 (Expenditure for Consumption of Indonesia 1987), CBS, January 1989.

senior secondary general education (15% for senior secondary vocational). This represents a very handsome growth payoff to larger rates of investment at sixth through twelfth grade levels. The returns at 10 percent for finishing a three year degree are substantial, but the university level is lower, and neither are not typical of all employments or sustained over time as will be seen (in Table II.7).

Rates of return to investment in physical capital in Indonesia are not this high on the average, averaging about 9.3 percent when corrected for inflation.

Any overall budget strategy that focuses on the relative rates of increase in different parts of the education budget is inherently an *investment* strategy. The key relevant criteria therefore from the point of view of economic analysis are *investment* criteria, which are the social rates of return just cited. These consider the returns to different forms of investment, relative to the costs, and are relevant to the growth of individual earnings as well as to the growth of National Income in the aggregate.

Figure II.3
Educational Attainment of the Labor Force in Indonesia
Current Attainment and Estimated Needs for Rapid Growth



(1) SAKERNAS, 1986
(2) Kim, Yoon-TAI, and C. Yun, Manpower Projections and Strategies, Korea (Educational Development Institute, Seoul, 1984, p. 24)
(3) Col 1 less Col 2
(4) Table 8 below.

III. NEW RESULTS ON SOCIAL RATES OF RETURNS

Cost-benefit analysis over time of the net monetary returns to investments in education at each level can also yield useful insights. The economic resources in Indonesia are scarce, and therefore it is especially important that they be used efficiently, increasinginvestment in education the fastest at those places where the payoff is largest. This requires looking not just at starting salaries, as many in education are prone to do, because they are misleading. Starting salaries can be temporarily lower in recessions, under-employment rates in Indonesia tend to be high only until about age 29, and some age-earnings profiles are flatter than others. But earnings even if considered over the life-cycle and discounted back to their present value can also be misleading unless they are considered in relation to the educational costs, including direct public tax costs, private direct costs, and foregone earnings cost.

The SAKERNAS surveys of the labor force now done annually and collecting data covering 360,000 individuals nationwide (including children) provides an excellent source for developing new refined investment criteria. There are some outliers that turned out to be due to cells in certain provinces that we had to delete. But the generally high quality of this data base, as well as specific exceptions, are analyzed in a paper by Alex Korns (1987).

Explanation of the Method of Computation

The total direct costs of education for 1982 and 1986 on a per-student basis are shown in Table II.5, together with the number of years it takes to complete each level. The latter rather drastically raises the costs at the university level (6.5 years to complete a 4 year degree) and lowers that rate of return. The foregone earnings costs are the wage and salary earnings for persons working in industry at each lower education level, which are shown in Table II.6 in Columns 1 and 4. The sum of these are the investment costs of education, and with the net benefits at each age (net of earnings at the next lower education level at that age), they enter into the benefit cost analysis for calculation of social rates of return.

The earnings shown in Table II.6 are earnings on the "first job," not including second and other jobs. However the latter may be more important in civil service and other nonindustry employments. (The 1982 results presented later include "all jobs," which is one reason the 1982 rates of return are somewhat higher). We control for the main nonmarket effects by sorting the data for differences between urban and rural (since farmers' money earnings are not an adequate measure of farm output), for male/female differences (since homemaker services are nonmarket), for geographical differences (when sorted by regions) and for industry vs. government and other kinds of employment. This largely controls for several kinds of effects on earnings that could bias the results, such as parent's "connections" that can sometimes affect earnings in ways unrelated to the amount invested in education and the quality of the education the student has received. We believe this to be better than controlling for the parent's income, or SES, which are key determinants of the amount invested in human capital on which the rate of return is being calculated.

With respect to the possible effects of self-selection bias as between the different levels of education, Griliches and Mason (1988) conclude that "the bias in the estimated coefficient due to the omitted ability dimension is not very large, on the order of 10 percent." The growth of earnings over time due to the diffusion of technical change (for which education is largely responsible) will raise earnings at older ages above what is reported in the instantaneous cross section data (perhaps 2% per year compounded?). We assume here that this approximately offsets the bias in the other direction due to self selection based on (unmeasurable) innate aspects of ability and motivation (which also interact with education). This assumption is tantamount to assuming that the "alpha coefficient" is equal to unity, i.e., that "comparisons across realized observations are a good first approximation to the relevant

return to education" (Sherwin Rosen, 1957, p. 299), which is in line with the conclusion reached by most of the recent research. Beyond this, the controls imposed as indicated above are significant.

The Investment Costs of education in Col. 3 of Table II.6 are composed of foregone earnings costs (Col 1) and Direct Costs (Col 2). Foregone earnings costs are assumed to be zero up through fifth grade. But at the sixth grade level a child can either earn an amount approximately equal to an older person with "some primary education" (for males, Col 4, Row 3, adjusted by the percent of time in school each year (.75) and by the probability of underemployment) or can tend smaller children and the smaller animals in rural areas. This increase in "forgone earnings costs" as the child gets older to the parents is not significant until later in industrial countries, but is probably the primary explanation for the higher drop out rate at the sixth grade level in most developing countries including Indonesia.

Table II.5
Direct Costs of Education, 1982 and 1988
Public Institutional Costs Plus Private Fees, in Thousands of Rupiahs

	Annual Yrs Cycle Cost			Direct Costs 1988
	Costs 1982	to Compete	Costs	(Cycle Costs in 1988 prices)
Some Primary	64.10	4.00	256.40	412.80
Primary	64.10	8.00	514.70	838.67
Jr. Sec. General	87.20	3.29	286.80	461.75
Jr. Sec. Vocational	87.20	3.57	311.30	495.57
Sr. Sec. General	107.20	3.45	369.40	594.73
Sr. Sec. Vocational	143.70	4.58	657.70	913.23
Sr. Sec. Teachers	121.80	3.29	400.70	
Sr. Sec. Commercial	110.30	3.33	367.30	
Manpower Dept's 3 Mo. Craft Courses Annualized (BLK's)*	438.80	1.00	438.00	2,122.41
Academy (College 1-3)	203.00	3.50	710.00	1,143.10
Univ. (College 4-7)	475.70	6.50	3,092.00	4,978.12

Source: McMahon, Millot, and Eng, (1986b, p. 2-200).

Yrs. = Average of Years in School
Inflation Rate 1982-3=8.40%; 1983-4=12.63%; 1984-5=3.64%
1985-6=5.66%; 1986-7= 8.83%; 1987-8=8.23%

Inflation Adjustment Factor
= (100)(1.084)(1.1263)(1.0364))(1.0566)
= 1.336 = 1.34

Source of Data on Inflation Rate: Data obtained by Abas Gozali of Pusat Informatik from the Bureau of Planning. See also *Indonesian Financial Statistics*, Vol. XXVI, No. 3 1988 to which these inflation rates correspond.

*Ministry of Labor and Manpower runs 3 month courses in craft skills (BLK's) at a cost of 147,000 Rp. in 1985/86. This *excludes* equipment and building costs, and routine expenditures on maintenance, electricity, telephone, water, and overhead staff. Nevertheless, on this basis, the annualized cost per student is 588,00 Rps, which in 1982 prices would have been the 438,800 Rps. shown above. The source of this data is Martin Godfrey (1987, p. 37).

Table II.6
Earnings by Age, Total Investment Costs, and Net Earnings Differentials in Industry, 1988

	Cost of Education			Mean Annual Earnings at Different Ages Age Groups					
	Foregone Earnings	Direct Cost	TOTAL	15-20	21-30	31-40	41-50	51-60	61-65
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
No School (M)	0.00	0.00	0.00	481.09	636.21	840.70	690.28	840.45	600.02
No School (F)	0.00	0.00	0.00	323.88	314.25	282.84	331.22	288.77	215.63
Some Primary (M)									
Cost & Earnings	0.00	-412.80	-412.80	545.64	677.07	743.91	731.92	661.40	551.14
Net Earnings Differential				64.55	40.86	103.21	41.84	20.95	-48.88
Some Primary (F)									
Cost & Earnings	0.00	-412.80	-412.80	343.22	412.40	352.31	398.78	337.53	277.72
Net Earnings Differential				19.34	98.15	69.47	67.56	48.76	62.09
Primary (M)									
Cost & Earnings	-360.82	-838.67	-1189.49	533.32	698.26	915.89	948.47	980.01	1201.23
Net Earnings Differential				52.23	62.05	275.19	258.19	339.56	601.21
Primary (F)									
Cost & Earnings	-242.91	-828.67	-1071.58	456.94	455.71	525.69	563.39	515.57	600.00
Net Earnings Differential				133.06	141.46	242.85	232.17	226.80	384.37
Jun. High School Gen. (M)									
Cost & Earnings	-363.52	-461.75	-825.27	583.92	852.62	1161.71	1216.05	1474.50	1600.00
Net Earnings Differential				50.60	154.36	245.82	267.58	494.49	398.77
Jun. High School Gen. (F)									
Cost & Earnings	-228.66	-461.75	-690.41	467.71	551.83	519.25	970.29	1000.00	1300.00
Net Earnings Differentia				10.77	96.12	-6.44	406.90	484.43	700.00
Jun. High Vocational (M)									
Cost & Earnings	-394.46	-495.57	-890.03	624.00	786.89	1252.77	1343.06	2237.14	2500.00
Net Earnings Differential				.68	88.63	336.88	394.59	1257.13	1298.77
Jun. High Vocational (F)									
Cost & Earnings	-248.12	-495.57	-890.03	582.43	437.63	1985.74	819.00	900.00	811.77
Net Earnings Differential				125.49	-18.08	1460.05	255.61	384.43	211.77
Sen. High School Gen. (M)									
Cost & Earnings	-407.94	-594.73	-1002.67	795.42	1105.44	1731.48	2157.96	2266.43	2600.00
Net Earnings Differential				211.50	252.82	569.77	941.91	791.93	1000.00
Sen. High School Gen. (F)									
Cost & Earnings	-326.75	-594.73	-921.48	566.80	819.56	1157.55	1550.00	1600.00	1500.00
Net Earnings Differential				99.09	267.73	638.30	579.71	600.00	00.00
Sen. High Vocational (M)									
Cost & Earnings	-541.56	-913.23	-1454.79	641.14	1006.23	1794.58	1811.23	2450.00	2500.00
Net Earnings				57.22	153.61	632.87	595.18	975.50	900.00

Table II.6
(continued)

Sen. High Vocational (F)									
Cost & Earnings	-433.78	-913.23	-1347.01	828.86	715.60	1207.34	2070.00	1540.00	1540.00
Net Earnings Differential				361.15	163.77	688.09	1099.71	540.00	240.00
College 1-2 Years (M)									
Cost & Earnings	-805.36	-1000.00	-1805.36		1380.00	2140.00	2190.00	3100.00	3700.00
Net Earnings Differential					274.56	408.52	32.04	833.57	1100.00
College 1-2 Years (F)									
Cost & Earnings	-573.89	-1000.00	-1573.89		990.00	1200.00	1800.00	2300.00	2700.00
Net Earnings Differential					170.44	42.45	250.00	700.00	1200.00
Academy (M)									
Cost & Earnings	-1127.51	-1143.10	-2270.61		1662.86	3942.00	2895.81	4680.00	4100.00
Net Earnings Differential					557.42	2210.52	737.85	2413.57	1500.00
Academy (F)									
Cost & Earnings	-803.44	-1143.10	-1946.54		1404.67	1700.00	2000.00	2500.00	3100.00
Net Earnings Differential					585.11	542.45	450.00	900.00	1600.00
University (M)									
Cost & Earnings	-2093.94	-4978.12	-7072.06		2241.40	2335.50	2514.00	6600.00	8160.00
Net Earnings Differential					135.96	604.02	356.04	4333.57	5580.00
University (F)									
Cost & Earnings	-1492.10	-4978.12	-6470.22		1012.20	1644.00	2500.00	3500.00	4200.00
Net Earnings Differential					192.64	486.45	950.00	1900.00	2700.00

A personal computer can then be used to compute the pure internal rate of return using these total social costs and the net earnings differentials shown in Table II.6 with the standard rate of return formula.

Rates of Return by Education Level and Type of Curriculum

The investment strategy most conducive to reaching the take-off stage of fast per capita growth in Indonesia is a strategy that increases investment in education by the *largest percentage each year* where the social rates of return are the highest, and *increases expenditure* but by *smaller percentage* amounts where the rates of return are smaller. High rates of return reflect high earnings relative to the costs, and high earnings reflect where the *demands for manpower* are relatively the highest, i.e., where the shortages or growth bottlenecks, lie. These economic signals are very useful for fine-tuning human resource development plans to get the largest possible growth payoff--and hence reach the take off stage of fast per capita growth more quickly. To these economic returns in industry and in agriculture must be added the indirect returns via the net effect on slower population growth, and judgementally, from increased equity due to increased productive involvement of the poor. Most of these latter gains are to be realized in Indonesia given the universal completion of grade 5 at the 6th grade and junior secondary levels.

Relative Rates of Increase in Investment

The economic rates of return are shown in Table II.7 for 1982 through 1989 nationwide.

Table II.7
Social Rates of Return to Investment in Education
Indonesia 1982-89

Level of Education	Nationwide			
	1982	1986	1988	1989
Junior Secondary	0.17	0.14	0.13	0.14
Senior Sec. Gen.	0.22	0.16	0.13	0.11
Senior Sec. Voc.	0.16	0.15	0.10	0.06
Academy (3 Years)	0.13	0.10	0.12	0.05
University	0.11	0.07	0.06	0.05

The results show consistently in all years that the highest growth payoffs are to be obtained by increasing investment by the largest percentage amounts in:

- Junior Secondary General and
- Senior Secondary General Education

Rates of return to the three year college degree programs should be largely ignored because this degree program has now been changed. However a two year community college type degree program would appear to have good potential for being economically productive.

Rates of return to Junior Secondary General education average 14.5 percent and to senior secondary general average 15.5 percent. The 1982 SUSENAS data reflected the same pattern of high rates of return to these two levels although the 1982 rates are higher because they cover "all jobs." (See McMahon, Millot, and Eng (1986b, Table 2.122.)

There are high investment returns to getting students to finish sixth grade, returns that must include the option value (although the rates of return to primary have fallen as jobs in exports have absorbed some of those persons with less than a primary education). There are also high returns to moving toward universal junior secondary education quickly. To these 14.5 percent urban economic returns must be added another 4.7 percent when agriculture is included, plus .5 to 1.0 percentage points for the effect the education of women through grade 9 will have in lowering fertility rates (and thereby rising per capita growth), as well as the income distribution effects to be gained by involving a much larger percent of the poor in the industrialization process. In general the 1982 through 1989 SAKERNAS data, and the nature of the nonmonetary returns to be obtained at this grade 7-9 level are consistent with seeking the goal of universal junior secondary education rapidly as an intelligent efficient and equitable growth strategy.

Types of Curricula

Indonesia has decided to phase out the junior secondary vocational schools which contain only about 1.2 percent of the students at that level. The U.S. did so long ago, and expanded vocational education at the community college level. Japan has just phased out its senior secondary vocational schools. As economic development occurs, the vocational-technical education tends to move to higher levels (senior secondary, community college, and college level engineering programs). Students with

junior secondary general education can read and write, whereas those taken out early to be put in lower level wood carving, weaving, and other craft jobs to receive training normally cannot. Secondary general education is highly correlated with the amount of learning that occurs on the job, as mentioned earlier (e.g., Bowman (1974), Mincer (1974)).

The learning on-the-job effect can be seen in the Indonesian data for industrial workers. In Table 6 the 1988 data shows a pattern of continuing to learn, and increasing earnings over the life cycle for both junior and senior secondary education graduates, although earnings drop after age 40 for female junior secondary vocational school leavers. The age-earnings profiles for the VOTEC graduates are sometimes flatter, however.

Unemployment and Underemployment

Table II.8 shows that the *unemployment plus under-employment* rates (defined in our analysis here as working less than 35 hours a week) are *highest for those with no schooling*,--47 percent in urban areas and 61 percent in rural areas! These unemployment and underemployment rates are *next* highest for those with only some primary schooling--37 percent in urban areas and 52 percent in rural areas. The sample has been sorted to include only the main wage earner in each family over age 15. (When sorted further by sex, unemployment and underemployment for both sexes reveal the same general pattern.)

Urban *unemployment* is largely a demand-side phenomenon. It currently is low in Indonesia, even though nominal interest rates are currently 25-30 percent. Among secondary school graduates, unemployment is confined to those under age 27. The remedy is to improve the efficiency with which job markets work at the school leaving age (e.g., faculty placement officers) and when inflation recedes to raise aggregate demand by easier monetary policies for which the Central Bank is responsible. But it is difficult to reduce *underemployment* as demand rises (without inflation) unless the potential entrants to the labor force have sufficient education.

Table II.8
Unemployment and Underemployment
by Education Level and Type

	URBAN Unemployed or Underemployed (Works 0-35 hrs/wk)	RURAL Unemployed or Underemployed (Works 0-35 hrs/wk)
No School	47%	61%
Some Primary	37%	52%
Primary	26%	47%
Jr. High General	22%	48%
Jr. High Vocational	23%	43%
Sr. High General	16%	32%
Sr. High Vocational	28%	45%
College 1-2 Yrs	42%	57%
College 3 Yrs	28%	29%
University 4-5 Yrs	19,6%	37%

The underemployment is lowest in urban areas all the way up to and including university graduates, as shown in Table II.8. There is higher underemployment of those with 1-2 years of college. But sorting the data by age reveals that this is all at younger ages, prior to about age 27, and a function of long job search times.

In the rural areas, underemployment remains high, even at secondary and higher education levels. This may be a major reason that persons eventually migrate to provincial urban areas. It is the *small* and *medium sized enterprises* in these provincial urban areas that have the highest labor absorption rates, they are the best hope for absorption of this underemployed partially educated labor, and that are a vital part of the economic growth process.

The employment *growth* shown in Table II.9 is highest among those with at least a junior high school, senior high school, or university education. Employment has grown at a 3.38 percent to 3.26 percent rate per year among these groups, as compared to only 1.99 percent to 2.4 percent among those with less than primary school.

Table II.9
Employment Growth by Education Level

Education Level	Annual Growth 1980-83
Less than Primary	1.99%
Primary School	2.40%
Junior High School	3.05%
Senior High School	3.26%
University	3.38%
Total Employment Growth	2.21%
Rate of Growth in the Working Age Population	2.91%

Source: Martin Godfrey, (1987, p. A-72 and p. A-9).

IV. CONCLUSIONS

This economic analysis surveying other relevant research and calculating original social rates of return over time finds that the most efficient and equitable growth strategy in Indonesia involves increasing investment in junior secondary general education at the highest percentage rate. The conclusions with respect to external efficiency and effects on per capita growth are consistent with seeking a goal of universal basic education through grade 9. The returns in agricultural output can be estimated to increase by 10 percent per year for each farmer that completes nine instead of five years of basic education, a rate of return of 23.3 to 24 percent (computed from studies in nearby rice-growing economies). The returns in all urban employments at the junior secondary level averages 14.5 percent in Indonesia from 1982 through 1989 both earlier and in the most recent rate of return analysis that it is possible to do given the time that it takes to make data available. These returns understate the returns to per capita growth because as females finish grade 9, the population growth rates can be expected to fall below the 2.1 percent current rate.

This emphasis needs to be accompanied by an expansion of senior secondary general at almost as high a percentage rate. The rates of return in urban areas in Indonesia average 15.5 percent. At these secondary education levels the underemployment rates are much lower than for illiterates or for those

with some primary education only, and the unemployment is largely below age 27. Both levels contribute to learning on the job, and may help to hold earnings down in ways that contribute to export growth.

Senior secondary vocational education also contributes to growth. The age earnings profiles are somewhat flatter than for secondary general, the rates of return are falling more rapidly, and the underemployment rates are higher. Given the extremely rapid expansion of VOTEC during Repelita IV, and these facts, continuing expansion but a somewhat slower rate of expansion, and some consolidation and improvement in quality, would be one option that appears to be economically justified.

Finally, the overall rate of investment in education in Indonesia is relatively low. Indonesia invests only about 9.4 percent of its government budget in education, in spite of the fact that rates of return are higher than to investment in physical capital as shown in this paper. It therefore would be economically justified to increase this percentage steadily over the next several years as junior and senior secondary education expand. Korea invests 20.54 percent of its government budget in education, and all countries that have reached the "take-off" stage in Asia are *investing* in the range of 18 to 22 percent of their budgets in education both before and in the early stages of rapid per capita growth. An economically efficient and equitable policy would be to establish *a clear goal of universal junior secondary general education* (with some emphasis on improving the quality of primary, and on expanding and improving senior secondary), and to move in this direction with all deliberate speed.

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III

ABSTRACT

Market Signals and Labor Market Analysis: A New View of Manpower Supplies and Demands

Walter W. McMahon and Boediono

This chapter suggests movement toward a more market-oriented human resource development planning and budgeting system. It focuses on Indonesia, but the strategy may also be useful in other countries seeking growth, equity, and greater attention to market signals.

The paper considers how historical technical coefficients used in estimating manpower requirements underestimate employer upgrading as relative salaries of educated labor fall (1986-89), and export demands and technologies change.

Market signals for 1982-89 reveal falling but still relatively high real social rates of return to investment in junior and senior secondary education, unemployment rates that are initially high but fall sharply to 1-2% by age 29, and job search times that are shortest at the junior secondary level.

A method is suggested for adjusting real rates of increase in investment in education in response to these market signals given off by Indonesia's rapidly growing economy.

III

Market Signals and Labor Market Analysis: A New View of Manpower Supplies and Demands

Walter W. McMahon and Boediono*

There are rapid changes occurring throughout the world in the search for rising living standards away from the detailed planning of quantities of output with quotas and toward a more responsive market system. With the dramatic economic changes occurring in Eastern Europe for example it has become very obvious that a planning system that ignores differences in costs and in other market signals such as earnings and new kinds of job opportunities does not respond very efficiently. There is a price to be paid in failing to monitor and respond to the new emerging growth opportunities that are revealed by these market signals in the form of reduced efficiency and slower growth of living standards.

What are the implications of this for Indonesia's manpower planning system? Underdeveloped human resources are Indonesia's largest potential resource, so it is of considerable importance that this be done efficiently. But although in other areas Indonesia has moved to set up the infrastructure for an increasingly responsive market oriented system, including an export oriented growth strategy for example keyed to world market prices, and a new Jakarta stock market tapping world capital markets, the education and manpower planning system is still characterized by a very detailed specification of the number to be trained in each field. In particular, the high degree of regulation implemented through the rigid tracking within the educational system, and specification of numbers of faculty and numbers of students in each field contribute to surpluses in some fields and shortages in others. This results in limited capacities to adapt to relative costs or to emerging opportunities and hence in inefficiencies and waste.

This paper offers a "new view" of the process of planning to meet the manpower needs of the economy. It suggests moving toward a more generalized kind of "indicative planning" while strengthening the necessary infrastructure that allows deregulation of the detail and allows the more meaningful market signals to work.

This increased responsiveness to growth opportunities and greater efficiency in human resource development involves a more liberalized system allowing greater choice to individuals to respond quickly to opportunities. It also requires greater capacity of educational institutions to respond to the economy's needs in efficient ways aided by larger amounts of more objective information. But since it is inevitable that most education at all levels will indefinitely remain in the public sector, this "new view" also requires a much more intensive annual monitoring of the market signals on relative

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* The authors are indebted to Abas Gozali, Prayitno, Dwina, and Nelson Xu for valuable assistance with the computations. Nothing in this paper should be interpreted as representing the policy of the Indonesian Government, or as criticism of their rather impressive educational accomplishments, but instead as a presentation of a factual background for policy options. Any conclusions, and any errors, are attributable only to the authors as individuals.

earnings, the costs of education, and job search times at all levels and in all fields annually with a much more active budgetary response to these signals of the economy's emerging needs.

As these and other aspects of the responsiveness to market signals are strengthened, then manpower planning would no longer need to specify detailed quantities of labor to be trained in each field for each industry. Instead manpower planning would become indicative planning of broader goals and strategic planning for certain types of capacities requiring very long lead times. These include for example the number of engineering colleges to be built, and the location and character of the smaller and more costly Ph.D programs to avoid overlap. The annual monitoring of the market signals such as the earnings of graduates at each level, costs of education, economic rates of return to each level, unemployment rates, and job search time leading to annual (3 year rolling) budget adjustments responding to these market signals would then become the key planning activity.

This process of monitoring the market signals is considered below. Part I starts with an evaluation of the current manpower planning estimates in light of the emerging information from the market signals given off by a growing economy. Part II presents the evidence offered by the market signals in Indonesia for 1982-89. Part III brings these market signals together with a description of the suggested market-oriented human resource development investment strategy, and summarizes the conclusions.

I. UNDERLYING FACTORS

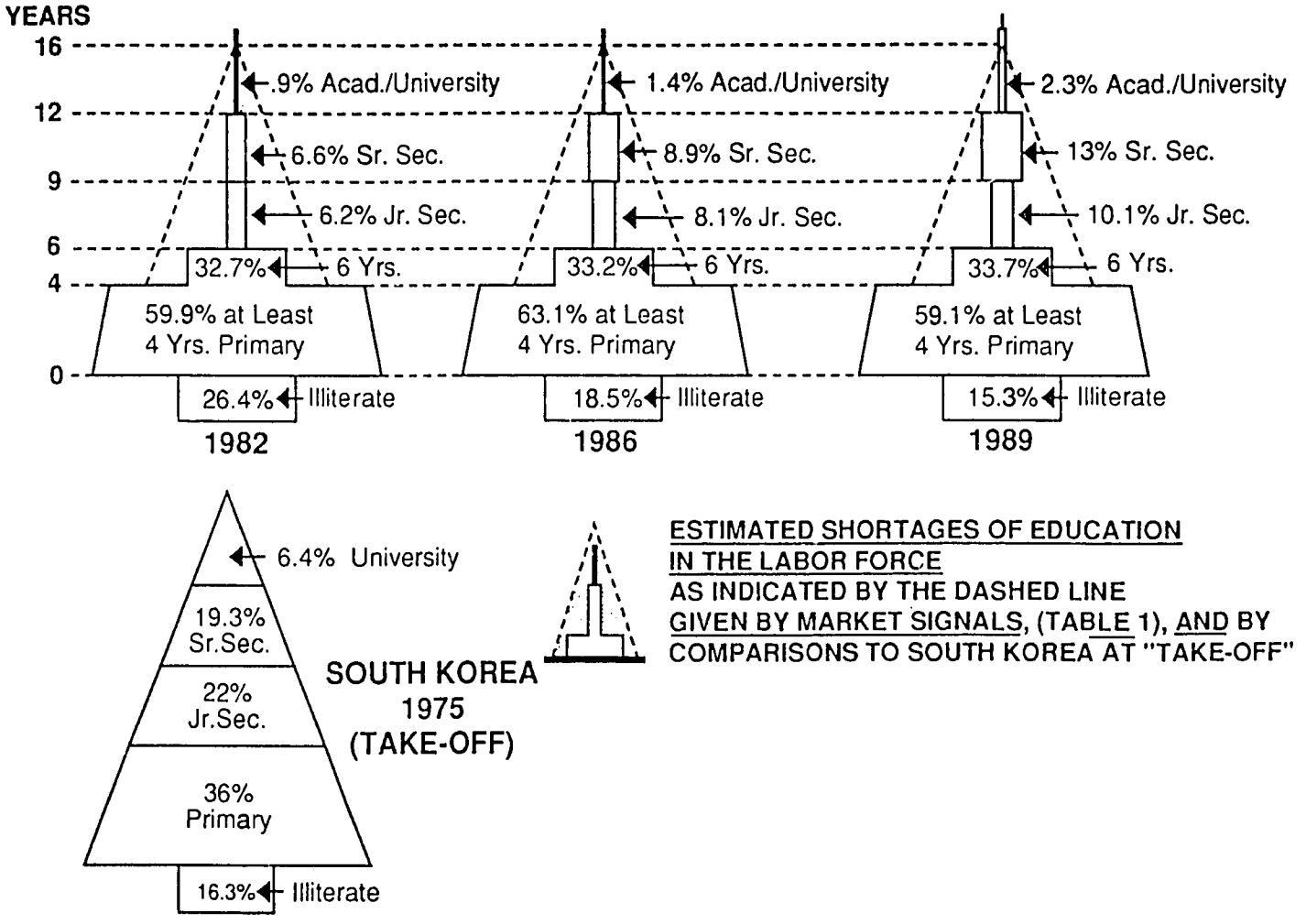
The rapid growth of the Indonesian economy continues to place heavy demands on the job market for increase in the supplies of labor with different levels and types of education.

The Problem With the Manpower Demand Estimates

The problem is that the manpower planning "requirements" methods alone based on historical Indonesian data is arriving at inconsistent results on the demand side and does not anticipate these growth needs accurately. Manpower "requirements" based on fixed (or dynamic) coefficients reflect high past utilization of *workers with primary education or less,* because that is essentially all that has been available in the labor force for many years (See Figure III.1 for 1982, 1986, and 1989 for example). But employers upgrade the educational requirements that they demand within each standard occupational category as better workers become more available (and their wages become *relatively* lower). This aids exports, and also helps to adapt to the technologies required by the world economy as they change in ways not anticipated by the manpower requirements. To cite just one example, primary school teachers in Indonesia included untrained parents during the war for independence in the 60's, but were required to have 9 years of education in the 70's, and now are required to have 12 years through the senior secondary level. These better educated teachers are better equipped with the knowledge and skills needed to educate primary school children effectively and hence are more productive in producing the required reading, writing, numeracy, and problem-solving skills in their students. But the fixed technical coefficients in the manpower requirements approach do not allow for this "upgrading" in each occupational category. Even dynamic coefficients based or historical Indonesian data do not anticipate the size and direction of the changes accurately. The latter isbecause the historical data show relatively little change at the secondary school levels for many years, (See Figure III.1, 1982 and 1986).

The inconsistencies generated in the past by the manpower requirements approach can be seen by comparing the primary and junior secondary levels in the current labor force shown in Tables III.4, III.5, and III.6 with Tables III.2 and III.3. It would be best if these "requirements" were regarded only as first approximations and fine tuned using market signals information. Large shortages of primary (6.3m) and small shortages of junior secondary school graduates (.289m) in the labor force were

Figure III.1
Educational Structure of Indonesia's Labor Force



reported as net manpower "requirements" for 1988-1993 in BAPPENAS/DEPDIKBUD/DEPNAKER/ BPS (1989) as shown in Column 4, Table III.10. However smaller shortages are reported at the primary level, but there are still large surpluses reported at the senior secondary general level in the new manpower estimates (See Table III.10, Col. 5 below from DEPNAKER 1991, p. 27). These all use basically the same manpower requirements methods based on historical labor utilization rates.

The Regulation of Quantities

The problems with specifying quantities of workers to be trained using manpower "requirements" are the same are those that arise in setting production quotas in other sectors of economic activity.

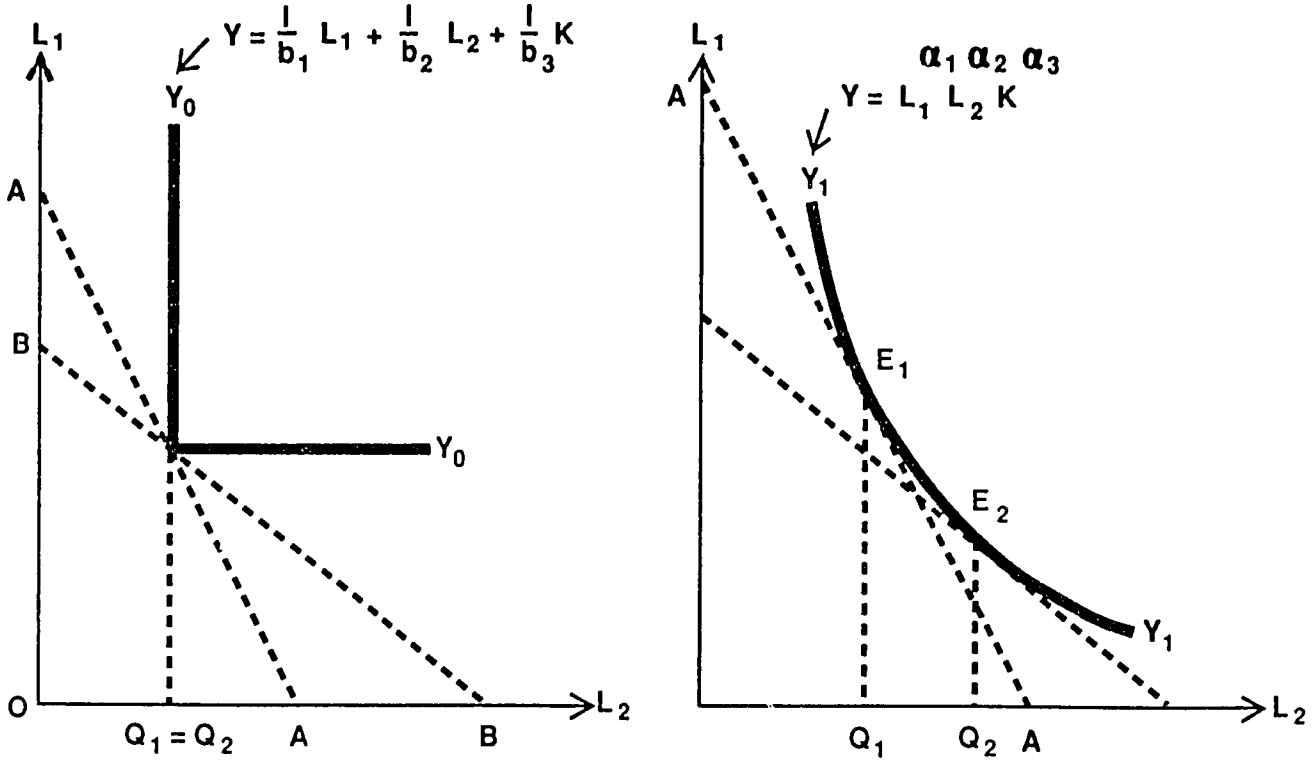
No Substitution Anticipated. The fixed technical coefficients typical of all input output analysis assume a linear production function such as that shown in Figure III.2 to estimate labor "requirements" (L1 and L2) to produce the output (Y) in each industry. This Leontief-type production function used in Indonesian planning implies right angled isoquants such as Y_0Y_0 in Figure III.1 which allow no substitution as relative prices change. However such substitution does occur in the economy. For example, at a low wage for persons with primary education or no school (L1) relative to secondary school grades (L2) as shown by the relatively steep price line AA, the *same quantity* of secondary school graduates would be expected to be hired by firms who optimize as would be hired if the relative earnings of secondary school graduates were lower as given by price line BB (i.e., Q1 = Q2).

However substitution will occur, since the curved isoquant given by the non-linear generalized Cobb-Douglas production function shown below in Figure III.2 is more realistic. Table III.1 shows how the relative earnings of secondary school and academy graduates in Indonesia have been falling from 1986 through 1989 at least. Their real earnings have fallen on the average by about 20% during the period, whereas except for those in the very young 15-20 age ranges, real earnings of those with primary school or less have remained essentially steady. This suggests that employers are starting to substitute, using persons with more secondary education who are becoming relatively cheaper, given that job search times at the secondary level are somewhat longer, but that unemployment from age 26 through 65 averages only about 1%. That is, they are likely to "upgrade" the education requirements in each occupation category because of this change in relative prices. The substitution is shown in Figure III.2 to the right, where employers who optimize will tend to substitute from E_1 to E_2, using more secondary school graduates and fewer workers with primary schooling or less over time.

The incremental demands and supplies of manpower as given by the most recent Depnaker (1991) estimates after aggregation across industries have been broken down for each year in Table III.2, with the net shortages or surpluses estimated for each year shown in Table III.3. *The supplies* depend partly on demographic factors, but even more important, are largely policy determined. If the government invests more in the schools to improve the quality of education and reduce the direct cost to the parents (thereby encouraging them especially in the poor rural areas to save and invest the foregone earnings costs of their children so the children can remain in school), then this partnership with the parents will help to reduce dropouts. Table III.2 provides for over 2 million additional children being accommodated at the junior secondary level by 1993, for example. So if the necessary funding is provided, the goal of universal basic education through 9th grade by 1993 will be attained. The accuracy of the supply-side estimates therefore depend heavily on the commitment to provide the funding. Given this, the goals would appear to be quite attainable.

The net shortages and surpluses by year shown in Table III.3 however depend on the assumptions about the demand side discussed above. There are rising shortages estimated at the primary and below level from 1991 to 1993, and rising surpluses at the senior secondary general level. These do not reflect the upgrading in each skill category done by employers as the earnings of the senior secondary general graduates fall relative to the earnings of those with primary schooling and

Figure III.2
Efficiency Problems with Ignoring Substitution, Relative Prices, and Costs



(One Result: Indonesia's Long Delay in Expanding Junior Sec. Educ.)

Table III.1
Trends in Average Earnings (Annual Wage)
In Current and Constant (1989) Prices, (Thousands of Rupiah)
All Urban Workers, Male

	Current Prices			Constant (1989) Prices			% Change Real Terms
	1986	1988	1989	1986	1988	1989	1986-89
No School							
Age 15-20	380	428	712	465	454	712	+53%
31-50	688	669	888	842	710	888	+5%
Primary							
Age 15-20	508	546	621	621	579	621	0%
31-50	938	973	1,125	1,148	1,032	1,125	-2%
Jr.Sec.Gen							
Age 15-20	649	1,058	659	794	1,122	659	-20%
31-50	1,218	1,031	1,448	1,490	1,093	1,448	-3%
Sr.Sec.Gen							
Age 21-30	1,084	1,106	1,101	1,326	1,173	1,101	-20%
31-50	1,541	1,872	1,891	1,886	1,986	1,891	0%
Sr.Sec.Voc							
Age 21-30	1,183	1,048	1,045	1,447	1,112	1,045	-28%
31-50	1,736	1,751	1,768	2,125	1,888	1,768	-17%
Academy							
Age 21-30	1,495	1,662	1,459	1,829	1,763	1,459	-20%
31-50	2,095	3,111	2,205	2,564	3,300	2,025	-21%
University							
Age 21-30	1,472	2,042	1,760	1,802	2,116	1,760	-2%
31-50	2,298	2,406	2,686	2,812	2,552	2,686	-5%
	1987	**1988**	**1989**				
Inflation Rate	9.3%	5.6%	6.1%				
Index 1986=100	109.3	115.4	122.4				

Source:
SAKERNAS 1986, 1988, and 1989 as reported in McMahon and Boediono (1989, p. 11) and 1988, 1989 as computed for this paper.

below as shown in Table III.1. The optimal solution for employers moves from 1 to 2 as illustrated in Figure III.1.

Another market signal is the costs of producing the education and skills through human resource development programs of all types. The costs are lower for the SMEA commercial vocational schools, for example, who produce persons trained in accounting, production management, finance, and other entrepreneurial skills needed by small and medium sized enterprises. This may be one reason the rates of return for these schools were found to be so high in the 1982 SUSENAS (24% for all occupations

Table III.2
Annual Increments to Labor Supplies and Demands
Anticipated by Use of the Manpower D&S Approach

SUPPLY

Level of Education	1989	1990	1991	1992	1993	Total
1. Primary + Below	1,326,015	1,203,154	1,062,457	947,451	835,506	5,374,583
2. Junior Sec. Total	424,746	440,347	324,927	510,952	535,230	2,236,203
3. Senior Sec. Votec	297,108	330,876	338,520	347,424	364,728	1,678,656
4. Senior Sec. Gen.	380,503	400,951	452,071	499,102	518,016	2,250,643
5. Academy	49,466	55,659	63,282	71,857	79,876	820,141
6. University (4+ years)	124,487	138,105	155,014	174,940	194,956	787,502
Total	2,602,325	2,569,093	2,396,272	2,551,725	2,528,313	12,647,728

DEMAND

Level of Education	1989	1990	1991	1992	1993	Total
1. Primary + Below	1,045,555	1,064,345	1,083,472	1,102,944	1,122,765	5,419,081
2. Junior Sec. Total	445,527	478,963	514,908	553,551	595,094	2,588,044
3. Senior Sec. Votec	317,827	342,226	368,499	396,789	427,250	1,852,591
4. Senior Sec. Gen.	259,908	282,117	306,224	332,391	360,794	1,641,434
5. Academy	69,212	75,611	82,601	90,237	98,580	416,241
6. University (4+ years)	82,130	96,417	113,189	132,879	155,994	580,610
Total	2,220,158	2,339,679	2,468,894	2,608,792	2,760,478	12,398,001

Source: Depnaker (1991).

Table III.3
Net Shortage or Surplus Annually by Education Level
Estimated by the Manpower Requirements Approach
Shortage ( ) or Surplus +

BALANCE

Level of Education	1989	1990	1991	1992	1993	Total
1. Primary + Below	+280,460	+138,809	(21,015)	(155,493)	(287,259)	(44,498)
2. Junior Sec. Total	(20,782)	(38,616)	(189,981)	(42,599)	(59,864)	(351,841)
3. Senior Sec. VOTEC	(20,719)	(11,350)	(29,979)	(49,365)	(62,522)	(173,935)
4. Senior Sec. Gen.	+120,596	+118,834	+145,847	+166,710	+157,222	+709,209
5. Academy	(19,746)	(19,951)	(19,319)	(18,380)	(18,704)	(96,100)
6. University (4+ years)	+42,357	+41,688	+41,825	+42,060	+38,962	+206,892
Total	+382,157	+229,414	(72,623)	(57,066)	(232,165)	+249,727

Source: Depnaker (1991).

and 37% in small business for males for example, See McMahon, Millot, and Eng, 1986, p. 2-224). To cite a second example of the relevance of costs, the costs of vocational training on the job by firms sometimes can be lower, and more up to date and relevant, for certain firm-specific skills than in the more costly formal VOTEC school settings. These VOTEC schools now have 149 separately defined VOTEC curricula that keep each curricula below "a critical mass" and hence available only at high cost per student. The manpower requirements approach does not consider the importance of these or other relative costs when planning for specific quantities. (See for example N2 on the horizontal axis in Figure III.3, which develops the difference between the way cost/benefit analysis (on the vertical axis) and the manpower requirements approach (quantities on the horizontal axis) look at the same labor market.) Cost however, which includes foregone earnings costs borne by the parents, as well as direct costs, are a very important economic signal that reflect the price of inputs and hence relative resource scarcities.

For efficiency, costs can also be very high *if the returns are also high.* Low costs alone do not bespeak efficiency. It is the costs *in relation to the effectiveness,* the latter as measured by the quality, and/or the returns that is the economic criteria for cost effectiveness and efficiency.

Technological progress occurs, contributing to rising productivity over time. This raises earnings, and is partly attributable to education due to the embodiment of technology in human capital through education. This is another factor that is not considered by the fixed coefficient manpower requirements approach in estimating manpower requirements. It also is not reflected in the cross section data used for rate of return estimates.

In seeking to evaluate the potential effects of employer upgrading and of productivity growth due to technical change on the coefficients used in the manpower requirements estimates in Indonesia, an

effort was made to consider South Korea's experience (see McMahon, Millot, and Eng, 1988, pp. 2-123, 2-128). Further study by L. Crouch and others at R.T.I. (1990) in greater depth also confirm that the "industry-education" coefficients are by no means fixed, and that changes in the education profile of the labor force are not solely due to shifts in the sectoral structure of the economy. Looking at Korea's technical coefficients does add perspective therefore. But it cannot be assumed that future changes in technology, or Indonesia's comparative advantages as development occurs, will exactly parallel those experienced by South Korea, or other Pacific Rim countries.

Nevertheless it would appear from these comparisons to South Korea and Pacific Rim countries that now that universal education through grade 6 has been achieved, junior secondary and senior secondary education seems to be what requires the greatest emphasis in a country such as Indonesia. At least that seems to be where the greatest percentage expansion occurred in other countries prior to their rapid economic development.

II. MARKET SIGNALS: THE EVIDENCE

But what do the market signals specific to Indonesia say? At the junior secondary level they reflect high earnings and low costs of education summarized in the relatively high real rates of return of 13% at this level in 1988, and 14% in 1989, consistently several percentage points above the 9.1% average real rates of return to investment in physical capital (See Table III.4). Detailed explanation of the methods of computing these condensed rate of return market signals can be found elsewhere (see McMahon and Geske, 1982, Ch. 7, or McMahon and Boediono, 1991), including further discussion of the controls imposed by sorting the data. But if the effect of technical change on productivity growth that increases earnings over the lifecycle beyond what is revealed by the cross section data approximately offsets the influence of factors other than education such as unmeasurable innate ability whose influence should be removed from earnings, then the direct observations of earnings lead to the best approximation of the true rate of return to education. This is what is assumed here (i.e., that the "alpha coefficient" equals unity), with the growth of earnings due to technical change approximately offsetting the influence of ability and other factors on earnings. This direct use of observed realizations is a common position taken by many (but not all) specialists in the field based on the more recent research.* See Rosen (1987, p. 299) for example who says "Corrections for self-selection bias arising from the correlation between years of school completed and measured ability suggest that a relatively small adjustment is necessary (sic!). Comparisons across observed realizations are a good first-order approximation to the relevant rate of return to schooling."

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* One recent paper, for example, by Jere Behrman and Anil Deolalikar (1990) argues that it is appropriate to control for a large number of "other" household factors such as those that relate not just to ability, but also to motivation, schooling quality, the parents income used to finance the schooling, employment opportunities, etc. We explicitly do wish to include quality, and hence use investment expenditure rather than number of years of schooling in computing rates of return. A second problem is that introducing controls that are not called for by a clear statement of the theory, and that often are correlated with the error term, biases the results. It is well known, for example, that controlling for (error ridden) measures of ability results in a downward bias in the returns to schooling. We assume here that since this is cross section data, the downward bias in our rates of return that results from the omission of an adjustment for the interdependence of education with technical change (a growth factor) is offset by the upward bias that results from omission of controls for ability or self-selection. In addition Rosen (1987), Griliches and Mason (1988) also say: "Using a clean schooling variable, (and a Mincer earnings function),...we conclude that the bias in its estimated coefficient due to the omitted ability dimension is not very large, on the order of 10 percent."

Figure III.3
Market Signals (at E_1) and Attempts to Forecast Quantities (at N_2)

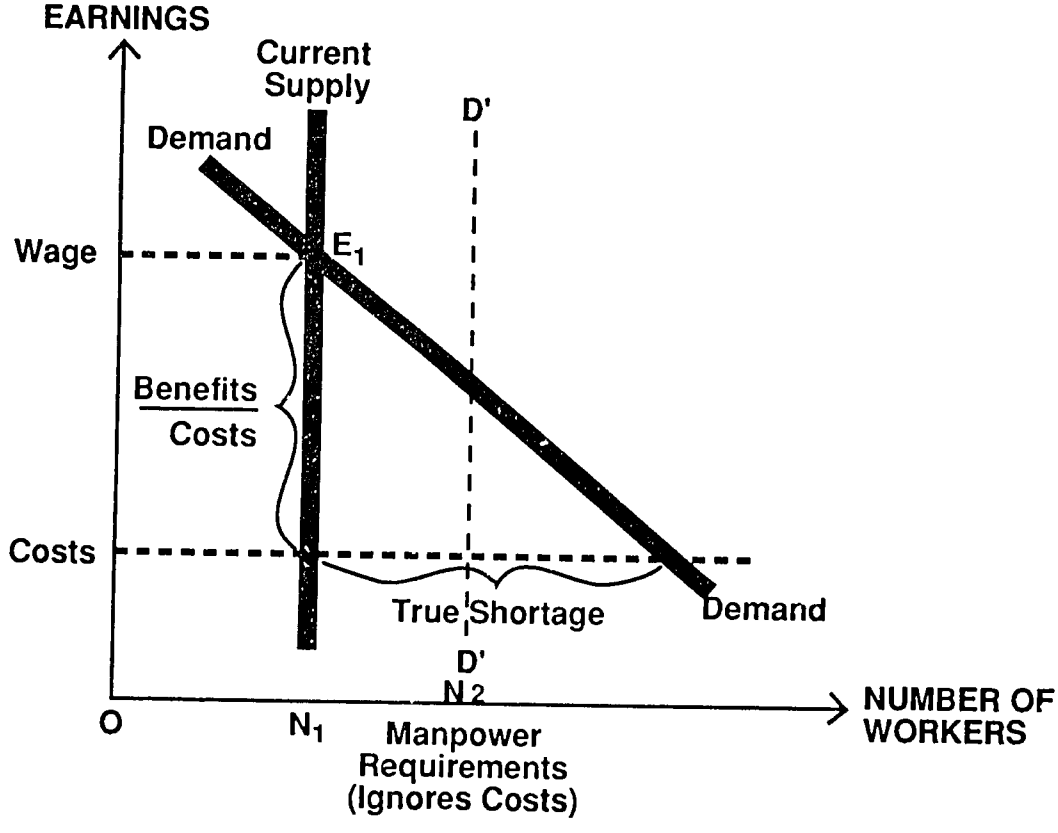


Table III.4
Real Rates of Return to Investment in Education and in Physical Capital
1982-1984[a]
Nationwide, Urban Workers, Male and Female[b, c]

	All Jobs	Main Job Only					
	1982	1986	1987[e]	1988	1988 Industry Only	1989[h]	1990
Returns to Human Capital:							
Primary, and Under[d]	13%	16%	11%	12%	13%	4%	
Junior Secondary[d]	17%	14%	14%	13%	13%	14%	
Senior Secondary General	22%	16%	12%	7%	13%	11%	
Senior Secondary Vocational	16%	15%	8%		10%	6%	
Industrial (STM)[g]	12%	-	-	-	-	-	
Commercial (SMEA)[g]	20%	-	-	-	-	-	
Teachers (SMKK)[g]	16%	-	-	-	-	-	
Academy (3 years)	13%	10%	6%	9%	12%	5%	
University (4 years)	11%	7%	6%	4%	5.5%	5%	
Average (unweighted)	15.3%	13%	9.5%	7.5%	11.2%	7.5%	
Returns to Physical Capital:							
Average Real Rate of Return (82-90)	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%
Annual Real Return	.8%	9.0%	9.7%	13.6%	13.6%	12.2%	9.4%
Nominal Interest Rate[f]	10.5%	18.2%	19.0%	19.7%	19.7%	19.3%	18.9%
Less the Inflation Rate	9.7%	9.2%	9.3%	5.6%	5.6%	6.1%	9.5%

Sources:

a)1982 SUSENAS, 1986, 1987, 1988, and 1989 SAKERNAS. From McMahon and Boediono (1992a, Tables 1, 2, and 3 for 1982 and 1986) and as computed from 1987, 1988, and 1989 SEKERNAS tapes for this paper.

b)Farmers removed since their earnings misrepresent their productivity.

c)All years are arithmetic averages of male and female rates of return.

d)Means of "Some Primary" plus Primary, and of Junior Secondary General and Junior Secondary Vocational, respectively.

e)Males only for 1987, and means for the four regions of Jakarta, Sumatra, Central Java, and Sulawesi. New cost data on actual (vs. budgeted) expenditures was collected for these four regions only, and used as benchmarks for 1987 and thereafter. No nationwide rates were computed for 1987.

f) From Central Bureau of Statistics (BPS).

g)B.P.S. separated the three types of Senior Secondary Vocational schools shown in 1982, but did not do so in the 1986-1989 SEKERNAS surveys.

h)For the earnings and cost data underlying these rate of return computations, see Table III.11 in Appendix III.A.

Consistent with the cost/benefit evidence, the unemployment rates are lowest at the junior secondary level of all education levels except primary, and this unemployment is almost all concentrated in the under 25 age ranges (Table III.5). Also consistent with "tight" labor markets at this level are the short job-search times for junior secondary school leavers, with 93% finding jobs within 3 months or less (Table III.6). And at the senior secondary general level, the real rates of return are equally high (12% in real terms in 1989 in Table III.4) with low unemployment rates shown in Table III.5 after age 26. The somewhat higher rates of return in 1982 are due in part to the fact the 1982 SUSENAS asked about earnings not on the main job, but also on all other jobs, which was not done in 1986-89. (A request has been made to B.P.S. to repeat this distinction annually.) The rates of return in the latter period therefore may be somewhat understated.

What is one to believe? The record of inconsistencies in forecasting manpower requirements using fixed coefficients, or even dynamic coefficients that attempt to anticipate employer upgrading of skill requirements, productivity growth, and shifts in technology is well known internationally (see Hincliffe, 1987, p. 325 and Hollister, 1965). The market signals on the other hand (Tables III.4, III.5, and III.6) although not perfect, do report the emerging needs for labor with different levels and types of skills in a market-oriented economy. They do not and are not intended to forecast the future, but instead to identify where the current investment opportunities lie as a basis for annual iterative adjustment, repeating the whole process later.

When these signals report the same pattern over a period of years (Table III.4), and also are consistent with different labor market signals about unemployment rates and length of job search time (Tables III.5, III.6, and tracer studies), the credibility of an approach that places greater reliance on the wisdom of employers in choosing what they need and on the annual monitoring of market signals for the purposes of educational medium term budget planning is considerably enhanced.

Universal Basic Education Through Grade 9: An Update on the Use of Market Signals for 5 Year Budget Planning

The market signals do not give precise quantitative targets for the number of students at each level. But what is more important for educational planning, and for planning for at least minimal quantities of each VOTEC skill, is the expenditure of funds to be made at each level. This will determine the extent to which there is a partnership with the parents, helping them to leave their children in school (hence determining enrollments) as well as the quality of the schooling which is what makes it attractive. If there is only planning for numbers of children not accompanied by the planning of the financial investment needed, then the quality of the education deteriorates. This is what has happened throughout the 1980's in many developing countries (See McMahon, 1990, Heyneman, 1990, and Ogbu and Gallagher, 1991).

Since resources are scarce, and funds are limited, priorities must be set for the rates of increase at each level, and for each type of education. This is exactly what the monitoring of longer term patterns in the market signals is best equipped to do. It should not be based on a single year's reading, since aberrations in the data can occur due to short lived recessions, or other factors, and investment in human resource development is a longer term investment process. But when a pattern emerges from several years of nationwide stratified random samples reporting on earnings, and costs of education, from which net rates of return can be calculated as part of a pattern of consistent market signals, there is a basis for using these to influence medium term budget planning and investment priorities.

From this point of view the decision to seek *Universal Basic Education* through the junior secondary level within the time frame of Repelita V has proven to be consistent with the market expressed priorities for labor well trained at this level (see McMahon and Boediono, 1992a). Hence it was a growth-oriented decision, which also advanced equity by providing wider access at this level and

Table III.5
Unemployment as a Function of Age (Job Search Time)
Nationwide, Urban and Rural, 1988
(Number of Cases in Parentheses)

Education Level	Age											All Ages Since Graduation
Primary	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	11-65
	2.0%	3.2%	2.1%	0.8%	0.6%	0.3%	0.3%	0.3%	0.4%	0.3%	0.1%	1.4%
	(3633)	(7297)	(5946)	(6919)	(6172)	(4987)	(3618)	(2905)	(1854)	(1213)	(724)	
Junior Sec.		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65	15-65
Gen.		7.2%	9.2%	3.7%	1.6%	0.9%	0.4%	0.8%	0.3%	1.3%	2.3%	4.5%
		(2613)	(1947)	(1531)	(1407)	(1148)	(759)	(653)	(341)	(158)	(87)	
Voc.		9.0%	8.6%	5.3%	1.0%	0.7%	0.1%	1.8%	4.1%	3.9%	0%	3.6%
		(188)	(221)	(247)	(298)	(283)	(188)	(168)	(97)	(51)	(29)	
Senior Sec.		18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-65	18-65
Gen.		40.2%	22.3%	4.7%	2.8%	1.0%	0.9%	1.4%	2.5%	0%	0%	17.8%
		(1842)	(1889)	(1031)	(744)	(574)	(460)	(289)	(119)	(39)	(9)	
Voc.		35.7%	13.6%	3.2%	0.9%	0.3%	0.6%	0.3%	0%	0%	0%	10.3%
		(1187)	(1519)	(1215)	(1029)	(709)	(483)	(336)	(153)	(42)	(13)	
Academy			21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	21-65
			29.2%	10%	3.1%	0%	2%	0%	0%	0%	0%	7.4%
			(120)	(229)	(128)	(130)	(106)	(90)	(44)	(10)	(3)	
University			22-26	27-31	32-36	37-41	42-46	47-51	52-56	57-61	62-65	22-65
			52.8%	14.5%	1.2%	0%	0%	0%	0%	0%	0%	11.1%
			(671)	(255)	(161)	(138)	(120)	(93)	(46)	(11)	(3)	

Source: Central Bureau of Statistics, 1988 SAKARNAS Labor Force Survey.

hence wider participation in increased earnings later. Specifically, the goal was set to increase the net educational participation rate from 54.2% in 1988 to 85% of the 13-15 year old age cohort by 1993. (The primary school net participation rate has been nearly 100% since 1988). This goal implies increasing the enrollments at this junior secondary level by 2 million by 1993 and the operating budgets for junior secondary schools by approximately 1,316 billion rupiah in 1991 prices, i.e., by 461,750 Rp per child times 2 m. children. These goals are of course meaningless (and will merely lead to a deterioration in the quality of junior secondary education unless the necessary financing is provided. As shown in Table III.4, the real rate of return of approximately 14% (or 24% expressed in current prices), and is still substantially above the 9.7% average real rate of return to investment in physical capital in Indonesia throughout this 1982-1990 period. So given the strong economic growth in Indonesia in 1990-1991 and the commitment to provide the necessary financing, it would appear

that this particular Repelita V "Universal Basic Education" through grade 9 goal continues to be not only a wise investment strategy, but is also realizable if the necessary budgetary commitment is made by 1993.

As mentioned above, there is independent evidence that the labor markets at this junior secondary education level remain relatively tight. In the 1988 SAKERNAS survey, as shown in Table III.5, the unemployment rate of 4.5% for junior secondary general graduates at all ages is lower than at any level other than primary. But looking more closely, almost all of this unemployment is concentrated at the younger 16-25 age ranges. After age 25, the unemployment is negligible.

Further detail on of the "tightness" in the labor markets at this junior secondary level is offered in Table III.6. The job search time is shorter at this level than at any other level of education except for those with primary education only. 48% to 50% have a job within one month, and 70% with junior secondary general or 63% with junior secondary vocational have a job within 2 months. 90 to 100% have a job within 3 months. It takes longer before 90% have jobs at the senior secondary and college levels.

We stress this consistent evidence of relatively high real rates of return and of relative tightness in the labor market at junior secondary level from 1982 through 1989. Indonesia has long had essentially universal basic education for both males and females through grade six (a 96.2% primary school participation rate in 1988 with 26,444,756 pupils enrolled, to be precise). This has resulted in the high 31.3% of the labor force that had completed 6 years by 1986 as was shown in Figure III.1 in the upper left panel. This means that the manpower planning technical coefficients based on this Indonesian historical data that are currently used, whether dynamic or fixed, merely reflect this long-standing pattern of inadequately trained workers that employers are forced to use (i.e., illiterates with less than primary, and primary school leavers). This past historical situation does not reflect the realistic emerging needs of a growing Indonesian economy. As these fixed technical coefficients are applied to this historical data for Indonesia to estimate the growth of employment opportunities (See column (2) in Table III.7), they operate to reproduce the current practice of employers and thereby reproduce the educational inadequacies from the past. Compare the percentage increase in employment opportunities in column 2 of Table III.7 which almost reproduce the percentages currently at each education level in Figure III.1.

The major point here is that cost benefit and additional market signals continue to be consistent with pressing forward toward the goal of Universal Basic Education. This implies the largest percentage increases in investment expenditure (and by implication still larger increases in the numbers of students) at this junior secondary level, but also the desirability of continuing to monitor the market signals as time passes.

Senior Secondary Education

The pattern from 1982 through 1989 in Table III.4 reveals that there is still a good 11% rate of return to investment in senior secondary general education and 6% to investment in senior secondary vocational education in 1989. The former is just above the 9.1% average real rate of return to investment in physical capital over these years. But the rates of return to both are declining. Earnings fell 15-22% during this period in relation to these with no school (World Bank, 1991, Table 1.12) and Table III.1 above. This is in part because of tight budgetary and monetary policies, leading to decreased demand for urban labor and hence to some labor market slack in the late 1980's. On the demand side there was also a shift toward growth of export demand for lower skilled labor intensive types of employment. But on the supply side there was also a faster growth in the labor force from 1986 to 1989 at the senior secondary school and college levels.0 faster than at the junior secondary level (See Figure III.1). This rapid increase in supply depressed wage rates at these more advanced levels.

Table III.6
Duration of Job Search
1988

	Age Entering Labor Force	One Month	2-5 Months	Over 6 Months	Total
Primary	12	57.5%	41.7%	0%	100
Junior Secondary Level	15	48.2%	47.8%	3.4%	100
Junior Secondary Vocational	15	50.0%	49.9%	0%	100
Senior Secondary General	18	37.9%	57.5%	4.5%	100
Senior Secondary Vocational	18	35.6%	60.6%	3.8%	100
Academy (S-0)	21	41.5%	53.7%	4.8%	100
University (S-1)	22[a]	51.4%	47.4%	0%	100

[a]Totals do not add precisely to 100% because of rounding.

Source: SAKERNAS, 1988.

Table III.7
Projection of Manpower Supply and Demand, 1988-1993
(Thousands)

Education Level	Graduate Output (1)	Employment Opportunities (2)	Net Shortage (-) or Surplus (+) (3)
Less than primary	1,817 + 15.3%	-2,945 - 25.6%	1,128
Primary (SD)	2,530 + 21.4%	8,429 + 73.2%	-6,345
Jr. Secondary	2,257 + 19.0%	2,546 + 22.1%	-289
Sr. Sec. Gen. (SMA)	2,191 + 18.5%	1,412 + 12.3%	779
Sr. Sec. Tech + Com	2,042 + 17.2%	1,551 + 13.5%	491
Academy (S-0)	393 + 3.3%	344 + 3.0%	50
University (S-1)	630 + 5.3%	173 + 1.5%	457
Total	11,862 100%	11,511 100%	351

Source: BAPPENAS/DEPDIKBUD/DEPNAKER/BPS (1989, p. 36).

These earnings trends are reflected in the pattern of declining rates of return seen in Table III.4 (1986-89 focuses consistently on earnings on the first job only). This pattern that can be seen to be repeated in all of the provinces in Table III.8, although rates of return to primary appear to be falling and to junior secondary education to be rising throughout Java. It is remarkable that the highest rates of return to primary and senior secondary investment are in the Other Islands (20%), which are poor. Also investment in senior secondary general education still pays slightly better than investing in the expansion of VOTEC everywhere, presumably because of the very rapid expansion of VOTEC during Repelita IV and because the senior secondary general graduates are more adaptable in adjusting to changing labor market needs.

Table III.8
Real Rates of Return by Region/All Urban Workers (M&F)

Level of Education	Jakarta				West Java				Central Java			
	1982	1986	1988	1989	1982	1986	1988	1989	1982	1986	1988	1989
Primary + Below	0.17	0.17	0.16	0.07	0.15	0.17	0.14	0.02	0.12	0.16	0.17	-0.01
Junior Secondary	0.23	0.10	0.24	0.10	0.13	0.15	0.11	0.18	0.25	0.13	0.12	0.20
Senior Sec.Gen.	0.28	0.19	0.10	0.08	0.21	0.13	0.12	0.13	0.31	0.17	0.12	0.10
Senior Sec.Voc.	0.08	0.20	0.07	0.05	0.15	0.18	0.09	0.08	0.11	0.16	0.09	0.08
Academy (3 yrs.)	0.30	0.07	0.11	0.03	0.14	0.13	0.08	0.11	0.09	0.10	0.09	0.08
University	0.18	0.11	0.07	0.02	0.10	0.09	0.06	0.08	0.08	0.05	0.09	0.05

Level of Education	Yogyakarta				East Java				Sumatera			
	1982	1986	1988	1989	1982	1986	1988	1989	1982	1986	1988	1989
Primary + Below	0.12	0.15	0.17	0.04	0.12	0.18	0.10	0.04	0.25	0.16	0.13	0.15
Junior Secondary	0.17	0.18	0.15	0.10	0.18	0.14	0.13	0.19	0.18	0.13	0.12	0.17
Senior Sec.Gen.	0.19	0.15	0.08	0.12	0.29	0.13	0.12	0.12	0.11	0.14	0.10	0.10
Senior Sec.Voc.	0.13	0.10	0.11	0.09	0.10	0.09	0.08	0.09	0.10	0.14	0.06	0.07
Academy (3 yrs.)	0.10	0.09	0.05	0.08	0.10	0.12	0.05	0.08	0.14	0.14	0.03	0.07
University	0.13	0.09	0.04	0.05	0.20	0.04	0.04	0.06	0.10	0.08	0.03	0.05

Level of Education	Kalimantan				Sulawesi				Other Islands			
	1982	1986	1988	1989	1982	1986	1988	1989	1982	1986	1988	1989
Primary + Below	0.12	0.18	0.22	0.09	0.13	0.18	0.13	0.07	0.17	0.14	0.13	0.20
Junior Secondary	0.15	0.12	0.08	0.01	0.10	0.15	0.15	0.13	0.12	0.17	0.07	0.20
Senior Sec Gen.	0.17	0.17	0.13	0.05	0.15	0.13	0.06	0.08	0.23	0.21	0.09	0.13
Senior Sec.Voc.	0.09	0.10	0.05	0.06	0.08	0.15	0.08	0.06	0.17	0.19	N/A	0.07
Academy (3 yrs.)	0.11	0.06	N/A	0.05	0.06	0.09	0.09	0.02	0.16	0.16	N/A	0.11
University	0.08	0.05	N/A	0.04	0.09	0.10	0.03	0.02	0.12	0.06	N/A	0.03

Level of Education	Nationwide			
	1982	1986	1988	1989
Primary + Below	0.13	0.16	0.13	0.04
Junior Secondary	0.17	0.14	0.13	0.14
Senior Sec.Gen.	0.22	0.16	0.13	0.11
Senior Sec.Voc.	0.16	0.15	0.10	0.06
Academy (3 yrs.)	0.13	0.10	0.12	0.05
University	0.11	0.07	0.06	0.05

Unemployment and Job-Search Times. Unemployment rates among senior secondary general graduates of 17.8% and among VOTEC graduates of 10.3% are higher than at any lower levels as seen in the last column of Table III.5. But this unemployment is almost entirely concentrated in the younger ages, as is dramatically illustrated below in Figure III.4 (based on Table III.5). By age 26, only 3 to 4% of all senior secondary graduates are unemployed and extremely low employment rates of 1 to 2% persist on up to age 65. As seen in Table III.6, this is due in part to longer job search times. Although 77.5% of the secondary academic graduates and 73.3% of the VOTEC graduates who look have jobs within 3 months, there is an unusually large 3.8% to 4.5% that take over 6 months to secure a job. This has variously been attributed to a high reservation wage that is adjusted downward only slowly by the graduate as the realities of the job market are learned (Van Adams, 1991, p. 15). It has also been attributed to the slow processes of bureaucracy coupled with relatively well to do parents that permit some to queue for better paying government jobs (Simanjuntak, 1987 and David Clark), and to problems with the internal quality and external efficiency of the education system (Godfrey, 1987).

This pattern of high unemployment rates at the younger ages among secondary school graduates with rates that fall sharply after about age 25, is typical of other developing countries as well as of the U.S. Figure III.4 also shows how unemployment rates at each age shift upward during a recession (1982 was a recession year in the U.S) and back down afterward, even though the same pattern of high unemployment rates and larger job search times at the younger ages persists both during recession and recovery. Finally, it is clear however that the unemployment rates at the school leaving ages among secondary school and college graduates are much higher in Indonesia than in the U.S, as can be seen in Figure III.4. This suggests that there is a case to be made for improving the quality and employability of the graduates, as well as improving the efficiency with which the job placement centers for secondary school and college graduates operate.

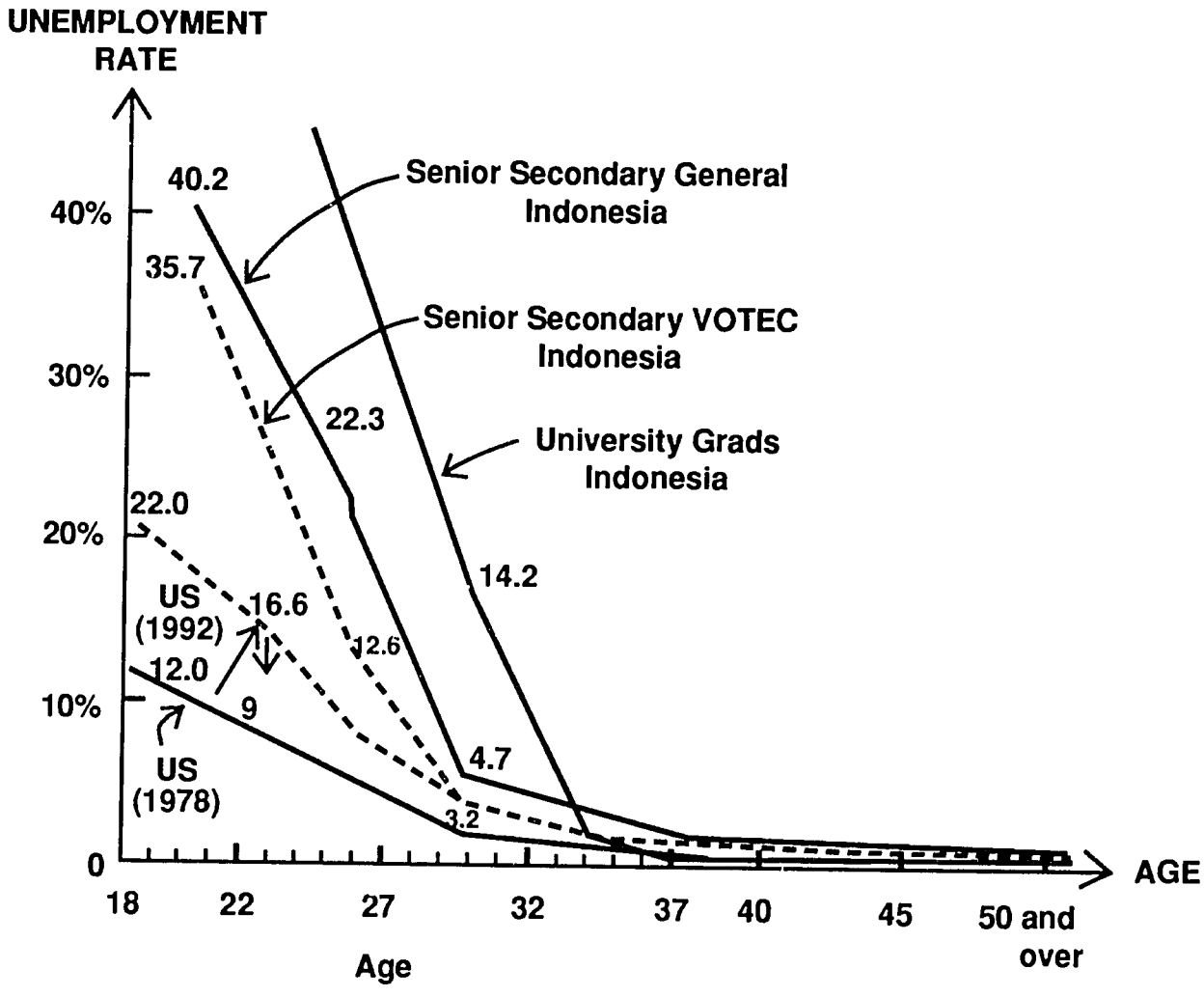
Senior Secondary Vocational

There is also a case to be made based on these market signals for a continuing expansion of senior secondary vocational education (See Tables III.4, III.5, III.6, and III.8). But the data do not support a percentage rate of expansion of VOTEC that is faster than the rate of expansion of investment in senior secondary general education. The rates of return are *not* higher and the unemployment rates and job search times are not significantly smaller.

This comparison is meaningful because the rates of return for the senior secondary general graduates are computed only for that subset that did *not* go on to college. There is no reason to think that their ability-level is higher than that of the VOTEC graduates therefore. If it were possible to measure innate IQ (which it is not), it might even be that the *innate* IQ of the VOTEC students is higher than that of the senior secondary general school leavers who did not make it into any college.

Table III.9 suggests some possibilities for improving the efficiency of senior secondary vocational schools. Table III.4 breaks down the relative ratesof return for SMT, SMEA, and SMKK schools in 1982, and reveals that the highest net returns are to the business and accounting programs (SMEA). But the data do not permit this breakdown in the later years. When these net returns are broken down by sex and by Regions, it is clear from Table III.9 that the VOTEC rates of return are highest for males in West Java (24%). Visits to the schools there should reveal what they are doing that makes them so effective. This could suggest improvements that could be made in places where the rates of return are lower, such as in the Other Islands (8%), East Java (8%), and Sumatra (10%). Possibilities that may be found where the rates of return are high include economies of scale (consolidation of overly detailed curricula), underexpansion of VOTEC in these high return areas, and technologically progressive curricula (See McMahon, Jung, and Boediono, 1991). Ade Cahyana (1991) is just completing a large study of VOTEC graduates from schools in West Sumatra, East Java,

Figure III.4
Unemployment of Graduates



Sources: Table 2 above, and (for USA) MacMahon (1987, p. 184)

Table III.9
Social Rates of Return to Senior Secondary Vocational Vs. Senior Secondary General Schools
1986
(number of cases in parentheses)

	Males		Females	
Province	General	Vocational/ technical	General	Vocational/ technical
Jakarta	14%	14%	24%	25%
	(412)	(158)	(69)	(62)
West Java	9%	24%	17%	11%
	(177)	(217)	(71)	(123)
Central Java	12%	14%	22%	18%
	(199)	(153)	(60)	(94)
Yuguakarta	15%	NA	NA	10%
	(58)	(49)	(14)	(25)
East Java	11%	8%	15%	10%
	(75)	(108)	(23)	(59)
Sumatra	11%	10%	17%	18%
	(347)	(258)	(82)	(170)
Kalimantan	13%	11%	21%	9%
	(154)	(132)	(28)	(63)
Sulawesi	14%	11%	12%	19%
	(210)	(138)	(74)	(97)
Other Islands	19%	8%	22%	29%
	(164)	(253)	(60)	(127)

Note. NA = not available

and the Other Islands (NTB) which develops ways of improving VOTEC quality and effectiveness.

College Graduates

The story is much the same at the Academy and University levels as it is at the senior secondary level. Real rates of return are lower than at the junior secondary level, and have fallen at the Academy (S-0) and to a lesser extent at the University (S-1) levels from 1982 through 1989. This decline has been occurring especially in Jakarta and not in the provincial universities (Table III.8). The high unemployment rates for university graduates are heavily concentrated in the 22-26 age group, but many of these may still be in school and searching for a job at the same time (Table III.5). There is a much smaller 10-14% of college graduates unemployed in the age 26-30 age group, and the unemployment rate falls to 1.2% and then to 0% above age 32. 41% to 51% of those leaving the Academy and University respectively have a job within one month, but about one-third experience a job-search time of 3 months or longer (Table III.6).

The low rate of return at the university level (and the high unemployment rates from age 22-26) are partly due to the excessively long 7 to 10 years that it is taking to complete a 4 year university degree, since this runs up the costs. It also reflects the rapid rate of expansion at this level of the supply of college graduates (See Figure III.1). This all suggests that it is important to concentrate on improving the quality and efficiency of higher education, and establishing college placement offices that work with students to achieve the earlier employability of new college graduates. A slower rate of expansion in investment expenditure at the college and university level than at the junior secondary level is appropriate, with a larger proportion of the improvement in college quality financed through resource recovery from parents paying tuition and fees (coupled with grants for students from low income families), and through greater efficiency by reductions in the 7-10 years it takes to graduate. It would also help if the control over access by employers were shifted from academic department heads, and the responsibility of the college placement offices for placing students (as distinguished from alumni) were stressed.

III. SUMMARY AND CONCLUSIONS: MARKET SIGNALS AND EDUCATIONAL INVESTMENT

The results of this analysis of what the market signals say and their implications for an efficient educational investment strategy are summarized in Table III.10. Our "new view" of this process is compared to the various manpower "requirements" and supply estimates that were discussed earlier. The objective here is to offer a practical method for making budget allocations so that central manpower planning of specific quantities is not just abandoned with nothing to put in its place.

First, since the overall growth of real GDP has averaged 6% in Indonesia over the last decade, the rate of increase in investment in education should increase faster than that, perhaps by 7.8% per year on the average in real terms as shown in column 6 of Table III.10. This is partly because the overall income elasticity of expenditure on primary and secondary education is approximately unity in most western market economies sometimes called the social demand for education but on the cost side implying that a rate of expansion of at least 6% in expenditure is necessary to maintain competitive salaries and educational quality. But this is the economics in countries where universal education through grade 12 has already been attained, which is not the case yet in Indonesia. (The income elasticity of effective demand for *higher* education in the U.S. is greater then unity.) But even more significant, the average rate of increase in investment in education, should be slightly larger than physical capital investment to approach an optimal allocation because the real social rate of return to education of 11.1% on the average (See Table III.10) even when considering only monetary returns to education on the first job from 1986-89 is about the same as the 9.1% average real rate of return to investment in physical capital in most years (See Table III.4).

Table III.10
Comparison of Market Signals and Manpower D+S Results and Their Implications by Education Level

	Market Signals			Manpower Requirements		Illustrative Implications @ Percentage Rates of Increase in Investment in Real Term		
	Real Rates of Return (1989)	Unemployment Age 26-35	Median Job Search Time	Surplus (+) or Shortage (-) in Thou, 1989-93 Rep V	Rev '91	Market Signals	Market D+S Rep V	Dep 91
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Primary	4%	.7%	1m	-5,217	-45	7%	11%	7%
Junior Secondary	14%	2.6%	1.2m	-289	-353	12%	7%	10%
Senior Sec. Gen	11%	3.7%	2m	779	+709	10%	3%	3%
Senior Sec. Voc	6%	2.0%	2m	491	-174	8%	4%	7%
Academy (3)	5%	6.5%	2m	50	-96	5%	5%	5%
University (4+)	5%	7.8%	2m	457	+207	5%	4%	4%
Overall Averages								
Human Capital	11.1% (1982-89), from Table 4.					7.8%	5.6%	6%
Physical Capital	9.1% (1982-90)							
Real GDP Growth						6%		

Notes: @ These assume an average growth rate of real GDP of 6%. The actual rates were for 1975-80 = 6.8%, 1981-1990 = 5.5%, and 1986-90 = 6%, source BPS, as quoted in World Bank (1991, p. 18).

Sources: Market Signals: Tables III.1, III.2, and III.3 above.
Manpower Requirements: Repelita V in BAPPENAS/DEPDIKBUD/DEPNAKER/BPS (1989, p. 36). Revision '91 as published in Depnaker (1991, p. 27).

Since this 11.1% does not include any private non-monetary benefits of education (better health of children, etc.), or externality spillover social benefits (e.g., a significant contribution to lower fertility and population growth rates, provision of a better basis for democracy, etc.), but instead includes only the contribution to labor market measures of National Income and Product growth, it is reasonable to assume that it understates the true return to investment in education.

This all suggests that a rate of increase in investment in education higher than the growth rate of real GDP and about equal to the rate of increase in investment in physical capital is required for an *efficient* investment strategy (i.e., on efficiency grounds). Furthermore, Indonesia's National plus local investment in education as a percent of GDP (which was about 3.5% in 1988), and the *Central* Government's expenditure on education as a percent of GDP (2% in 1988) are the lowest in comparison to all of the Pacific Rim Countries (See McMahon and Boediono, 1992b, Figures II.1 and II.2). South Korea's experience as mentioned above was one of a large increase in junior secondary and senior secondary school investment prior to rapid growth take off. Enrollment rates in South Korea in all secondary education rose from 35% in 1965 to 56% in 1975 (See Figure III.1 above, and World Bank, 1991, p. 60). All of these points also suggest that a rate of increase in real investment in education higher than 6% is called for on efficiency grounds, and is probably a necessary condition for a take off into sustained faster per capita labor productivity growth and hence sustained economic growth.

Second in comparison to the suggested average rate of expansion in real terms (here about 7.8%) the social rates of return in Col. 1 of Table III.10 and the other market signals reflecting the relative "tightness" of the labor markets indicate where the *priorities for expansion* lie. Clearly the market signals suggest junior secondary should have highest priority (say a 12% annual increases in real expenditures), senior secondary general the second highest (say 10%) and senior secondary vocational the third highest (say 8%), all higher than the average 7.8% rate of expansion of investment expenditure in real terms. Lower rates of increase in investment in real terms are called for at the primary level, say 7%, given that there are needs for free textbooks, higher 6th grade completion rates in the rural areas, and improved quality, but also given that universal primary education has already been attained. Optimum rates of expansion of investment would be lower at the college level (say 5%) where there are needs to improve efficiency by reducing graduation time, but also raise salaries and improve quality, but where also the rates of return are the lowest, and falling, and the unemployment rates and job search times are the largest.

These priorities are the same in certain respects, but also are somewhat different than those that we have inferred here by use of the manpower requirements forecasts as can be seen by comparison of columns (4), (5), (6), (7), and (8) in Table III.10. For whatever reason, there appears to have been significant underinvestment in this junior secondary education in Indonesia over a period of many years (See Figure III.1). The revised manpower requirements are better (Col. 5, Table III.10) than the earlier estimates (Col. 4, Table III.10). But they still would lead to some continuing underinvestment in junior secondary and serious underinvestment in senior secondary general education (Compare Cols. 6 and 8 in Table III.10). The latter is not warranted by the earnings, costs, rates of return, unemployment rates after age 25, comparisons to South Korea's experience, or other Indonesian market signals at these junior and senior secondary general education levels.

Finally, our "new view" of manpower demands and supplies does require use of the periodic national labor force survey which is well established in almost all developing and European countries (often with the help of the I.L.O.) to regularly monitor the market signals suggested above as one important basis for annual adjustments in the rates of increase in investment in various types of human resource development. The infrastructure must simultaneously be strengthened enabling individual secondary school and college students to respond more flexibly to emerging employment opportunities (e.g., establishment of college placement offices and high school job counsellors, better capacity to switch curricula in response to labor market needs, etc.). Together the more flexible public and individual response to market signals should enable other developing countries as well following Indonesia's example to benefit through greater allocative efficiency in human resource development and more flexible response to emerging technologies, trade, and growth opportunities.

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Appendix III.A

Total Social Costs and Gross and Net Returns to Education for Computation of Rates of Return

Earnings of all Urban Workers, 1989, All Provinces
Program Developed by Walter W. McMahon, University of Illinois

	Cost of Education			Mean Annual Earnings at Different Ages					
				Age Groups					
	Foregone Earnings 1989	Direct Cost 1989	Total	15-20 (1)	12-30 (2)	31-40 (3)	41-50 (4)	51-60 (5)	61-65 (6)
No School (M)	0.00	0.00	0.00	712.00	890.00	872.00	906.00	775.00	668.00
No School (F)			0.00	526.00	386.00	508.00	417.00	627.00	354.00
Some Primary (M)									
Cost & Earnings	0.00	-420.75	-420.75	529.00	832.00	914.00	936.00	948.00	733.00
Net Earnings Dif. from the Last Lev.				-183.00	-58.00	42.00	30.00	1000.00	65.00
Some Primary (F)									
Cost & Earnings	0.00	-420.75	-420.75	394.00	384.00	435.00	417.00	448.00	321.00
Net Earnings Dif. from the Last Lev.				-132.00	-2.00	-73.00	0.00	-179.00	-33.00
Primary (M)									
Cost & Earnings	-534.00	-844.60	-1378.60	621.00	861.00	1035.00	1216.00	1255.00	994.00
Net Earnings Dif. from the Last Lev.				-91.00	-29.00	163.00	310.00	480.00	326.00
Primary (F)									
Cost & Earnings	-394.50	-844.60	-1239.10	415.00	506.00	555.00	610.00	1035.00	291.00
Net Earnings Dif. from the Last Lev.				-111.00	120.00	47.00	193.00	408.00	-63.00
Jun. High School Gen. (M)									
Cost & Earnings	-1287.15	-470.63	-1757.78	659.00	942.00	1300.00	1596.00	1951.00	1344.00
Net Earnings Dif. from the Last Lev.				38.00	81.00	265.00	380.00	696.00	350.00
Jun. High School Gen. (F)									
Cost & Earnings	-1075.21	-470.63	-1545.84	482.00	789.00	853.00	1663.00	1725.00	1660.00
Net Earnings Dif. from the Last Lev.				67.00	283.00	298.00	1053.00	690.00	1369.00
Jun. High Vocational (M)									
Cost & Earnings	-1396.69	-510.84	-1907.53	506.00	924.00	1374.00	1670.00	1824.00	1341.00
Net Earnings Dif. from the Last Lev.				-115.00	63.00	339.00	454.00	569.00	347.00
Jun. High Vocational (F)									
Cost & Earnings	-1166.72	-510.84	-1677.56	436.00	652.00	763.00	1358.00	1912.00	1440.00
Net Earnings Dif. from the Last Lev.				21.00	146.00	208.00	748.00	877.00	1149.00
Sen. High School Gen. (M)									
Cost & Earnings	-1764.47	-606.17	-2370.64	719.00	1101.00	1487.00	2296.00	2209.00	2380.00
Net Earnings Dif. from the Last Lev.				60.00	159.00	187.00	700.00	258.00	1036.00

	Cost of Education			Mean Annual Earnings at Different Ages					
				Age Groups					
	Foregone Earnings 1989	Direct Cost 1989	Total	15-20 (1)	12-30 (2)	31-40 (3)	41-50 (4)	51-60 (5)	61-65 (6)
Sen. High School Gen. (F)									
Cost & Earnings	-1247.18	-606.17	-1853.35	720.00	1039.00	1358.00	1669.00	2300.00	2254.00
Net Earnings Dif. from the Last Lev.				238.00	250.00	505.00	6.00	575.00	594.00
Sen. High Vocational (M)									
Cost & Earnings	-2263.67	-1071.54	-3335.20	692.00	1045.00	1553.00	1985.00	2233.00	3084.00
Net Earnings Dif. from the Last Lev.				33.00	103.00	253.00	389.00	282.00	1740.00
Sen. High Vocational (F)									
Cost & Earnings	-1655.67	-1071.54	-2727.21	600.00	913.00	1213.00	1744.00	1929.00	914.00
Net Earnings Dif. from the Last Lev.				118.00	124.00	360.00	81.00	204.00	-746.00
Teacher School (M)									
Cost & Earnings	-1626.08	657.54	-2283.63	458.16	711.58	794.17	1036.74	869.45	801.00
Net Earnings Dif. from the Last Lev.				-200.84	-230.42	-505.83	-559.26	-1081.55	-543.00
Teachers School (F)									
Cost & Earnings	-1189.34	-657.54	-1846.88	300.00	428.72	453.88	600.00	699.96	650.04
Net Earnings Dif. from the Last Lev.				-182.00	-360.28	-399.12	-1063.00	116.28	116.28
Commercial (M)									
Cost & Earnings	-1645.85	-602.73	-2248.58	458.16	711.58	794.17	1036.74	869.45	800.01
Net Earnings Dif. from the Last Lev.				-200.84	-230.42	-505.83	-559.26	-1081.55	-543.99
Commercial (F)									
Cost & Earnings	-1203.80	-602.73	-1806.53	300.00	428.72	453.88	600.00	699.96	650.04
Net Earnings Dif. from the Last Lev.				-182.00	-360.28	-399.12	116.28	116.28	116.28
Academy (M)									
Cost & Earnings	-1585.40	-1165.10	-2750.49		1459.00	1902.00	2509.00	2406.00	2357.00
Net Earnings Dif. from the Last Lev.					358.00	415.00	213.00	197.00	-23.00
Academy (F)									
Cost & Earnings	-1625.40	-1165.10	-2790.50	903.00	1497.00	1855.00	3003.00	2500.00	
Net Earnings Dif. from the Last Lev.					-136.00	139.00	186.00	703.00	246.00
University (M)									
Cost & Earnings	-2944.31	-4073.92	-8018.23		1760.00	2321.00	3052.00	4025.00	3116.00
Net Earnings Dif. from the Last Lev.					659.00	834.00	756.00	1816.00	736.00
University (F)									
Cost & Earnings	-3018.60	-5073.92	-8092.52		1419.00	1925.00	3294.00	2406.00	0.00
Net Earnings Dif. from the Last Lev.					380.00	567.00	1625.00	106.00	-2254.00

Methods of Computation:
The data on earnings as shown above come from the National Labor Force Survey (SAKERNAS), which is available in most countries based on questionnaires and statistical standards established with the help of the ILO. *Foregone earnings* costs at each educational level are the earnings of school leavers at the next lower level multiplied by .75 since 3/4 of a year only is spent in school, multiplied by the average number of years it takes to complete the education level in question (see McMahon, Millot, and Eng, 1986, p. 220), multiplied by the probability of being unemployed and underemployed at each level. *Direct costs* are total government expenditures on the schools at each level available from the Ministry of Education

in each country, adjusted to the prices prevailing in each year, and multiplied by the number of years required to complete each level. (For specifics see ibid., p. 220, and the 257 page "Cost Appendix.")

The pure internal rate of return is solved for iteratively at each level within the LOTUS program (IRR). It is that rate that discounts the "net earnings differential" at each age back to its present value and sets it equal to the compounded total social cost (for the social rate). (See ibid., pp. 214-232 for details.) Controls are imposed (by sorting the data) for urban-rural differences, male-female differences, for regional differences, and (in the 1982 data) for government employments. These control for most of the influences on earnings unrelated to education (e.g., the parents' connections, agricultural price and non-market distortions, etc.). No growth factor was added to the (cross-section) earnings to adjust for future technical change, which is assumed to approximately net out with the effect of (unmeasurable) native ability (i.e., approximately 10%, see footnote 1). Further controls are not likely to be appropriate, given the theory of what it is we are seeking to measure. Inappropriate controls (since they are normally correlated with the residuals) also tend to bias the results.

IV

ABSTRACT

Strategies for Planning Efficient and Equitable Human Resource Development

Walter W. McMahon and Boediono

This chapter suggests that a market signaling system for human resource development policy be considered. It involves an annual, iterative, responsiveness to the needs of the market as these needs change in response to new technologies, to changing export markets, and to other realistic opportunities for faster economic growth and broadly based development.

The main features of a market signaling system would include:

- Differing percentage increments to total routine plus development investment in each level and major type of education that are sensitive to the needs for growth being signaled by the market.
- Annual computation of key labor market signals, including earnings, educational and training costs, efficiency ratios of benefits to costs that consider the entire life cycle (i.e., social rates of return), unemployment and underemployment rates for all levels of education and ages, job-search times, and tracer study information.
- A 3 year rolling budget financing plan.
- Job placement offices in the schools and colleges, and
- Provisions for pupil equity and broadly based development

Finally, the types of research needed on the emerging market signals for an annual monitoring of the planning system are outlined.

IV

Strategies for Planning Efficient and Equitable Human Resource Development

Walter W. McMahon and Boediono

This chapter outlines a strategy for human resource development policy analysis and planning in Indonesia that encourages efficiency in the education and training components of the human resource development system. The objective is to increase the allocative efficiency and cost effectiveness of the contribution of education (a term used throughout to include training) to faster per capita economic growth and to broadly based development.

Education is a necessary, although not a sufficient, condition for development. But it is only if the education system is externally efficient in serving the needs of the society, internally efficient is not wasting resources, and financed by methods that promote incentives for efficiency and broadly based development that the very considerable potential of human resource development for contributing to growth in Indonesia can be realized. It is for this reason that we suggest that a market signalling strategy for human resource development policies be considered.

Following an "Overview" of the strategy, the nature of education's contributions to growth and the criteria for efficiency are reviewed briefly first. This is followed by development of the specific elements and means of implementation of a policy analysis and planning strategy that is designed to introduce a continual monitoring for efficiency into the education and training system. This is followed by the policy research needs for implementation of this strategy, including the kinds of research capabilities that need to be institutionalized. The paper concludes with a summary of the main conclusions.

I. OVERVIEW

Efficiency, both external and internal, requires a constant monitoring of market signals to the extent that accurate market signals are available in Indonesia's mixed private-sector public sector economy. These market signals are relevant to *internal* efficiency because they include costs, and costs reflect the *prices of the inputs* that are purchased on the market. That is, costs reflect the price of materials for textbooks, teacher salaries, and building costs. These unit costs of the different levels and types of education and on-the-job training thereby reflect, albeit imperfectly, *relative resource scarcities*. Costs also reflect the opportunity costs, or opportunities foregone, as the government and families choose to spend on a particular level or type of education or training.

With respect to *external* efficiency, available market signals include earnings which reflect the relative intensities of demand for the various levels and types of graduates produced by the education and training system. These provide valuable information about the economic "growth bottlenecks" that are ignored by the nation only at its own peril, or "monopoly rents" that need to be reduced by increasing the supply. This information is not perfect, but an enormous amount of it does exist. Continuing research is needed, for example, that develops information on the cost per student of all major types of education and training. This reflects the numbers and costs of teachers, the price of textbooks, and the contributions by parents. Then this can be combined with earnings over the life

cycle of individuals with each level and type of education, which constitute the market signals given by the salaries employers are willing to offer. The data can be sorted to eliminate or to set aside distortions and to use the remainder to help to maintain an efficient and equitable course.

Education of all types does not serve only the needs of the economy. It seeks to develop human potential in a much broader ways. But as between those characteristics developed by education that increase productivity as developed in part II below, which include adaptation over the life cycle, adaptation to changes in export markets, and adaptation to changes in technologies, and those characteristics that develop cultural and other human potential, there is a very large complementarity. Curricula that develop basic literacy, numeracy, analytical skills and creative thinking for example contributes to on-the-job learning and to productivity. But the worker does not leave his human capital on the job, he takes it home with him. There it continues to contribute to the enjoyment of the fruit of his labor, to his access to culture, and to his social and public service activities, and not just to a higher standard of living.

Education and training is fragmented in Indonesia among many Ministries. Education is in the Ministry of Education and Culture, on the job training in the Ministry of Labor and Manpower, primary teacher salaries in Home Affairs, parts of basic education in Religion, financing methods and incentives in Finance, and parts of higher level manpower development and training in the Ministry of Research and Technology.

But there are some common denominators. First, the *economy* is a common denominator. This is not the only goal of education as mentioned. But the needs for economic development are especially important in a developing country where the economic needs are great. Education relevant to life long employment is complementary in major ways with the development of all human potential as mentioned. A second common denominator is the important *data base* provided by the Central Bureau of Statistics in their annual SUSENAS - SAKARNAS nationwide surveys concerning the education and earnings of individuals throughout their life cycles. Although no data base is ever perfect, this data base is good and can continue to be refined and extended to serve the needs of human resource development planning. This avoids the lack of understanding and conflict that occurs among Ministries when they each come up with their own data bases. It is also comprehensive, covering all levels and all types of training in the nation's highly fragmented human resource development system.

Finally, the challenge is to integrate market signals with the time dimension in human resource development planning in appropriate ways. This involves seeking a coherent relationship between long term (5 year, 25 year) planning goals and medium to shorter term (1 year, 3 year) human resource development planning and budgeting. Indonesia has a system of "indicative planning" that is very well suited to this task. It does not have the coercive prescription of specific quantities by narrowly defined categories that characterize human resource development planning (as part of central economic planning) in Eastern Europe and Russia, a system that is economically very inefficient as has become very obvious. This "indicative planning" makes an excellent contribution by articulating broader goals, such as "universal basic education by 1995," or decisions about the number of engineering colleges, medical schools, or teacher education institutions to founded, which require very long lead times. For the specifics, a market signalling system with constant monitoring of costs, earnings, economic forecasts, plus use of tracer studies, has a much better chance of moving efficiently toward the achievement of the broader goals of faster per capita growth and development by utilizing situations where the true economic opportunities lie.

Economic forecasting and a cost/benefit market signalling system are most useful for human resource development planning over 6 month, one year, 18 month, and 3 year time frames, where the degree of predictive accuracy is much greater. Error margins are likely to be larger over a five year period, and still larger over 25 years. But for broadly defined categories of education there are large "stocks" of persons with education at that level related to relatively small additions or flows, so that the

"stocks" change very slowly. Therefore large discrepancies in rates of return persist often for 5 or 10 years or more. In this case, the market signals can have longer run validity. Study #6 described in Part V below sought to develop contributions to Repelita VI using those market signals that appear to have validity in the longer run, but avoiding excessive detail.

Economic forecasting in any detail however (e.g., of prices, unemployment, and industry-by-industry breakdowns), and the resulting manpower needs in specific narrowly defined categories have large error margins over five years, and ten year manpower requirements modeling borders on crystal ball gazing. This longer term would appear to be where the market signalling, detailed manpower requirements planning, and economic forecasting can *all* only "see through the glass darkly." The one exception may be for much more broadly defined categories of education needs. Volume I in this series has sought to identify education needs in this 25 year indicative planning or goal setting context. Here the articulation of more *broadly defined* national goals are useful to inspire, to aid incentives by suggesting where the future opportunities may lie, and to facilitate informal coordination.

It is for this reason that a "rolling" human resource development (education and training) budget limited to three years will be suggested in this paper in parts III and IV. It is designed to bring together the best that can be offered by the market signalling system (cost/benefit) and by econometric forecasting within the time frames where they are most accurate, together with the level and methods of financing. Financing has an important bearing on planning as well as an achieving efficiency in the system. This three year "rolling" human resource development budget would be updated annually as each new data tape becomes available from BPS and is analyzed, and as new tracer studies and short term industry forecasts are implemented.

This budget, and the market signalling system as a whole would be greatly supported if there were at least one staff member trained in job counselling and responsible for placement of graduates in every senior secondary school, and college. This person could be supplied with local job market information by the Ministry of Manpower, perhaps through a computerized Occupation Information System (OIS) operated through MOEC. This should help to reduce job-search time, and *improve the external efficiency of the education system as job market information flows back to the local school administrator.* It should eventually obviate the need for detailed central planning within the central government of quantitative outputs of narrowly defined VOTEC skills.

Finally, it is obvious that the inter ministerial cooperation that is required, given Indonesia's fragmented human resource development system, may best be achieved by continuing to use the existing informal largely staff-level working groups. Eventually an economic analysis and planning capability within each of the relevant ministries should be able to do the necessary cost benefit analysis, and economic forecasting, and work on improving the external and internal efficiency in those programs for which that ministry is responsible. Where opportunities for improvement are discovered, a "policy analysis" paper could be written and presented within the ministry concerned for evaluation and decision by the relevant decision makers.

It would seem that no large organization should move without carefully testing the ground first with one or more carefully thought out, analytical, empirically based studies. Then, going one step at a time, when the organization's weight is shifted, it is not onto thin ice or into unknown territory. It is also essential that these policy analysis papers and implementation plans be developed within MOEC and the Ministry of Manpower, and BAPPENAS, so that the results of basic research studies gets translated and brought to bear providing an empirical basis for budget decisions.

II. EFFICIENCY CRITERIA, AND THEIR SIGNIFICANCE

The specific ways in which education contributes to economic growth and to broadly based economic development are relevant to the measurement and use of efficiency criteria based on market

signals. A brief identification of these contributions, and the relation of manpower training in job skills and of the entire education system to economic growth will be a useful point of reference for discussion of use of the efficiency criteria.

Education and Growth

A very large fraction of each year's Gross National Product is attributed to the existing stocks of education and skills. But the contribution of new human resource *development* to economic *growth* is defined more narrowly than this. The education system helps to maintain the current level of education and skills in the labor force as workers retire each year, and this is necessary to sustain the current level of output. See Figure IV.1, the larger inside circle representing the contribution of human capital created by education to measured GNP. The outside circle in Figure IV.1 adds the contribution to culture, and the smaller center circle represents the more limited contribution of job skills within the industrial sector.

But the contribution of education to *growth* focuses on the *increase* in the education and skill level of the labor force, and its relation to the *increase* in real national output. Furthermore the focus must be on the *per capita* growth in real GNP which is very highly correlated with productivity growth per worker, and determines the rising standards of living that the nation desires. In this context, the contributions of education to *real per capita economic growth and development* include the following:

1. Persons with more formal education learn more through experience on the job, and are more likely to pursue further on the job training (Mincer, 1962, 1974, 1989), contributing to their productivity. Mincer earnings functions that we have estimated from the 1989 SAKERNAS data reveal the same effect of formal schooling to learning-on-the-job here in Indonesia. See Table IV.1, where the interaction term sx, where s measures years of schooling and x measures years of experience (proxied by years since graduation) is always highly significant. Specifically, the t-statistics for this term are:

   Eq. (3), t = 44.8
   Eq. (4), t = 13.8
   Eq. (5), t = 15.49

   These are well above the values required to reach the .05 level (t = 1.96) and also the .01 level (t = 2.58) ofsignificance, demonstrating the heavy dependence of the amount of leaving-on-the number of years of prior formal schooling.

2. Education that embodies the new technology results in a higher demand by employers for these educated workers for implementing the new technology (Bartel and Lichtenberg, 1987).

3. Formal education (especially general education) facilitates the capacity of workers to adapt later in their life cycle to continuing changes brought about by changing export demand, new technology, new inputs, and other changes in the economic structure (T. W. Schultz, 1975). It also affects worker decisions about job changes (Greenwood and McDowell, 1986). To the extent that workers make rational decisions, this capacity to better adapt to change and to make job changes means that productivity is higher over the life cycle.

Figure IV.1
Relationship of Manpower Planning of Specific Skills for Industry to Education
for Economic Growth

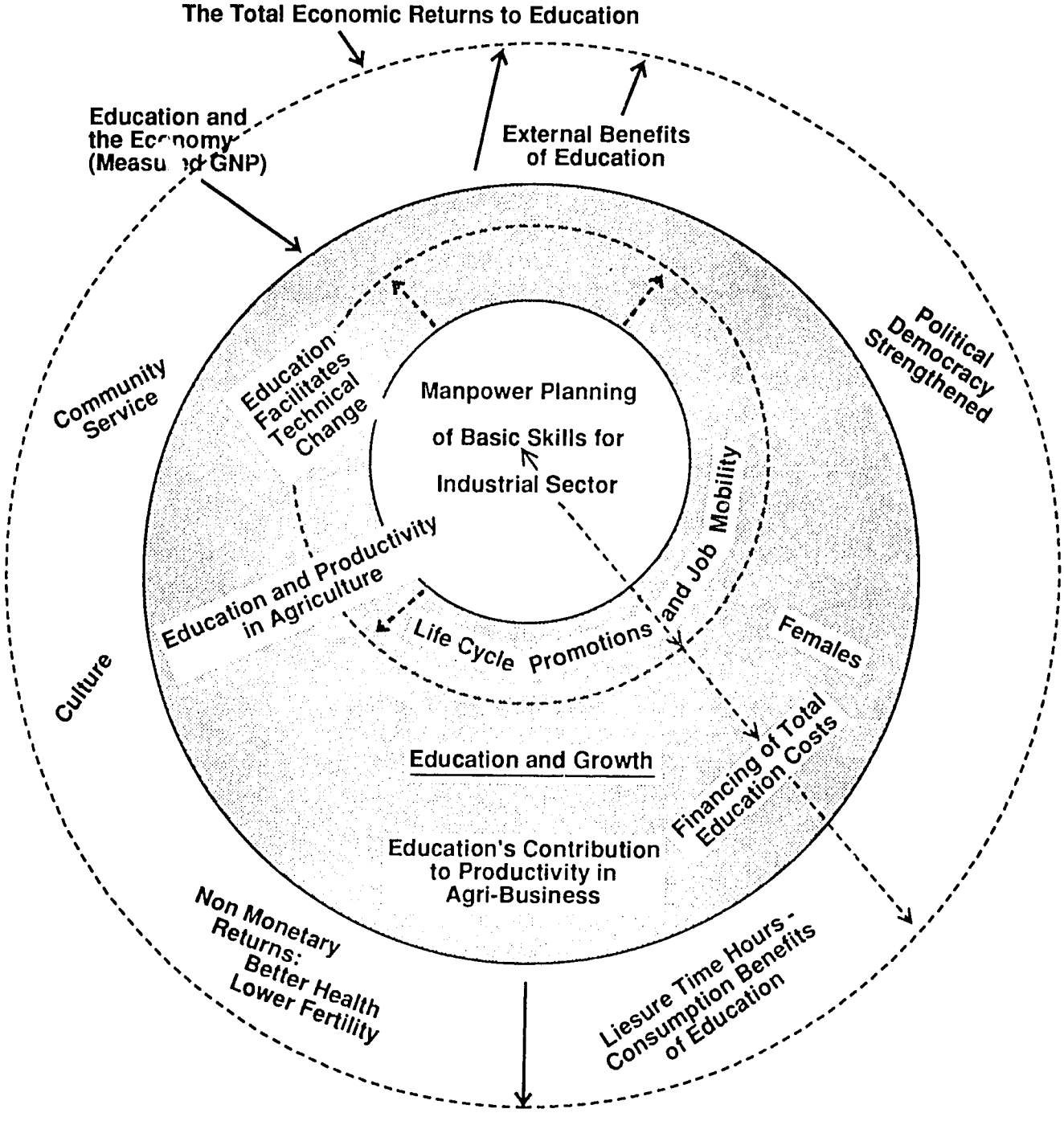

Table IV.1
The Dependence of Learning on-the-Job on Prior Formal Education

Education Level	Rates of Return Calculated from the Mincer Earnings Functions Shown Below					
	(1)	(2)	(3)[a]	(4)[a,b]	(5)[a]	Direct Method
s = 6 yrs & under						5%
s = 4 yrs	9.1%	14.16%	4.7%	(10.3%)	8.6%	--
s = 6 yrs	9.7%	13.34%	5.7%	(10.3%)	9.2%	--
s = 9 yrs	10.6%	12.36%	7.3%	(10.3%)	10.1%	11%
s = 12 yrs	11.5%	11.28%	8.9%	(10.3%)	11%	12%

(1) $\ell n\ Y = \underset{12.8}{\beta_0} + \underset{.0786}{\beta_1 s} + \underset{.0015}{\beta_2 s^2}, \qquad R^2 = .26$

$t = (1129)\ (25.7)\ (8.15) \qquad r^* = \frac{\delta \ell n\, Y}{\delta s} = \beta_1 + 2\beta_2 s$

(2) $\ell n\ Y = \underset{11.9}{\beta_0} + \underset{.156}{\beta_1 s} + \underset{-.0017}{\beta_2 s^2} + \underset{.0199}{\beta_3 x}, \qquad R^2 = .34$

$t = (726.0)\ (50.3)\ (-9.6)\ (70.0)$

(3) $\ell n\ Y = \underset{12.7}{\beta_0} + \underset{.003}{\beta_1 s} + \underset{.0026}{\beta_2 s^2} + \underset{-.0003}{\beta_3 x} + \underset{.0029}{\beta_4 sx}, \qquad R^2 = .37$

$t = (518.2)\ (.694)\ (12.9)\ (-.54)\ (44.88)$

(4) $\ell n\ Y = \underset{11.7}{\beta_0} + \underset{.095}{\beta_1 s} + \underset{.001}{\beta_2 sx} + \underset{.053}{\beta_3 x} + \underset{-.0006}{\beta_4 x^2}, \qquad R^2 = .39$

$t = (437.9)\ (45.9)\ (13.8)\ (36.27)\ (-35.7)$

(5) $\ell n\ Y = \underset{11.93}{\beta_0} + \underset{.065}{\beta_1 s} + \underset{.0014}{\beta_2 s^2} + \underset{.0013}{\beta_3 sx} + \underset{.049}{\beta_4 x} + \underset{-.0006}{\beta_5 x^2}, \qquad R^2 = .39$

$t = (342.3)\ (13.4)\ (6.91)\ (15.49)\ (31.78)\ (-33.9)$

Where:
Y = earnings,
s = years of formal schooling, and
x = years of experience, measured as the worker's age minus the age at the time he left school.

Footnotes:
(a) where x is held constant at the overtaking age of 8 years
(b) Since Eq. (4) has no s^2, the marginal rate of return is constant and equal to the average rate of return.

4. Education is found to be complementary to physical capital and research by Griliches (1969), Psacharopoulos (1973), Fallon and Layard (1975), McMahon (1984), and (for Indonesia) Bishry (1990). This means that increased physical capital accumulation (characteristic of industrialization *must* be accompanied by sufficient human capital formation, or diminishing returns to physical capital will set in and growth will not occur.

5. Education has been shown to have a direct impact on farmers' productivity (see Fig. IV.1). It has a *real* rate of return averaging 27% per year in "modernizing" agricultural wet rice cultures such as Indonesia's (Jamison and Lau, 1982; Moock, 1981; Phillips and Marble, 1986; Dhakal, Grabowski, and Belbase, 1987; and Lockheed, 1988, 1990). Much agricultural output is produced and consumed on the farm, and the export prices of rice are often distorted. This means that the money earnings of farmers do not reflect their true productivity. So the data must be sorted as between urban and rural, and the market signals cannot be relied on to measure the contribution of rural education to the nation's economic growth. Instead the output of farmers must be measured in physical quantities of rice produced, in relation to their education, while controlling for other factors. This is a case where increased investment in *rural* education is conducive both to fast growth (given the high approximately 27% real rates of return that are available) and to equity in extending good quality education throughout the provinces and rural areas to achieve a broadly based economic development.

6. Rates of labor force participation by women are increased by schooling (Shields, 1987). This increased participation contributes to economic growth.

7. Education of women is known to lower fertility rates (Cochrane, 1979; World Bank/IFC, 1988, Ch. 2). If it extends at least up through 9th grade, as is contemplated in the goal of universal basic education first established in Repelita V, the effect of education on improving the health and survival rate of children (which *raises* population growth rates) is over-powered by this fertility rate effect, so that population growth slows. Other things equal, a lower population growth rate means higher economic growth *per capita*, and with universal basic education there is a promising outlook in this regard for Indonesia. Education of women in the rural areas through 9th grade, furthermore, can be expected to reduce the population growth rates in these areas, thereby reducing the flow of population to the larger cities (other things the same). As it raises *per capita* income there it also reduces rural poverty and supports a broadly based development.

8. Investment by the Government, or by private donors, encourages the parents to save (by refraining from current consumption) and invest in the education of their children (McMahon, 1984). As parents gradually have more education, it also increases the contribution that they can make (relative to the contribution made by formal schooling) (World Bank, 1987, 1991).

9. There are also increases over time the amount of resource recovery that is possible (e.g., through tuition and fees at the more advanced levels of education). This is in a sense a "pump-priming" effect, inducing larger private contributions to the financing of human resource development at all levels by the private (household) sector.

10. There is a close relationship between literary levels and life expectancy (Hicks, 1987). With a higher life expectancy, individuals can reap a higher return from their educational investments, spending a smaller fraction of their lives in the less productive childhood years, thereby increasing the rate of economic growth.

Significance of Sources of Growth For Use of Market Signals

The nature of contributions 1 (learning on the job), and 2 and 3 (adaptation to later technical change) of education to productivity over the life cycle in the list above suggest that in *using earnings as a market signal it is crucial that earnings over the entire life cycle be considered, and not just earnings on the first job.* Initial employment alone can be somewhat misleading about what happens later!

Contribution #4 above suggests that education is necessary if the returns to physical capital are to be maintained (complementarity). Therefore the rate of return to education *relative to the real* rates of return to physical capital *are important market signals* that must be considered if the nation's overall investment strategy is to be efficient. A physical capital intensive growth strategy leads to low labor absorption rates. It is the small and medium sized enterprises which have higher labor absorption rates and are a major engine of growth. With insufficient attention to human capital formation there will be diminishing returns to physical capital.

Contribution #5 above (of education to productivity growth in agriculture) implies that the market signals based on money earnings are distorted in the case of farmers, and cannot be used. There are however ways of applying efficiency criteria as suggested above to the planning and financing of rural education, as suggested in Studies #1 and #6 below.

Contributions #6 and #7 above focus on the contribution of the education of women to per capita growth. The higher labor force participation rates of women (#6) are reflected through the market signals. The effect of women's education in lowering population growth is not. The latter requires forecasting fertility and population growth rates, and their degree of dependence on education in Indonesia.

This effect on population growth is not only relevant to calculating per capita growth, but also is highly relevant to planning for growing school enrollment at levels where education is universal. It is also relevant to planning teacher training and school construction needs which both have long lead times.

Contribution #8 above which deals with how public subsidies induce larger private household saving and investment in education. There is no easy efficiency criteria that can be applied to this. It has to do with the marginal time preference between current consumption and future income (growth), and the society's collective preferences. But it is a strategic consideration relevant to the level of saving and investment that is done by the nation, and to the economic growth rate eventually achieved.

Contribution #9 above, the contribution of education to the length of the working life, could in principle be expressed in terms of efficiency criteria. But just as the contribution to slowing population growth rates, this has not been done and would take some work.

III. APPLICATION OF EFFICIENCY CRITERIA

A market signalling system for human resource development policy within a multi-year planning context requires both a flow of information annually and a thoughtful application of the efficiency criteria. Applications should not be oblivious to equity, or to market distortions of earnings or of costs, or to sources of error in econometric industry forecasts.

The Mechanisms or Elements Involved in Implementing a Three Year "Rolling" Draft Human Resource Development Budget

1. **First, Reporting of Current Investment Expenditure Levels and Development of Differing Increments For Each Level and Type of Education.** These need to reflect the different rates of return (benefit/cost ratios) that transmit the market signals. These rates of return must be recomputed annually from the SAKERNAS-SUSENAS BPS tapes.

The resulting expenditure levels consist of prices (cost per student) and quantities (numbers of students). When these expenditures (including the percentage increments) are divided by the cost per student (based on the cost analysis studies), it gives the numbers of students for which plans need to be made at each level and type of education.
Using the econometric forecasts by industry for three years ahead, the forecasts of manpower demand by each industry for numbers of persons in each occupation can then be estimated. When converted into demand for each level and type of education, the results can then be compared to and reconciled within the more global rate of return efficiency-based estimates of the quantities to be produced. These manpower demand forecasts by industry provide more specific detail. But the industry studies available in BAPPENAS are limited to only the needs of industry, and do not encompass broader needs for human resource development. The latter must include attention to the education of females, to rural education, and to the estimated returns over the *entire life cycle*. The actual level of investment and educational planning also must be governed by the education and training *cycle cost per graduate* for each level and type of education if efficiency is to be achieved, since these education and training costs are not being borne by the prospective employers, but instead by the society.

2. **The Second Element in the Application of Efficiency Criteria Requires a Financing Plan.** This would be based on the cost analysis, and the planned increments to expenditure levels, and is needed to bring the planned expenditure and the means of financing it together in this rolling 3 year planning context.
At this point, the computerized school aid formula discussed below also becomes relevant for guidance in distributing the funds to the local schools in ways that incorporate incentives for efficiency within the school system.

3. **Third, Planning For Pupil Equity and a More Broadly Based Economic Development.** The economics of this can be provided for by considering the results of the cost studies by province, and the urban/rural differences. Finding ways to achieve greater equality in expenditure per pupil (or pupil equity through the school aid formula) can help to serve the education needs in the rural areas and provincial towns and foster the growth of small and medium sized enterprises there. Providing textbooks to the 80% of the provincial children now without them, for example, is a cost effective policy that would serve the objective of a more broadly based economic development. This can be a real engine for growth given that the rates of return to this type of investment are enormous. The SME's it supports can cause people to be more contented to work in the provincial towns rather than migrating to Java and to Jakarta. The Balitbang quality study suggests that larger expenditures per pupil in small towns including financial teacher incentives will be necessary to achieve an emphasis in the curriculum on creativity and independent analytical thinking in these areas. This also would be supportive of innovation and success in agri-business firms. For this it is necessary to establish a school-aid formula that fosters greater equalization of expenditure per pupil nationwide based on cost per pupil in average daily attendance (ADA).

4. **The Fourth Element in implementing a market signalling system suggests a feasibility study about the designation and training of job placement counsellors** in junior and senior secondary schools and colleges nationwide. Eventually these counsellors could obtain job market information supplied by the Ministry of Manpower (MOM) through a computerized Occupation Information System (OIS) operated by MOEC. MOM might be in good position in the training of these job placement counsellors through short courses.

This will enable curriculum choice decisions and job placement decisions to be made by the individual student with the assistance of his or her counsellor. Students are far better motivated when they can choose their own curricula, and become more productive members of the labor force when they choose their own job based on objective information about job market opportunities. The experience in many countries is that anything that involves compulsion dampens incentives and is a failure. It is possible that too severe "tracking" in the schools without the opportunities to cross over may result in a poorly motivated student, and lower productivity later as a result of the coercion, and also to be unpopular with the parents.

Eventually this should lead to reduction in the job search time and more external efficiency in the local schools and colleges. Budget money and teachers can be shifted gradually by school administrators to support expansion of the curricula that are in high demand. In due course this will eliminate the need for overly detailed manpower planning of specific vocational and technical manpower planning at least inasmuch as is detail currently practiced.

Long Term Planning

Finally the relation of a market signalling system to long term 5 year and 25 year planning needs to be considered. If the longer term goals have given careful thought to where the true economic opportunities lie, and also are sufficiently broad and not too detailed, then they can feed in smoothly to the shorter run more precise market signals. There are also several ways they can facilitate growth by encouraging greater efficiency.

First, some aspects of education planning require very long lead times. How many engineering colleges, medical schools, or teacher training institutions to establish for example, or approximately how fast to junior and senior secondary education. Most things can be done more efficiently if the lead times are adequate. Crash programs (e.g., the rapid expansion of VOTEC called for in Repelita IV) can be more costly and inefficient.

Second, population trends provide a good basis for the longer range planning of teacher needs and school building construction. This is especially true at levels K-9 where education in Indonesia will soon be universal, but also at grades 9-12. The use of these in developing the 25 Year Plan Education Goals is illustrated in Chapter I, Volume I, of this series (Boediono, McMahon, and Adams, 1992).

Third, goals can inspire, and also facilitate informal coordination of efforts. This results in stronger incentives and more accomplishment than would otherwise occur. It is a standard leadership technique.

Fourth, explicit provision needs to be made for situations where there is market failure, and the market signals break down, requiring public intervention or supplementation. This includes situations where there is inadequate information (e.g., the need for job placement counsellors in the schools), where there are externalities (e.g., spill-over social benefits from universal education, and from the support of basic research), or where there is monopoly (e.g., restrictions by unions on the number trained in which case flooding the market with new public school trainees breaks the monopoly). Finally the need for equity builds a stronger middle class and a wider participation in the growth process.

Fifth, although risky, there are sometimes strategic opportunities that can be foreseen longer range advance planning. These include situations where the nation may have a comparative advantage (such as where Indonesian exports are growing rapidly), or where there are obvious opportunities for technology transfer if the human resource base for it to occur were to exist.

IV. STAFF FUNCTIONS NEEDED IN SUPPORT OF EFFICIENCY BASED MULTI-YEAR PLANNING

When considering staff functions, the primary focus in this strategy paper continues to be on the substance of what is needed for the annual economic policy analyses designed to achieve and maintain external and internal efficiency. Budget planning occurs in a situation of continual economic change, as export markets change, technological opportunities change, and world events impact the economy, an annual monitoring of costs, earnings, and of the industry forecasts is necessary. For example, it is helpful to recompute rates of return in each new annual data set from BPS. This acts as check on sampling errors, increases the confidence that can be placed in the results, and keeps the market signals up to date. This is especially needed in the detailed breakdown by provinces where the sample size for some cells broken down by education level, sex, occupation, and age sometimes get too small, and needs to be averaged out as new data and tracer studies become available.

For informal coordination of the cost, return and industry forecast studies there has existed for some time an informal staff-level MOEC-MOM-BAPPENAS working group. The results of the studies could be communicated informally by this working group to the various Ministries that are involved in operating education and training programs for their information. These include the Ministry of Education and Culture responsible for formal education, the Ministry of Labor and Manpower responsible for training programs and placement, BAPPENAS responsible for industry econometric forecasts and currently conducting 5 year industry econometric forecasts that are a useful basis for estimating manpower needs, and the Ministry of Home Affairs responsible for paying primary teachers which is the largest part of the primary education budget and has many ramifications for economic development in the provinces. There is also the Ministry of Research and Technology which sponsors advanced education in technology relevant to multi-year HRD needs, the Ministry of Religion concerned with primary and some secondary education, and finally the Ministry of Finance which is responsible for the budgeting and disbursement methods affecting the economic efficiency, both internal and external, of all education and training.

In due course, an economist concerned with the efficiency and equity of education and training programs needs to be identified within these other Ministries. This informal staff level working group could gradually be expanded by adding this person to facilitate informal coordination and reduce overlap.

Functions That Need to be Institutionalized Within MOEC

There are four basic functions that need to be performed annually with a separate person within MOEC and/or BAPPENAS trained in the economics of education and training who is responsible for each. They are as follows.

1. Cost Analysis

This work (currently conducted by Yenny and/or Sophia) needs to be pressed forward. It is collecting data on *actual* expenditures per pupil, as distinguished from *budgeted* amounts, for each level and type of education nationwide, and by province, and within provinces by urban/rural, and inserting them on a LOTUS worksheet. This data eventually needs to be supplemented with data or the number of pupils in average daily attendance (ADA), and the number of pupils per teacher in each Kabupaten and Kecamatan to get more accurate and detailed unit costs. It is now supplemented with the number of years it takes the average pupil to complete each level of education which allows for

repeaters, to compute cycle costs. These estimates of the number of years taken for completion are now being broken down by province, and need to be refined.

The cost analysis function feeds into the many cost/effectiveness analyses that could be performed by the cost analysis group. These include use in the computerized school aid formula, use in studies of pupil equity designed to achieve a more broadly based economic development, use in the planned cost/analysis workshop, use in updates of the Education Sector Review and use as part of the annual rate of return (cost/benefit) calculations relevant to external efficiency. Trained staff permanently assigned to perform these functions is fundamental to any effort designed to foster internal or external efficiency in HRD. The results should be written up for use by others.

2. Computation of Rates of Return Annually

As each new BPS labor force survey tape becomes available, it needs to be converted into SPSS binary with and breakdowns of mean earnings by education level and age, as well as for underemployment nationwide and by province (currently done by Heru). These results then need to be inserted in the LOTUS program for computing the internal rates of return to education nationwide and by province. The results should be written up annually.

3. An Annual Efficiency-Investment-Strategies Paper

Starting with the current education budget by level and type of education, a senior economist in MOEC needs to analyze the rate of return results nationally and by province, and propose percentage increments for each budget line over a 3 year period for policy discussions. The various policy options could be presented to the Minister in his Operation Room.

Dividing these increments by the unit costs gives the number of pupils this expenditure level will finance. Then as discussed above, this needs to be integrated with the group doing the Manpower Planning models in BAPPENAS, using the 3 year industry forecast multiplied by the technical coefficient matrices (hopefully refined to allow for upgrading of skill requirements by employers over time), and the results reconciled. The results should be written up annually.

4. A Financing Plan and Multi-Year Budget

The financing capacities feed back on the education and training goals, affecting the extent to which they can be implemented. The financing methods used for dispersal of funds to the local schools are inherently a set of incentives that can either encourage efficiency and broadly based development or be counterproductive. An economist trained in educational finance is needed to work on 3 year financing capacities, as well as on the computerized school aid formula. This will involve informal coordination with the Ministry of Finance which has the responsibility for implementation and access to the necessary data.

Inter Ministerial Cooperative Activities Needed

1. The Informal, Staff Level, MOM-MOEC-BAPPENAS working group that already exists has been mentioned above. It includes Yudo Swasono from MOM, Endang and Pak Machrany from BAPPENAS, and it could be augmented with an economist from BPPT (e.g., Rony Bishry) soon, who is knowledgeable about these matters. Eventually others may be identified.

2. BAPPENAS is already a part of the staff level working group. It should soon be in a position to bring to develop and apply the work on market signals (e.g., cost studies, rates of return over the life cycle, tracer studies, and 3-5 year industry economic forecasts) on 3 year budget and 5 year Repelita planning. As information improves on costs (MOM, MOEC), returns (from BPS), cost/benefit and econometric industry forecast reconciliations, financing incentives, and school level placement

capabilities, a somewhat more important role for a market signalling system and internal and external allocative efficiency (as economists use that term) may gradually emerge. In this matter, BAPPENAS has a strategic role.

3. Within MOM, capabilities need to be strengthened in the capacities for *cost analysis*, and writing *policy analysis* papers to get action based on the results of research studies that currently often do not get attention. Specifically:

(a) **Cost Analysis, and Cost/Effectiveness Analysis**

This function is identical to that described for MOEC above, except the cost data to be collected and analyzed relates to the OJT and skill-training courses operated by MOM. The cost effectiveness of O-J-T vs. formal VOTEC school education in specific skills would be examples of the types of analyses a person trained in cost and cost/effectiveness analysis in MOM could conduct and write up.

(b) **Policy Analysis, and A Multi-Year Planning of MOM Programs**

Again, there is the need to utilize the rate of return market signals, and tracer study results in policy analyses, and to develop a capacity for doing policy analyses that result in action. Adding a few questions to the annual SAKERNAS nationwide surveys would help a great deal in the analysis of the cost effectiveness of each of these training courses.

(c) **Job Market Information Availability in the Schools and Colleges**

This involves inter ministerial cooperation between MOM and MOEC. A feasibility study is the best first step, since there are already placement offices being established in 3 or 5 USAID-aided colleges, and there are now job placement centers in most towns operated by MOM. The problem is to get the information to students at an earlier stage within the schools and colleges before they graduate. This is a separate function, independent of the data collection and policy analysis functions identified above. It involves training local school faculty in job counselling, and supplying job market information (and employer contacts) to them.

V. SUMMARY OF CONCLUSIONS

An overall strategy for human resource development planning that promotes efficiency in human resource development as it relates to education and training has been outlined in this paper. It seeks to be comprehensive in that several different Ministries are involved in education.

There is need for use of the common data base offered by the Central Bureau of Statistics and for comprehensive measures of efficiency that include attention to the costs of education and other current market signals if external efficiency is to be achieved. The SAKERNAS-SUSENAS data needs to be improved for this purpose, but the implementation of this market signals strategy does not depend on that. This paper also seeks to indicate the functions that need to be institutionalized within the Ministry of Education and Culture and the policy analyses that need to be pursued as next steps.

The strategy for seeking greater efficiency and a more broadly based development is based on a close annual monitoring of the market signals as given by the costs of each level and type of education and training to the society in relation to the returns as measured by earnings over the life cycle. The data must be sorted in several directions to avoid the distortions to the benefit/cost ratios that could otherwise result. The strategy includes provision for policy analysis papers designed to bring the issue and the planning needs to the attention of decision makers as a basis for decisions and achieving action. The strategy also includes use of these market signals in a 3 year rolling development budget as well as reconciliation with manpower forecasts of growth rates and manpower needs for each of the major industries in Indonesia. When supplemented by the rate of return analyses, which include the

larger non-industrial use of educated workers, the cost/benefit ratios can act as a check and corrective to the manpower requirements approach which ignores both costs and current salary levels. As these market signals from both approaches are fed into multi-year planning, and into a rolling 3 year human resource development budget that includes positive incentives imbedded in the methods of financing, a more efficient human resource development system should be the result.

In a longer time frame, the strategy also includes provision for 5 year and 25 year longer range goal setting and planning. The focus here is on broader categories of human resource needs (e.g., engineering colleges, teachers, physicians), where the establishment of new institutions requires long lead times, rather than on the detailed specification of the number of persons to be trained in narrowly defined occupations (e.g., 1321 electrical engineers). The propensity of students to shift over into those fields where the opportunities lie and the encouragement of the establishment of decentralized job placement counselling and information in every secondary school and college is part of the strategy. As school and college administrators shift teacher time and financial resources toward those fields that students choose, and that are in high demand, this eventually obviates the need for detailed central planning of VOTEC skill outputs or for higher level manpower by narrowly defined categories.

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V

ABSTRACT

Investment Criteria for Financing Education in Developing Countries

Walter W. McMahon and Boediono

This chapter offers a brief description of the methods of financing basic and higher education with respect to the sharing of costs as among parents, students, firms, government, and international donors in the developing countries. This is with a view to seeking insights that might be useful in Indonesia and elsewhere. It leads into the definition and application of efficiency criteria for financial transfer mechanisms and for investment strategies for growth. The latter include comparisons of real rates of return across countries, and the insights offered by elasticities of substitution computed using the production function approach (a Nested CES).

The inefficiency that is revealed by application of these criteria in the form of underinvestment in primary and junior secondary education in many of these countries is not new. Nor are the inequities in the provision across urban-rural and suburban-ghetto differences. But a new theme is pursued here by exploring the complementarity, or lack of conflict, between efficiency and equity in key types of human resource investment. For example, increasing investment fastest in the type of education where rates of return are very high (e.g., rural basic education, education of women, education in the provinces) often can simultaneously improve pupil equity, and hence reduce inequality in the distribution of income later. Additional methods of improving efficiency in the education system by improving the methods of financing (without jeopardizing equity) are suggested.

V

Investment Criteria for Financing Education in Developing Countries

Walter W. McMahon and Boediono*

This chapter will consider market signals, and in particular, economic rate of return investment criteria computed from the increments to earnings due to education over individual life cycles which are useful for determining the efficiency of the *level* and *types* of investment made in public education. These are similar to the market signals used in the private sector, but in public investment decisions they often are not used. One result is underinvestment in primary education in many of the developing countries (or in junior secondary education in Indonesia), even though these types of investment contribute dramatically to growth. Higher education in developing countries also contributes to growth after a lag (e.g., McMahon, 1987). But sometimes (not in Indonesia) it is overexpanded, and frequently it is inefficient and relatively costly.

Furthermore, the *methods* of financing used often contain incentives that permit or encourage inefficiencies. The failure to reward attendance and achievement contributes to high drop-out rates in basic education, high repetition rates, low pupil achievement, and short time-on-task caused by short school days and too many holidays, for example. And where large subsidies to higher education result in very low tuition for all, including those who could contribute more, the result is an excess "social demand" for higher education (as in Pakistan), prolonged degree programs, and deteriorating quality.

The methods of financing can also be perverse as they relate to equity. There are also extremely wide variations in expenditure per pupil (or under central funding as in Indonesia, wide variation in the number of pupils per teacher), as between urban and rural areas, and as between slow and rapidly growing localities. There is often also a noticeable lack of wealth neutrality as between pupils in high-income and low-income areas. This is particularly severe in Brazil and South Africa, as well as in many nations in Sub-Saharan Africa, in Pakistan, and in Nepal, for example. It is not conducive to economic development in the provincial towns and rural areas, and perpetuates inequality into the next generation.

This chapter will first consider in Part I some major aspects of the level and the methods of financing human resource development in the developing countries. This includes some comparisons to the United States, and to the fastest growing Pacific Rim countries. Part I draws for documentation on a series of background papers dealing with basic and higher education in Latin America (McMahon, 1989b, 1988c) in the United States (McMahon, 1984a, 1991a, 1991b, 1992b, 1992c), in

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Africa (McMahon (1987, 1988a), in Pakistan (McMahon, 1989c), in Nepal (McMahon, 1988b), in Indonesia (McMahon, 1986, 1989g), and in the O.E.C.D. countries (McMahon, 1984b).

This paper then in Part II will develop the efficiency criteria and equity criteria and apply them to the level and methods used in financing human resource development in a sample of these countries. After considering some of the major policy options, Part III summarizes the conclusions about methods that are available for improving the decisions about financing in the effort to reduce the inefficiency and inequity.

I. METHODS OF FINANCING HUMAN RESOURCE DEVELOPMENT: A BRIEF DESCRIPTION

The financing of investment in education (and in health), is shared by parents, by their children, by government, by firms, by international donors and alumni gifts.

Parents

From an economic point of view, the largest investment by far is made by parents in the form of the childs' earnings or value of the childs' help on the farm that the parents forego when the child is in school. The parents save by restricting their own consumption (to support his/her room and board costs) during this period. This foregone earnings cost is borne entirely by the parents at the primary and secondary levels, and there are sometimes additional fees for books, uniforms, and teachers' salary supplements (BP3 fees). So parents finance a much larger percentage of the total investment costs out of their income than is commonly realized and the public subsidy to institutional costs must be viewed as an incentive to this private family saving and investment. This foregone earnings cost is a major contributing factor to the high drop-out rates after about fifth grade in most developing countries, especially in the rural areas. It is the major explanation of the high illiteracy rates in the labor force.

In higher education, tuition and fees and sometimes even room and board costs are more heavily subsidized in developing countries than they are in the U.S. Resource recovery is very low in higher education in Bolivia, Brazil, Dominican Republic, Uruguay, Turkey, Pakistan, Indonesia, and all of the countries in Africa except Nigeria (for data see McMahon, 1988c and 1989b). In Africa even secondary school boarding costs are subsidized. These larger higher education subsidies occur even though 60-83% of the students typically come from the highest income families. (See World Bank, 1986, p. 61.) This method of financing results is a high tax-cost per student in higher (and in African secondary) education. There is the loss of considerable potential for resource recovery from parents who are able to pay contributions that then would be available for further expansion and improvement in the quality of higher education. In Brazil, for example, higher education costs per student are 18 times what they are at the primary level, compared to 10 times primary in all of Latin America, 2 times primary in the U.S. and in the industrial countries, and 53 times primary in Sub-Saharan Africa. (See the World Bank, 1988.)

The large participation of parents in the financing of primary and junior secondary education (even though the social rates of return are highest at that level) and low participation by parents in the financing of higher education in principle acts to contribute to a large social demand for higher education and then either severe rationing of places or deteriorating quality. It also encourages *internal* inefficiency in higher education, where the low tuition tends to lengthen the time it takes a typical student to graduate, which runs up the total cost per graduate. It takes 6 1/2 years to finish a 4-year degree in Indonesia, for example, and longer than that in Greece and Yugoslavia, although in the latter cases draft dodging is also a factor. (See McMahon, Millot, and Eng, 1986, p. 196.) At the primary and secondary levels, the relatively high costs to the parents are associated with the high drop-out and repetition rates, and hence this kind of internal inefficiency at that level.

Students

Students bear a portion of the total investment costs in all of the industrialized countries and a lower portion in the developing countries through student loans and work-study.

Student loans accounted for $13.2 billion of U.S. Federal Government student aid in 1990. The Federal Government also provided $.9 billion for work study (not including the students' earnings), and $5.1 billion in direct Pell Grants and Equal Education Opportunity Grants. The average loan was $2,694, average annual earnings from work study was $900, and the average Pell Grant was $1,473, with 42% of the 10.9 million full-time undergraduate students enrolled holding loans and 29% receiving Pell Grants. (Source: U.S. Bureau of the Census, pp. 158-9.) Student loans are used extensively in Sweden, Canada, and Korea, and are available in Norway, Japan, Columbia, Venezuela, and Argentina. New student loan programs are being underwritten by the World Bank in Jamaica and some other places.

Studies of the experience with student loan and grant programs generally conclude three things (see Woodhall, 1987, p. 449):

1. All low tuition, and also all maintenance grants should all be *targeted* more adequately by the use of means tests to the students from poor families who are the ones who need them.
2. The same is true of access to student loans, because loan programs are usually heavily subsidized, and because higher income families otherwise will use these lower interest funds for other purposes.
3. A combination of loans, tuition waivers, work-study, and grants is a more flexible system of student aid than is a student aid program that contains only one of these.

At the Masters' and Ph.D. levels, parents seldom support either tuition and fees or maintenance costs. Most graduate students in the U.S. finance these costs themselves by means of half-time teaching and research assistantships. This practice is less common in the European countries or in developing countries where usually full-time faculty and full-time research assistants are used. There is increasing awareness that this latter practice limits access due to the higher costs, and limits diffusion of the technology since trained full-time permanent teaching and research assistants do not interact with undergraduates or help to diffuse the new technology to industry when they graduate.

Government Financing

About 85% of the purely institutional expenditure not including foregone earnings is borne by the central government in most developing countries, and by state and local governments in the U.S. The remainder of the institutional costs are accounted for by private schools, which account for only 10-20% of the primary and secondary students in each geographical region throughout the world, and by tuition and fees at public institutions (World Bank, 1988, p. 134). The private sector at both the secondary school and higher education levels tends to grow more rapidly when public schools are underfinanced and do not meet the needs. (See McMahon 1992b.)

This dominance of the public sector is the prevailing financing pattern because there is *market failure*, with the private market failing to provide education in sufficient quantities. There are three basic reasons for this. A major source of market failure is that families cannot borrow sufficient sums to finance human resource development, even though the rates of return on educational investment are higher. This is because of capital market failure in the finance of human capital formation due to the uncertainty of future earnings and insufficient collateral. (See Ritzen, 1989, and McMahon, 1989a and 1992b, for analytic proofs and empirical research results.) A second reason for market failure and hence for public sector financing is that there are *externalities*, or spillover benefits to the society that the parents who otherwise would have to do all of the financing are unable to perceive or to recoup.

This is controversial in the case of higher education, but not for basic education, or research. A third reason for public financing involves equity, or "merit wants." The poor would remain uneducated, or insufficiently educated, as the private sector "skims" the market, unless there is public financing. When parents are poor, they are not able to pay the level of tuition and fees or to sustain the foregone earnings costs that make private production economically viable.

Once government does intervene, its financing induces *further* saving and investing of foregone earnings and fees by parents. That is, when subsidized tuition and grants are available, this induces higher enrollment rates which in turn encourages families to refrain from consumption (save) and invest the foregone earnings of the child in education, constituting total saving and total investment that would not otherwise occur. (See McMahon, 1984a.) The government's financing role in determining the total level and types of investment in education therefore is the major determining one and is crucial (see McMahon, 1992c, for further development of the two relevant models and empirical tests).

The result is that the government can apply appropriate economic investment criteria in the form of cost/benefit and rate of return analysis to ensure that the *total* level of investment (financed by parents, students, and taxes) and the investment made at primary, secondary, and higher education levels is economically efficient.

However, it is also the responsibility of the government, since investment in human beings is involved, to see that the investment is equitable. Education cannot be provided only to the children of the wealthy, who can pay for private schools, or be responsive only to influential pressure groups who distort expenditure per child upward in wealthy suburbs and downward in rural areas and urban ghettos. When this occurs as it does in rural education in developing countries it might be viewed as an instance of "public sector failure," as the more powerful pressure groups distort education expenditure to their own ends. A common result is a breakdown of "wealth neutrality," which is also a frequent subject of litigation in U.S. courts (see Cohn, 1991). It also involves a lack of horizontal equity, a widely accepted principle in public finance. In this case it leads to inequality of educational opportunity as among children at the same level in different schools, as well as to high welfare, crime, unemployment, and other social costs later.

It is fortunate that in financing human resource development the directions indicated by efficiency criteria and by equity criteria in many important situations are not in conflict. For example, if there is diminishing returns to expenditure per pupil, a certain amount of equalization increases the total returns. In another very important dimension, rates of return to primary education tend to be higher than they are to higher education, and primary education benefits the poorest segment of the population as well. For example, social rates of return to primary and secondary education in Latin America average 29% compared to 17% for higher education, and 59% of the benefits of public primary education go to the poorest 40% of the population. (Psacharopoulos and Woodhall, 1985, pp. 56-7 and World Bank, 1986, p. 61.) So this is a case where an improvement in efficiency by increasing financing faster for primary education where the rates of return are higher simultaneously advances equality of opportunity and equity. There is not a "tradeoff" of efficiency for equity; instead advancing one can also advance the other.

International Donors

In the developing countries, the World Bank, Asian and Latin American Development Banks, and national donors have made large education sector loans and grants to governments to assist with the financing of human resource development. These transfers have usually stressed those areas where there is a comparative advantage to assistance from the industrialized countries, such as higher education and graduate study abroad where there is an additional advantage to be gained from the transfer of technology (as well as indirectly to the donors). Sometimes they have supported activities

where the cost effectiveness is known to be relatively lower such as too much emphasis on buildings in relation to texts and teaching materials, which are known to be more cost effective. (See Fuller, 1987, for a good survey of cost effectiveness as it relates to pupil achievement.) This leaves the government in the developing country with the task of "topping up" the education budget from its own tax sources so that the efficiency and equity of the entire budget is not distorted by this action of donors. Unfortunately, this is a task that sometimes is not performed.

More recently, a great deal more emphasis is being placed by major donors on achieving both greater efficiency and equity in human resource investments. Large education sector loans have been made by the World Bank to expand primary education where the rates of return are higher than at the college level in Pakistan, African nations, and elsewhere (see McMahon, 1989c). Policy reform requiring more resource recovery in higher education, and means-tested student loans and grants have also been imposed as a condition of higher education loans in Indonesia, Jamaica, Morocco, and elsewhere (see Jiminez, 1989). A large USAID grant to Pakistan, and one to Bangladesh, finances investment in primary education, as does the new USAID project ABLE worldwide.

II. FINANCING EDUCATION: PUBLIC REVENUE SOURCES AND INCENTIVE EFFECTS

It is important to consider briefly the incentives for efficiency in the schools, and incentives for participation in the financing of the various private participants discussed above that are inherent in the changing revenue sources and changing financial transfer mechanisms as development proceeds.

Revenue Sources

The major tax sources used to support education tend to be import duties (supplemented by private fees) at the very earliest stages of development. This source, however, tends to diminish in relative importance, from 33% of government revenue in low income countries, to 19% in lower middle income economies, 9% in upper middle income economies, and 1.8% in industrial market economies (data from World Bank, *World Development Report*, 1991, Table 24, Central Government Revenue). Taxes on consumption, such as sales taxes, value-added taxes, and excise taxes tend to remain at about 25% of total revenue, although they are higher in the low income countries (26.8%) and lower in the industrial market economies. Social security contributions represent a growing share (from .5% in LDC's to 27% in industrial economies), but are less relevant to education. Personal and corporate income and capital gains taxes tend to become a more important revenue source as the new industrial sources of total GNP become more important. They are 21% of total revenue in the low income countries, 24% in lower middle income, 27% in upper middle income, 40.4% in the industrial market economies, and a high 64.8% of revenue in Japan (ibid).

The main significance of these facts for education is that all of these taxes are taxes that can be collected more effectively by the central government than they can by localities, because of the spillage over geographical borders. This then requires financial transfer mechanisms that inherently contain various incentives, which can be positive or negative. These incentives are for:

- **internal efficiency** in the schools (e.g., use of Average Daily Attendance as the basis for receipt of aid),
- **adequacy** of some foundation level of education (since pupils come out of different circumstances), and
- **incentives** (or the lack thereof) *for participation in the financing* of the schools by local governmental units, and/or by private parents and students.

As economic development proceeds, especially in larger countries encompassing more diverse cultures, the pattern then that tends to develop is one of *fiscal federalism*. This decentralization of some of the financing, especially of the schools, accommodates diversity and reduces conflict, but also

leads to greater inequality in expenditure per pupil. Indonesia, however, is an example of a large, diverse, country where strong patterns of fiscal federalism have not developed, as yet at least. As the need to decentralize in order to tap other revenue sources and to accommodate diversity grows use of the property tax based on the assessed value of houses, land, and commercial property grows. The property tax is not ideal by any means. But the property tax can be collected effectively by localities, and does not have as severe jurisdictional problems as do other types of taxes. Richard Musgrave, in his book on *Fiscal Systems* (1969, Ch. 2-6), has an excellent description of the evolution of fiscal federalism worldwide. This partial decentralization of school revenue sources was clearly a pattern followed in Japan in the 1950s, to illustrate this experience in a Pacific Rim country.

These taxes used to finance education have differing degrees of income elasticity. They range from the very regressive "house-tax" that is a property tax but not based on the value of the house or land. It is used in Nepal, in Africa, and more recently as a "poll tax" in Margaret Thatcher's Britain that has produced enormous controversy. The income tax revenues of the central government are likely to be more income elastic. Education is a "normal good," and per capita expenditure rises when income rises (see Chapter 6 below). If the revenue base is income elastic, this fact is accommodated. But if it is not, as is the case with sales taxes or property taxes, then the rates have to be changed. (For a detailed analysis of the experience in the U.S. see McMahon, 1971.)

The income elasticity of government investment in education over time is approximately 1.0 in the U.S. (McMahon 1992b). The income tax rates have been cut from time to time (given the higher income elasticity of the revenue base), whereas property and sales rates (with a less elastic revenue base) have tended to increase.

In conclusion, as fiscal federalism develops, and the revenue sources, and level of government sharing in the financing responsibilities change, then the need for a sophisticated financial transfer mechanism that reflects this change increases. It is the financial transfer mechanism that provides incentives for internal efficiency in the schools, adequacy and greater equality in expenditure among pupils, and also incentives for local government and private parental participation in the financing of education.

Efficiency in the Overall Levels of Investment in Education

Are countries investing too much or too little in education? Or are they balancing it with the rate of investment in physical capital and thereby employing an overall efficient investment strategy for growth?

Investment Criteria. The economic criteria for this type of decision is the potential returns (e.g., growth of National Income per person in the labor force or growth of labor productivity), relative to the investment cost of the education. The potential returns alone which depend on the effectiveness of the education are very important, but they are an absolute measure and not a measure of efficiency. Similarly, costs taken in isolation are relatively meaningless unless they are in relation to the returns or effectiveness. To measure efficiency requires calculating the ratio of potential returns to the economic cost of the investment.

But since the prospective returns extend for a period of time into the future, which have less value than immediate returns, they must be discounted back to their present value. To do this, it is better to avoid having to make a gratuitous assumption about the social discount rate, and also to obtain a measure that can be compared to the economic efficiency of investment in physical capital and to the efficiency of educational investment across nations. These are the reasons for the widespread preference for calculating a pure internal rate of return, or, with some allowance for the social benefit from externalities and equity or merit wants (as measured by taxes paid), the social rate of return.

As shown in Table V.1 below, the real social rate of return to investment in education in Asia, Latin America, and Africa is consistently higher than the real social rate of return to investment in

physical capital. This is less true in the industrial countries where large investments in human resource development have already been made. But the real returns there are nevertheless high, normally above the real interest rate, and although not higher than those in industry in most cases, they are distinctly higher than the 5% real rate of return to investment in housing in the U.S., which is an evidence of overinvestment.

With respect to decisions about the *level* of education that yields the highest return, there is some controversy about rising social rates of return for this purpose. The argument is that the returns at the lower level feed into, or are interdependent with, the returns at the higher level. However these are not *average* rates of return that include the returns at the lower level, but instead are *marginal* rates of return to the last level of education completed. This is what is relevant to any incremental investment decision. Beyond this, the basis for separating the returns to the prior level are the earnings of school leavers who leave the education system at the end of the prior level, which then determine the foregone earnings cost of the investment at the next higher level. This may not be a perfect measure, but it is an objective market determined criterion and there is no better method for determining this value and making the separation.

Table V.I shows that investment strategies are not very efficient. Differences in rates of return among levels of education persist over long periods of time and in many countries. There is clearly underinvestment in *primary* and *secondary* education in Asia, Latin America, and Africa, where real rates of return range from 14% to 27%, compared to about a 11-13% real rate of return to investment in physical capital. The social rates of return to investment in higher education are less advantageous, but still substantial, and some continuing expansion and improvement in quality is inevitable as larger numbers of students in the future finish secondary education and reach that level.

Comparing recent estimates in Indonesia and Pakistan, there are high real rates of return approaching 33% available to financing primary education in Pakistan, where 74% of the labor force is still illiterate. In contrast, the rates of return at the junior and senior secondary level are much higher (14%), if one assumes the returns in rural primary schools are higher (27%) but must be averaged in with the lower return (5%) in urban primary in recent years. These findings are reported in detail in McMahon and Boediono (1992e). This is not surprising when one considers not only the relative shortage of workers with even primary school basic skills in Pakistan, in contrast to the long-standing universal primary education in Indonesia with the result that 60% of the labor force has completed primary. With only 6% having completed junior secondary in Indonesia, this shortage of 9th year graduates could explain the higher 14% rate of return at that level. In response to these investment opportunities, the World Bank and USAID have each made large $250-500 million commitments to expanding primary education in Pakistan, and Indonesia made the attainment of universal junior secondary education the major human resource investment goal of its most recent five-year plan. Both are economically efficient investment strategies.

It should be stressed that the rates of return to investment in rural education at the primary level are very high, working out to about 27% on the average in studies covering 35 countries. Since a very large percentage of the low-income population is in the rural areas, this means that expansion of primary education in the rural areas is not only an efficient strategy, but it also improves equity. (For a survey of the studies of the effect of education on agricultural productivity, see M. E. Lockheed, 1987, pp. 110-115.)

The purely economic returns to the education of women tend to be as high or higher than to the education of men. Psacharopoulos (1985, p. 589) estimates a 15% rate of return to the education of women, and 11% to men, with the largest advantage to women at the secondary level. But there is an additional effect, very important in the low income countries where population growth rates are very high, averaging 2.8% per year in the developing countries, compared to 0.6% in the industrial countries, and 2.1% in Indonesia (Source: McMahon, 1992b, Table 1). It is the effect of education of

women to the ninth grade level and beyond in enabling them to enter the labor force as teachers, for example. This in turn lowers fertility rates and the size of completed families, reducing poverty (see McMahon, 1989c, for a survey of those studies that relate to Pakistan). The secondary education of women, in addition to rural basic education, is a second instance where efficiency in financing and equity are not in conflict.

Table V.1
Evidence on Real Rates of Return to Human and Physical Capital

	Education[a]			Physical Capital	
	Primary	Secondary	Higher	Overall	
Asia	27%	15%	13%	13[g]	
Indonesia[b] (1989)	27	13	6	9.4[b]	
Pakistan[c] (1985)	33	3	10		
Latin America	26	18	16	13[g]	
Africa	26	17	13	13[g]	
Industrial	10	9		Industry	Housing
United States[d] (1987)	10	12		15%[e]	5%[e]
Canada (1961)		11.7	14	9.9[f]	
Japan (1976)		8.6	6.9	13.6[f]	
Sweden (1967)		10.5	9.2	5.5[f]	
United Kingdom (1978)		9.0	7.0	5.9[f]	
Netherlands (1965)		5.2	5.5	28.3[f]	

	Education	Physical Capital
Developing[g]	15	13
Industrial[g]	9	11

Sources:
a. Social rates of return are marginal rates of return to each *level* of education from Psacharopoulos (1985, pp. 586 and 598-600).
b. McMahon (1992a, Table 7). The primary rate of return is for rural schools.
c. McMahon (1989c).
d. McMahon (1991a, Table 1).
e. E. Mills (1989).
f. T. P. Hill (1979, p. 23). This is the trend level from 1976 for industry including transport, i.e., adjusted to remove cyclical effects.
g. Psacharopoulos (1985, p. 591).

Education and Growth

The contribution to growth will be greatest if the public sector will increase the rate of investment in education the fastest where the rates of return are highest, which in turn induces further private family saving and investment in education at the level. With respect to total investment in education, the efficiency criterion suggests that this should only be done so long as rates of return to education are above the real rates of return to physical capital. The rates of return to education are normally estimated from microeconomic data revealing the effect of education on each individual's

earnings over the life cycle. But real marginal productivities, which are instantaneous undiscounted rates of return, can be estimated directly from a production function. This circumvents most arguments about whether or not average earnings are a reasonably good measure of productivity, arguments about self-selection and screening, and also addresses more adequately the interdependence between higher education and technical change (or R&D).

This has been done for the U.S., using a nested-CES production function as shown below. The nested-CES production function in this form allows for the possibility that both human and physical capital *substitute for raw labor*, with larger elasticities of substitution, whereas human and physical capital are complementary with one another with a lower elasticity of substitution. This was found to be true by Griliches (1988, pp. 147-81) for the U.S., and is supported by results for developed and underdeveloped countries respectively by Fallon and Layard (1975).

New nested-CES production function estimates for the U.S. for 1947-88 are:

$$(1)\quad Y_p = [\underset{(120.3)}{.97}\, Z^{-1.31}_{(8.4)} + \underset{(120.3)}{.03}\, (e^{at}NS)^{-1.31}_{(8.4)}]^{-1/1.31}_{(8.4)}$$

$$Z = [\underset{(29.1)}{.91}\, K^{-3.46}_{(6.71)} + \underset{(2.67)}{.09}\, H^{-3.46}_{(6.71)} + \underset{(2.67)}{.01}\, HE^{-3.46}_{(6.71)}]^{-1/3.46}_{(6.71)}$$

$R^2 = .998$; DW = 1.92, Rho = $\underset{(3.59)}{.57}$

t- statistics in parentheses.

where: Y_p = real potential GNP; Z = the combined factor; K = physical capital; H = human capital (primary and secondary); HE = human capital (higher education); NS = labor supply (number of workers); a = rate of growth of the R&D stock

Technical change is regarded here as embodied as the result of past investment in both physical capital (K) and human capital (H and HE). But it also potentially contains a disembodied component that is raw-labor-augmenting via $e^{at}NS$.

The elasticity of substitution calculated from the estimates above is higher (% = .43) for the substitution of total capital (Z) for raw labor (NS). There is a lower elasticity of substitution among the different forms of human and physical capital (% = .22) as would have been expected from Griliches, Fallon, and Layard's results. This strongly suggests that human capital (H and HE) are complementary with physical capital (K), and that those with higher education in the labor force (HE) also require those with secondary education level skills (H) to work with.

The marginal productivities can then be calculated from the estimates shown in Eq. (1) (the mathematical derivations from the Nested CES are shown in McMahon (1991b, Appendix A). They are:

(2) $MPP_K = .11, \quad MPP_H = .14, \quad MPP_{HE} = .09$

This works out to just under an 11% rate of return for physical capital for 1974-88, which is remarkably close to the average of the 15% and 5% for Non-Housing and Housing capital estimated by other methods and shown in Table V.I. The derivation of rates of return from the marginal productivities is shown in Becker (1975, Ch. 2) and worked out for the Nested CES in McMahon, Jung, and Boediono (1992d). Just under 14% for *primary* and *secondary* education is close to the 10% reported for *secondary alone* if primary which tends to be higher were averaged in. Just under the 9% return for higher education from the marginal productivity in Eq. (2) is also close to the 10.5 and to 10.9% reported for the earlier 1949-1969 period for higher education by Psacharopoulos (1985). Greater faith can be placed in such estimates based on microeconomic earnings data, but it is useful that there is consistency with them found in these aggregate production function estimates.

It is possible to conclude that there is external inefficiency in the U.S. due to some underinvestment in secondary education (H) and in plant and equipment (components of K) where returns are high, relative to overinvestment in housing where returns are low. Although there was a dip in the 70s, there is no evidence of any trend downward in rates of return to higher education, or of serious overinvestment in higher education in the U.S.

Faster Growth

As shown in Table V.2, the six fastest growing countries in the world who all had real growth rates that were sustained at 4.7 to 7.8% since 1965 are all investing between 18-21% of their total government budgets in education. But they also are saving and investing in physical capital at a high 29% average rate. Their investment financing strategy takes into account the complementarity between human and physical capital by investing simultaneously in both at relatively high rates, and it does seem to work. They also share a peaceful environment, are market economies, and employ and export-oriented growth strategy which for the analysis here are treated as preconditions.

Table V.2
What Works and What Doesn't

Fastest Growing Countries in the World	Real Per Capita Growth Rate 1965-85	I_K/Y	I_H/G	Income Received by Lowest 40%
Singapore	7.8%	47%	21.6%	15.0%
South Korea	6.6%	29%	20.5%	16.9%
Hong Kong	6.2%	24%	20.0%	16.2%
Botswana	6.2%	21%	19.4%	9.0%
Taiwan	4.9%	28%	18.0%	22.3%
Japan	4.7%	28%	12.0%	21.9%
Three Slow Growing Countries				
Pakistan	2.4%	17%	3.1%	19.0%
Philippines	2.6%	18%	25.6%	15.2%
Nepal	.2%	10%	7.2%	n.a.

Source: Data from World Bank (1990, Statistical Appendix, p. 236).

The inequality in the distribution of income in these fastest growing countries is also relatively low compared to most developing countries. From several World Bank analyses of the sources of this (e.g., Jiminez, 1987, World Bank 1990), this is partly because high rates of investment in primary and secondary education have made basic education universal in all of these countries except Botswana and thereby spread earnings more widely in the population.

For comparison, the Philippines had very high rates of investment in education (25.6%) and Pakistan and Nepal had very low rates of investment in education (3.1% and 7.2%). The per capita growth rate was higher in the Philippines than in Pakistan or Nepal, but was basically much lower in all three of these countries than in the fastest growing countries shown at the top of Table V.2. There are of course other factors that affect growth (wars, the degree of political commitment to achieve sufficient growth, etc.). But with respect to investment strategies, perhaps this is sufficient to illustrate that investment in education is not a sufficient condition for growth, but it does appear to be a necessary condition.

III. CONCLUSIONS

There are many sources of inefficiency, as well as inequity, in education that then transpose themselves into the pattern of economic development. Many of these are rooted in the methods of financing human resource development.

It is suggested that there are financial transfer mechanisms and economic criteria that are relevant to finding and achieving efficient and equitable human resource investment strategies. The social rates of return to investment in education, especially in primary and secondary education, tend to be significant higher than the overall rates of return to investment in physical capital in many developing countries. In the U.S., they are not higher than returns to investment in plant and equipment, but are over twice the real rates of return to investment in housing.

Assuming that the externality benefits of education exceed the cost spillovers, since social rates of return to investment in education are high, and since a positive contribution is made by investment in primary and secondary education to reducing inequality in the distribution of income, there are both efficiency and equity gains to be made simultaneously in the developing countries by improving investment strategies. Beyond this, improving the objectivity and equity with which funds are distributed to the schools can help to improve the internal efficiency of the schools, equality among pupils, and incentives for local governments and private households to help with the financing. There is also potential in higher education for improving the targeting of financial aids through better means testing (see McMahon, 1988c). Each of these steps involving use of standard economic financing and investment criteria would increase both efficiency and equity which in these cases are not in conflict, improving the total investment strategy, and thereby contribute to economic growth and broadly based development.

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VI

ABSTRACT

The Economics of School Expansion: Why Families Invest in Education

Walter W. McMahon and Boediono

The preceding chapters have focused on the external efficiency of education from the point of view of efficiency criteria applied to investment strategies, to the way education relates to labor markets, and to the methods of financing education. Nothing has been said about the "social demand for education," yet it has been behind the scenes when planning enrollment goals (Vol. I) or when evaluating the efficiency of the total level of private plus public investment (Chapter V above).

This chapter will focus on some basic research involving a model of the household to ask "Why do families invest in education?" It considers the returns that students expect from education, together with the sources of funds (such as the parents' income, and public subsidies). Both are crucial, but the empirical tests using microeconomic data conclude that variation in the sources of funds among families, and over time, explain most of the variation in the "social demand" arising from families. In developing countries, including those covered in the introductory review of patterns of school expansion worldwide, governments usually respond to these families, who are voters, with the result that governmental units support education by publicly subsidizing the direct costs. This from the family's point of view removes a barrier and induces additional saving and investment in covering the indirect costs by the family. This feedback effect is important since there are imperfect capital markets for financing investment in human capital formation by families through borrowing.

The result is a larger amount of private saving (i.e., refraining from current competition) and investment in human capital formation by families, in partnership with governments, in developing countries than would otherwise occur.

VI

The Economics of School Expansion: Why Families Invest in Education

The Basis of Social Demand

Walter W. McMahon and Boediono*

Formal education is a widely desired and very successful enterprise if considered in terms of the continuing expansion of school enrollments worldwide. This has occurred not only as an absolute increase in enrollments over the last two decades as population has grown. But the expansion has also been in the form of an increase in the percent of children enrolled in each age bracket, and in the poor, middle income, and high income industrial countries alike.

There is evidence however in the 1980s that this process also works in reverse when there are external shocks. Enrollment ratios began to decline in the poorest countries of sub-Saharan Africa and Latin America. These were the countries making the largest public budget cuts in education as per capita income following high oil prices and high U.S. interest rates in the 80s began to decline.

The economics of long run school expansion however is not concerned only with enrollments. It is also concerned more importantly with expenditure per pupil in real terms, and hence with the quality of the education provided. When these elements are introduced, the economics of expansion has its counterpart in the economics of educational decline, relevant to the poorest non-oil producing countries at least.

In particular, investment in education per pupil and per capita by governments has declined sharply in real terms in the 39 lowest income countries over the last two decades. In the middle income newly industrializing countries however it has grown rapidly, more than doubling over this same period. In the high income industrial countries, real expenditure per capita has also grown rapidly, nearly doubling in spite of the much higher initial expenditure base.

With respect to quality, the evidence is that quality is positively related to expenditure per pupil (although there are exceptions, and after some point diminishing returns sets in). Furthermore, as measured by internationally standardized Cambridge Exam and Baccalaureate Exam test scores in basic subjects in countries where real expenditure per pupil has been declining, the quality of education is falling.

It is these kinds of stylized facts about the economics of school expansion, and the economics of education decline, that a more general theory of school expansion must explain. This chapter focuses

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* This chapter is adapted in revised form from *The Political Construction of Education: School Expansion, the State, and Economic Change*, Bruce Fuller and Ricky Rubinson, eds., Praeger, New York, forthcoming, 1992.

on the very important economic and other variables influencing decisions within families and within governmental units. Fuller and Rubinson (1992) offer a "general model of school expansion," to which this chapter is related, and present additional stylized facts.

Part I will offer a brief overview of the economic and political aspects of the general model of school expansion. This is followed by a more specific presentation of the salient facts of worldwide school expansion (and the reverse process of decline). Part II will develop the conceptual framework in more specific terms. This includes the feedback mechanism, as per capita income growth contributes to the growth of investment in schooling, followed by a feedback as these individuals enter the labor force and contribute to further national (and per capita) income growth in later years. It also develops the logic of individual family investment decisions, including the relevance of the budget constraint to households' *effective* demands and the reason continuing school expansion depends so heavily on the capacities of public tax systems to help finance this type of human resource investment. In conclusion, Part III will consider some of the implications for efficiency and equity in education of the patterns emerging during periods of expansion and contraction.

I. ECONOMIC DIMENSIONS OF SCHOOL EXPANSION AND DECLINE

A brief overview of the logic of what determines the level of investment in education, and of enrollments, will be presented first, and related to the dynamic process of expansion of schooling over time. This will be followed by a more specific presentation, and interpretation, of the stylized facts. Questions of efficiency and an analysis of the relation between expenditure and quality in this dynamic context are not considered here since this topic is addressed later in Part III.

Introduction: An Overview of the Model of School Expansion

The term "investment in education" will be used, rather than expenditure, because this type of investment expenditure yields returns later in the life cycle for the individual, and for the family. Parents are aware of this, and although younger children especially are normally quite myopic, there is evidence that the "generalized preferences for schooling" referred to in Fuller and Rubinson's (1992) general model of school expansion depend significantly on the families' aspirations.

But to proceed with an overview of our model, there is the expectation of future monetary *and non-monetary* returns, as well as shorter run current returns. But this is not sufficient to result in *effective* demand or enrollment unless the economic resources of the family are sufficient to sustain the investment-costs. The major investment made by the parents is in the indirect costs of foregone assistance at home, and in agriculture, that could be provided by the child except for the fact that the child is in school. This opportunity cost is a major factor, and a critically important cause of high drop out rates among primary and secondary school children in developing countries. These indirect costs are quite apart from any direct costs of tuition, textbooks, uniforms, and fees which are not always fully subsidized by the state. The key economic aspect of this is that "generalized preferences" alone are not effective until there is a joint determination consistent with the family's economic constraints that results in real resources being invested, in support of enrollment. Then these generalized psychological preferences are converted into effective demand.

It is the parents who have children who have these incentives, not those without children. The latter do not contribute to school enrollments, and normally are very reluctant to support the expansion of school budgets. In light of this situation, it is not surprising that the two most important determinants of the level of public investment expenditure on education (and the rate of its expansion) are the real per capita income of families, Y and the number of children ages 5-17 as a percent of the population, C (see, for example, McMahon (1970) where other subsidiary influences are also tested and discussed).

When per capita income declines, and where the number of children as a percent of the population declines, investment in education (in real terms) and enrollments can both be expected to decline. If however population is growing rapidly, and per capita income and public expenditure is falling, as was true in the 1980s in much of Africa, then enrollment pressures can be expected to grow, at least up to a point, education expenditures to fall, and quality to deteriorate.

Government leaders are subject to some extent to current pressures from these families, who are also voters, resulting in a social demand for education. But these leaders also have aspirations of their own about the future, with goals for economic development to which investment in education is relevant. Tax revenues must be raised to finance the school expansion, which otherwise would occur privately but to a much more limited extent, given the inadequacy of loans as a means of financing this type of human resource investment. The payback period is long, and the risks and uncertainty facing individual borrowers and lenders is very high, so that even though the rates of return may be very high, the investment will not be undertaken without substantial public subsidy.

Finally, there is a feedback effect as educated workers enter the labor force and contribute to earnings growth later in the life cycle, and to National Income growth. This income growth that results, if augmented by physical capital formation and technical change, in turn generates the income that supports further school expansion.

The Basic Empirical Patterns of School Expansion: Stylized Facts

The number of children between the ages of 6 and 17 more than doubled between the 1950 and 1980 census years, with the most rapid population growth occurring in the poorest developing countries (see Table VI.1, Col. 2).

Table VI.1
Income and Population Growth
Average Annual Growth Rates

		Real GNP Per Capita 1965-86	Population Growth Rate 1980-86
Lowest Income Countries (Not including China & Indonesia)	(37)	.5%	2.8%
Low Middle Income	(28)	2.5%	2.6%
Upper Middle Income	(23)	2.8%	1.9%
Industrial Economies	(18)	2.3%	.6%

Source: World Development Report (1988, pp. 222, 274).

But more remarkably, the percentage of children engaged in formal schooling increased at the primary, secondary, and higher education levels in countries at all levels of economic development as shown in Table VI.2. The large 25 and 29 percent increases in the percent enrolled at the primary level in the lowest income and low middle income countries, as well as the 12 to 26 percent increases at the secondary level, are particularly remarkable in light of the failure of per capita income to grow in many of them. It is consistent with the hypothesis that the growth in the number of children as a percent of

the population is a major factor creating enrollment pressure on the government, and on the schools. A weighted average (not shown in Table VI.2) indicates that the total years of schooling demanded, and provided by the schools, increased by 32 percent in the lowest income countries, 46 percent in the middle income countries, 50 percent in the upper middle income countries, and by 16 percent in the high income industrial countries in spite of the fact that primary and secondary education in these industrial countries is nearly universal.

The percent of children enrolled however is tied very closely to government per capita spending on education. For 23 African countries from 1975 to 1985, Gallagher and Ogbu (1989, p. 29) find a positive relationship (.58) that is also highly significant. There have been some recent setbacks in enrollment ratios however in 13 out of the 29 lowest income countries for which data is available (op. cit., p. 31). These declines occurred regardless of their structural adjustment status, and appear to be more closely related to declines in their per capita income (and to a war situation in Angola and Somalia where the declines were greatest).

Real investment in education per capita, however, shown in the last column of Table VI.2, shows a similar but an even more drastic pattern than that revealed by the enrollment ratios. There has been a sharp 67 percent decrease in the real per capital financial support by governments for education in the lowest income countries, a 22 percent increase in the lower middle income countries, and a 140 percent increase in the upper middle income countries. The increase in the industrial economies (87%) is smaller than that in the upper middle income countries, but is much larger in absolute terms. This is illustrated by the top solid line in Figure VI.1. For the 39 lowest income countries in the world, with incomes averaging $270/year in 1985, the 67 percent *decline* in the investment expenditures per capita on education since 1972 is in sharp contrast to the large *increase* in expenditure for the low middle, upper middle and high income countries (with $820, $1,850, and $11,810 per capita incomes, respectively).

Table VI.2
The Expansion of Schooling

Country Groups		Percentage Point Increase in Percent of Age Group Enrolled 1965-1985[a]			Percent Growth of Real Expenditure Per Capita on Education 1972-1981
		Primary	Secondary	Higher	
Lowest Income Countries	(39)	25	12	4	-67%
Lower Middle Income	(33)	29	26	9	+22%
Upper Middle Income	(23)	8	28	9	+140%
Industrial Countries	(18)	0	30	18	+87%

Sources:

a. Computed from World Development Report (1988, p. 280).

b. T. Paul Schultz (1988, p. 555).illustrated by the top solid line in Figure VI.1. For the 39 lowest income countries in the world, with incomes averaging $270/year in 1985, the 67 percent *decline* in the investment expenditures per capita on education since 1972 is in sharp contrast to the large *increase* in expenditure for the low middle, upper middle and high income countries (with $820, $1,850, and $11,810 per capita incomes, respectively).

These different rates of increase in expenditure per capita taking enrollment growth into account, are reflected directly in expenditure per pupil as shown in Figure VI.1 by the middle dashed line. Expenditure per pupil has the most direct implications for the quality of education. What limited evidence there is suggests that expenditure per pupil is clearly linked to quality. There are many sources of inefficiency, but these do not necessarily change very much over time. As reported by Gallagher and Ogbu (1989, pp. 79-81), for example, average test scores on internationally standardized exams for both primary and secondary schools in Burkina Faso were worse in the 80's than in the 70's, and are still declining. This was associated with a decline in per pupil expenditure at those levels (and a shift of resources to higher education). In Senegal test scores of primary school graduates declined by 9 percent, and of secondary school graduates increased by 8.6 percent, prior to which time primary school expenditures per pupil were falling and secondary school expenditures were growing. In Botswana, the one place in Africa where expenditure per pupil has been growing dramatically, the pass rate on the Cambridge internationally standardized exams increased from 52 percent in the 1970's to 83 percent in the late 1980's, and the proportion of those obtaining a Grade 1 pass has tripled. Per capita expenditures do not reflect the total resources devoted to the sub-sector of education for which test scores are available, nor capture changes in the degree of internal efficiency. But at this lower end of the expenditure spectrum, what evidence there is suggests a distinctly positive relationship between expenditure per pupil and student achievement.

Since without funds, the best teachers cannot be attracted and retained, and adequate teaching materials and facilities cannot be secured, by this somewhat crude indicator of quality, it would appear that the falling expenditure per pupil in the 39 lowest income countries is associated with a deterioration in the quality of the education provided By the same reasoning, the largest improvements in quality are likely to be occurring in the middle income countries where expenditure per child is rising.

Finally, there is a dramatic contrast between the slower per capita economic growth and more rapid population growth in the lowest income countries, and the more rapid economic growth and slower population growth in the middle and higher income countries. Indonesia would appear to be just on the verge of joining the latter group. This was shown in Table VI.1. It is clear that the rapid population growth and the inadequate level and growth of economic resources in the poorest countries puts tremendous pressure on the schools.

II. A GENERAL ECONOMIC MODEL OF SCHOOL EXPANSION

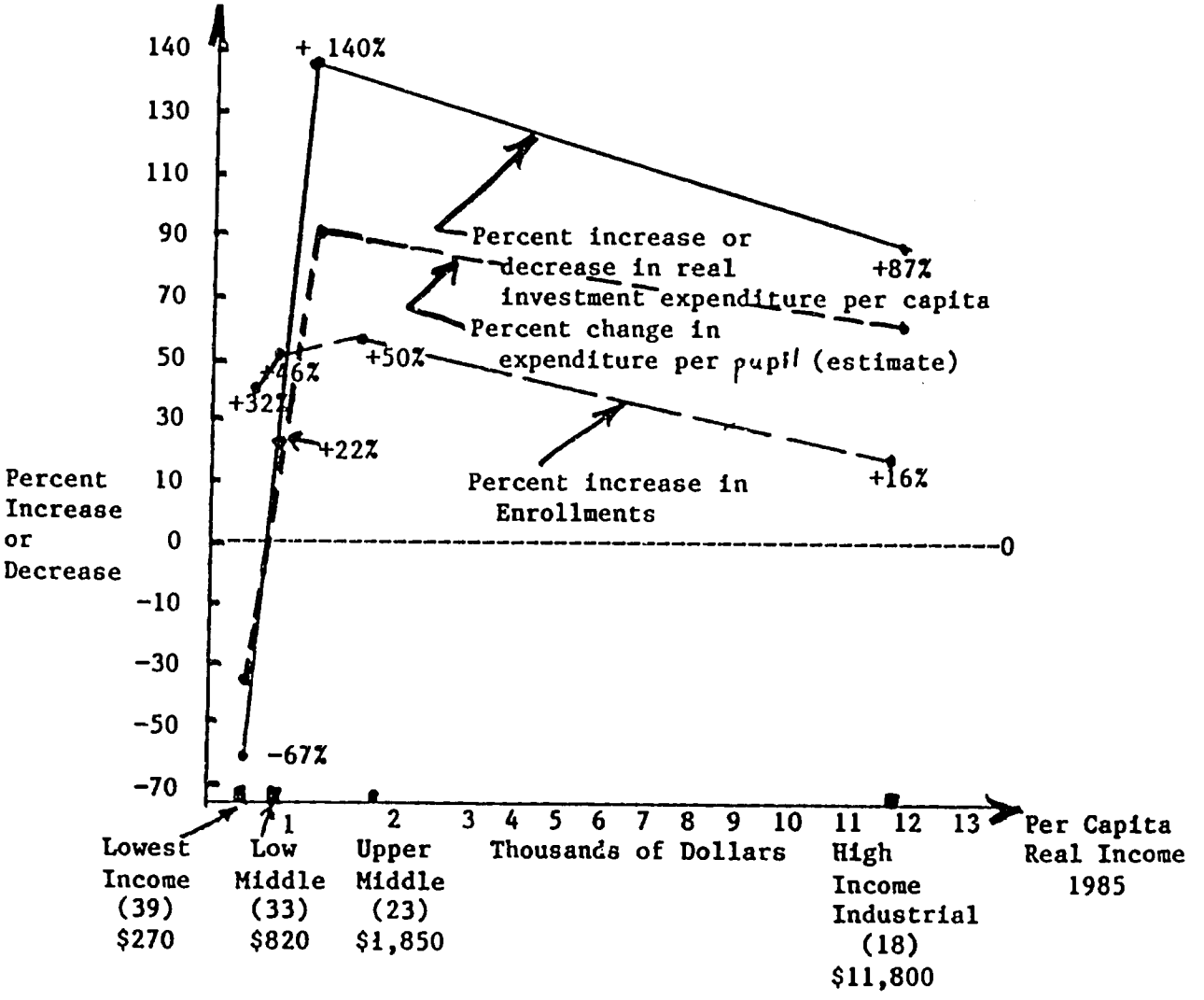
The Flow of Causation: Joint or Recursive?

Has the rapid rate of increase in investment in education and improvement in the quality of education (to the extent that this is associated with increased expenditure per pupil) contributed to the higher productivity of school leavers, and higher economic growth rates in the middle income and higher income countries? Or instead, have the high rates of economic growth in the middle and higher income countries contributed to the more rapid school expansion in these countries?

Logically there is 2-way flow of causation so that both effects are true, given sufficient time delays. But this kind of causation can never be inferred from the data. It can only be inferred from the logic of the theory, or of the process.

Clearly, within a life cycle context, when parents invest in the education of their children, this does not raise the parents' income. It raises the children's earnings later, and the direction of the flow of causation is clear. It is from the parents' higher income, given that they are likely to invest more in the education of their children, to the growth in earnings of the children later after they enter the labor force. This is also true, and in no way conflicts with the logic of the former process.

Figure IV.1
Investment Expenditure Increases and Enrollment Increases by Income Level



Source: T. Paul Schultz (1988, pp. 551, 555)

The Model

The general economic model of school expansion seeks to capture the main economic effects of income growth on school expansion discussed in Part I above, as well as the feedback effects from this expansion to the further growth of per capita income and output later. This model is set out in more precise terms in the three equations in Appendix VI.A, which are accompanied by a detailed definition of the variables. But the process that they capture can be explained simply.

The rates of investment in basic education I_{IE}, and in higher education I_{IIE} by families, and hence also by governments, are largely determined by the per capita incomes of these families, the number of children in the school age groups as a percent of the total population, and by the increased earnings expected as a result of the child's education. Other influences on the rate of investment, and hence expansion of the quantity and/or quality of education are less systematic. They include religious and cultural attitudes, the shocks of wars, and major oil price changes among other things.

This investment in human capital in turn contributes to productivity growth, and hence growth of per capita income as shown in Eq. (3) of Appendix VI.A. Other factors such as the rate of investment in physical capital, I_K/Y_{-5}, also contribute to growth of per capita income, as does higher rates of investment in technology, and an economic structure conducive to strong incentives and efficiency. Without the advance of education, diminishing returns to physical capital soon set in, it cannot be operated, and growth does not spread. Furthermore, without education, the technology cannot be transferred or used. A vast amount of technology is available. But it has little effect on production techniques in the many poor countries such as those in sub-Saharan Africa where many are illiterate and unable to understand the adaptation and use of available technology.

This simultaneous model was estimated for 30 sub-Saharan African countries for the period 1965 through 1985. The data consists of 5-year average rates of growth in real Gross Domestic Product, and in population. The effective investment in schooling was measured by the sum of the expenditure by governments, the private expenditure by families, and the value of that investment done by families in the form of foregone earnings. There are controls for investment in physical capital (I_K), and for oil price increases (in $_1$, $_2$, and $_3$) in the production function. For purposes of estimation, instead of C, a lagged endogenous variable was introduced on the right in each equation. This captures the delayed effects from increases in the number of children in prior years, while simultaneously reducing possible problems with serial correlation in the residuals.

There are 120 observations (30 countries, 5 observations of 5-year periods for each). However, 30 observations are lost in Eq. (3) as the result of the 1-period (five year) lag. The mathematical derivation of the production function (Eq. 6) from a Cobb-Douglas form is shown in McMahon (1987, pp. 186-7), where other technical details also are explained. These include explanations of the use of the ratios to facilitate inter-country comparisons, and explanations of the use of other controls that were used but did not prove very significant and therefore are not discussed here.

Implications of These Empirical Results for Educational Expansion and Decline

Results of estimates of this model of school expansion for Africa are shown below in Appendix VI.B. The simultaneous equation 2 stage least squares method takes into account the three equation specification including the two-way flow of causation that is implied by the logic of the process.

These 30 African nations are among the poorest in the world, but at the same time have key population growth and low per capita economic growth characteristics in common with many countries in Latin America and the Asian subcontinent. There is special concern about the economics of school expansion and decline in countries of this type.

It is clear from results reported in Appendix VI.B that even in this low income country group, the income elasticity of the effective investment demand for schooling is somewhat greater than unity. As income increases, a constant I/Y ratio would imply that a 10 percent increase in income makes possible a 10 percent increase in investment. But above and beyond that, increases in per capita income in Eqs. (4) and (5) contribute positively to an increase in this investment/income *ratio*. This is in addition to the lagged effect from initial investment levels which reflect the generalized preferences and tastes made effective through earlier investment decisions in each country.

The positive contributions of primary and secondary education to the growth of per capita income after a 5-year lag also shows up. When this is converted into a 1-year (rather than a 5-year) rate of return, it constitutes a 21.2 percent social rate of return to investment in primary and secondary education in these African countries. This is to be compared to the 21.7 percent social rate of return obtained on the average by numerous microeconomic studies using earnings functions in these countries (computed from Psacharopoulos, 1985). Higher education is negatively associated with *shorter term growth* in these countries, perhaps because it drains resources from other uses with no short run returns. *Longer term 10-15 year lags,* however (see McMahon (1987, p. 1989), are consistent with the hypothesis of a positive contribution of higher education to growth. The net effect of these short term and long term effects suggests a net positive contribution of higher education to growth.

Since per capita income has been falling in many of these countries in recent years (see World Bank, 1988, p. 222), it should be noted that the positive relation to per capita income in Eqs. (4) and (5) would predict a decline in the ratio of investment in education to GDP. This is consistent with what appears to have been happening in the 39 lowest income countries as shown previously in Table VI.2.

Finally, there is clear evidence of a feedback effect in this data. The evidence is consistent with the hypotheses that the growth of income contributes directly to increased investment in education, even in the poor countries, which in turn contributes to further economic growth and further school expansion.

Individual Family Investment Decisions

Underlying these overall economic effects is the life cycle model of household decisions at the microeconomic level explaining decisions to consume in the present, versus choosing to refrain from consumption and invest in education in order to increase both earning capacity and other satisfactions in the future. But although the expected monetary and non-monetary returns from education may be high, families cannot normally borrow to finance basic education of their children and therefore are limited by their own total income and education services provided at lower cost by the state. This is partly because capital markets are imperfect. Lenders will not lend to low income individuals for this purpose, regarding the risk as a poor one (e.g., Hirschleifer, 1958, and Hartman, 1973). It is also because some families are very adverse to debt, and at least some are myopic and choose to live in the present with little thought to the longer run future of their children. But irrespective of which of these is the reason, the net effect is to force the effective decision to invest in education to be limited by the family's current total income.

The implication of this is that if the income of the family is low, there will be serious under-investment in education. Furthermore, the family's *effective* demand for education is also low. This is a major source of lower *effective* demand for education in poor countries, and in poor neighborhoods. It is not primarily cultural, but instead an inability to cover substantial indirect costs compounded by inability to borrow for this purpose.

The school-leaving age where the choice is made by families whether or not to invest in more schooling is one important point at which it is useful to study these family decisions. In the U.S., this

is faced by most families as a student is leaving high school, and a decision is made as to whether or not to go on to a 2-year community college, or a 4-year bachelors degree or possibly more. Empirical results based on a sample of 5,200 individual students who reported the non-monetary returns they expected from college as well as their expected earnings, and whose families reported their income, assets, sibling aspirations, and parental education levels are shown in Appendix VI.C.

The model estimates simultaneously the investment-demand function, that contains the "generalized preferences for schooling" that are part of the Fuller-Rubinson (1992) general model of school expansion, together with the supply-of-funds schedule ,for white males and white females separately. The estimates for black males and black females were presented in an *American Economic Review* article separately by McMahon (1976). Suffice it to say that since the sample is large, it is possible to control for many influences on these schooling decisions, including the schooling of the mother, S_M, schooling of the father, S_F, ability level of the student, A, and uncertainty, . All variables have the expected sign, except for some of the terms representing non-monetary returns (N_2, N_4, and N_6).

A summary of these results is quite revealing. The influences that are most important in determining the *amount* to be invested (and hence the *effective* demand for schooling) are the expected monetary returns (r*, t=14.92), the schooling of the mother (S_M, t=3.49), and only one of the components of expected non-monetary returns, "finding a spouse with college-developed values" (N_7, t=4.57) on the demand side. The demand function does slope downward as expected, reflecting the higher foregone earnings and lower implicit *rates* of return (albeit higher absolute returns) as the more advanced levels of education are contemplated. Other factors that might have been expected to be important determinants of demand for further schooling simply were not significant. For example, ability as measured by test scores has a very low level of significance (A, t=.48) when there are controls as there are in this study for the education level of the parents and the income of the parents. Uncertainty about expected returns had a negative effect on the amount of planned investment as expected, but was not very significant (, t=1.36). A whole range of possible expected non-monetary satisfactions simply were not very significant influences on these actual decisions. Or they simply were reported by the prospective students as not an important consideration; for example, N_6, "finding a spouse with good financial prospects," has a t=3.97 but it is *negatively* related to these generalized preferences. The pattern revealed for females was very similar to this pattern for males with the one exception that ability was a much more significant factor for females in the decision to go further to school (A, t=4.42).

What really is the most important by far in determining the effective demand for more schooling however are the financial resources available to the family and the student. *All* the t-statistics relating to the supply of financial resources available to either males or females are very highly significant. The income of the parents (Y, t=21.8) is an important internal source of funds to the family, as are scholarships and subsidized tuition, room, and board (S, t=6.42 for males and 20.3 for females). Subsidized and government-guaranteed student loans significantly reduce the impediments to borrowing to finance human capital formation (L, t=23.18). The other variables control for other effects on the decision, such as the number of siblings which reduce the financial resources available to the family for each child (B, t=-4.67). Other controls include hours withdrawn from investment in education due to work (W, t=-45.4), and the order of birth which has a small coefficient for males, but a much larger positive coefficient for females.

Government Unit Decisions to Invest in Education

In this section we seek to analyze the economics of government unit decisions to invest in, expand, or contract, education. The unit of analysis will be the individual governmental unit, that is, the combination of legislative and executive elements that make the basic decisions to invest in

education and also determine the level of taxation to support this expenditure. The conceptual framework and more rigorous empirical tests will be developed as they apply to the determinants of the expression of public education in the United States where the data is much more adequate. This will be followed by an analysis of analogous processes in developing countries.

There is an enormous literature in economics on the theory of public expenditure, going back to Peacock and Wiseman (1961), *The Growth of Public Expenditure in the U.K.*, and before (e.g., Musgrave and Peacock, *Classics in the Theory of Public Finance).* The more recent streams, starting with Bowen's *Toward Social Economy* and continuing with Buchanan's *Demand and Supply of Public Goods* have placed increasing emphasis on relating voting and the election of representatives to education expenditure and access decisions.

Admittedly, educational expenditure and tax rate decisions in the United States and some other western countries are considerably more democratic than in many developing countries. They are also much more decentralized, in contrast to the highly centralized national financing of education characteristics of most of the poorer countries and some of the high income industrial countries. There is more individual citizen participation in voting for representatives on school boards where expenditure decisions are made, voting on school tax referenda, and voting for state legislators and governors where the level of education budgets and related tax changes are often pivotal issues. This suggests a relatively high degree of responsiveness to citizens' "generalized preferences for education" and to the citizens' willingness to pay taxes to convert their preferences into effective demand. Nevertheless, in developing countries the governments are responsive--in differing degree to be sure--to enrollment pressures at the local level. This responsiveness occurs through the bureaucracy within the Ministry of Education that is in touch with the problems in local schools, as well as a responsiveness to economic capacities as taxing decisions are made.

So, although the specific public expenditure model to follow would need to place "national development goals" in a more prominent role as one of the determinants of the effective demand for public education in a developing country, the other elements of the model would be quite similar. The basic model is as first developed for application to the expansion of public expenditure or education by McMahon (1970) focused primarily on the analysis of interstate differences in the U.S. where other factors are more homogeneous than in cross section international data which permits the controls to be more rigorous. It then is adapted to analyze the growth of public expenditure on education over time in McMahon (1975) as well as the joint determination with the tax side of expenditure over time in McMahon (1971).

First, the data show a *longer run* income elasticity of real expenditure on primary and secondary education, I_H, that is greater than one (the upward bending dashed line in Figure VI.2a). But the *shorter run* cyclical elasticity (and slope) is less than one (the solid lines with a flatter slope). And the cross section income elasticity is also less than one (Figure VI.2b). This common pattern needs to be kept in mind when making shorter run and cross sectional comparisons such as those made by Panitchpakdi (1974) within subsets of many African, Asian, and Latin American countries, or the recent longer run intertemporal income elasticities of 1.4 and 1.5 computed by T. Paul Schultz (1988), p. 546).

The underlying structural demand and supply functions are illustrated in Figure VI.3, and presented for those interested in the specifics in Appendix VI.D. The estimates of the reduced form end results of solutions at points like E that are shown in Figures VI.2a and VI.2b are presented in Appendix VI.E. This is essentially the same model as the one estimated later by T. Paul Schultz (1988, pp. 562-3) using data for 89 developing countries from 1950 to 1980, so it is possible to make some international comparisons of the results.

Figure VI.2
Family Income and State School Expenditures

Figure VI.2a
United States, 1869-1980

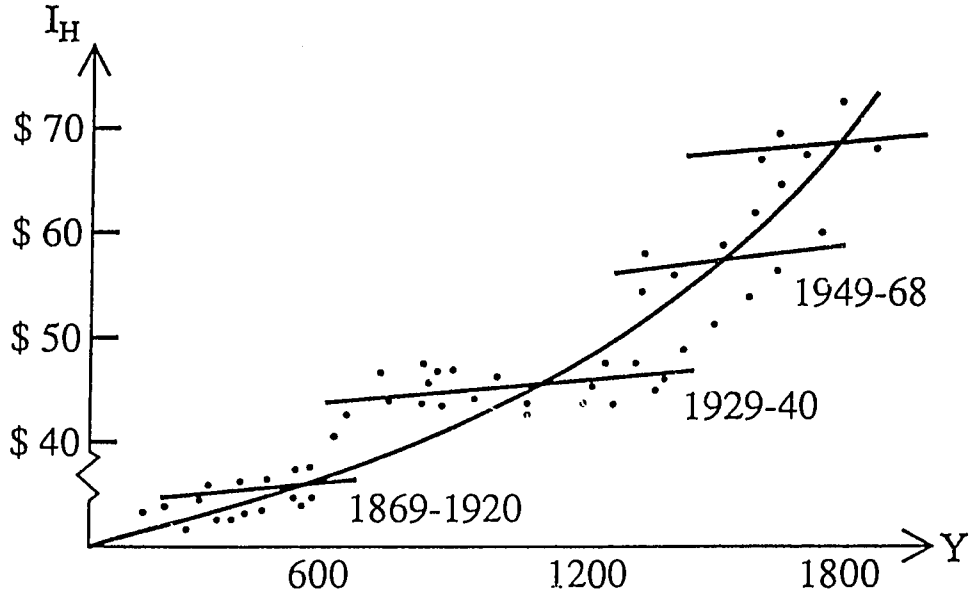


Figure VI.2b
Interstate

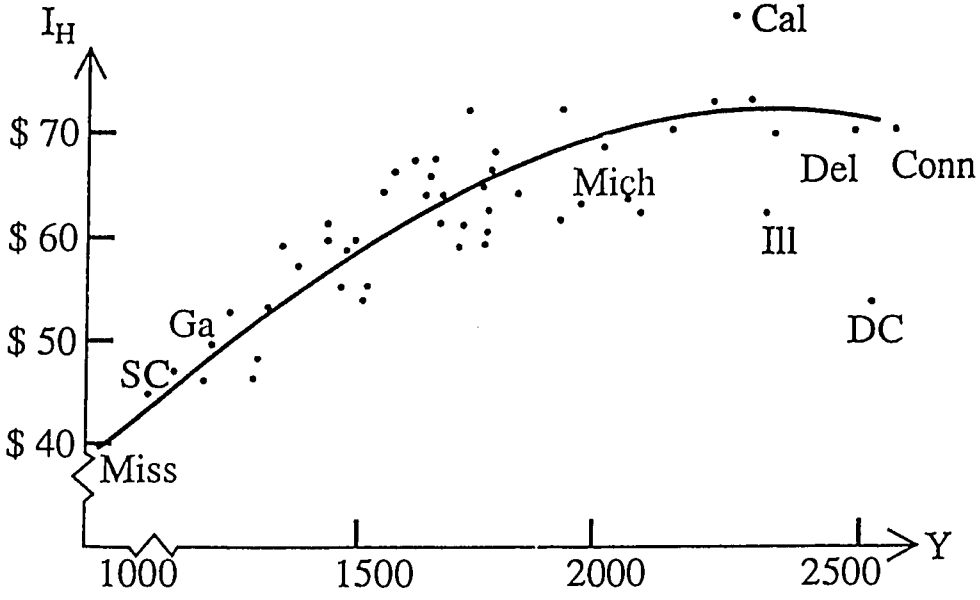
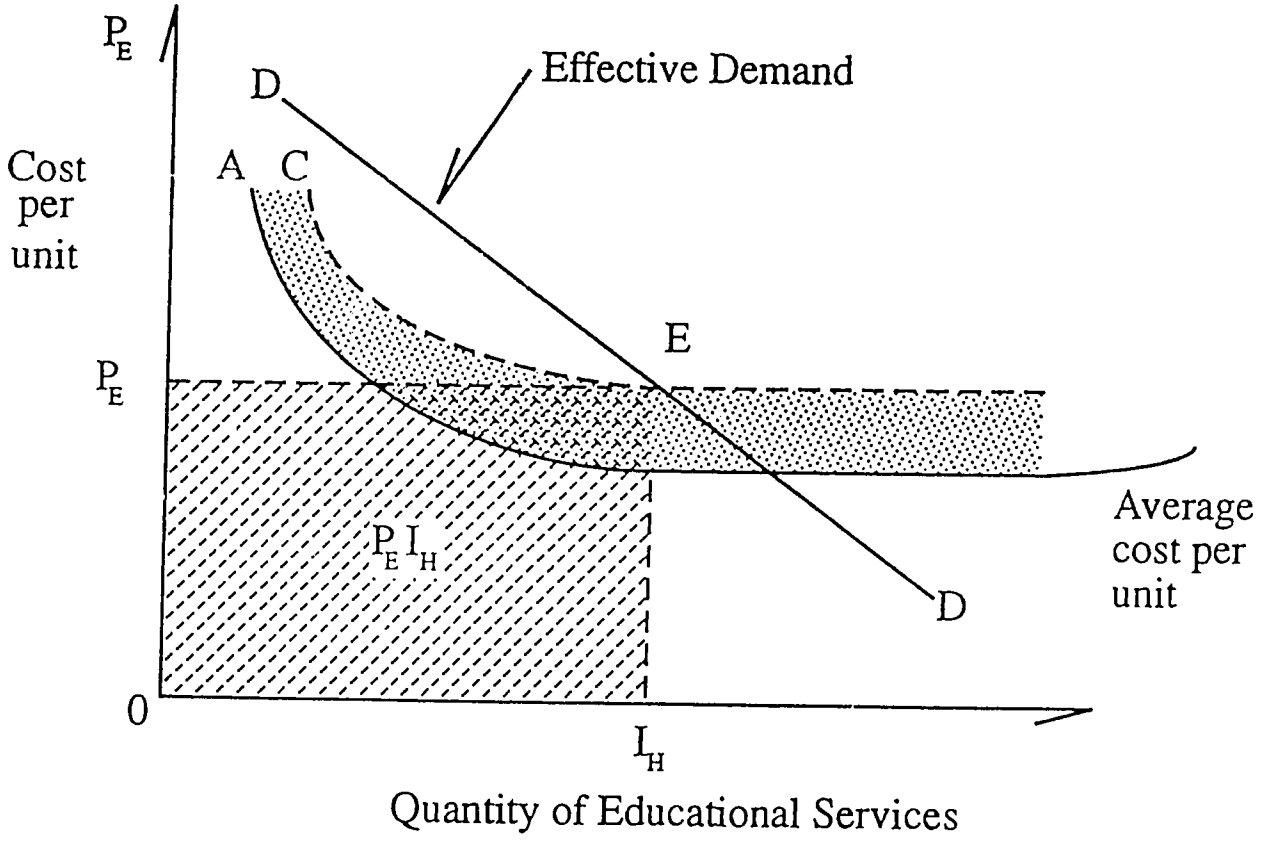


Figure VI.3
Effective Demand for and Supply of Schooling



The *demand for education* is the amount demanded by the median family, ignoring those who do not vote or have no political influence. More specifically, the amount invested in the schools depends upon Y, the taxpayers real disposable income, C the children 5-17 as a percent of the population, N the children not attending public schools as a percent of C, D = urbanization, and the disturbances. (This demand function is shown as Eq. (7) in Appendix VI.D and as DD in Figure VI.3.) The desire for economic development by national economic planners may also add to these educational demands, but for the moment this is included in the disturbance term here. Similarly, technical change and income growth may shift the total derived demands for educated labor, thereby increasing the rate of return to education and hence the demand for schooling. But identifying these structural parameters is not attempted here, and shifts in the expected returns due to technical change or other factors are also left in the disturbance term. The variable N picks up pupils in non-public parochial schools and thereby reflects religious differences, but differences in the political base of the government and the forces to which it responds which can be large among developing countries are left to the disturbances. This demand function in Figure VI.3 is expected to shift outward in response to increases in income (Y) and in the school-age population (C), and downward in response to a larger percentage of students in parochial or private schools (N).

The *production cost* of education underlies the supply side of educational services. (It is given by equation (8) in Appendix VI.D.) These educational production costs are also illustrated by the average cost curve in Figure VI.3. The underlying production function for educational services together with the optimization process is shown in McMahon (1970, Eqs. 2-4, p. 244) as well as in T. Paul Schultz (1988, Eqs. 1-3, pp. 562-3). If the public educational system minimizes costs, then the solid line that forms the lower boundary of the scatter of observations in Figure VI.3 is the average cost curve.

However, if costs are "padded" due to internal inefficiencies, then the dashed line that forms the upper boundary (and points in between) are points on the actual average cost curve, and the solution is at point E in Figure VI.3. If internal efficiencies can be increased, the output of educational services can be increased at no extra cost. This new solution of demand with the supply side would use the solid line average cost curve and is to the right of I_{II}. The supply of education services by school districts more specifically depends upon p_E, the price per unit of educational services of given quality; Q, the number of pupils per school district as an index of net economies of scale; W, the real wage of teachers; Z, the number of pupils per teacher; D, the density of population; and $_8$, the disturbances. (See Appendix VI.D, Eq. (8).)

It is true that the price of teachers' salaries declines relative to average income and tends to lower the unit cost of providing schooling, shifting the cost curve in Figure VI.3 downward as growth occurs. This is a major engine of educational growth as T. Paul Schultz (1988, p. 546) points out. However, there are also significant economies of scale in education as population density D increases, which is seen to be a highly significant term as may be seen in Appendix VI.E. Major economies of scale have also been found in higher education in the developing countries, as reported in McMahon (1987, p. 139).

Finally, although demand and supply-price (solving Eqs. (7) and (8) in Appendix VI.D together) gives a solution for the desired level of expenditure, i.e., produce $p_E I_{II}$ as illustrated in Figure VI.3, this is not *effective* unless there are "tax handles" available to provide the necessary revenues. Tax decisions, therefore, depend more specifically as in Eq. (9), Appendix VI.D, upon A, the assessed value of taxable property; S, the local government support for the local schools; F, the federal or central government support; r, the interest rate cost of funds borrowed from donors, or the public; R, nontax revenue sources; and $_9$, disturbances. These are the elements contained in the financial transfer mechanism discussed above in Chapter V. It is in one sense a supply of funds to the governmental unit, or a government budget constraint. The parameters in the tax function can be

interpreted as variable tax rates about which decisions are being made. In developing countries most of the funds come from the centrality, World Bank and other donor loans, and various fees. In the United States, local property tax sources and provincial-level state aids dominate.

A comparison can now be made of the empirical estimates obtained for this model using U.S. cross section and time series data separately with the estimates of a very similar model using pooled cross section and time series data for a larger set of much poorer countries in Africa (30 countries), Asia (23 countries), and Latin American (19 countries). Several major economic forces relevant to our major themes show up clearly, and the comparison is quite illuminating.

The evidence again is consistent with the hypothesis that the growth of per capita income is a major determinant of school expansion (and of decline). The shorter run income elasticities are smaller than the longer run elasticities. But in the U.S., as per capita income rises, it is associated with an approximately equal increase in expenditures on primary and secondary education after a lag, with longer run income elasticities of approximate unity. (See Figure VI.1 with further details in McMahon (1975 and 1987)). When many lower income countries are included in the analysis, T. Paul Schultz finds an even higher responsiveness to longer run income growth with income elasticities of 1.35 and of 1.47 for primary and secondary expenditure per pupil respectively in his 89 nation sample. This is not logically inconsistent with a simultaneous feedback effect from school expansion on productivity and income growth, as suggested above. Other types of investment and other factors are also important in generating income growth, of course, as indicated previously. The precise empirical size of the direct effect of income growth on school expansion from the indirect feedback effects requires a more fully specified simultaneous equation model such as the one discussed above and in Appendix VI.B.

The effects of more rapid population growth on school expansion are revealed mostly through increases in the number of children of school age as a percent of the population, C (shown in Appendix VI.E). More children are significantly associated with larger expenditure! And the tax, "effort" expressed *as a percent of GNP* is also highly significant (as may be seen in Eqs. (10-13), Appendix VI.E). But larger proportions of children are also associated with *lower expenditure per child* (and presumably lower quality) as indicated by the highly significant negative coefficients. (See Eqs. (14) and (15) in Appendix VI.E.)

Urbanization per se exerts a relatively weak relationship. This is consistent with the hypothesis that it has both a positive effect on demand (as governments respond to the more politically effective and higher income urban dwellers), and a negative effect as the benefits of the economies of scale in urban areas and school consolidation are realized. The *net* effect of urbanization on "effort" is insignificant in the U.S., and yet consistent with the negative relation observed in the 89 country study, a relation that T. P. Schultz describes as "relatively weak."

The percent of children in non-public private or parochial schools, N, which was expected to be associated with lower total public expenditure because of voting patterns does have a negative relationship to total public expenditure. Some states such as Louisiana and Massachusetts have large parochial enrollments. But in the 89 country study, when the percent Catholic and the percent Muslim is added to the model to explain expenditure per child, this, as indicated by T. P. Schultz (1988, p. 573) "does not change the above noted patterns."

Finally, as per capita income rises; teachers' salaries also rise. But they do not rise as fast as average per capita income over time. T. Paul Schultz (1988, p. 569) finds an income elasticity of the *relative* price of teachers of .87 at the primary level and .94 at the secondary level. This suggests that the relative salary of teachers (W/Y) actually *declines* by 6 percent to 13 percent as the average income in a country doubles. This reduction in the relative *real* cost of teachers is a reduction in the real price of educational services, shifting the average cost curve in Figure VI.3 downward. This assumes that the quality of education is unaffected by the loss of able teachers to other callings, however. The

pattern suggests that the lower relative price of this input (measured as W/Y in Eqs. (12), (14) and (15) in Appendix VI.E) is associated with a lower net unit cost (involving a smaller reduction in quality), and this therefore is a force facilitating the expansion of schooling. But it does *not* follow that during contractions, and given wage stickiness, that proportionately large enough teacher salary cuts will occur to maintain quality!

III. IMPLICATIONS FOR INTERNAL EFFICIENCY AND EQUITY

Efficiency is a ratio of effectiveness to costs, as discussed in Chapter V and is not the same as low expenditure per pupil. As indicted above, the recent limited evidence for Africa, at least, suggests that declining investment cost per pupil is associated with falling Baccalaureate and Cambridge examination test scores in basic math, science, and language subjects. These examinations are on an international standard, and by this measure at least, quality is deteriorating.

Conversely, as income rises, if managed properly, total investment in education, expenditure per child, and quality all can be expected to increase. But although it is beyond the scope of this paper to develop the evidence here, it does appear that with increases that are too rapid, or go too far in relation to the other schools in the system, diminishing returns sets in, so that there is a smaller and eventually no further quality gain.

So, under continuing population pressure in Africa, Latin America, and much of the Asian subcontintent, and low (or sometimes negative) growth in real per capita incomes, enrollment grows but expenditure per child falls as predicted by this model of school expansion and decline. When taken with the fact that budgets for teaching materials and texts tend to be cut first, then eventually teachers, and later administrators, this results in a less efficient input mix. With lower expenditure per pupil, and less than proportionate cuts in salaries, quality falls. Larger percentage cuts appear to be made at the primary education rather than higher education level, and in rural and low income areas rather than in the high income urban areas, so equity, as well as efficiency, appears to be adversely affected, at least in the short run.

IV. CONCLUSION

The basic model suggests that families expect future potential monetary and non-monetary returns from schooling to be positive, assuming the quality of the education is adequate, and the family is informed and not excessively myopic. From the limited evidence presented, expected monetary returns (earnings) appear to be much more important than expected non-monetary returns.

However the sources of funds available to the family to cover direct and indirect costs explain most of the variation, both among families, among (African) countries, and over time. As governments respond to this "social demand" from families, they act to ease these constraints on quality and on costs, thereby inducing additional saving and investment in education on the part of households, and further school expansion.

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Appendix VI.A
The Model

Investment in Education as Desired by:

(1) Families, and Governments: $I_H/Y = I\left(\frac{\partial \ell n(Y/N)}{\partial t_{-5}}, C, \mu_1\right)$,

(2) Families, and Governments: $I_{HE}/Y = I\left(\frac{\partial \ell n(Y/N)}{\partial t_{-5}}, C, \mu_2\right)$.

Education's Contribution to Growth of Income Per Capita:

(3) Production Function: $\frac{\partial \ell n(Y/N)}{\partial t} = Y(I_H/Y_{-5}, I_{HE}/Y_{-5}, I_K/Y_{-5}, \mu_3)$.

$\partial \ell n(Y/N)$ = Percent rate of growth of real GDP (Y) per capit.. (N),

I_H = Investment in primary and secondary education by families a id by government,

I_{HE} = Investment in higher education by families and by government,

C = Children of school age as a percent of the population (and for I_{HE}), who have completed prior schooling levels,

I_K = Investment in physical capital goods, and

$\mu_1 .. \mu_3$ = disturbances. (These can include religious differences, wars, oil price shocks, and technology transfer. The model abstracts from allocations between public and private education.)

Appendix VI.B
Effective Investment-Demands for Schooling

30 African Countries, 1965-1985. Lags in effect of education on growth (Eq. (6)); t-statistics in parentheses.

$$(4) \qquad I_H/Y = \underset{(2.88)}{.044}\,\frac{\partial \ell n\,(Y/N)}{\partial t} + \underset{(1.58)}{.104}\,(I_H/Y)_{-5} + \underset{(7.40)}{.027} + \mu_4$$

$$(5) \qquad I_{HE}/Y = \underset{(2.88)}{.044}\,\frac{\partial \ell n\,(Y/N)}{\partial t} + \underset{(2.53)}{.383}\,(I_{HE}/Y)_{-5} + \underset{(4.15)}{.008} + \mu_4$$

$$(6) \qquad \frac{\partial \ell n\,(Y/N)}{\partial t} = \underset{(2.19)}{1.62}\,I_H/Y_{-5} - \underset{(-1.53)}{5.02}\,I_{HE}/Y_{-5} + \underset{(3.06)}{.65}\,I_K/Y_{-5} + \underset{(4.12)}{.43}\left(\frac{\partial \ell n Y/N}{\partial t}\right)_{-5} + \mu_6, \qquad R^2 = .43$$

Source: From McMahon (1987), Eqs. (16 & 17), p. 190 and Eq. (8), p. 189 (recursive), respectively.

2 SLS estimates of Eq. (6), which change the specification by eliminating the lags, give corresponding coefficients in Eq. (6), 1st term on the right of .36 (for I_H/Y), (6-2) = .71, (6-3) = .31 and (6-4) = .48, after controlling for oil price shocks, and underutilization as before.

Appendix VI.C
Determinants of Investment in Education by Families
(Three-stage least squares; t-statistics in parentheses)

A. Males (Whites only)

Demand: $I_t = -62r^* + .04A + 2.66S_M + .97S_F - 2.36\mu - 1.06N_1 - 2.55N_2$
(14.92) (.48) (3.49) (1.26) (1.36) (1.31) (2.21)

$+ .90N_3 - 3.45N_4 - 1.60N_5 - 4.13N_6 + 3.74N_7 + .30$
(.82) (2.07) (1.74) (3.97) (4.57) (11.65)

Supply: $I_t = -4.44r + .43Y + .004S + .62L - .25B - .73W - .13O + .27$
(6.27) (21.82) (6.42) (23.18) (4.62) (45.41) (10.97) (22.33)

B. Females (Whites only)

Demand: $I_t = -19r^* + .19A + .47S_M + .29S_F - 1.19\mu - .18N_1 + 1.24N_2$
(6.71) (4.42) (1.21) (.74) (1.52) (.42) (2.07)

$- .57N_3 - .89N_4 + .51N_5 - 1.12N_6 + .97N_7 + .11$
(1.02) (.83) (.74) (2.62) (2.30) (6.15)

Supply: $I_t = -2.01r + .25Y + .005S + .37L - .16B - .62W + 1.93O + 7.54$
(5.57) (21.79) (20.35) (20.08) (5.71) (31.47) (2.79) (10.79)

Investment demand,

$$I = I(r^*, A, S_M, S_F, \mu, N_1, ..., N_6),$$

I = planned investment in college. The number of years of education planned by the student and his family (e.g., two-year associate degree, bachelor's, master's, M.D., Ph.D., etc.) was multiplied by the expected costs per year. The latter were the sum of tuition and fees, reduced by the tax subsidies and endowment fund subsidies to tuition, room, and board, plus foregone earnings costs.

r^* = the expected rate of return. A pure internal rate of return to the planned degree program computed for each student by iterative methods. It equates the student's expected earnings over his or her life cycle (analyzed in McMahon and Wagner, 1981) to the family's total private investment costs as defined above by I. This is a *private* expected rate of return of the type relevant to private household investment decisions, which is developed further in McMahon and Wagner (1982).

A = ability, as measured by the ACT composite test score used for college admissions. Greater ability could be expected to increase the expected rate of return and hence shift the demand function upward as among different families.

S_M= schooling of the mother. The hypothesis is that home investment in children, when the mother has more education, raises the IQ or ability of the child (see Liebowitz, 1974) and also, especially if the mother has been to college, shifts the utility function toward greater farsightedness. Both imply larger investment in education.

S_F = schooling of the father, analogous to S_M.

μ = degree of uncertainty. This was measured by asking the student to estimate his or her degree of uncertainty about future earnings on a scale from 0 to 1.

N = expected nonmonetary returns from education--the contribution of education to greater efficiency in household production of satisfactions.

The supply-of-funds schedule,

$$I = r(r, Y, S, L, B, W, O),$$

r = the rate of interest on student loans. In the rare instance that the family borrows in the nonsubsidized, nonguaranteed loan market to support human capital formation, r is the market rate of interest available to them.

Y = family disposable income, including earnings of the student, collected from parents and students separately in the survey.

S = tax subsidies and endowment fund subsidies to tuition, plus scholarship aid received from all sources.

L = student loans--the amount available to middle- or lower-income families, based on a means test, guaranteed by the federal government, and available at a subsidized rate.

B = the number of brothers and sisters at home or in school. This is a limiting factor on the availability of family financial support.

W = work time spent in the market by the student, withdrawn from hours of study or leisure.

O = order of birth--a dummy variable, equal to 1 if the student is the first-born. The hypothesis is that the first-born male in some families (especially black families) is expected to help support the family, so that foregone earnings are less available for the support of further education.

Appendix VI.D

The Demand for Education (by Households)

(7) $I_H = p_E Y(\alpha_1 C + \alpha_2 N = \alpha_3 D = \mu_7)$

Production Costs (Supply by governmental Units)

(8) $p_E = Q(B_1 W + B_2 Z + B_3 D = \mu_8)$

Revenue Sources (Tax handles, borrowing (r) and fees)

(9) $p_E I_H = \gamma_1 A + \gamma_2 S + \gamma_3 F + \gamma_4 r + \gamma_5 R + \mu_9$

Eqs. (7), (8), and (9) must be solved jointly to obtain equations that are estimated such as Eqs. (10) through (15) in Appendix E. For definition of the variables, see Appendix E and the text.

Appendix VI.E

Comparison of Determinants of School Expansion and Decline
(standard errors in parentheses)
coefficients underlined are significant at the .05 level or above

	Dependent Variable	Demand Influences Y/POP	C	N	Z	Q	Production Costs D	W/P	Tax Sources A	S	F	R^2
	(1)	(2)	(3)					(8)	(9)	(10)	(11)	(12)
					U.S. Interstate[1]							
(10)	pE_{IH}/Y	.013	.15	-.02	-.09	.04	-.01		-.02	.01		.74
		(.024)	(.04)	(.01)	(.02)	(.01)	(.01)		(.02)	(.02)		
(11)	pE_{IH}/Y	(see	.155	-.029	-.087							.73
		col. 1)	(.016)	(.007)	(.004)							
					U.S. Time Series[2]							
(12)	pE_{IH}/Y	(see	.13	-.01	.08	.05		-.08	.04	.86	.41	.99
		col. 1)	(.05)	(.03)	(.08)	(.01)		(.01)	(.03)	(.31)	(.40)	
(13)	pE_{IH}/Y	(see	.208	-.159	-.149						D-W	
		col. 1)	(.026)	(.028)	(.049)						(1.78)	.984
					89 Developing Countries, Primary School Level[3]							
								W/Y				
(14)	pE_{IH}/C	1.35	-1.12				-.25	.16				
					89 Developing Countries, Secondary School Level[3]							
(15)	pE_{IH}/C	1.47	-1.68				-.26	.24				

pE_{IH}	=	Expenditure on education in constant U.S. dollars
C	=	Children in the relevant school-age bracket
Y	=	GNP in local constant U.S. dollars
N	=	Not attending public schools as a % of C
Z	=	Pupils per teacher
Q	=	Pupils per district
W/P	=	Teachers real wage
A	=	Assessed property
D	=	Density
S	=	State aid
F	=	Federal aid
Pop	=	Population

Sources:
1. W. McMahon (1970, Eqs. 8 & 14, p. 247)
2. W. McMahon (1970, Eqs. 15 & 23, p. 248)
3. Paul Schultz (1988, Eq. 5, p. 569)

VII

ABSTRACT

Excess "Social Demand" for Higher Education, Quality, and the Market for College Graduates

Walter W. McMahon and Boediono

Against the background of the truly remarkable achievements, and expansion, of higher education in Indonesia—an expansion of over 600% since 1965, this chapter considers the sources of some of the problems with external efficiency. This is followed by the policy implications, and some of the policy options available.

There is excess "social demand" for higher education related to low resource recovery, problems with quality given inadequate resources and high cost methods, and difficulties for graduates in relating to job markets in view of the quality of the education and the centralized planning of quantities. Policy options suggested in more specific terms in the text include:

- Steadily increasing resource recovery from parents, students, and other private sources.
- Internal improvements in efficiency in addition tuition as sources of resources for improving quality.
- Tuition waivers and financial aids for able students from poor families based on a nationwide system for objective analysis of financial need.
- "Market signals" publicized to enable students and their institutions to relate more effectively to job markets.
- Decentralization to Vice Rectors of allocation decisions within institutions, and development of the infra-structure such as MIS systems and new college placement offices.
- Reform of the admissions criteria to facilitate a more accurate reflection of the student's potential productivity later. This would simultaneously provide for the needs for cultural diversity, intergenerational mobility, and regional economic development.

This chapter concludes that there are very practical means by which external efficiency can be improved, and suggests a framework for debate of these and other policy options.

VII

Excess "Social Demand" for Higher Education, Quality, and the Market for College Graduates

Walter W. McMahon and Boediono

I. INTRODUCTION

Indonesian Higher Education has expanded rapidly—over 600% since 1965. The accomplishments in education have been truly remarkable, moving from very few institutions in 1968 to at least one public university in most provinces, and over 700-800 colleges altogether in 1992.

But with this expansion has come many problems with academic quality. Currently there are inadequate faculty salaries, for example, with faculty often employed or teaching elsewhere in ways that do not update their professional academic skills. There are also problems with financing related to internal inefficiencies and costs higher than necessary, accompanied by problems with quality. The curricula and teaching methods are not always conducive to expeditious creation of a technically qualified, problem solving, and innovative workforce that can contribute effectively to economic development especially in the provinces.

These problems with the quality of the technical, professional, and research training appear to contribute to the problems with employability. It is not only that many graduates remain without jobs, and are not employable, but also that most graduates experience an excessively long job search time, far longer than is typical in western market economies (see Part V). In areas other than human resource development, Indonesia has moved recently and very successfully toward an export-oriented liberalized market economy. But the higher education system has only begun to move away from overly detailed and rigid central planning toward a liberalized system that would allow students to know what the job options are at the time they are planning their programs. This would allow better informed choices by students of their majors, and allow them to respond, together with their Deans, in more realistic ways to their employment options.

Response to these market signals that reflect growth bottlenecks and realistic economic development opportunities, together with improvements in the internal efficiency and quality of the higher education degree programs, are both important to the external efficiency of higher education. This in turn is conducive to increasing the contribution Indonesian higher education make to the economic growth of the nation and development in the regions.

II. POTENTIAL MAJOR SOURCES OF INEFFICIENCIES IN HIGHER EDUCATION

Considering "Why families invest in education" (Chapter VI), given the expected earnings and in some cases scarcity rents that are earned, the sources of funds available to the family and the student to cover the foregone earnings costs (room and board), and direct tuition, fee, and book costs tend to explain most of the variation in the years of higher education chosen. Less systematic evidence suggests that these influences are much the same in Indonesia, although the extended family members living near the college more often help cover room and board costs, and work-study is less important. The effects of these influences will tend to be that:

- The income of the parents is a major determinant of who goes to college given the lack of sufficient need-based grants, loans, and work-study. This effect is reinforced by the test score criteria that are almost exclusively used for selection for college admissions in Indonesia, since test scores reflect prior human capital formation and are normally very highly correlated with the parents' income.
- The relatively highly subsidized college tuition eases the sources-of-funds constraint and leads to an excess *"social demand"* for higher education. Since this cannot be fully accommodated due to limited resources, rationing of access to the public universities ensues.
- With excess "social demand" and efforts to expand enrollments to respond to it, the financial resources are inadequate and *quality deteriorates.* This is one major source of the problems with jobs for college graduates, and hence with external efficiency.

A second source of the problems with external efficiency in higher education is the use of centralized manpower requirements planning that is not in sufficiently close touch with the market signals, or effective demands for different types of workers in each of the regions. The data was developed in detail in Chapter III above. Some of the effects within higher education are:

- Insufficient decentralization of decisions so that Vice Rectors can respond in part to the realistic markets for their bachelor's graduates, shifting resources (and gradually some faculty) into those fields where the realistic opportunities are greatest.
- Students cannot "vote with their feet," shifting in junior and senior years toward those fields where the jobs are.
- The lack of college placement offices charged with the responsibility of placing students before they graduate (with one or two notable exceptions) illustrates the lack of the necessary infrastructure for greater decentralization.

A third major source of the problems with external efficiency in the higher education system may be the lack of a sufficient number of junior secondary and senior secondary level workers in the labor force. In some countries (not Indonesia), there are trained Ph.D.'s, but the labor force is largely illiterate, and the two do not mix. The labor force required in most industries looks more like a pyramid, e.g., many with basic education, some skilled workers, foremen, and supervisors and a very few highly educated scientists and professionals. There is evidence in Indonesia, reported in Chapters II and III above, of relatively tight labor markets at the junior secondary level. These are evidenced by low unemployment rates of this level (Table VII.1 and Figure VII.1 below), lowest job search times at this level (Chapter III above and Figure VII.3 below), and higher social rates of return (Chapter II).

III. POLICY IMPLICATIONS: POTENTIAL MEANS OF IMPROVING THE QUALITY AND EXTERNAL EFFICIENCY

There are several policy implications of these three major sources of external inefficiency. Each involve policy options, including decisions about the speed of implementation of each. These options will be discussed further below. But in brief overview, the following are some of the main policy implications, and options:

IV. Costs And Financing Policy Options

1. **To restrict excessive growth of the "social demand" for higher education, and to provide the resources necessary for improving quality,** tuition at the public universities can be raised further, from covering the current 15-20% of full cost toward covering perhaps 50%

of full cost. This will help improve the external efficiency of the system by improving the quality of graduates. There are also other private sources discussed below.

2. **To improve equity, and facilitate a greater contribution to regional development,** a significant expansion of need-based tuition waivers and grants becomes more essential as tuition goes up. Objectively administered, this avoids excluding able students from poor families.

V. External Efficiency Policy Options (other than Financing)

1. **"Market Signals" to enable students and their institutions to relate more effectively to job markets.** This requires decentralization of decisions about bachelors degree fields to Vice Rectors, and to individualized choices by students. Central influence can be retained through some budget allocations. Placement offices need to be established in all colleges, and aided with centralized MIS data systems, to help create the necessary infrastructure for efficient decentralized decisions.

VI. Access and Equity

1. Admission criteria that reflect more accurately the probability of success in college and the productivity
in jobs later (i.e., rank in the high school and rank in the college class) need to be seriously considered to replace test scores (which reflect the parents' income and are an inferior predictor of success later).
2. This would aid external efficiency (i.e., the relation to productivity later), economic development in the regions (since more graduates will go back), and cultural and ethnic diversity in the access to college.

With this introduction and overview completed, the policy implications of the sources of external inefficiency in higher education and the related policy options available will now be considered.

IV. COST AND FINANCING OPTIONS

Apart from the excess "social demand," a major source of the severe problems with quality in higher education is that the faculty are seriously underpaid. They do not have meaningful incentives to devote their full energies to teaching and to the types of research that keep their skills up to date at the universities where they have their primary appointments. They work hard, but they must work elsewhere to survive.

Some surveys suggest that the salary rate currently is about 25% of what is needed to survive (Clark, 1989, p. ii). Faculty must earn the other 75% by second jobs and consultancies with the Government, or moonlighting by teaching on the side at private universities or working at other jobs even less directly related to deepening their skills and to quality instruction at the home institution. Far too little of existing budgets is being spent on salaries as well; only 50% of unit costs at the state University of Brawijaya in Malang and other selected universities in Java is being spent on salaries, whereas in most countries 70% of recurrent costs are salaries (Clark, 1989, p. ii).

The same amount of teaching could be done by fewer persons if faculty could be paid enough to induce them to work full time at their jobs. At this point universities could begin to insist on high quality teaching, research, and public service, and rule out moonlighting that does not deepen and update skills or raise support from industry and research grants to aid students and contribute to academic quality at the expanding advanced levels.

One source of these problems lies in internal inefficiencies that keep costs too high, as well as in inefficiencies (and inequities) in financing. Since financing sources and methods have a bearing on efficiency, academic quality, faculty incentives, and the employability of graduates, two options designed to reduce these problems will be discussed.

First, somebody must pay more, so there is bound to be objections to whatever is suggested. The only hope is to address these matters objectively to see what needs to be done to reduce the problems that exist--not to expect unanimous consent. The policy options relate to (1) external sources of greater resource recovery and (2) internal sources for financing through reallocation, and (3) new private sources of funding.

(1) Increased Tuition, Restricting "Social Demand" and Raising Revenue to Improve Quality. This set of policy options considers the appropriate proportion of costs to be borne by the parents, the student, National and local tax sources, and various donors including private industry, international donors, alumni, and bequests. This classification is meant to include all sources, and can be thought of as related to each student for the financing of his or her costs on a per student basis. It is important to discuss briefly how the major financing components can be made more efficient.

There are considerable untapped financial resources still available to the public universities from support by parents, who now cover only about 15% of full costs. But if tuition is to be raised further, it is necessary to have an objective means-tested tuition-waiver, student loan, and work study student financing plan available as discussed below.

The advantages are that (a) higher tuition will help to reduce the high costs by providing strong incentives for shortening the length of the degree program! (b) an objective system for means-testing eliminates leakage and waste due to favoritism or poorly designed aid packages, and (c) additional resources are secured that can be used to improve quality. Increased resource recovery from parents, and financial need analysis based grants, are provided for in the draft of Indonesia's 25 Year Plan Goals. (See Boediono, McMahon, and Adams, 1992, Table 1.2, Chapter 1.)

The evidence that there is still untapped potential for financial support from students even though Indonesia has raised tuition to over 15% of unit costs (and above that where fees are added, see Clark, 1989, p. 6), lies in the fact that many students at public universities come from the highest income families in Indonesia. This ability to pay is also evident in the fact that parents pay closer to 100% of the unit costs at the private universities. Differentiation among some programs in tuition policies is also desirable because where there are high expected earnings following some degrees (e.g., MBA programs), the programs can cover more than their full costs and contribute to other programs. Tuition strategy however must be reasonable; raising tuition each year, or every other year, by the inflation rate plus (say) 5%, rather than in large jumps that will produce an adverse reaction.

The second aspect of this financing strategy is the support available from *students*, which also is not being utilized to anywhere near its potential at present. This requires student loans, that the students later repay, and work-study grants.

Student loans require a government guarantee to the banks guaranteeing repayment by the government if the student later should default. This reduces the risk to the private bank, so that such loans are available and the interest rate is low. By this means all of the costs of the student loan program are removed from the government's (or the Bank of Indonesia's) budget and shifted to private bankers, except for a revolving default trust fund and administrative costs. The student loans must also be means-tested, since they normally involve these elements of public subsidy, and loans should not be made available to high income families who do not need them and will use the low interest money for other purposes. Indonesia's earlier experience with student loans through the Central Bank needs to be reviewed. But a redesigned program, perhaps with the help of Maureen Woodhall in London who is the world expert on this, or Bob Hartman at Brookings who designed the U.S program, may deserve another try. In the United States, for example, in 1990, student loans were the source of 13.2 billion

dollars for financing tuition, fees, and foregone earnings costs for 10.9 full-time undergraduate students. Sweden, Germany, South Korea, and Japan among other countries also rely heavily on student loans for the financing of their higher education systems.

Finally, as part of this policy support initiative, work-study programs should also be viewed as a way of helping finance some of the institutional costs. That is, students who cannot pay fees instead provide services in-kind. These campus jobs should not be viewed as a way of employing low income surplus labor in the community. Instead they are a *means of cost recovery* in higher education (from students) and a means of helping low income students finance their college degrees. Employers complain that the students currently have had no work experience in even the simplest rudiments. Frequently student lab assistants, library assistants, computer operators, etc. also can gain experience in their field or in roles relevant to a job later. This also helps the external efficiency of higher education. Student work/study grants also must be means-tested as part of the system described above.

(2) Strategies for Financing Through Internal Cost Recovery. There are two major sources for internal financing that also can increase efficiency and that are widely used elsewhere and that constitute large potential sources of funds for Indonesian higher education. They are (a) internal reallocation and (b) faculty apprentices.

Internal reallocation is needed to improve the response to market signals (discussed further below). But it is also a crucial source of internal funding to improve quality. There are very large differences in instructional units (or students) per faculty member compared to patterns that are typical elsewhere as cited by Clark (1987, p. iv). This indicates that resources are being wasted, and there is a need to reduce salary lines where there are too many faculty and IU's are low. This can be done preferably by attrition, retirement, and reassignment. The Vice Rector through his position control then would have funds available where there are retirements to improve effectiveness, relate to the job markets for his graduates, and to raise salaries. Then faculty members can be expected to devote larger fractions of their time to high quality teaching and research at their home institutions.

Faculty Apprentices Are the Other Major Source of Internal Financing--both teaching assistants and research assistants. This is typical for medical interns, apprentice craftsmen, and apprentice attorneys alike. This must be done wisely by holding to teacher training and research training provisions, and to selection of able younger graduate students as apprentices rather than older less able staff from other institutions. But using faculty apprentices to assist with freshmen and sophomore students and is well known to be very cost effective (See McMahon, de Groot, and Volkwein, 1991). It also is a crucial element in improving faculty incentives and faculty productivity. This policy option could be for experimental implementation in Indonesia.

It is also of strategic significance in enabling Indonesia to train its own Ph.D.'s eventually who can teach and do research. In contrast to many of the semi-isolated and more restrictive European and Australian institutions who train less for Engineering, Business Administration, and other careers in the private sector, each new generation of faculty apprentices who finish advanced degrees and then themselves enter industry and government take the latest technology and operational research skills that were acquired at the universities with them. This experience with the concepts and the investigatory skills can be the source of major improvements in the dissemination of knowledge to the economy and in the external effectiveness of the higher education system.

(3) Strategies for Financing By Alumni, By University Entrepreneurial Activity, and by Industry. There are considerable underdeveloped possibilities for financing higher education from these other private sources. The alumni can be canvassed for contributions and bequests, including endowments for faculty chairs, research programs, libraries, student scholarships, and buildings. Endowment income and gifts have become a source of about 7% of the budgets at many public institutions in other countries.

The university as an entrepreneur, needs to develop closer relationships with industry, including the service industries like medicine, law, local and provincial governments, and small and medium sized enterprises (SME's). The latter are vital to regional economic development. There are many services they can "sell," including programs of assistance to SME's that the provincial governments could support. These are opportunities to use and develop the skills of university faculty, operated through the university budgets so that they can be seen to provide positive incentives for the development of the quality of the faculty as well as to contribute to the economic development of the region.

(4) User-Driven Finance of Research at Universities. The DGHE has already begun a research grant program. But a vast expansion of this is suggested in the draft 25 Year Plan Education Goals (see Boediono, McMahon, and Adams, Ch. 1, Table 1.2, and extended discussion of this in McMahon, Moegiadi, and Bishry, 1992). The peer group review processes for financing on a project-by-project basis also needs to be developed with the cooperation and help of BPPT (Bishry and Wardiman).

This policy option also badly needs to investigate further the possibilities for greater government research grant support going to the universities, as distinguished from the current practice of doing the research at research institutes who are isolated from the educational process (e.g., LIPI) or doing the research within the government using full-time government staff and foreign consultants. The universities can better do the more basic research, although some types of applied work with shorter-time deadlines are also possible.

V. EXTERNAL EFFICIENCY POLICY OPTIONS

Universities and their students need market information about starting salaries, lifetime earnings, job search time, unit costs, and sources of high internal degree costs if they are to be managed efficiently and if they are to respond to the economic development needs of the region. Universities also need to have the incentives flexibility to respond to the emerging economic growth and job market needs.

(1) Market Signals: Earnings, and Cost/Benefit. Starting salaries and earnings over the life cycle of graduates need to be collected and made available to students and their Deans to assist them in making intelligent choices. This data can also be used together with information about unit costs and length of program to calculate cost/benefit and cost/effectiveness measures useful to the management of the institutions, and to deciding about budget allocations among fields and among universities.

Data on earnings over the life cycle of academy and university graduates is now available from the annual SAKERNAS data tapes nationwide. This also reports data for the provinces, although in the latter case the sample is small. It is possible that the Central Bureau of Statistics might agree to release the annual tapes earlier, and to insert useful questions about type of degree, level, and institution in future annual SAKERNAS and SUSENAS surveys.

Data on starting salaries of Sumatra graduates are available from tracer studies for universities in Sumatra (Strudwick, 1991). These provide an index to the level of the expected age-earnings profile by field, and by institution. The SAKERNAS data covering all ages provides the shape of the age-earnings profile and nationwide comparisons. This together with cost data can provide the basis for quite sophisticated cost/benefit comparisons among institutions, public and private, and among fields. Direct provision of this earnings data to students and Deans will also help to provide them with information about the region's emerging economic development opportunities. It could be used as one basis for encouraging bachelors-level students to make rational choices among fields.

(2) Unit Costs and the Degree Length Policy Option. The lack of knowledge of costs, and pressure to manage costs, is a major source of internal inefficiency. It also has very negative effects on

the rates of return to higher education because it raises the cycle costs in cost/benefit calculations to such a high level.

The costs include unit costs per student (or institutional direct costs), plus foregone earnings costs (given by the earnings data above), and cycle costs for completing each degree (requiring separate analysis of the length of the degree program).

There has been some work done on unit costs of higher education in the Sector Review (McMahon, Millot, and Eng, 1987) and in the World Bank Wave 2 Baseline Studies. This needs to be coordinated with the plans in the World Bank Wave 3 for studies of unit costs at other institutions in the nation. However, it is not practicable to wait until all of the new accounting practices are in place. For purposes of economic analysis and to assist many management decisions it is possible to construct estimates of unit costs out of the published annual budgets, followed by trips to the field to modify the estimates for each institution. *It is very important that the cost analysis concepts be coordinated with the uses to which they are to be put* in cost benefit analyses, in the costs and financing policy initiative, and in the cost and productivity indicators as well as the DGHE's World Bank Loan work so that the results have significant implications.

Prior work done on unit costs can be updated, and made specific to the institutions. This includes the comprehensive work by Gweneth Eng in the Sector Review (see McMahon, Millot, and Eng, 1987, pp. 2-220 and 248-404), the in-depth study at selected universities by David Clark (1989), and the unit cost study at IPB, Bogor, by the DGHE (1990).

A second dimension of the study of costs is to collect data on the length of the degree program at each project institution, and to develop a Policy Issue Paper on means of reducing this major source of internal inefficiency. Data on the length of degree programs for Sumatera will soon be available from Strudwick's (1990a) tracer studies (the questionnaire asks the entering year and the graduation year of each respondent). The average time currently taken to complete a four year degree has been estimated at 6.5 years for all fields by Eng (see McMahon, Millot, and Eng, 1987, p. 220), at 8.0 years by Godfrey (1987, p. 65, quoting the USAID Sector Review), and 6.5-7.5 years for agriculture graduates in Sumatra by Strudwick (1990).

Some of the possible sources of this internal inefficiency need to be considered. One is the rigidities and loss of time if students change curricula. Another is the bachelor's level thesis requirement (i.e., SKRIPSI). The thesis .equirement at the bachelors level has been eliminated long ago in the U.S. and most other industrial countries as too time consuming and costly. At the Masters level, a two year Masters Degree without thesis is now also very common (e.g., at the University of London, the U.S. MBA degree, etc.), although the thesis option is available for many Masters level students and required for all Ph.D.'s. A system for course credits is also vital if students who are now very limited in their ability to transfer from one department to another at the present time, are to be permitted to transfer. They then would be able to save some of their credits, without taking new examinations, when they choose to transfer in order to respond to emerging job market opportunities. A policy issues paper needs to be developed that presents the options and estimates the (large) cost savings available from each.

Once the earnings data and cycle cost data are developed, the data can be used to inform students and to facilitate better internal cost management. The data can also be used to calculate social rates of return that are quite specific to each institution, including comparisons to the private institutions. The results can also be broken down by sex and used to study women in the professions, as well as the cost/benefit ratios for both males and females.

(3) Reducing Job-Search Time and Unemployment. There is a major problem with the efficiency with which the job markets work for university (and secondary school) graduates as is shown in Figures VII.1-VII.4 below.

The problem is that students who are given very little information are taking far too long to find a job by any standard. They are not normally assisted by college placement offices, and often are further delayed by very slow government personnel and employment practices. Those students who are from higher income families can wait out the government queue for a very long time, sometimes over two years (see Semanjutak ,1987).

It is largely a matter of the poor quality of the training received by many university graduates and of excessively long search times, and not of unemployment per se of university graduates andsecondary school graduates throughout their life cycles as is shown in Figures VII.1-VII.3 and Table VII.1 below. Using the most recent SAKERNAS data for Indonesia in 1988, unemployment rates are a high 35.7 to 52.8% at the senior secondary and university levels, respectively, but plunge sharply to only .9% to 1.2%, respectively, by about age 30. Unemployment rates for college and academy graduates are in fact 0% for age 37 through 65 and between 0% and 1% for senior secondary general and senior secondary vocational graduates in these same age ranges. At age 22-26, given the BAPPENAS definitions of unemployment used here, the unusually high unemployment may include many current students who are "looking," since the average university leaving age is 27.39 years, so this 52.8% rate may be overstated. Nevertheless, all of these unemployment rates at the school leaving age are high compared to those in western market economies. Figure VII.1 shows this to be true in comparison to the U.S. both in recession and in normal years.) They are also high in relation to the unemployment of junior secondary school graduates where the job markets are relatively tight.

The length of the search time is too long for university graduates and for secondary school graduates, averaging 15 weeks as compared to 10 weeks for junior secondary general graduates. Most American university students have taken permanent employment by the date of graduation, as shown in Figure VII.4 (McMahon, 1987).

The case therefore is very strong for establishing job placement centers and taking other supportive policy steps that seek to reduce this very costly search time and excessively long degree programs. New job placement centers need to be charged primarily with placing students before they graduate (not alums), see Figure VII.4. The DGHE would need to charge the *Rectors* at the time they receive this assistance with the responsibility for placing as many students as possible before they graduate. This may require another policy issue paper, presenting the decision options to the DGHE. It needs to include new data for the DGHE and for the Rectors on job search time at each institution, data that can be developed from tracer studies. This job-search time information (now available for Sumatra universities) can be related to the benchmark of the nationwide pattern shown in Figure VII.3, and to breakdowns of the SAKERNAS data on search time for Sumatra.

(4) Institutional Responses. This fourth policy option is aimed at reducing the rigidities inside the university system that currently prevent effective responses to the realities of the economic development opportunities in the regions. This is the source of many of the inefficiencies in the system. Students have to select their field before entry, generally are not allowed to change majors without significant penalties, and Vice Rectors do not have authority to switch budget money for salaries from low demand to high demand fields. Faculty are paid by the civil service system (BAKN) in Jakarta and their salaries and number of faculty per department are fixed rather rigidly.

Figure VII.1
Unemployment by Age

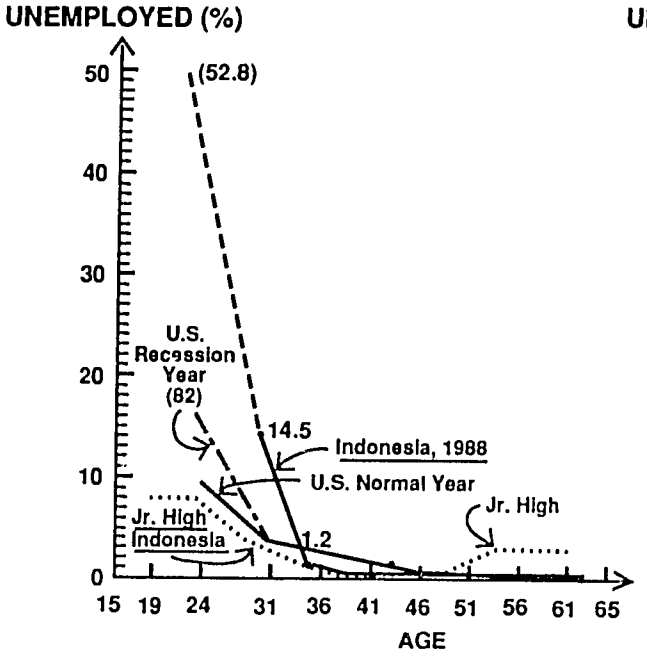

Figure VII.2
Unemployment by Education Level

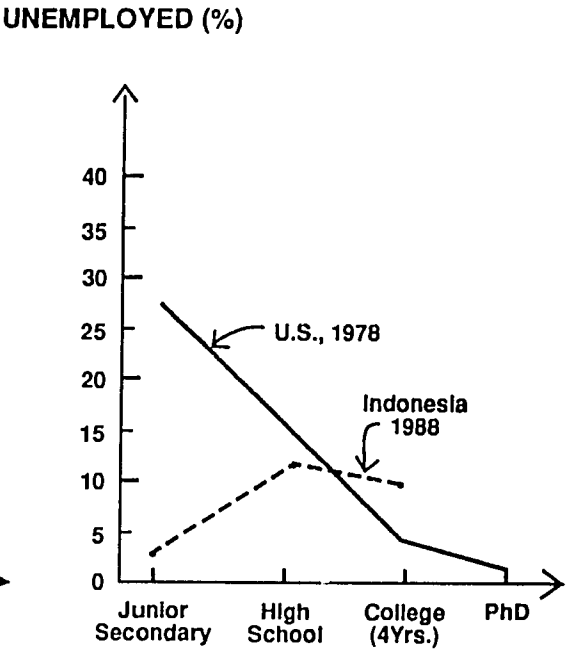

Figure VII.3
Search Time
Indonesia, 1988, by Education Level

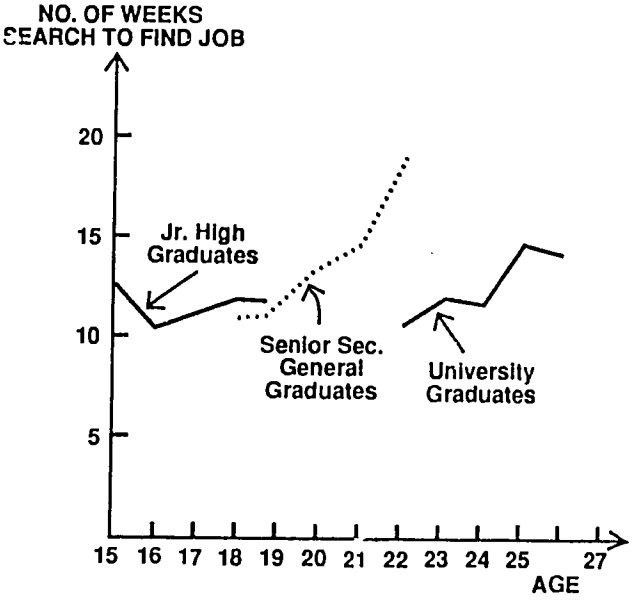

Figure VII.4
Search Time by Field of Study
(University of Illinois, Bachelors Degree)

	Employed by Graduation Day	Employed Within 24 Weeks
Engineering	95%	98%
Agriculture	60%	97%
Science	59%	97%
Business Admin.	57%	97%
Liberal Arts	40%	93%
Education	13%	95%

Sources: All U.S. data from McMahon (1987)

Table VII.1
Indonesian Unemployment Rates, 1988
By Age Group; Nationwide (Urban & Rural)
(No. of Cases in Parentheses)

	Age									All Ages Since Graduation
University		22-26	27-31	32-36	37-41	42-46	47-51	51-56	57-61	61-65	22-65
		52.8% (127)	4.5% (255)	1.2% (161)	0% (138)	0% (120)	0% (93)	0% (46)	0% (11)	0% (3)	11.1%
Academy		21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	21-65
		29.2% (120)	10.0% (229)	3.1% (128)	0% (130)	2% (106)	0% (90)	0% (44)	0% (10)	0% (3)	7.4%
Senior Sec.	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	3-65	18-65
Gen.	40.2% (1842)	22.3% (1889)	4.7% (1031)	2.8% (744)	1.0% (574)	0.9% (460)	1.4% (289)	2.5% (119)	0% (39)	0% (9)	17.8%
Voc.	35.7% (1187)	13.6% (1519)	3.2% (1215)	0.9% (1029)	0.3% (709)	0.5% (483)	0.3% (336)	0% (153)	0% (42)	0% (13)	0.3%
Junior Sec.	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65	15-65
Gen.	7.2% (2613)	9.2% (1947)	3.7% (1531)	1.6% (1407)	0.9% (1148)	0.4% (759)	0.8% (653)	0.3% (341)	1.3% (158)	2.3% (87)	4.5%

Source: Central Bureau of Statistics, 1988 SAKERNAS Labor Force Survey, Cross Tabulations prepared by the authors.

Higher education in Indonesia is an example of a centralized indicative economic planning system within education that specifies the number to receive degrees in each field in enormous detail. This is a type of planning both in human resource development and economy-wide that has been shown to be so very inefficient in Poland, East Germany, the USSR, and other Eastern European countries. But in Indonesia the labor market data, budgeting system, and local MIS data banks have not been in place to support decentralization of decision making and allow intelligent, efficient and economically productive choices by students and Vice Rectors. But the Government has declared its interest in doing this.

The first essential element requiring development of this policy option (e.g., for selected institutions in Sumatra) is that students be allowed to select and to change their majors. As is well known from prior research by Richard Freeman (1971), if students have adequate information they will gravitate to those fields where the salaries and employment prospects are best. There is always some loss of credit (and some students have strong motivations to select a field irrespective of the economic gain), so not all will move. Only enough move at the margin to respond and thereby respond to the realistic economic development opportunities in the region at the time. In addition, students should be allowed to transfer across institutions if they meet the admission standards of each.

The second essential element, also needing development of a policy implementation design and related policy options, is that Vice Rectors need to be allowed to switch budget money *and salary lines* out of fields where the number of instructional units (IU's) and faculty productivity are low, and toward those fields that are in demand. Central office guidelines are necessary. For example, this is most easily done on the basis of attrition–that is, when there are retirements or resignations. It can also be done where there is similar subject matter–e.g., the math department could teach service courses for any and all fields using applied mathematics as they do in the U.S. rather than teaching only math majors. Then if there are no jobs for pure mathematics majors, it is no longer a source of internal inefficiency since the math skills of the faculty remain fully employed.

The budget money and salary lines need not (and will not) move 100% in response to shifting economic demands for graduates in the market place. It also need not lead to the elimination of any departments valued highly for their cultural contributions, even though there is little student or outside demand. Instead this leads only to a restriction in the *number* of graduates produced in the low demand fields. To refuse to allow Vice Rectors to respond to student demands reflecting the realities of the job markets results in a rigid system that leads to the unemployment of many graduates and also fails to respond to the emerging economic opportunities for development in the region.

Some central planning needs to be retained–but in more broadly defined ways, for the number of engineering colleges or medical colleges to build, and the location of costly advanced degree programs to prevent duplication at too many institutions, as well as to centrally monitor the costs per instructional unit, for example. Students can be approached much earlier in their academic careers with job information so that they don't lose so much credit by switching curricula. The credit system can also accommodate a general education curricular core required in the first years.

(5) **Employer Surveys.** Employers must be contacted directly about their needs and experiences, supplementing the tracer study information collected from students. This is an opportunity to inform employers about the advantages of seeking out those students who can be expected to have the highest job effectiveness. It is also an opportunity to set the stage for employer visits to the campus to interview students, arrange for work/study internships, and to participate in other university-business partnerships.

To collect employer information (coordinating with the DGHE's World Bank Wave 3) will require a survey of employer needs. The Ministry of Labor and Manpower Job Placement Officer would be glad to assist. But the policy analysis paper also needs to develop the potential for employment in the provinces by considering the BAPPENAS and Repelita VI economic data on industries, including a realistic appraisal of the employment openings in the Economic Development Zones. The Central Bureau of Statistics also has a nationwide employer survey, and the Ministry of Manpower has central data banks on job openings nationwide in Jakarta in addition to information available from local MOM job placement offices located in the major provincial cities. At present local employer lists and job data files are locally available only on well thumbed card files which should be computerized and put on line with the central MIS system in Jakarta. Nevertheless the cooperation of local placement officers who place secondary school graduates will be very helpful. The possibility of cost sharing with MOM for college-level operations may also exist.

Table VII.2 summarizes research findings on what personal attributes contribute the most to job performance. These can be presented to employers to help them to use relevant selection criteria. The highly significant factors are a good academic record (GPA, rank in class), selection of high demand fields (e.g., engineering and science), leadership and organizational experience, and past part-time work experience. When these qualities are sought by employers, the effect on student motivation should be positive. If used for university admission instead of the current use of national test scores, these are the same kinds of factors that are known to reflect more realistically the probability of

academic success, as well as job performance and productivity relevant to Indonesia's economic growth later.

Table VII.2
Selection Factors Contributing the Most to Job Performance

Academic Attributes		**F**
College Grade Point Average		22.2
Rank in Graduating Class		11.4
College Selectivity		5.7
Engineering or Science Major		16.0
Non-Academic Traits	**t**	
Leadership and Organizational Ability	10.0	
Past Job Experience	8.1	41.9
Parents Income and SES	1.0	
Job Security Index	-8.0	

Source: Wise, *American Economic Review* (1975, p. 357).

A word needs to be said about the plan for extending the recent experience with tracer studies before concluding this section. What is needed is university-centered ongoing longitudinal tracer studies of graduates, following up current graduates and recontacting them periodically thereafter. These are costly, but appropriate scheduling could permit one cohort to be followed up from one participating university each year. The following strategy is suggested:

1. Prepare a broad analysis that speaks to the "acquisition of employment" drawing on existing data.
2. Develop a set of instructional materials from the tracer study manuals already completed by Strudwick (1990(a), 1990(b), 1991) inclusive of administrative guides, questionnaires, code books, and analysis guides for use in a workshop.
3. Instruct participating institutions in the full range of relevant tracer study techniques and analysis procedures.

VI. ACCESS AND EQUITY

Two issues are of considerable concern to all governments for which new strategies are badly needed. *The first is better methods of student selection that are more realistically related to success in and timely completion of academic work* as well as to job effectiveness later. *The second is expanding university access to individuals that have traditionally been underrepresented in Indonesia*, addressing ethnicity, gender, and low middle income rural/urban characteristics. The strategy here proposes the two linked policy support initiatives that follow, both designed to achieve the projects overall objective of achieving a more employable graduate with recognized job effectiveness qualities, while also improving equity in access.

(1) Development of a More Suitable Selection Index. There is extensive research in the U.S., that shows that a *Selection Index* placing about 80% weight on the rank in the local high school class (i.e., not rank nationwide) and about 20% weight on test scores (such as the ACT test in the U.S. or,

which should be replicated and tested empirically in Indonesia using the Indonesian PPI through PPIV exams) is the most realistic predictor of successful academic performance in college. These are more reliable than test scores because students with high scores are sometimes low achievers and are poorly motivated or have not learned good work habits.

There are the beginnings of this kind of a changed selection system already in place. Proyek Perinpis (PPI) was the system based on June exam scores for admission to the best universities and highest demand programs (medicine, engineering, economics, etc.). The name has been changed, but still rank in the high school class is not a factor for section, which means that the parents' income is the dominant practical factor. Proyek Perinpis II (PPII), now Program Penelusuran Bakat, using the EBTANAS, does take into account the 3rd year rank in the high school class and is used in several universities such as at IPB for all programs, and UI and ITB for natural sciences and some other programs. PPIII for most provincial universities, and PPIV for colleges of education (IKIP's) still use only examinations, although they are different than the PPI and PPII exams. It is very difficult to get students from the suburbs entering IKIP's to teach in the remote regions, and few students from the remote areas are likely to be admitted based on the current criteria. Those same factors (i.e., prior academic performance and rank in class rather than test scores) were also shown by Wise's (1975) research shown in Table VII.2 above to also be the kinds of factors that are more realistic determinants of productivity, job performance, and rank in the firm later.

A change from use of regional test scores to a selection index placing 80% weight on rank in high school class has other major advantages as a policy option in Indonesia. It would be helpful to economic development in the provinces because it means that every valedictorian and salutatorian in any high school class in the regions would have an excellent chance of admission to college, as well as of success in college, and success in a job later. These students are much more likely to return to provincial towns and help with economic development there than are the students from Jakarta suburbs who currently make up a substantial proportion of the student body in regional universities.

A third advantage is that this would help the universities to motivate the programs in the secondary schools. Information on rank in the high school class would have to be obtained directly from the secondary school principal, and suitable penalties for dishonesty made clear by a MOEC policy decision in Jakarta. This is important, because currently principals are bribed to misrepresent the rank in the high school class, or the high school grades. Consultants are available who have been involved in research on admissions policies at public institutions. These universities also seek to *serve the citizens of their respective regions,* and to further both rural and urban economic development *in the region.*

(2) Expansion of Access to Marginalized Populations. Education, of all major social institutions, is best able to contribute to equality. Through education, a culture is transmitted and transformed, social functions and status are reproduced, and new forms are created. Culture acts upon and is acted upon by education. The problem of inequality of educational opportunity, be it geographic, sexual, and/or socioeconomic, is also closely linked to inequality of distribution of income.

Access to higher education is known to be a prime determinant of intergenerational mobility, or intergenerational equity. (See Knight and Sabot (1990, pp. 34-7).) Education systems are thus a means of reducing social inequalities, and of encouraging upward mobility (Hallack, 1990). The key point is who gets the education?

The initial task in this policy option is to determine the composition of current enrollments in terms of gender, ethnicity, religion, geographic location, socioeconomic status, and previous educational attainment. Secondly, the composition of the universities potential student body needs to be understood, again in terms of gender, ethnicity, religion, geographic location, and socioeconomic status but also in terms of educational background (in terms of type and status of school attended and achievement). Disproportionate representation, where it exists, can then be identified and possible

policy alternatives be developed that will afford marginalized populations a better opportunity to gain access to meaningful tertiary education.

This result is heavily dependent on reform of the admissions criteria to stress rank in the high school class (which admits students from rural areas) and on implementation of tuition waivers and financial aids for admissible students based on financial need analysis procedures as discussed above.

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VIII

ABSTRACT

Responsibilities for the Placement of Graduates: The Infrastructure for Decentralization

Walter W. McMahon and Yudo Swasono

To decentralize career decisions to undergraduate students and their families, and budget allocation decisions within colleges and universities to the Vice Rectors, better information needs to be available to students on career opportunities and the college's success in placing its graduates.

This chapter briefly identifies the need for the establishment of a placement office in each college or university, and a trained job placement counsellor in the secondary schools. It also suggests the kind of MIS system to transmit information about job openings and student availability (and involving cooperation between the Ministry of Manpower and the Ministry of Education and Culture) that is needed, together with a few other key parameters of a successful job placement operation.

VIII

Responsibilities for the Placement of Graduates: The Infrastructure for Decentralization

Walter W. McMahon and Yudo Swasono

There are long delays in the time it takes recent graduates at college and SMA-STM levels to find jobs. One recent tracer study of graduates in Agricultural curricula in Western Sumatera finds that it takes three to four years before 80 percent are employed (Strudwick, 1990). Another tracer study finds that it takes six to 10 months at the secondary level to reach this same percentage (Swasono, 1990, p. 201). This means that the statistics on unemployment of graduates reflect this excessively long job search time and the current inefficiency with which these types of labor markets operate.

I. THE BACKGROUND AND PERMANENCY OF THIS PROBLEM

Historically, as colleges and universities developed over the centuries, they first served only the needs for training future civil servants, teachers, religious leaders, and future academics. Gradually as the needs for highly trained manpower in the economy were recognized, Colleges of Agriculture, Business Administration, and Engineering were established. This has now occurred in Indonesia, and is occurring in other developing countries. It accentuates the need for these colleges and other professional fields producing bachelors-level graduates to relate more closely to the changing technologies and changing needs of business, agri-business, and industry, and of the regions. The direction of this trend in higher education to relate to the needs of the economy appears to be quite clear, and permanent, so that the needs to provide the kind of information necessary at the local level for a smoother transition from school to work will only intensify.

Chapter VII, Table VII.1 and Figures VII.1-4 above have shown that unemployment of secondary school and college graduates is very much a function of age. The problem is one of excessive job-search time, and primarily at the school-leaving age.

II. THE SPECIFIC NEED

The search-time could be substantially reduced if the information available to students in the *semester before they graduate*, to prospective employers, and to school and college administrators at the local level were earlier and better than at present. What is needed is a college placement office on each campus nationwide, and at least one job counsellor trained in the methods of local placement in every secondary school. The placement officer, or job counsellor, should have as his or her primary function the placement of as large a percentage of *each new upcoming graduating class* as possible. These officers could also assist "alumni" who wish to change jobs, but they should not see that as their primary role.

The college placement office needs to be under the control of the Rector and academic Deans on each campus. Its second important responsibility should be to feed the information back to Deans who need to *then be made responsible for placement of their students*. This information must include starting salaries of all graduates placed from each course of study, and the percentage of the graduates

either placed or accepted for advanced study as of the date of graduation and within three months after graduation.

Similarly, a secondary school job counsellor should be under the local school principal. The same information about the job market and employment of graduates should be widely disseminated to the students so they can plan their courses better in accord with the economy's expressed needs. These counsellors in the secondary schools at present appear to be trained primarily in psychological counselling, which may also be needed. But this is not the same as responsibility for helping terminal students select careers and find jobs before they graduate.

Although any job placement counsellor would normally have localized responsibility for developing contacts with employers, the Ministry of Manpower is in an excellent position to assist. They can:

1. Provide computerized information to the school of the needs of local employers who register their needs with MOM.
2. Train job counsellors and college placement officers in short courses, and assist with their training in IKIPS, about local job markets.

III. THE POLICY OPTIONS

There is substantially more experience in Indonesia at the college level at pilot locations with implementation of a placement function, and more momentum toward its replication than there is at the SMP, SMA, and STM levels at the present time. For implementation, the first policy options therefore would appear to be:

1. **Replication of the existing college placement office experience** in Palembang, with certain important refinements, at U.S.U., Medan Area University, Dhaana Agun (Medan), Nomensen University (Medan), Islamic National University (Medan), Riau (Pakenbaru), Lombok, Aceh University, the University of West Sumatera, and Surabaya.
2. **A Feasibility Study of the methods of providing relevant job counsellor training** in the IKIPS and of in-service teachers, and of *bringing computerized job market information from Ministry of Manpower offices* to the job counsellors in the schools.
3. **Extension on a Pilot Basis of the Efficiency-Based Management Information System (EMIS) in MOEC to include registration by graduating seniors** at the beginning of their senior year who are wanting jobs. Interconnection of this with the MIS system in the Ministry of Manpower reporting employer inquiries. The job markets for secondary school graduates are local, but job markets for bachelors-level college graduates are regional, and to some extent national.

This would gradually improve, in due course, the external efficiency of the education system and reduce the waste of trained manpower. *But to avoid merely attracting job-seekers to Jakarta*, Bandung, and Yogakarta, where job market information is already more highly developed, and to spread the economic development through the utilization of skilled human resources to the provinces, it is desirable to emphasize development of placement offices in the provincial public and private universities. The entrepreneurial skills of those with talent who come from the provinces should thereby help to foster faster economic growth and development in the provinces, and not just in Jakarta.

A joint effort with the Ministry of Manpower looks quite promising. As placement officers start to make contact with local industries, Chambers of Commerce, and governmental agencies, the

experience in the local job market of the local Ministry of Manpower employment offices is a key initial point of departure and a continuing resource. The computerized access through PCs and modems to the national registry of job openings, salary levels, and job seekers will avoid duplication of efforts and facilitate the communication of information on these matters essential to an efficiently operating job market.

IV. THE MEANS

At the College level, the Indonesian staff would be paid by the Universities, which means by the Government in the case of public Universities, at standard pay scales, or in private universities by private sources. But the training courses in job placement and counselling methods could be supported by the Ministry of Manpower, and Donors such as the World Bank, USAID, and ADB may be willing to help with any PCs and modems needed, technical assistance from placement officers brought from abroad, and expenses (including telephone, travel, mailing, files and office expenses) related to contacts with employers (about 10,000,000 Rp. per semester per campus in the Pilot center in Palembang.

Based on this experience, the policy option is for the Government to make a commitment to:

1. Establish Pilot placement centers at some other campuses (e.g., Surabaya, etc.).
2. Replicate the placement centers later in all of the other campuses nationwide, starting at the campuses in the lowest income regions in the East, where the need is greatest.
3. Although donors such as the World Bank and USAID could be asked to contribute the non-salary costs (20,000,000 Rp./year per center), it would be better if a commitment were made to establish and operate these placement centers whether or not donor support is forthcoming.
4. The Budget for the Center would consist of:
   a. One Director's salary
   b. One Assistant Director, trained job placement counsellor's salary
   c. One PC operator's salary

   Plus:
   d. 20,000,000 Rp./year budget for PC, modem, travel, xeroxing, telephone, mailing, and other operating costs.
5. The cost/effectiveness ratios for each center based on *cost per placement* could then be easily calculated for the first, second, and successive years of operation, and the cost effectiveness of each center could thereby be monitored.

At the 12th grade levels, a feasibility study is needed. This should be a joint effort by Balitbang Dikbud, MOEC, and the Ministry of Manpower.

This feasibility study needs to cover:

1. The current methods of identifying counsellors within each school.
2. The training of these counsellors (currently it is largely in psychology, and not in job placement activities and counselling).
3. What is needed:
   a. To upgrade job placement training in IKIPS.

b. Within MOM to provide short courses to existing high school counsellors in job placement.
c. Incentives needed for good job counsellors
d. Computerized data bases in MOM, and computer and modems in the schools.
e. Costs, and prospective cost/effectiveness, of placements.

There are many materials available on the operation of college placement offices in the U.S. Robert Mosberg, for example, operates an outstanding placement office in the College of Engineering at the University of Illinois, and in a normal year places 95% of all graduates before graduation day. Table VIII.1 offers an example of the activity in the College of Commerce and Business Administration placement office operated by Lois Meerdink at the University of Illinois. Fifty-seven percent are employed by graduation day, and 97% have a job within 6 months in a normal year.

Table VIII.1
Placement Activity
1991

Major	# of Grads	% Employed	% Considering Offers	% Grad School	% Other Plans	% Available
Undergraduate Students						
Accounting	279	82	0	4	2	12
Business Admin.	58	50	0	0	17	33
Marketing	138	56	0	13	0	31
Economics	15	40	0	33	20	7
Finance	249	61	0	9	5	25
Total	739	69	0	8	4	19
Graduate Students						
MBA	139					
MAS	25					
MA/MS Economics	4					
MA/MS Finance	16					
Other	46					
Total	230					

V. CONCLUSION

In conclusion, it would appear that the problem with "educated unemployment" which the data reveal is concentrated very heavily at the younger school-leaving age could be drastically reduced if placement officers were trained to assist in placing students. Also the information generated would be very useful in facilitating effective decentralization of career decisions.

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IX

Conclusions

Walter W. McMahon and Boediono

This volume develops ways of improving the efficiency of the education system, focusing on the scope of the contribution of education to economic development, and on the improvement in external efficiency as a key means of increasing that contribution.

The problems with external efficiency in education in Indonesia–a poor match between graduates and the changing needs of job markets, and including either under or over investment in human resource development at each level, or overall–is a common one in developing countries. But it is a problem that emerges as the successes of educational expansion and the role of education in aiding development begin to unfold.

These successes have been remarkable in Indonesia. They include a dramatic expansion of basic education, with essentially co-equal education of all males and females through 6th grade, 41% through 9th grade, and a 600% expansion in access to higher education in recent years for example. The senior secondary and college systems have begun to serve the needs of a growing economy, in engineering, agri-business, and commerce and business administration. These needs however now are changing rapidly and will continue to change since Indonesia has moved to an export oriented growth strategy, and since the demands of changing technology and management techniques require increasing numbers of well educated graduates who also can learn on the job and adapt to change.

This requires a new way of looking at the implications for the development of human resources through education. This volume seeks to do this, seeking to avoid an excessively technical level so that it is readily accessible to a wide audience of government officials, academics and others in the education system, and citizens in business and other communities who are well informed but who are not specialists. At the same time it seeks to maintain a high level of technical competence (some of the chapters are adaptations of articles that have been refereed by technical specialists and are being published in academic journals), and to be in tune with current worldwide research on the issues addressed.

That is not to say that there will be unanimous agreement among technical specialists, much less among persons who have vested interests in one or another part of the education system. There never is when new ideas raise questions about some aspects of older ideologies, or where a system such as education is involved that touches deeply the lives of so many people. But we have tried hard to be objective, as factually accurate and comprehensive as is possible given the resources that are available, and to faithfully represent the mainstream position on technical issues in current research.

I. SOURCES OF INEFFICIENCY

Findings concerning *sources of external inefficiency* in education that may reflect generically the conditions in many emerging developing countries but that are based primarily on data for Indonesia include the following:

First Source of External Inefficiency: Overall, with respect to optimal total levels of investment in human capital under uncertainty, there appears to be some problems with the quality of education following enrollment expansion that are partly due to:

- Underinvestment of financial resources in education overall, vis-a-vis rates of investment in physical capital (Ch. II), making it difficult to maintain quality.
- Underinvestment especially at the junior secondary level (given the high rates of return, low unemployment, and lower underemployment rates available) (Ch. V).
- Public subsidy through the provision of good schools and good books helps to induce additional *private* saving by parents (refraining from consumption as the childs' earnings and contribution to home production is foregone) and *private* investment (of these foregone earnings in the child's room, board, clothing, and other school expenses), a critical saving and investment partnership with parents that contributes to the nation's economic growth (Ch. VI).

Second Source of External Inefficiency: Mismatches of graduates with the needs to accommodate changing technologies in production, marketing, and management and with emerging new opportunities in an increasingly export-oriented economy due primarily to:

- The need to use *Market Signals* more, in relation to manpower requirements planning methods that reflect historical data in order to respond to changing needs (Ch. III).
- Lack of the infrastructure for decentralization of career decisions to students and their families, who are known from studies done elsewhere to "vote with their feet" when given the information and the capacity to do so (Chs. III, IV, and VIII).

Third Source of External Inefficiency: Excess "social demand" for public higher education, contributing to problems with the quality of the education, given the limitations on the resources available, and high costs because of delayed completion of bachelor's degrees. These are all due to:

- Insufficient resource recovery from parents through tuition (Chs. VI and VII).
- Insufficient resource recovery from students, due to lack of sufficient opportunities for work-study (undergraduates) and research and teaching assistantships (for graduate students) that also develop apprenticeship and job skills (Ch. VII).

Fourth Source of External Inefficiency: Selection criteria for undergraduates that give insufficient weight to the criterion that is usually found to be the best predictor of success in college and productivity in the labor force later (Ch. VII).

- The reason for this might be the methods for monitoring each high school principal when determining the student rankings within each local school class to prevent subversion of this important statistic.
- The implications relate not only to improving intergenerational mobility, improving educational incentives within the poorer schools, and achievement of cultural diversity in leadership, but also greater productivity of graduates due to the combination of ability and motivation, and hence greater external efficiency.

Fifth Source of External Inefficiency: Methods of financing that do not provide sufficient incentives for internal efficiency (in the primary and secondary schools, or in colleges), or provide sufficiently for pupil equity at these levels (Ch. V).

II. POLICY OPTIONS

Policy options are suggested for dealing with each of these sources of external inefficiency (which in turn is somewhat interdependent with internal inefficiency if quality is low and costs therefore are relatively high). Various alternatives are offered throughout this volume, most of which would require a further implementation-project design study. In brief summary form, related to each source identified above, the policy options include:

(1) For Achieving Overall Optimal Levels of Investment:

- A 3-Year Rolling Budget covering total investment in human resources development through education (routine plus development, MOEC plus MHA) that is responsive to annual recomputation of the emerging market signals.

(2) For Reducing Mismatches of Graduates with Jobs:

- Development of more comprehensive market signals based on annual nationwide data from refined SAKERNAS and SUSENAS surveys to gradually replace the indicative manpower "requirements" planning methods used at earlier stages of development when data was less available.
- Decentralization of career decisions to students, with schools and Vice-Rectors encouraged (through budgetary means) to respond to local market signals.
- Further development of the system of credits given for individual lecture-discussion or lab courses completed, permitting students to transfer most credits as they change majors, transfer between colleges, and change high school tracks.
- Extension of efficiency-based Management Information Systems to school systems and colleges, and expansion of their scope to include job-placement information in cooperation with the Ministry of Manpower.
- Establishment of college placement offices and training for job-counsellors in the schools.

(3-4) For Improving the Quality of Higher Education, and Simultaneously Reducing Excess Social Demand":

- Increased resource recovery from parents (tuition).
- Increased resource recovery from students (work-study, research assistantships, teaching assistantships, student loans).
- Increased resource recovery from alumni.
- Increased resource recovery from industry (apprenticeships, product and process development contracts).
- Increased resource recovery from government (user-driven research grants).
- Refinement of the college admissions selection criteria based on further research using Indonesian data testing the weight to be placed on (accurate) ranks within each local high school as a predictor of success in college.
- Accreditation of private (and public) colleges and universities to maintain standards.

(5) For Improving Financing:

- Development of an objective financial transfer mechanism for financing K-12 schools that provides incentives for efficiency (time-on-task), pupil equity (equality of educational opportunity), and incentives for local participation in the financing.

- Need-based tuition waivers and other financial aids for able admissible college students from low income families based on an objective nationwide financial need analysis system.
- The internal resource recovery policy options suggested above should not only provide resources to increase quality, but also contribute to efficiency (e.g., 4-4½ years to normally finish a bachelor's degree).

Finally, other volumes in this series deal with *internal* efficiency in education (Vol. III), financing methods (Vol. IV), and applications to longer range planning or goal-setting (Vol. I). They develop the evidence and the policy options in those areas in much greater depth.

Taken together with external efficiency, these combine to seek overall economic efficiency in human resource development. Since the major underdeveloped resource in many developing countries, and also the one with the greatest potential, is the nation's human resources -- and Indonesia is no exception -- seeking to constantly improve the efficiency and equity with which this is done is a matter of considerable importance.

We hope that these studies will contribute positively to improving efficiency, quality, and equity in the educational system. This includes in particular the ways that the educational system can make provisions for continual adaptation to the changing needs of a growing export-oriented economy, and to the needs for regional development. The gradual improvement in the capacities of the people through education, aided by improvements in the education system, is a critical element to what is otherwise a potentially very bright economic future for Indonesia.