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Education and Macroeconomic Performance in Indonesia: A Comparison with Other ASEAN Economies*

Akhmad Bayhaqi

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EDUCATION AND MACROECONOMIC PERFORMANCE IN INDONESIA: A COMPARISON WITH OTHER ASEAN ECONOMIES

Abstract

In this paper, the three-factor formulation for TFP growth is used, with the result that Indonesia recorded negative TFP growth for the 1969-1998 period. The use of three-factor formulation seems to result in lower TFP growth compared with the two-factor model. Bosworth, et.al. (1995) noted that countries with extremely high growth in years-of-schooling would leave very little output growth to be attributed to improvements in TFP. We find that education contributes little to economic growth, while capital is a major source of growth. While factor inputs per se might not have been important for growth, they did interact with other factors to increase total productivity, the so-called residual. Countries that are less affected by the crisis, such as Singapore and Malaysia to a lesser extent, seem to have good capital and education endowment from the past. Countries in ASEAN which have better capital and educational endowment have also survived the crisis well.

Introduction

Indonesia's achievement and other East Asian Countries' rapid economic development have attracted many interests in the past. Even the World Bank has published a special report about the rapid growth of eight East Asian Economies titled "The East Asian Miracle" (World Bank, 1993). The report has noted the growth enhancement of educational level in the rapidly growing East Asian economies:

> In nearly all the rapidly growing East Asian economies, the growth and transformation of systems of education and training during the past three decades has been dramatic. The quantity of education children received increased at the same time that quality of schooling and training in the home, markedly improved. Today, the cognitive skill levels of secondary school graduates in some East Asian economies are also comparable to, or higher than, those of graduates in high-income economies (World Bank (1993), p.43).

Crafts (1999) examined East Asian growth before and after the crisis and acknowledged that unusually strong efforts to accumulate human capital and to improve and develop imported technology are the 'strong positives' from the Asian economies.

However, the onset of the Asian Financial Crisis changed all that. As Sarel (1996) stated, when practitioners of the Dismal Science have recourse to a Higher Power, the reader knows that he is in trouble. Countries badly hit by the crisis, include Indonesia with a -13.7% real GDP growth rate in 1998, followed by Thailand (-8%), Malaysia (-7.4%), South Korea (-5.84%) and Philippines (-0.48%). Singapore seemed to be less affected by the crisis with a positive real GDP growth rate of 1.5% in 1998. In the 2nd quarter of 1999, Korea's real GDP growth rate rebounded to 9.8%, followed by Malaysia and Thailand at 4% and Indonesia only has a minimal growth of 0.47%.[1] Singapore also achieved high growth of 6.7% in the 2nd quarter of 1999. Krugman (1994), responding to the "East Asian Miracle" report, projected a different view about the East Asian economic growth. He pointed out that the remarkable record of East Asian has been matched by input growth so rapid that Asia's economic growth, incredibly, ceases to be a mystery.

Nelson and Pack (1997) and Felipe (1997) further divide the theories of the Asian Miracle into two groups:[2]

1. The Fundamentalist (accumulation theories), who claim that growth in the region was mainly input driven, as a result of investments in moving these economies "along their production function".[3]
2. The Assimilationists (assimilation theories), who argue that the essential component of the recipe followed by the East Asian countries was the acquisition and mastery of foreign technology, and the capacity to put ideas into practice. These theories stress the entrepreneurship, innovation and learning that these economies had to go through before they could master the new technologies they were adopting from the more advanced industrial nations and see investment in human and physical capital as a necessary, but far from sufficient, part of the assimilation process.

For the Fundamentalists, rising human capital is treated simply as an increase in the quality or effectiveness of labor while the Assimilationists see the effects of sharply rising educational attainments as providing an important pillar for successful

entrepreneurship. Both neoclassical and assimilationist theories put considerable emphasis on investment in human capital. By stressing the importance of innovation and learning, and the role of an educated work force in the processes, the assimilationist might push even harder on the education front than would a modern neoclassical economist (Nelson and Pack, 1997).

Indeed, Indonesia is well known for its rich natural resources, such as oil and agriculture. As Woo, et.al. (1994) noted:

> "The archipelago is endowed with significant resources. Fish, particularly from the Java and Banda seas, are abundant, and there are large forested regions, particularly in Kalimantan (the Indonesian part of Borneo). *The Oil and Gas Journal Databook* (1993) has estimated that in 1991 the petroleum reserve amounts to 6.6 billion barrels and natural gas reserve to be 64.8 trillion cubic feet…..Indonesia is a major exporter of tin (primarily from the islands of Banka and Billiton) and copper (from Irian Jaya). Commercially significant nickel deposits also exist (in Sulawesi and Irian Jaya), and coal of mediocre quality is mined in Sumatra. Gold and variety of other mineral resources have also been discovered in modest quantities……*it is nevertheless true that Indonesia's physical resource base is sufficient to sustain economic growth at a high level. Long-term success in economic development will therefore depend on proper management*.(emphasis added)"

Resource-rich countries certainly have more policy options than resource-poor ones and wise use of them will maximize the benefits and minimize the problems of resource outsourcing that could be time-consuming.

During the Soeharto era, industrialisation was the backbone of the economy. The period of Industrialisation was marked by extensive capital-intensive industries and massive foreign investment. As a result, the private sector significantly replaced the state as the engine of growth.

In addition, analyses of the Indonesian economy during the 1980s and 1990s have always put forward the importance of macroeconomic management coupled with a freer system of competition. Less emphasise has been given to the development of Indonesia's human resource. As such, by analysing the education sector thoroughly, and by comparing to other ASEAN countries, we could explain why Indonesia has suffered deeply during the Asian financial crisis.

Korea and Singapore are included in the Newly Industrializing Countries (NICs), Malaysia and Thailand are considered to be second-tier industrializing economies, Philippines and Indonesia are regarded as developing economies and the other remaining ASEAN countries are considered to be transition economies. In the World Development Report 1999/2000, Indonesia, Lao, Vietnam and Myanmar are included in the low-income group; Philippines and Thailand in the lower middle-income group; Korea and Malaysia in the upper middle-income group; while Brunei and Singapore are in the high-income group.

The rest of this paper is organised as follows. The next section will a provide short overview of education as the source of growth. Then we will sketch the model and the conclusion resulting from it. The analysis of each factor in the model, namely the total factor productivity growth, capital, and education will be provided in a comparative perspective with other ASEAN countries. Finally, a short review of the link between human development and economic growth will be laid out before the conclusion.

The Attention Toward Education as The Source Of Growth

The focus on education as one of the factors contributing to economic growth began in the 1960s, when the works of Becker (1960,1964), Schultz (1961), and Denison (1962) cast light on how, and to what extent, education contributes to the enhanced productivity of the labor force and, in turn to growth in national income. The contribution of extended education (after high school) to economic growth is presumed to occur through a number of distinct yet interacting functions (Becker and Lewis, 1993).

Although more attention has usually been paid to the accumulation of physical capital and development specialists in the 1950s and 1960s came perilously close to saying that investment in physical capital was all that mattered, important thinkers since Adam Smith have argued that education also has a critical role to play. Utilizing physical capital effectively surely requires that many different skills be learnt. Pyo (1995) in investigating how much the accumulation of human capital has contributed toward economic growth in South Korea reached a conclusion that human capital

accumulation has been equally important as physical capital accumulation in explaining economic growth. Pyo argued that:

> "…for a growing economy which has not yet arrived at a long run steady state and has not completed its productivity convergence to the industrial nation level, human capital plays the role of accumulating capital, complementing physical capital and labor rather than providing economy-wide externality as hypothesized by the endogenous growth models. The low estimates for the labor coefficient indicate that human capital is accounting partly for labor embodiment and partly for capital embodiment." (Pyo, 1995, p.238)."

Lim (1996) argued that the rapid growth of the Japanese and South Korean economies probably owed much to the mass literacy and numeracy achieved early in the process. This produced a labor force that adapted rapidly to changes in technology and the economic environment. Together with good economic management, this enabled agricultural and industrial productivity to increase.

Richardson (1997) pointed out that there is a wide consensus in economic theory that human capital is an essential determinant of productivity growth. As well as facilitating technological advance and diffusion of techniques, higher education levels may also improve the mobility of the labour force towards more productive activities, facilitating factor reallocation. Empirical evidence provides considerable support for a role for both the initial stock and the subsequent investment in human capital in fostering faster income growth. Educational expenditures by governments also have been found to have a strong positive impact, and the rate of return on public education is also found to be high. Barro and Sala-I-Martin (1995) calculated an annual rate of return on public education of the order of 20%.

Gundlach (1999) mentioned that over the last ten years, growth theory has celebrated a remarkable come-back in mainstream economics. The new growth theories highlight the impact of human capital on economic development. However Gundlach also felt that there is a relative lack of macroeconomic studies that support the presumed role of human capital in development in an empirically convincing way. When it comes to human capital, economic theory seems to be well ahead of measurement.[4]

A human resource development programme could be quite successful in producing high level of literacy but much less so in the supply of skilled workers. A severe shortage of skilled and experienced technical and vocational personnel could act as a major constraint in economic growth (expatriates continue to fill key positions). Lim (1996) noted that education contributes to economic growth in six ways:[5]

1. it improves generally the quality of the labor force by imparting skills and work knowledge;
2. it increases labor mobility and therefore promotes the division of labor;
3. it enables new information to be absorbed faster and unfamiliar inputs and new processes applied more effectively;
4. it improves management skills which leads to a more efficient allocation of resources;
5. it removes many of the social and institutional barriers to economic growth;
6. it encourages entrepreneurship by promoting individual responsibility, organizational ability, risk-taking in moderation, and planning over the long-term.

In addition, Krueger and Lindahl (2000) conclude from their regression equation that those with more schooling would be expected to have a higher steady-state income so that more education should be expected to promote faster growth.[6]

In terms of agricultural production, significant effects of education on productivity in agriculture were found in several East Asian countries. According to the available evidence, the contribution of education to agricultural productivity was quite high in South Korea: one year of additional education was estimated to increase productivity by 2.22% (Jamison and Lau, 1982). Education also influences the selection of technologies in farming. A better educated farmer may be able to choose a superior technology than a less educated farmer, and the productivity levels obtained with the new technology may crucially depend on the level of farmers' education. Education also acts as a complementary input for the appropriate use of technologies (Cotlear, 1990).[7]

The Model

The model that is going to be used in this paper is basically a neo-classical model of economic growth, with the inclusion of human capital as the third factor of production.[8] The model is taken from Gundlach (1999)[9] as follows:

$$\ln (Y/L) = \ln A (0) + gt + \alpha \ln (K/L) + \beta \ln (H/L)^{10}$$

With α and β as production elasticities of physical capital and human capital. Technology A grows according to the rate of g, that is $A_t=A_0e^{gt}$. Y is output measured by GDP, and K is capital and L is labour measured by the number of people worked in the period t. Basically the model says that the amount of output per worker (or productivity) would depends on the amount of capital per worker available, the amount of human capital (i.e. education) per worker, and the growth in total factor productivity g. The data used here comes from the Central Bureau of Statistics of Indonesia and is based on the time period 1969-1998.

Young (1993) suggested that to arrive at an understanding of the factors behind the growth of output in the NICs it is necessary, as a first step, to move away from measures of output per capita (which reflect standards of living) to measures of output per worker (which are more closely linked to productivity).

Limitations of The Model

First, a major problem with highly aggregated economic data is that it masks the magnitude and even the nature of the allocational changes going on. However, if we would like to capture the externalities of each factor of production and the overall performance of the economy, such aggregation is unavoidable. As such, a longer time series is required to give a more reliable estimation. In addition a longer time series would enable us to assess the long-run effects of education and capital on growth. By focusing more on a longer time period we could asses whether an economy has shifted its production function to avoid diminishing return (an increase in technical progress or TFP), or has remained on the same production function such that diminishing return would eventually occur.

Second, the use of Cobb-Douglas production function to estimate the separate contributions of the three sources to output growth has certain limitations, even if the correct method has been used to obtain α and β. The contribution of technical progress is obtained only as a residual. In cases where technical progress is estimated in this way to contribute to output growth, this is clearly not a satisfactory method of arriving at its contribution, especially as the estimate will also incorporate errors in the measurement of capital and labour.[11]

Third, the direction of causation is not clear because there are good reasons for believing that it goes from growth to education (e.g. the wealthier the country the more it can afford or appreciate education) or that the causation flows in both directions.

Finally the classic problem of data measurement is always unavoidable. The measurement of capital stock poses weakness in the accuracy and largely depends on the method used to calculate the investment and depreciation rate.

Model I

Looking at the result from the Model I (refer to table 1) we see that with a 95% confidence interval, only variable ln(K/L) and the constant are significant. The model is able to explain 97% of the variation in the ln(Y/L) variable.

The coefficient ln(K/L) implies that a 100% increase in the amount of capital per worker would lead to an 84% increase in the output per worker, and it is significant at 95% level of confidence. The insignificant coefficient of g and β could be interpreted that the technological growth and human capital factor are not important, or at least not constraining factors for Indonesia.

The H is measured in terms of the total number of schooling years for total labour in the economy. As the majority of labour in Indonesia receive no schooling or do not graduate from elementary school then the index is very sensitive to the weight given for the elementary school graduates/non graduates. This model uses no special weight for elementary/secondary level of education. As is well noted the rate of return for elementary and or secondary education is to be considered a lot higher than other levels of education. As such, assigning a higher weight for elementary and or secondary education could be useful. In terms of workers who do not graduate

elementary school, it is doubtful that they would gain significant skills compared to workers who never received schooling.

Table 1: Model I Summary

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	.986[a]	.971	.968	5.207E-02

a Predictors: (Constant), t, ln (H/L), ln (K/L)

ANOVA[b]

Model		Sum Of Squares	df	Mean Square	F	Sig.
1	Regression	2.397	3	.799	294.588	.000[a]
	Residual	7.051E-02	26	2.712E-03		
	Total	2.467	29			

a Predictors: (Constant), t, ln (H/L), ln (K/L)
b Dependent Variable: ln (Y/L)

Coefficients (Dependent Variable: LNYL)

		Unstandardized Coefficients		Standardized Coefficients		Sig.	95% Confidence Interval for β	
Model		β	Std. Error	Beta	t		Lower Bound	Upper Bound
1	(Constant)	8.061	1.301		6.194	.000	5.386	10.736
	ln (K/L)	.839	.205	1.282	4.095	.000	.418	1.261
	ln (H/L)	.113	.109	.120	1.040	.308	-.110	.336
	t	-1.373E-02	.010	-.414	-1.335	.193	-.035	.007

a Dependent Variable: ln (Y/L)

Empirical studies conducted by other researchers such as Denison (1986), however, give contrary weight for primary education. In Denison's study, 0.7 is the weight given for no schooling, 1.0 for primary education, 1.4 for secondary levels, and 2.0 for third level of education. The same formula was also used by Bosworth,et.al., (1995) to examine economic growth experiences of 88 developing and industrial economies over the period 1960-1992.[12]

Model II

By giving no weight for no schooling, and giving 1.5 weight for primary education, and 1 for other level of schooling we obtain the following result (table 2):

Table 2: Model II Summary

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
2	.988	.976	.973	4.814E-02

a Predictors: (Constant), t, ln(H/L), ln(K/L)

ANOVA

Model		Sum Of Squares	df	Mean Square	F	Sig.
2	Regression	2.407	3	.802	346.158	.000
	Residual	6.026E-02	26	2.318E-03		
	Total	2.467	29			

a Predictors: (Constant), t, ln(H/L), ln(K/L)
b Dependent Variable: ln(Y/L)

Coefficients

Model		Unstandardized Coefficients β	Std. Error	Standardized Coefficients Beta	t	Sig.
2	(Constant)	7.681	1.197		6.419	.000
	ln(K/L)	.899	.186	1.373	4.840	.000
	ln(H/L)	.179	.075	.287	2.385	.025
	t	-2.214E-02	.010	-.668	-2.150	.041

a Dependent Variable: ln(Y/L)

Looking at the result from model II we see that with 95% confidence interval, all variables, ln(K/L), ln (H/L) and t are significant. The model itself is able to explain 97% of the variation in the ln(Y/L).

The coefficient ln(K/L) means a 100% increase in the amount of capital per worker would lead to a 90% increase in the output per worker, and it is significant at 95% level of confidence. The coefficient of β would mean that a 100% increase in the amount of human capital (education level or years of schooling) would lead to 18% increase in output per worker. Whereas the g coefficient would mean that the total factor productivity growth during the period amounted to -2.2%.

Model III

By giving no weight for no schooling, and giving 1.5 weight for secondary education, and 1 for other level of schooling we obtain the following result (table 3):

Table 3: Model III Summary

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	.987	.974	.971	5.007E-02

a Predictors: (Constant), t, ln(H/L), ln(K/L)

ANOVA

Model		Sum Of Squares	df	Mean Square	F	Sig.
1	Regression	2.402	3	.801	319.417	.000
	Residual	6.517E-02	26	2.507E-03		
	Total	2.467	29			

a Predictors: (Constant), t, ln(H/L), ln(K/L)
b Dependent Variable: ln(Y/L)

Coefficients

Model		Unstandardized Coefficients β	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	7.994	1.242		6.434	.000
	LNKL	.856	.194	1.307	4.422	.000
	LNHL	.156	.086	.255	1.816	.081
	T	-1.900E-02	.010	-.573	-1.812	.082

a Dependent Variable: ln(Y/L)

Looking at the result from model III we see that with a 95% confidence interval, only ln(K/L) is significant. However, with 90% confidence interval, ln (H/L) and t are also significant. The model itself explains 97% of the variation in the ln(Y/L).

A 100% increase in the amount of capital per worker would lead to a 86% increase in the output per worker, and it is significant at 95% level of confidence. The coefficient β means that a 100% increase in the amount of human capital (education level or years of schooling) would lead to 16% increase in output per worker. Where as the g coefficient would mean that the total factor productivity during the period amounted to -1.9%. The result of model III is actually only slightly different from model II.

Conclusion From The Result Of The Three Models

It seems that by giving more weight to elementary or secondary education the significance of the human capital variable could be improved. Also no weight should

have been attributed to worker with no schooling, because insignificant effect in skills building and increased productivity would be expected. The labor would have acquired the skills without the role of any education institution. It shows that in each stage of development, education level has different level of significance. It could be true that for industrialised countries, tertiary education should be given more emphasise because of their already high-level of development. Whereas for developing countries, secondary and primary level of education should be given more weight due to their lower development stage.

Krueger (1999) found that there is higher return to primary schooling than to secondary schooling or tertiary schooling, which also suggests disadvantaged children benefit most from additional human capital investments.[13] Low-income families have less scope to substitute home resources for schooling resources, and have home environments that are less conducive to learning, which might explain why pre-school programs are successful for these students. The explanation relies on some form of imperfect capital markets because, if families were not constrained, they would invest in human capital until the point at which the marginal benefit equals the marginal cost. However many authors have noted that future human capital cannot be used to collaterize loans because of moral hazard problems. Perhaps more importantly, poorly endowed families may underestimate the value of education — after all education is purchased to improve information and decision making, and those with a low level of education may be particularly susceptible to making sub-optimal decisions. As such it seems plausible that primary education should be given more weight due to its externalities effect.

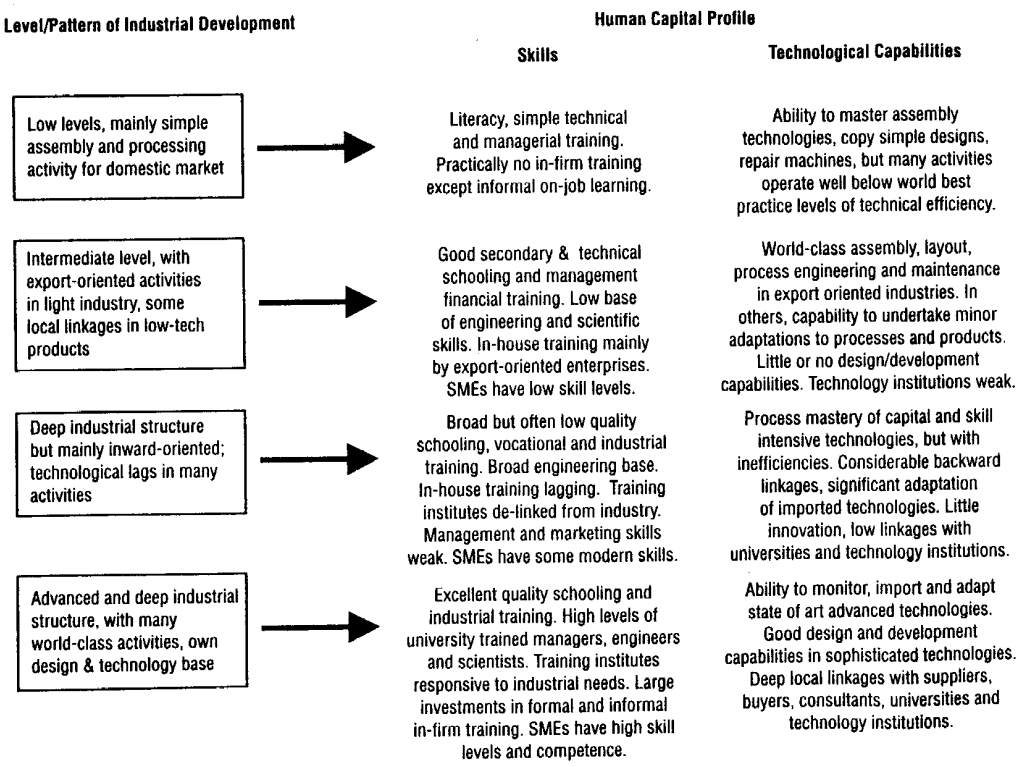
Richardson (1999) asserts that the effects of human capital on growth are most evident at the primary and secondary level in low and higher income developing countries, and at the tertiary level in developed economies. Explanatory variables used by Gemmel (1996) include the initial stock of human capital (i.e. the share of the labour force with human capital skills), as well as the subsequent accumulation, by level (i.e. primary, secondary and tertiary). Results differ across sub-sample of countries: primary human capital appears to be important in the poorest LDCs, secondary human capital in 'intermediate' LDCs, while tertiary human capital effects are strongest in the OECD

countries. High levels of public support for universal primary education are thought to have played an essential role in the East-Asian success in particular.[14] According to the World Bank (1993), growing human capital was one of the two main engines of growth in East Asia. High shares of national income have been devoted to education; the declining rate of growth of population — partly linked to education — allowed expenditure per pupil and thus the quality of education to rise; and the allocation of resources mostly towards basic education instead of higher education is also found to have been decisive for the success.

Lall (1998) stated that the requirements of both forms of human capital differ significantly according to the level of industrial development. Each level and strategy reflects and produces specific kinds of skills and capabilities as described in figure 1.

Our coefficient on human capital contribution seems to be rather low. A 100% increase in the amount of human capital (education level or years of schooling) would lead to 16%-18% increase in output per worker. It could be that the demand for educated labor is rather scarce in Indonesia. Robertson (1997) argues that the transitional growth path of an economy under conditions of unskilled labor abundance, is very similar to the standard neo-classical model. The economy is predicted to exhibit high levels of physical capital investment, relatively high income growth and low rates of human capital accumulation. An initial abundance of unskilled labor resources implies that the marginal and average product of physical capital is high, relative to balanced path levels. This induces rapid accumulation of physical capital and rapid growth of final output, as in the standard neoclassical growth model.

Figure 1. **Human Capital and Industrial Development Patterns**



Source: Lall, Sanjaya. "Meeting the Human Capital Needs of Maturing Asian Economies", in *The Future of Asia in the World Economy* edited by Colm Foy et.al., 1998.

Pritchett (1999) concludes that education has not had the same impact in every country and the coefficient in a cross-national regression masks enormous heterogeneity in the impact. There are three explanations for the differences in the impact:

- Schooling has in some countries been enormously effective in transmitting knowledge and skills while in other countries it has been essentially worthless and created no skills.
- The rate of growth of demand for educated labor (in part due to different sectoral shifts, in part due to policies such as openness to the world economy) in part due to exogenous differences in technological progress has varied widely across countries so that the marginal return has fallen dramatically, or stayed constant, or risen.
- In some countries schooling has created cognitive skills and these skills were in demand, but to do the wrong thing. In some countries the institutional environment was such that the bulk of newly acquired skills were devoted to privately remunerative but socially wasteful, or even counter-productive activities.

Finally, Pritchett (1999) estimated that the growth accounting regression coefficient on educational capital to be around 30%,[15] which is similar to the result of this study.

A Focus on the Total Factor Productivity Growth

The objection of Krugman (1994) and Young (1993, 1995), Kim and Lau (1995) and Lau (1998) of the East Asian Miracle (World Bank, 1993) is that NIEs' growths were not based on productivity-enhancement. The sources of growth of the East Asian tigers were merely based on input growth with no or even negative improvements in technology. Felipe (1997) asserts that this line of reasoning is neoclassical in nature. In this growth model, output level and growth are a function of a country's resource endowment and the productivity of factors of production, or total factor productivity (TFP). Easterly and Levine (2000) mention that the term TFP usually refers to the 'something else' (besides physical factor accumulation) that accounts for economic growth differences. Growth is explained from the supply side with the help of an aggregate production function that describes the production possibilities of a country. According to the standard neo-classical model (Solow, 1956), input-driven growth is not sustainable because there are limits to input mobilization and because incremental growth in inputs is subject to the law of diminishing returns. Thus, this model implies that if there is no technical progress, and growth results exclusively from the accumulation of resources, then the process will stop as a result of diminishing returns to the factors.

Sundrum (1988) also argues that for any economy to experience sustained growth over a number of years, there must be a steady increase in its productive capacity. But Sundrum stresses that this is not enough. There must also be a growth in aggregate demand to make use of the expanding productive capacity and to increase the level of actual production. However, market forces themselves do not necessarily create growth in demand to keep pace with the growth of productive capacity. Sometimes aggregate demand may exceed aggregate supply. Then, the level of production will be constrained by supply conditions, and the actual rate of growth will be determined by the growth of productive capacity. But sometimes aggregate demand may fall short of aggregate supply. Then, the level of production will be constrained by

demand conditions, and the rate of growth will be determined by changes in aggregate demand.

Based on the result of model II and III above, it seems that Indonesia had no improvement in TFP. Others have done similar studies, the result of which is in table 4.

Table 4: Estimates Of TFP Growth In Indonesia

Period	Average TFP Growth	Source
1975-90	-0.9%	Thomas and Wang (1993)
1978-85	0.0%	Dasgupta, Hanson and Hulu (1995)
1985-92	1.1%	Dasgupta, Hanson and Hulu (1995)
1985-90	-2.7%	Osada (1994)
1970-80	3.1%	Kawai (1994)
1980-90	-0.1%	Kawai (1994)
1970-80	2.4%	Ikemoto (1986)
1970-90	-0.5%	Marti (1996)
1960-94	0.8%	Collins and Bosworth (1996)
1978-96	1.2%	Sarel (1997)
1970-85	1.2%	Young (1994 and 1995)
1950-87	1.2%	Kawai (1994)
1965-90	2.7%	Lindauer and Roemer (1994)
Source: Timmer (1999), additional sources added by author.		

If we examine the time period carefully, and combine the result from model II or III, it seems that average TFP growth of Indonesia is zero if not negative. The positive result from Dasgupta, et.al. (1995) are only for a short period of 7 years while the result from Kawai (1994) and Ikemoto (1986) are only from the early stages of development in Indonesia (i.e. 1970-1980). As Sundrum (1988) noted, Indonesia's rapid economic growth in 1968-81 was more due to improvement in terms of trade which was linked to the expansion of the public administration sector as well as the increased volume of investment and imported producer goods.

We may therefore conclude that Indonesia's economic growth from the 1970s to the 1990s was accompanied by zero or negative TFP. The World Bank (1993) and Collins and Bosworth,et.al., (1995) report a positive TFP for Indonesia, however as we have mentioned above they used different weight for the level of school enrolment for primary and secondary education. Bosworth, et.al., (1995) also used a uniform value of

0.35 for α in each country for international comparisons. Crafts (1999) noted that an inferior level of TFP reflects a combination of lags in technological knowledge and/or the diffusion of technology, inefficient allocation of resources, and inability to achieve economies of scale.

As Lau (1998) mentioned, it should be emphasised that our finding of no measurable technical progress (TFP) in Indonesia is for the economy as a whole. It is entirely consistent with the possibility of the simultaneous existence of significant positive technical progress in certain industries and sectors and negative technical progress (rising inefficiency) in other industries and sectors. Thus, positive technical progress in these industries may be offset by rising inefficiency in certain other industries, especially those in the non-tradable sectors, such as construction, which are often the most monopolistic and tradition-bound as well as the least competitive. As a result, the economy as a whole exhibits no measurable technical progress (this is less likely to be true for an open and competitive economy).[16]

Looking at the coefficient of our regression, capital per worker seems to have a more important role in explaining the growth of the Indonesian economy than the human capital aspect. King and Levine (1994) suggested that differences in the amount of capital per worker accounted for only small differences in national standard of living, and while capital accumulation is important, it is far from a dominant factor in explaining differences in economic growth over time. Young (1993) disputed the view by saying that high rates of factor accumulation is actually the main reason of the rapid growth of the east Asian economies, while total factor productivity of the regions is of no significance.

Young's conclusion is controversial because it implies that there were no large efficiency-gains in market liberalization and that the governments of the East Asian economies have made no important contribution in terms of good governance and policies.

However, a recent paper by Easterly and Levine (2000) suggests that factor accumulation does not account for the bulk of cross-differences in the level or growth rate of GDP per capita; rather TFP accounts for a substantial amount of cross-country differences. After accounting for factor inputs and for changes in the quality of labor

inputs, Easterly and Levine (2000) find that the 'residual' accounts for the bulk of output growth in most countries and the majority of cross-country differences in both per capita and growth rates.

TFP figures for most countries in ASEAN are below 2%. Interesting to note here is that Singapore, which has been less affected by the crisis, has a low or even negative TFP.

TFP in Korea is higher than the ASEAN countries. In ASEAN itself, Thailand's and Singapore's TFP rank highest. Maddison (1996) found TFP growth for industrialized countries such as France, West Germany and Japan to be more than 3%. It seems that all the ASEAN countries are experiencing lower TFP growth compared with the industrialized ones, and Korea seems to be catching-up with the industrialized countries. As productivity gaps are indicated, there remains a good deal of scope for brisk catching-up before diminishing returns to heavy capital accumulation occurs. Gerschenkon (1962) suggested that backward countries could achieve a take-off into very rapid growth if they could substitute capital for "missing pre-requisites", in particular a lack of entrepreneurship.

Park (1992), in comparing the Korean economy to other late developing countries, contended that certain processes are required for "learning" to be an effective engine of industrialization in late developing countries. First, these countries have to acquire foreign technology and managerial know-how, learn how to use them, and adapt them to local market condition. These countries then need to improve and internalize these skills so that they become part of the endogenous capability. At least three essential elements are required to successfully complete this process. They are:

1. the availability of entrepreneurs who can organize dedicated engineers and well-trained workers for high productivity and low wages;
2. a continuously increasing demand for the product to make use of this acquired technology;
3. the organizational and institutional arrangements, including government policies, to support the efforts of entrepreneurs, so that the project may be reasonably profitable.

Korea, in particular, relied on four approaches to import and master foreign technology and to develop domestic technological capability; foreign direct investment,

foreign technology licensing, foreign technology consultants, and imported capital goods.[17]

Table 5: Estimates Of TFP Growth In ASEAN					
	Malaysia	Philippines	Thailand	Korea	Singapore
1970-80 (Ikemoto, 1986)	1.70%	1.30%	1.40%	3.50%	1.80%
1960-89 (World Bank, 1993)	1.60%	na	3.00%	3.50%	1.70%
1970-90 (Marti 1996)	0.40%	-0.40%	1.60%	1.40%	1.40%
1960-94(Collins and Bosworth, 1997)	0.90%	-0.40%	1.80%	1.50%	1.50%
1964-90 (Lau, 1998)	na	na	na	0.00%	0.00%
1950-88 (Drysdale and Huang, 1995)	na	na	na	2.10%	0.80%
1970-92 (Takenaka, 1995)	na	na	na	0.80%	-2.40%
1978-96 (Sarel, 1997)	2.0%	-0.8%	2.0%	2.2%	
1966-90 (Young 1994 and 1995)	1.1%[a]		1.5%[a]	1.7%	0.2%
1950-87 (Elias 1990)	0.9%	1.6%	1.43%	2.8%	1.8%
1965-90 (Lindauer and Roemer 1994)	1.1%	0%	3.3%	4.9%	3.6%

a 1970-85

In addition, Wong and Ng (1992) argue that TFP growth would be determined by a society's technological absorption capacity which could be decomposed into factors that determine learning capacity on the supply side and those that determine utilization opportunities on the demand side. In conventional economic analysis, learning capacity is assumed to be acquired through investment in education and training.[18]

The Interpretation Of The Elasticity Of Output With Respect To Capital

Looking at our results in Model I and II, the elasticity of output with respect to capital is found to be around 86-90%, which is extremely large for Indonesia. Looking at other estimates provided by Senhadji (1999), Indonesia's share of capital is around 50%, which is approximately the same for other ASEAN countries (table 6), except for Philippines, where only 20% of growth is attributed to capital. In addition Bosworth,

et.al. (1995) also assume a value of 0.4 for α (0.3 for industrial countries) due to the finding that labor's share of total income is lower in developing economies.[19]

However, recent work by Lau (1998) finds that tangible capital accounts for 80% in South Korea and 85% in Taiwan with respect to economic growth. While for Singapore it is 68%. As a result, the technical progress for the above countries are close to zero. Earlier, Lim (1996) also argues that capital accumulation is by far the most important contributor to economic growth in developing countries while for developed countries the most important source is technical progress. As such, Lim (1996) argues that as development proceeds, technical progress becomes more significant and capital accumulation less so.

Robertson (1998) argues that intuitively high capital shares seem to support the notion that *transitional growth*[20] has been important. However, using the data from Young (1995), Robertson shows that only between 6-24% of the growth in Taiwan, South Korea and Hong Kong can be attributed to transitional dynamics. Singapore is an exception, with the share of transitional growth of 30%.

Robertson (1998) provides an interesting theory about the difference between the elasticity of output with respect to capital α, and the relative contribution of capital to growth c_K. Deviations from $c_K = \alpha$, reflect deviations from steady growth paths and, therefore, growth due to transitional growth.

As such, looking at the difference of Indonesia's c_K by using international standards of around 0.4-0.5 that is different from our α value of 0.86-0.90, would suggest that the growth of Indonesia from 1969-1995 was a transitional growth. This would also explain the negative TFP and the common view that Indonesia's growth is input-driven and unsustainable in the long-run. The high capital contribution suggests that developing economies on average are experiencing more transitional growth than developed economies.

The high shares of capital in productivity growth in Indonesia, also makes sense if we look at Asia's financial crisis. With capital accounting for the majority of productivity, once the capital is gone, productivity would collapse due to its multiplier effect. Crafts (1999) noted that capital accumulation is jeopardized by failures in the

financial system of some countries. As such, the interesting question would be how to increase TFP or more labor-input growth so that a country is not dependent on any factor of production, whether it be capital, labor or human capital.

Developing countries are usually faced with lack of capital and technology. The only resource that they have in abundant supply is unskilled labor. For capital-scarce and labor-abundant economies, giving the worker more capital to work with will increase productivity significantly and rapidly. In contrast, in industrial countries workers already have a large quantity of capital to work with, the infrastructural system is well developed and specialization and division of labour are already at a high level. Under these conditions capital-deepening will not do much to increase output, instead technical progress will likely contribute the most.

We must also take into consideration the relationship between physical capital and human capital. It is most likely that the relationship is more complementary than substitutional. Easterly and Levine (2000) demonstrate the pervasive tendency for all factors of production, including physical and human capital, to bunch together. Lau (1998) and Boskin and Lau (1990) stressed that technical progress is tangible capital augmenting. In other words, tangible or physical capital and technical progress (intangible capital) are complementary. This implies that the more tangible capital there is, the more productive is intangible capital. It also implies that if there is very little tangible capital, investment in intangible capital may not be that productive.[21] Then, we might need to look at the level of capital, rather than its growth, for a broader view.

Table 6: Cobb Douglas Production Function Estimates[a]	
Country	α
Indonesia	0.49
Korea	0.54
Malaysia	0.47
Myanmar	0.61
Philippines	0.20
Singapore	0.49
Thailand	0.59

a. The Cobb-Douglas Production function specification is: $Y_t=A_tK_t^{\alpha}(L_tH_t)^{1-\alpha}$
Source: Senhadji(1999).

Finally, Krueger and Lindahl (2000) mention two reasons why the coefficient on capital could be biased upwards:

1. measured capital is derived from investment flows, and GDP is a direct function of investment, so errors in the investment data will be positively correlated with the dependant variable;
2. countries that experience rapid GDP growth may find it easier to raise investment, creating simultaneity bias.[22]

Education and Macroeconomic Performance for ASEAN

It is interesting to note that in the western countries, particularly European countries, significant growth of formal education seems to have followed, rather than preceded economic growth, particularly in the form of transformation from agriculturally based to industrially based economies. In the developing countries in general, the process seems to be the other way round: economic growth followed expansion of formal and informal education (Lewin, et.al., 1982). In the case of East Asian countries educational growth preceded economic growth, as by the early 1960s there were high rates of literacy and enrolment ratios in schools in those countries.[23]

Booth (1999) noted that countries in South East Asia have difficulties in coping with cultural and colonial barriers, so that governments were forced to do some drastic measures; such as heavy investment in education for Singapore (together with family planning program), affirmative action in Malaysia, compulsory nine-year cycle in Thailand, and increased government expenditures due to oil-boom in Indonesia (though

some have argued that the Government of Indonesia has actually underinvest in education).

Even though primary education in Indonesia has been compulsory and free since 1977/78, Pangestu and Oey-Gardiner (1992) stressed that there are children who still cannot afford to go to school. The reason is that their parents cannot afford to purchase the needed uniforms and school supplies as well as other contributions. Other reasons for non-attendance are that parents still do not see the necessity for education, the distance to school being too far and that the parents need their children to help them. The rate of school drop-outs by educational level has also increased since 1984. The high percentage of drop-outs has been due to lack of funds. While growth in terms of the number of schools and the wide coverage is impressive in Indonesia, less priority has been given to the quality of education, especially educational performance and standards. In general, the performance of pupils in the rural areas of Indonesia is poorer than that of urban pupils, indicating the difference in the quality of instruction.[24] There was also a mismatch between education and work in Indonesia for the period of 1989-1994; there appears to be an excess demand at the primary and lower secondary school levels and an oversupply at the secondary and tertiary education levels.[25]

Booth (1999) argues that the four HPAEs in South East Asia have all followed different education policies over the decades of rapid growth since the 1960s, reflecting in part their different colonial legacies, and in part the different attitudes of their governments to the role of education in the growth process. In her view the key problem in those countries where performance has been poor lies with the governments and their reluctance to use budgetary resources to increase access to education, especially at the secondary level.

Looking at the school enrolment ratios for ASEAN countries (refer to Appendix A), in 1960-65, Philippines and Singapore seem to have a better human capital endowment, with gross primary enrolment exceeding 100%, and secondary Gross Enrolment Ratios[26] (GER) reaching 34-39% and Tertiary GER reaching around 10-20%. The GER for Singapore and Philippines were actually better compared with Korea at the time.

During 1970-1975, Philippines and Singapore were still leading with Vietnam starting to follow-up. It is worth noting that in this period, the primary and secondary GER of Philippines and Singapore were already comparable with Korea.

In the 1980-85 period, almost all regions of ASEAN had universal primary education. The highest GER for secondary was Philippines with 65.3% followed by Brunei (63%). Philippines also had the largest GER for tertiary (24.6%) followed by Thailand (16.8%). Korea in this period has outpaced Philippines and Singapore in terms of GER for secondary education.

For the 1986-1990 period, Philippines and Singapore led again in GER for secondary and tertiary education. During 1991-1996, Brunei outpaced Philippines and Singapore in terms of Secondary GER while Philippines and Singapore still led in GER for tertiary education.

Looking at the above observations, it appears that Singapore and Philippines are the front-runners for educational achievement in ASEAN. These two countries also had the highest educational attainment for ASEAN with total mean years of education during 1986-1987 reaching as high as 8 years for Philippines and 7 years for Singapore (appendix B). However, Singapore seems to make more improvement because actually in the 1960-65 period the human capital stock of Singapore was lower than Philippines, Thailand and Malaysia. Singapore actually also has the highest number of Scientists and Engineers in R&D (per million people) compared with Korea and other ASEAN countries (appendix J). Indeed by looking at GDP growth, Singapore is the only country with growth rate at or even higher than 7% for the same period mentioned above (table 7). For Philippines, some experts have argued that occurrences of natural disasters have often stalled the growth process, while Thailand, Indonesia and Malaysia have good growth records in GDP.

Soon (1992) noted that the Singapore Government's early and continued emphasis on education and manpower development, and on the upgrading of its skilled manpower have contributed significantly to its rapid economic growth and development.[27] The fundamental tenets of Singapore's long-term education policy were:[28]

1. to continue with the existing policy of free and universal primary education;
2. to make secondary education more widespread;
3. to give more attention to vocational and technical education;
4. to expand tertiary education; and
5. to send able students on overseas scholarships and bursaries.

Table 7: GDP Growth (Annual %)

Countries	1960-1965	1970-1975	1980-1985	1986-1990	1991-1996
Brunei	na	2.5	-3.9	0.4	0.8
Indonesia	2.0	7.9	6.2	7.1	7.8
Korea	5.9	8.1	6.3	10.0	7.4
Laos	na	na	na	10.5	6.5
Malaysia	6.9	7.0	5.5	6.8	8.7
Myanmar	na	na	na	na	na
Phillip	5.2	5.4	-0.1	4.7	2.8
Singapore	7.0	10.4	6.8	8.4	8.3
Thailand	7.2	6.7	5.4	10.3	8.1
Vietnam	na	na	3.8	4.8	8.4

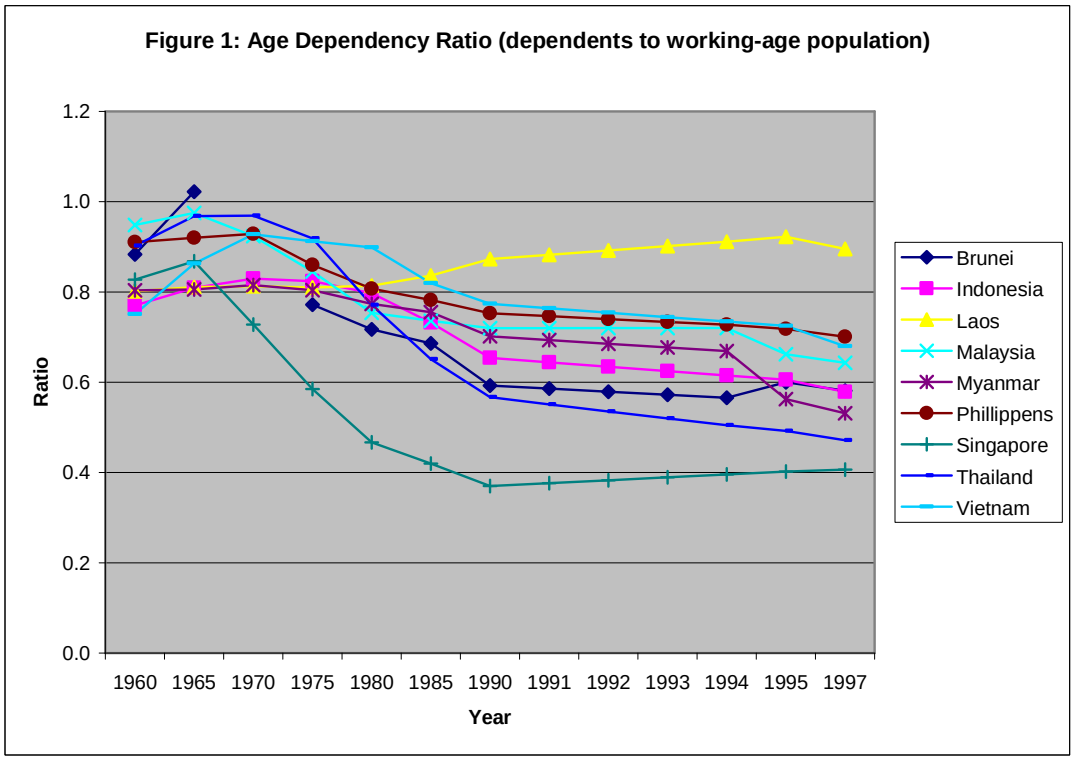
Source: WDI CD-ROM, calculated by author.

We see that since the 1960-65 period, Singapore has produced the highest output per worker, followed by Malaysia (appendix C). In the 1986-90 period, Singapore still produced the largest output per worker and still followed by Malaysia. Philippines lacked improvement as the amount of output per worker outpaced Thailand's in the 1986-90 period, where as Thailand in the 1960-65 period only had achieved 65% of the Philippines figure.[29] The depreciation of the bhat in 1986 seemed to improve the price competitiveness of Thai exports, resulting in manufacturing exports increasing by an average of 29% p.a. in volume in the 1986-1989 period. Thailand also benefited from the surge of direct investment from Japan and the Asian NIEs in their efforts to generate offshore production in the face of rising land and labor costs. Wahawisan (1992) concludes that the boom in the Thai economy has brought a number of problems in the form of strains on both the physical and human infrastructure. These shortcomings will have serious implications on Thailand's ability to sustain growth over a longer term. In particular, shortages of skilled labor, such as engineers and technicians, will be critical to the continuing growth of Thai economy.

The alleviation of these shortcomings has become one of the main economic challenges to Thai policy-makers.[30] Indeed, if we look at the number of scientist and engineers and R&D (appendix J), Thailand is still lagging below Philippines and far below that of Singapore and Korea (only 4%-5% ratio). Wahawisan (1992) feels that the large numbers of agencies and government ministries involved in training at Thailand, at times with overlapping interest at the local, provincial, and national levels, make the whole system complex, slow and inflexible in adapting to the changing needs of the economy. With this complex structure also comes the attendant difficulty of administrating and implementing policies.[31]

Singapore also seems to be the country which is most successful in reducing the age dependency ratio compared with the others, especially after 1965 (chart 1). Young (1993) also noted the contribution of rising aggregate participation rates in the economic growth of NICs, due to aged post-war baby boom, increasing female labour participation and declining population growth.

Figure 1: Age Dependency Ratio (dependents to working-age population)



Source: WDI CD-ROM.

In terms of educational expenditure, data is sadly lacking (appendix D). For educational expenditures, we notice that Singapore devotes more resources especially in tertiary education, followed by Malaysia. The emphasis that Singapore has placed on education also is apparent from the fact that Singapore is the only country in ASEAN that has the almost complete data on educational expenditure in ASEAN.

In comparison, developed countries spend 5-6% of its GNPs for education while the developing countries spend around 3-4% during 1965-1995. For the developed countries, the share of education in the government total expenditure (budget) is around 15 to 20 percent.[32]

However in terms of government expenditure on education, Malaysia seems to be the country with the highest government expenditure on education with more than 5% of GDP devoted to education budget in the 1970-1996 period, followed by Singapore in the range of 4% (appendix E). According to the survey of Malaysia's university graduates (Mehmet and Yip, 1986), the Malaysian government is actually the largest employer of university graduates, with 70% of employed graduates working for the government and statutory bodies (56.9% and 13.3% respectively). In contrast, only 29.8% of employed graduates (or 19.5% of all graduates) worked for private firms or were self-employed (Mehmet and Yip, 1986).[33] Ariff and Yeoh (1992) stated that Malaysian society has always attached a premium on higher education, although it was biased towards academic and professional pursuits, with technical and vocational training being relegated to the back seat. This was presumably due in part to the social status attached to white-collar jobs and in part to the fact that vocational jobs were not financially as rewarding.[34]

The high expenditures on education, however, should be interpreted carefully. The dynamics of the employment supply and demand process in developing countries tend to expand educational spending beyond the socially optimum level. In most developing countries wages in the modern sector are much higher than the traditional sector, which creates a very strong demand for jobs in the former. Entry into the modern sector depends initially on the level of completed education, creating, in turn, an equally strong demand for education. At the same time rapid population growth over a long period produces more workers that can be absorbed by the economy. Under such

conditions, employers tend to select by educational level, with, for example, workers who have completed primary education filling jobs that can be performed satisfactorily by those with no primary schooling. Individual workers safeguard their positions by acquiring a higher level of education, which increases the demand for each level of education.[35]

Sectoral Distribution of Labor Force

Economic transformation usually takes the form of the increasing share of manufacturing in the economy. In this section we would like to focus, instead, on the labor force distribution in the economy.

For Indonesia, the sectoral share of total employment in 1976 was still dominated by the primary sectors (66%). It is only after 1993 that the share of secondary sectors became more than 50%. For Korea, the secondary sectors became the main source of employment in 1974. In 1974, Malaysia's share of total employment in agricultural sectors accounted for 49%, while in the Philippines, secondary sectors reached more than 50% after 1987. In Thailand, even in 1997 the share of primary sectors in total employment was 50%. Brunei's agricultural labor share remained low at 34% in 1960 and 2% in 1990. Lao's and Vietnam's share of employment in agriculture in 1990 amounted to more than 70% (data from ILO and WDI).

It seems that the composition of the labor force in the ASEAN economies remain significantly dependant on agriculture so that the transformation in the employment sector lags behind the transformation in the economic structure. Laal (1998) categorises Singapore and Korea as the two "Tiger Economies", representing the most mature economies in Asia. Indonesia, Malaysia and Thailand are categorized as three "New Tigers", because these countries started on export-oriented industrialization later, but have recorded sustained expansion and deepening of their industrial sectors.[36]

Table 8: Manufacturing Growth and Structure

Country	Annual Growth Rate (%)[a]		1990-94	MVA[b] 1994 ($ billion)	MVA Per Employee[b] 1994($)	% Share Of Capital Goods And Chemicals In MVA[c]	
	1980-94	1980-90				1980	1994
Singapore	7.1	6.9	7.6	20.6	56,265	49	67
Korea	10.5	11.9	7.4	159.2	54,214	27	46
Indonesia	11.1	11.8	9.3	28.6	7,526	24	22
Malaysia	10.4	9.3	13	18.6	15,339	25	46
Thailand	10.2	9.9	11.1	47.5	24,389	16	23

a. Compound annual growth calculated from UNIDO data on manufacturing value added in constant 1990 dollars.
b. UNIDO data for manufacturing value added, current 1994 dollars.
c. World Bank and UNIDO.
Sources: UNIDO and World Bank in Lahl (1998).

Looking at the manufacturing value added (MVA) per employee in 1994 (table 8), Singapore and Korea are the highest among the ASEAN economies. Thailand only has less than half of MVA per employee of Singapore, followed by Malaysia (27%) and lastly Indonesia (13%). In terms of total MVA however, Korea was the largest in 1994, followed by Thailand, Indonesia, Singapore and Malaysia.

The value of MVA per employee can serve as a rough indicator of the degree of sophistication of the industrial sector, since this value increases with capital, skill and technology intensity.[37] As such, Singapore and Korea have the most advanced sectors and are more mature economies, while Thailand and the rest seem to be lagging behind.

Investments and Savings Condition for ASEAN

In order to have more capital, a country either uses its savings or attracts foreign investments/aids in order to finance it. The need for savings and capital formation for economic growth was also the central idea of Arthur Lewis more than five decades ago (1954 and 1958). The essence of Lewis development process is the generation of surplus funds for greater capital accumulation, with the surplus labor from the subsistence sector providing the initial source of savings and capital formation.

Looking at the investment-savings data (appendix F), Singapore is most notable in its investment and savings figure, especially after 1975, with investment-savings rate

around 30-40%. Indonesia's figures for investment and savings were actually not very high, Thailand and Malaysia seem to have higher levels of investments and savings compared with Indonesia. These high rates of savings were achieved through a more interventionist mechanism: Malaysia and Singapore compelled high private savings rates through mandatory provident fund contribution.

If we look at the spread of lending and deposit rate, Laos and Thailand seem to have the highest drastic increase in spread after 1991 amounting to around 10%. This would partially explain why the crisis hit Thailand in the first place, because it represents overheating of the economy and an inefficient banking sector. After financial deregulation in 1980s, Indonesia experienced a positive spread in 1986 of 4-6% which reduced to 2% in 1995. The Philippines spread after 1986 was stable at 4-6% range; while Singapore's spread seems to be amazingly constant since 1978 at a level of 2-3% (appendix K).

In terms of spread between domestic interest rates and LIBOR, Indonesia had the largest spread in 1986 followed by the Philippines. In 1991 Laos took over Indonesia's position. The economic reform in Laos actually started in 1986 and was supported by IMF arrangements in the period 1989-1997.[38] In 1993 Vietnam took the lead with a 29% spread, marking a transition from socialist to market economy. IMF (1999) attributed the impressive growth of Vietnam in the 1992-97 period to reforms initiated in the late 1980s along with large inflows of FDI from the Asian region. However, Indonesia's spread remained significant over 1991-93 averaging 19% and 13% for the 1994-96 period. For Thailand, the spread dropped in 1987 to 3.5% compared to 6.5% in the previous year. Not until 1990 did the spread double to 6% and has averaged at 7.6% during 1991-97. It seems that most of the ASEAN countries, except for Singapore, have experienced a significant spread between the domestic interest rate and LIBOR which would lead to significant capital inflow and FDI. For Singapore, it was not until 1991 that it experienced a positive spread and the average of the spread during 1991-97 was only 1.2% (appendix L).

As a result of this high investment, Singapore had the largest capital per worker in ASEAN for the 1960-1990 period (appendix G), followed by Malaysia. Korea's capital per worker was only slightly lower than Malaysia's. Malaysia and Singapore

seem to have more capital endowment since the 1960-1965 period, Singapore's capital per worker was twice of Malaysia's.

In the 1960-65 period, Korea had less than half of Malaysia's capital per worker, but during the 1986-1990 period Korea had outpaced Malaysia. The Korean economy in 1960 was heavily dependent on foreign aid. In the late 1950s, exports contributed only 5% of industrial growth while import substitution contributed 24%. However, since the early 1960s economic growth and structural transformation in Korea have been led by exports. On the eve of its take-off towards industrial transformation and economic growth, Korea did not have any visible comparative advantages, such as abundant capital or natural resources, except for a fairly well educated and low-cost labor force. Thus, the rapid growth of the Korean economy through industrialization since the early 1960s can be attributed to the significance of "social capability"[39] as the key explanatory variable.[40] Philippines seems to be left behind in term of capital per worker. While it ranked third in the 1960-65 period, its level of capital per worker had only grew slightly and seems to have been caught up by Thailand and Indonesia. It is likely that Singapore, Korea and Malaysia have strong capital-labor complementary while the Philippines does not.

However reliance on capital accumulation, e.g. through savings and investments as the source of growth, could prove to be dangerous, as it was jeopardized by failures in the financial systems of some countries (Crafts, 1999).

The large investment rate of Singapore would lead to the question of why some countries invest so much than others. Hal and Jones (1996) consider that in countries in which the infrastructure favors diversion[41] over production, investment in capital, skills and new ideas is reduced by the threat of diversion. Moreover, some of the investment that does take place is devoted to increasing the effectiveness of diversion instead of the effectiveness of production.

Hall and Jones (1997) define infrastructure as :

> The infrastructure of an economy is the collection of laws, institutions, and government policies that make up the economic environment. A successful infrastructure encourages production. A perverse infrastructure discourages production in ways that are detrimental to economic performance. A corrupt bureaucracy, for

> example, act as a tax on the productive activities of the economy. Investors must spend some of their time and resources bribing officials in order to obtain permit and licenses necessary for the conduct of business. As Shleifer and Vishny (1993) argue persuasively, if the government is organized so that a number of bureaucrats have "hold up" power over an investment project, the result may be to cut investment dramatically: the officials may be unable to coordinate, so that the sum total of bribes required to conduct business is greater than the private gains from setting up the business in the first place.
>
> This kind of diversion of resources can have important dynamic consequences for the allocation of talent. Individuals who might otherwise become entrepreneurs will instead devote their energies to rent-seeking or other forms of diversion. The type of skills that an individual accumulates may be those that maximize and individual's chance of securing a position in the government bureaucracy instead of skills that would increase the productive capacity of the economy….. (p.5).

Similarly, Haq and Haq (1998) mention that social capital signifies sound institutions and good governance, which, in turn depend largely on the coverage and quality of education.[42]

The evidence gathered by Easterly and Levine (2000) suggests that creating the incentives for productive capital accumulation is more important that capital accumulation per se. Lau (1998) also supports this view, saying that:

> " …while tangible capital accumulation is important for economic growth, it is not sufficient by itself. Some economies that had rapid rates of growth in their capital stocks, such as the former Soviet Union and China before 1979, did not experience rapid growth in their output. What is needed is thus not just capital accumulation but efficient capital accumulation. This is primarily what the East Asian NIEs have achieve. They have grown rapidly,….because they have allocated their investment to sectors in which they are the most productive."

If we look at the current report by Transparency International (appendix H), Indonesia is among the lowest ranks for Corruption Perceptions Index (CPI), with CPI index of 1.7, while Singapore is ranked 7 with CPI index of 9.1. As investment and capital are channeled through a financial system to link savings and investments, the quality of the financial system would later determine the quality of investment taken and the productivity of capital. As Wall and Eisenbeis (1999) argue, the character of banking regulation in any given country is influenced by bureaucratic structures, the low

quality of bureaucratic structure in Indonesia would result in low quality of investment and low productivity of capital. Poor financial performance waste savings by supporting projects for which the subpar return owners realize upon completion reduce the value of the capital stock to below its cost of production (Kane, 2000).

Also if we look at the time series data concerning freedom provided by Freedom House country ratings since 1972 (appendix I), and focus on the 'change of category' rather than the category itself, Indonesia and Thailand have changed categories in 1997-98. This may be as a result of the crises, which led to the change in the 'environment' in which people did business (Indonesia is the only country in which the economic crisis transformed into a political crisis that later on created drastic changes in the national political structure). As there are changes in the environment, business entities definitely would need to change their usual practice which would take considerable time and slow the investment process in the private sector.

In addition, Morisset and Revoredo (1995),[43] analyzing how education contributes to savings, assert that there are many reasons to believe that education and savings may be linked, either positively or negatively. It is generally expected that people with higher education will earn greater income, thereby leading to higher savings, even if the positive relationships between education and income and between income and savings take time to be completely realized. The relationship between education and income can be negative at first because education expenses initially increase consumption and reduce current disposable income. Another argument for a negative link concerns precautionary savings. If there is a precautionary motive for savings, education should reduce income volatility because educated people are less likely to be unemployed, or, if unemployed, they are covered by unemployment insurance. With less need for precautionary saving among the more educated, education and savings would be negatively correlated.[44]

The Link of Human Development (HD) and Economic Growth (EG)

Ramirez, et.al. (1997) wrote an interesting paper that scrutinized the links between human development and economic growth. They divided the link into two chains,

Chain A (From EG to HD) and Chain B (From HD to EG). Their empirical results showed that for Chain A, the higher the social expenditure, adult literacy, and female education enrollment for a given level of GNP per capita, the larger the improvement in HD. For Chain B, the relationship between HD and EG was stronger with higher investment rate and more equally distributed income. The existence of two chains linking HD and EG means that an economy may be on a mutually reinforcing upward spiral, with high levels of HD leading to high growth, and high growth in turn further promoting HD. Conversely weak HD may result in low growth and consequently poor progress towards HD improvement. The strength of the links in two chains determines the extent of mutual reinforcement between HD and EG, in either direction.

Ramirez, et.al. (1997) then classify the countries' performance into four categories, virtuous, vicious, and two types of lop-sidedness, i.e. lopsided with strong HD/weak EG (called 'HD-lopsided'); and lopsided with weak HD/strong EG ('EG-lopsided'). In the virtuous cycle case, good HD enhances growth, which in turn promotes HD, and so on. In the vicious cycle case, poor performance on HD tends to lead to poor growth performance which in turn depresses HD achievements, and so on. The stronger the linkages in the two chains described above the more pronounced the cycle of economic growth and HD, either in a positive or dampening direction. Where linkages are weak, cases of lop-sided development may occur. On the one hand, good economic growth may not bring about good HD, if, for example, there are such weak linkages as a low social expenditure ratio; on the other hand, good HD performance may not generate good EG if there is a dearth of complementary resources because of low investment rates. Such cases of lop-sided development are unlikely to persist. Either the weak partner in the cycle eventually acts as a brake on the other partner, leading to a vicious cycle case, or, if the linkages are strengthened, possibly by policy change, a virtuous cycle case results.

Ramirez et. al. (1997) then continue to suggest that to move from vicious cycle to HD-lopsidedness one needs to strengthen the links in Chain A, which may be achieved by adopting some of the following policies:

- those leading to a shift in resource allocation towards education and health services, especially those serving the majority of the people, as apparently occurred in Argentina with enhanced decentralization.
- those generating a more equitable income distribution (for example, through land and tax reform or a move towards a more employment-intensive pattern of output). Algeria is an example, with land reform in the 1960s and some large-scale employment programs in the1970s.

Movement from the HD-lopsidedness to the virtuous category requires strengthening the links in Chain B by, for example:

— taking advantage of improved HD to promote economic growth through policy reform;
— increasing the investment rate, possibly assisted externally; and
— improving the distribution of income.

Ramirez et.al.(1997) also emphasize an important conclusion about the sequencing of policy change, i.e. that HD must be strengthened *before* a virtuous cycle can be attained. Policy reforms that focus only on economic growth are unlikely to succeed. Countries in a virtuous cycle category may well slip back into HD-lopsidedness, if, for some reason, growth slows down, but as long as HD stays high such cases have a good chance of resuming their virtuous cycle pattern. Whenever either or both chains appear to be weak, leading to lop-sidedness or vicious cycles, it is important to identify where the weak links are and what the appropriate policies might be to strengthen such links. Such policies must, moreover, be viewed in an evolutionary context.

Looking at ASEAN states based on Ramirez's category (table 9), almost all ASEAN countries were seemingly blessed with relatively strong HD in the 1960-70 period. As such, it follows that an increase in investment would bring about growth which Indonesia has achieved but Myanmar and Philippines have failed to attain.

Ranis and Stewart (2000) following Ramirez, et.al.(1997) using HD progress in the 1960-95 period as indicators of success in HD, concluded that Singapore, Korea and Malaysia were among the 'global best performers'.

Table 9: Performance of ASEAN Countries based on Ramirez, et.al. (1997)			
	1960-1970	1970-1980	1980-1992
Indonesia	HD lop-sided	Virtuous	Virtuous
Korea Rep.	Virtuous	Virtuous	Virtuous
Malaysia	Virtuous	Virtuous	Virtuous
Myanmar	HD lop-sided	Vicious	Vicious
Philippines	HD lop-sided	EG lop-sided	Vicious
Singapore	Virtuous	Virtuous	Virtuous
Thailand	Virtuous	Virtuous	Virtuous

CONCLUSION

In this paper the author used the three-factor formulation with the result that showed negative TFP growth in Indonesia for the period of 1969-1998. The use of three-factor formulation seems to result in lower TFP growth compared to the two-factor model. As Bosworth, et.al. (1995) noted, countries with extremely high growth in years-of-schooling would leave very little output growth to be attributed to improvements in TFP.

Sarel (1997) calculated TFP in Indonesia by using national accounts approach to estimate factor shares and concluded that if the value of α is relatively high, then the rate of TFP growth in Indonesia will be small and may even be negative.

Senhadji (1999) argued that:

1. Initial conditions — as captured by the initial levels of TFP, physical and human capital — explain a large part of the differences in TFP across countries. The more favorable the initial conditions are, the higher the TFP performance is. In particular, the initial endowment in human capital plays a crucial role in determining the future level of TFP for a given country.
2. A good macroeconomic environment contributes significantly to the level of TFP: lower inflation, lower real exchange rate, lower government consumption, higher ratio of reserves to imports, and lower external debt are associated with higher levels of TFP.
3. Both current and capital account convertibility improve TFP.
4. The contribution of TFP to output growth depends crucially on the share of physical capital in real output (α). The higher α is, the lower the

> contribution of TFP to growth because decreasing α lowers the contribution of physical capital (K) and increase the contribution of labor (L). This result, combined with the fact that K generally grows faster than L, leads to the negative correlation between the contribution of TFP and the level of α.[45]

We find that education contributes little to economic growth, so that capital dominates the sources of growth. As this is the case, Indonesia would surely be vulnerable to changes in investment climate, such as an increase in world interest rates and growth slowdown in industrial countries.[46] The productivity of capital is highly dependant on the financial and banking system which have only liberalised recently after severe financial repression. The common practice of "financial repression", where governments control interest rates at a level below that of inflation had only recently disappeared.[47] With little experience in managing the liberalised financial structure with high investment rates and low quality of bureaucracy, the quality of investment would be lower and a systemic failure in the financial system could easily occur. Combined with a high level of corruption, it would also reduce the quality of available public infrastructures, and the productivity of capital in Indonesia would further deteriorate. Park (1994) pointed out that the financial sector policies of a developmental state placed little weight on auditing, capital adequacy, credit rating, disclosure requirements, prudential regulation, or risk management.

Countries which are less affected currently by the crisis, such as Singapore, and Malaysia to a lesser extent, seem to have already good capital and education endowment from the past.

The relationship of the level of capital with TFP and education could also be explored further. As explained, the complementary nature of physical (tangible) capital and technical progress (intangible capital) would cause investment in intangible capital (which could also include educational capital) to be less productive if insufficient level of physical capital were available.

The contention that well performing economies such as Singapore, are not experiencing significant improvement in productivity is doubtful. Physical capital could be productive only if 'someone' makes it operational, that someone being workers and

managers of enterprises, and bankers who seek and filter investment proposals. Well educated bankers, managers, engineers and workers have a comparative advantage in seeking new opportunities and coping with new problems. We found that although all ASEAN countries have relatively good physical capital and human capital per worker, the amount of output per worker varies, implying that the environment in which an economy operates matters a great deal.

NOTES

1. Data from the International Financial Statistics, IMF.
2. Felipe (1997) divide the categories into three, the last one being the nihilistic view, that maintain the whole debate about the sources of growth is misplaced due to a serious methodological problem inherent in the tools used in the analysis.
3. For example Young (1992,1994a,1994b), Kim and Lau (1994), Krugman (1994), Collins and Bosworth (1997).
4. Gundlach (1999), p.7.
5. Lim (1996), p.147.
6. Krueger and Lindahl (2000), p.14.
7. Tilak (1998), p.12.
8. The author tried to use regression that put enrolment rates as the right-hand side variable but this resulted in poor results. This coincides with Bosworth et.al.'s, (1995) conclusion that enrolment rates are not a good proxy for human capital.
9. Gundlach (1999), page 15, eq.8.
10. The model originated from the three-factor production function: $Y=A_tK^{\alpha}H^{\beta}L^{(1-\alpha-\beta)}$. (Bosworth and Collins, p.8)
11. Lim (1996), pp.56-57.
12. The author has conducted the same exercise for the data, obtaining no significant results.

13. Krueger (1999) also pointed out that college students from more disadvantaged families benefit more from attending elite colleges than student from advantaged families (see Dale and Krueger, 1998).
14. Richardson (1997) p.22.
15. Pritchett (1999), p.21.
16. Lau (1998), pp.55-7.
17. Park (1992), p.12.
18. Wong and Ng (1992), p. 3.
19. However, Bosworth, et.al. (1995) also admitted that it could be a mistake to attribute the higher share to the greater importance of capital in developing economies. For example, income shares could overstate the role of capital, if developing countries systematically suffer from weaker competition and a greater role for monopoly profits. (p.18).
20. To Hall and Jones (1997), transition dynamics crudely means a country with output substantially below its balanced growth path level will grow rapidly; a country above its balanced growth path will grow slowly. (p.2).
21. Lau (1998), p.49.
22. Krueger and Lindahl (2000), p.17.
23. Tilak (1998), p.22.
24. Pangestu and Oey-Gardiner (1992), p.62.
25. Pangestu and Oey-Gardiner (1992), p.68.
26. Total enrolment in a specific level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education in give school-year.
27. Soon (1992), p.21.
28. Soon (1992), p.22.
29. Hall and Jones (1997) conclude that differences in levels of economic success (which is measured by the level of output per worker) across countries are driven primarily by the institutions and government policies (or infrastructure) that frame the economic environment in which people produce and transact. Societies with secure physical and intellectual property rights that encourage

production are successful. Societies in which the economic environment encourages the diversion of output instead of its production produce much less output per worker.

30. Wahawisan (1992), p.48.
31. Wahawisan (1992), p.52.
32. Tilak (1998), p.30 and 31.
33. Ariff and Yeoh (1992), p.41.
34. Ariff and Yeoh (1992), p.43.
35. Lim (1996), pp.149-150.
36. Laal (1998), p.154.
37. Laal (1998), p.156.
38. IMF (2000), p.4.
39. Park (1992) define social capability as the ability to acquire, adapt and internalize foreign technology and managerial know-how, as well as to develop and innovate indigenously (p.9).
40. Park (1992), p.9.-10.
41. Diversion encompasses a wide range of activities, including theft, corruption, litigation, and expropriation.
42. Quoted in Tilak (1998).
43. Some of the authors' major findings for a panel of 74 countries over the period 1960 - 90 are:

    - Education positively influences savings in the long run. For each percentage point increase in education stock, the savings rate increases 0.37 percent. But it takes more than five years for the positive effect, through income, to compensate for the initial negative impact on savings.
    - People are more productive, invest more, or are a better complement to physical capital in an environment where many people are well-educated. Accordingly, the positive effect of education on savings appears higher in industrial countries, given their higher initial stock of human capital, than in developing countries.
    - The effects of primary and secondary education on savings are positive and significant in all regions, while the effect of university education is positive only in industrial countries. One explanation might be that

industrial countries tend to invest in new projects rather than to adopt existing technology.

44. Morisset and Revoredo (1995) derive several policy recommendations from their conclusions. First, the positive effect of education on savings is enhanced by a reduction in the cost of education, which automatically increases disposable income. In many countries, the unit costs of education may be reduced by exploiting economies of scale and by developing incentives for greater cost-consciousness among consumers and providers. Many education systems may also need to upgrade their internal efficiency.

Second, a focus on primary education should be encouraged, specifically in developing countries. The empirical results indicate that the positive long-run effect associated with primary education is twice as large as that for secondary and tertiary education. Latin America's traditional neglect of primary education contrasts sharply with the policy of Asian countries.

Finally, it is important to increase the coverage of education, not only for equity but also for efficiency reasons. Indeed, how much a child learns is influenced by the nature of the learning environment, as supported by the role played by externalities and the initial level of education in the relationship between education and savings.

45. Easterly and Levine (2000) noted that if the improvements in the quality of labor inputs due to education and health are not considered then those improvements would be assigned to TFP growth. Unmeasured improvements in physical capital, would similarly be inappropriately assigned to TFP. In addition Pritchett (1999) also find that the growth of educational capital shows a large and very statistically significant negative effect on TFP growth (p.22).

46. Easterly (2000) conclude that industrial countries were to blame for the developing country slowdown.

47. Easterly (2000), p. 7.

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About the author

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E-mail: bayhaqi@alumni.nus.edu.sg

APPENDIX A

SCHOOL ENROLLMENT, (% GROSS)						
Countries	**Series Name**	**1960-1965**	**1970-1975**	**1980-1985**	**1986-1990**	**1991-1996**
Brunei	Primary	na	na	106.8	114.2	109.8
	Secondary	na	na	63.0	65.3	77.5
	Tertiary	na	na	1.8	4.2	5.9
Indonesia	Primary	71.5	83.0	113.7	116.0	114.5
	Secondary	9.0	18.0	35.3	46.4	45.3
	Tertiary	1.0	na	5.3	9.2	10.5
Korea	Primary	97.5	105.0	104.3	100.6	99.3
	Secondary	31.0	49.0	84.2	92.0	96.0
	Tertiary	6.0	na	24.3	38.6	48.1
Laos	Primary	32.5	55.5	110.3	108.4	107.5
	Secondary	1.5	5.0	22.3	25.6	25.3
	Tertiary	0.1	na	1.0	1.3	1.7
Malaysia	Primary	93.0	89.0	97.2	95.8	100.5
	Secondary	23.5	38.0	50.5	57.2	58.2
	Tertiary	2.0	na	5.0	7.2	10.0
Myanmar	Primary	63.5	83.0	96.5	104.0	120.6
	Secondary	12.5	21.0	23.3	24.3	26.5
	Tertiary	1.0	na	4.6	4.1	5.3
Philippines	Primary	104.0	107.5	109.2	110.4	111.5
	Secondary	33.5	50.0	65.3	70.6	76.8
	Tertiary	19.0	na	24.6	27.4	28.6
Singapore	Primary	108.0	107.5	108.8	104.4	102.7
	Secondary	38.5	49.0	57.5	68.8	67.0
	Tertiary	10.0	na	10.7	18.6	28.7
Thai	Primary	80.5	83.0	97.7	98.0	92.5
	Secondary	13.5	21.5	30.2	28.6	45.0
	Tertiary	2.0	na	16.8	16.2	19.3
Vietnam	Primary	Na	119.0	105.5	104.0	110.2
	Secondary	Na	46.0	42.5	39.0	37.4
	Tertiary	Na	na	2.0	1.9	2.9
Source: WDI CD-ROM, calculated by author.						

APPENDIX B

Human Cap. Stock: Total Mean Years Of Education						
Countries	1960-1965	1966-1969	1970-1975	1976-1979	1980-1985	1986-1987
Indonesia	2.0	2.0	3.0	3.0	4.0	4.0
Korea, Republic of	3.2	4.0	4.8	5.8	6.7	7.5
Malaysia	3.0	3.5	4.0	5.0	5.5	6.0
Myanmar	1.0	1.0	1.5	2.0	2.0	3.0
Philippines	5.0	5.5	6.0	6.5	7.0	8.0
Singapore	2.5	3.5	4.5	5.5	6.5	7.0
Thailand	4.0	4.0	4.5	5.0	5.2	6.0

APPENDIX C

OUTPUT PER WORKER (REAL GDP PER WORKER, 1985 INTERNATIONAL PRICE)						
Countries	1960-1965	1966-1969	1970-1975	1976-1979	1980-1985	1986-1990
Brunei	na	Na	na	na	na	na
Indonesia	1635.5	1673.5	2158.5	2892	4013.7	4593.0
Lao PDR	na	Na	na	na	2667.0	2735.2
Malaysia	4499.5	5178.25	6962.8	8392.75	10549.8	10793.6
Myanmar	na	Na	na	na	na	na
Philippines	3177.5	3598.5	4125.5	4844	4917.5	4529.4
Singapore	5344.5	6782.25	11278.3	14017	17136.8	21325.0
Thailand	2064.8	2646.25	3195.3	3908.75	4519.5	5709.0
Vietnam	na	Na	na	na	na	na
Source: Easterly, W. and Ross Levine (1999), calculated by author.						

APPENDIX D

EXPENDITURE PER STUDENT, (% OF GNP PER CAPITA)						
Countries	Series Name	1960-1965	1970-1975	1980-1985	1986-1990	1991-1996
Brunei	Primary	na	na	na	na	3.5
	Secondary	na	na	na	na	7.5
	Tertiary	na	na	na	na	7.3
Indonesia	Primary	na	na	na	na	na
	Secondary	na	na	na	5.9	6.6
	Tertiary	na	na	na	18.7	11.8
Korea	Primary	6.2	7.9	13.0	12.3	15.4
	Secondary	8.6	7.4	11.8	9.5	12.5
	Tertiary	36.7	28.0	13.2	6.9	5.8
Laos	Primary	na	na	na	na	4.9
	Secondary	na	na	na	na	24.5
	Tertiary	na	na	na	na	61.1
Malaysia	Primary	na	na	13.6	13.7	11.9
	Secondary	na	na	na	na	na
	Tertiary	na	na	149.7	121.5	95.9
Myanmar	Primary	na	na	na	na	na
	Secondary	56.8	na	na	na	na
	Tertiary	314.4	95.8	na	36.0	19.0
Philippines	Primary	na	12.3	5.9	7.5	na
	Secondary	na	na	2.9	3.4	na
	Tertiary	na	21.0	12.3	12.4	na
Singapore	Primary	9.8	6.3	8.0	8.6	7.4
	Secondary	13.3	12.4	na	na	na
	Tertiary	59.4	49.4	52.3	46.1	37.2
Thailand	Primary	8.3	8.9	11.3	13.1	16.0
	Secondary	23.4	na	na	na	na
	Tertiary	148.6	148.8	28.1	20.3	27.9
Vietnam	Primary	na	na	na	na	na
	Secondary	na	na	na	na	na
	Tertiary	na	na	na	na	na
Source: WDI CD-ROM, calculated by author.						

APPENDIX E

Government Expenditure on Education(% of GDP)					
Countries	1970-1975	1976-1979	1980-1985	1986-1990	1991-1996
Brunei	na	Na	na	na	na
Indonesia	1.4	1.8	2.0	1.8	1.6
Korea, Rep.	2.3	2.6	3.2	2.9	3.3
Lao PDR	na	Na	na	na	na
Malaysia	5.4	5.4	5.6	5.9	5.2
Myanmar	2.2	1.6	1.8	2.1	1.6
Philippines	na	Na	na	na	na
Singapore	2.9	3.1	4.6	4.6	3.8
Thailand	2.9	3.5	3.9	3.1	3.3
Vietnam	na	Na	na	na	na
Source:IMF, Government Financial Statistics, calculated by author.					

APPENDIX F

Gross Domestic Investment and Saving (% Of GDP)								
Countries		1960-1965	1966-1969	1970-1975	1976-1979	1980-1985	1986-1990	1991-1996
Brunei	investment	na	Na	na	na	7.72	na	na
	saving	na	Na	na	na	na	na	na
Indonesia	investment	9.8	9.6	20.0	24.1	26.2	28.4	29.9
	saving	10.9	4.1	22.3	29.0	30.9	30.7	31.5
Korea	investment	14.3	25.2	26.2	31.0	29.7	32.0	37.0
	saving	5.0	14.1	18.4	27.9	27.4	36.8	35.6
Laos	investment	na	Na	na	na	6.6	10.2	28.3
	saving	na	Na	na	na	2.0	0.1	11.8
Malaysia	investment	19.0	19.4	25.0	26.2	33.6	27.4	39.0
	saving	23.7	24.2	26.7	34.2	31.8	35.2	37.8
Myanmar	investment	12.7	20.5	11.5	31.8	19.2	11.9	13.6
	saving	11.3	18.8	9.6	27.2	14.2	9.9	12.8
Philippines	investment	18.9	24.4	23.8	39.8	25.2	19.6	22.7
	saving	18.4	16.0	23.3	34.1	22.0	19.2	16.1
Singapore	investment	16.7	24.2	40.9	26.6	46.6	35.7	35.0
	saving	-17.3	21.7	24.9	21.9	42.3	41.6	48.5
Thailand	investment	18.1	Na	25.3	na	28.8	32.6	41.1
	saving	16.6	Na	22.5	na	24.1	30.8	35.9
Vietnam	investment	na	11.3	na	15.9	na	15.4	22.3
	saving	na	9.7	na	11.5	na	5.5	16.8
Source: WDI CD-ROM, calculated by author.								

APPENDIX G

Capital per Worker (Using Agg. Inv.) (1985 international prices)						
Countries	1960-1965	1966-1969	1970-1975	1976-1979	1980-1985	1986-1990
Brunei	na	na	na	na	na	na
Indonesia	1122	1162.75	1570	2648.5	4728	7636
Korea, Rep.	2138	2931.5	5686	9701.25	15757	23685
Lao PDR	na	na	na	na	579	608
Malaysia	4952	6331.75	8445	11871.75	17581	22468
Myanmar	617	670.25	734	754.75	972	1046
Philippines	2837	3465.5	4250	5693	7524	7448
Singapore	8453	9782	18531	27503.75	38298	53148
Thailand	1701	2501.75	3643	4606.75	5838	7159
Vietnam	na	na	na	na	na	na
Source: Easterly, W. and Ross Levine (1999), calculated by author.						

APPENDIX H

The 1999 Transparency International Corruption Perceptions Index (CPI)				
Country Rank	Country	1999 CPI Score	Standard Deviation	Surveys Used
7	Singapore	9.1	0.9	12
32	Costa Rica	5.1	1.5	7
	Malaysia	5.1	0.5	12
50	Jamaica	3.8	0.4	3
	Lithuania	3.8	0.5	6
	South Korea	3.8	0.9	13
54	Philippines	3.6	1.4	12
	Turkey	3.6	1.0	10
68	Guatemala	3.2	2.5	3
	Thailand	3.2	0.7	12
75	Ivory Coast	2.6	1.0	4
	Moldova	2.6	0.8	5
	Ukraine	2.6	1.4	10
	Venezuela	2.6	0.8	9
	Vietnam	2.6	0.5	8
96	Azerbaijan	1.7	0.6	5
	Indonesia	1.7	0.9	12
Source: Transparency International, http://www.transparency.de/				

1999 CPI Notes:

1. 1999 CPI Score - relates to perceptions of the degree of corruption as seen by business people, risk analysts and the general public, and ranges between 10 (highly clean) and 0 (highly corrupt).
2. Surveys Used - refers to the number of surveys that assessed a country's performance. Seventeen surveys were used and at least 3 surveys were required for a country to be included into the 1999 CPI.
3. Standard Deviation - indicates differences in the values of the sources: the greater the standard deviation, the greater the differences of perceptions of a country among the sources.

APPENDIX I

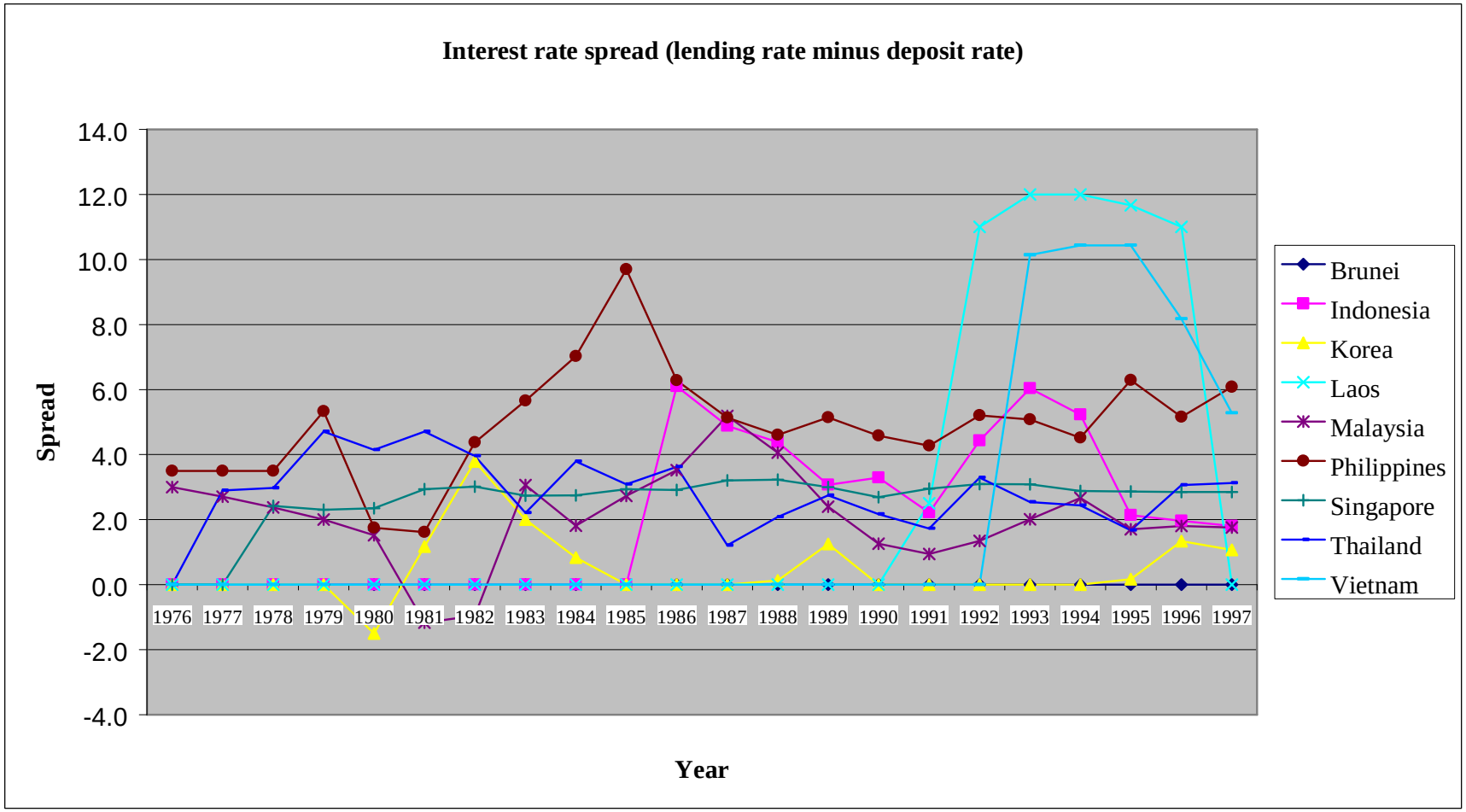
ANNUAL SURVEY OF FREEDOM COUNTRY SCORES, 1972-73 TO 1998-99										
Year	Brunei	Burma	Indonesia	Korea	Laos	Malaysia	Philippines	Singapore	Thailand	Vietnam
1972-73	NF	NF	PF	NF	PF	F	PF	PF	NF	-
1973-74	NF	NF	PF	PF	PF	F	PF	PF	PF	-
1974-75	NF	NF	PF	PF	PF	PF	PF	PF	PF	-
1975-76	NF	NF	PF	PF	NF	PF	PF	PF	F	-
1976-77	NF	NF	PF	NF	NF	PF	PF	PF	NF	NF
1977-78	NF	NF	PF	PF	NF	PF	PF	PF	NF	NF
1978-79	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1979-80	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1980-81	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1981-82	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1982-83	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1983-84	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1984-85	NF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1985-86	PF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1986-87	PF	NF	PF	PF	NF	PF	PF	PF	PF	NF
1987-88	PF	NF	PF	PF	NF	PF	F	PF	PF	NF
1988-89	NF	NF	PF	F	NF	PF	F	PF	PF	NF
1989-90	NF	NF	PF	F	NF	PF	F	PF	F	NF
1990-91	NF	NF	PF	F	NF	PF	PF	PF	F	NF
1991-92	NF	NF	PF	F	NF	PF	PF	PF	PF	NF
1992-93	NF	NF	PF	F	NF	PF	PF	PF	PF	NF
1993-94	NF	NF	NF	F	NF	PF	PF	PF	PF	NF
1994-95	NF	NF	NF	F	NF	PF	PF	PF	PF	NF
1995-96	NF	NF	NF	F	NF	PF	PF	PF	PF	NF
1996-97	NF	NF	NF	F	NF	PF	F	PF	PF	NF
1997-98	NF	NF	NF	F	NF	PF	F	PF	PF	NF
1998-99	NF	NF	PF	F	NF	PF	F	PF	F	NF
Source: Freedom House country ratings, http://www.freedomhouse.org										

APPENDIX J

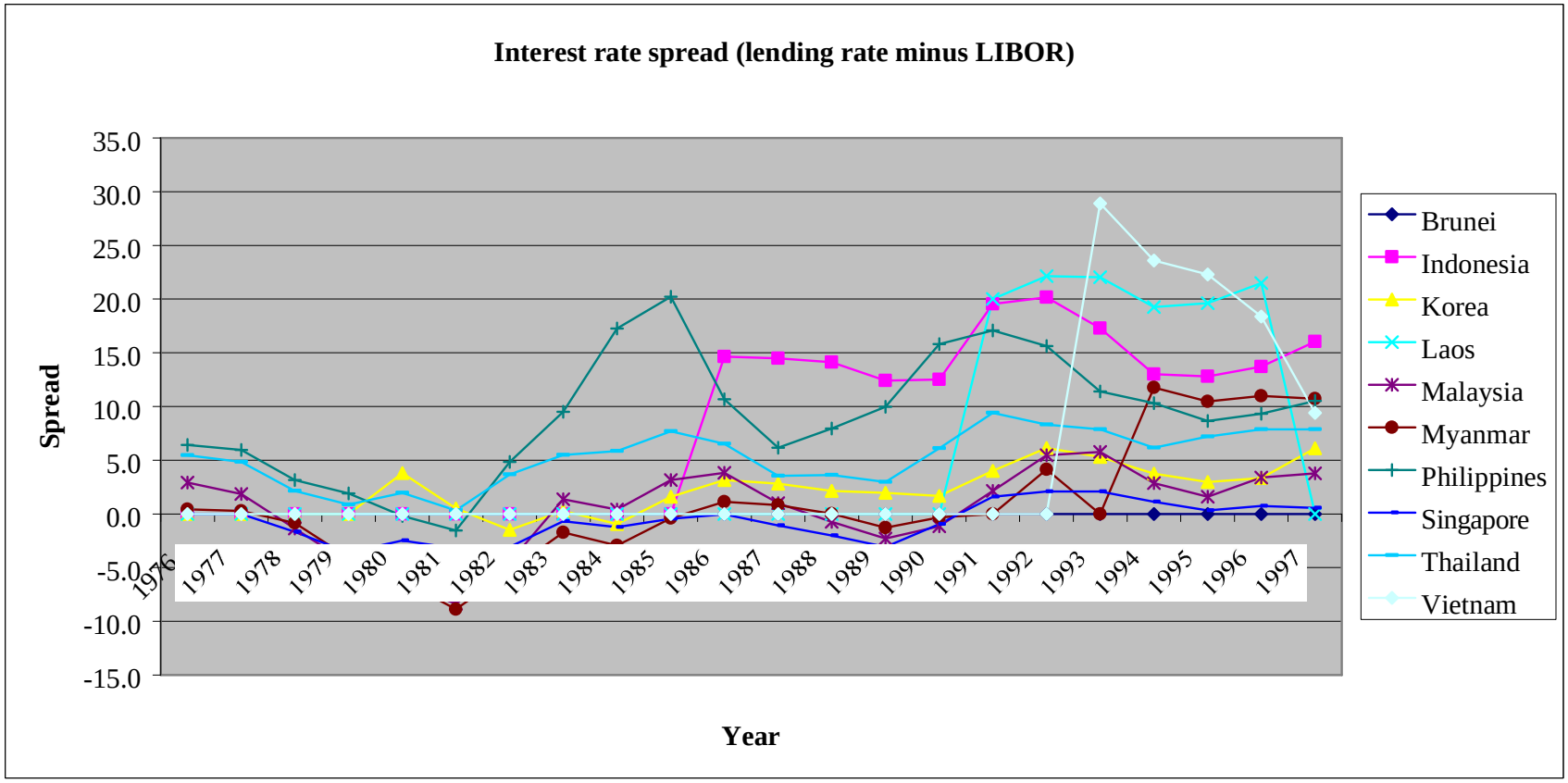
Scientists and Engineers in R&D (per million people)	
Countries	**1991-1996**
Brunei	na
Indonesia	na
Korea	2,636
Laos	na
Malaysia	87
Myanmar	na
Phillip	157
Singapore	2,728
Thailand	119
Vietnam	308

Source: WDI CD-ROM, calculated by author.

APPENDIX K


Interest rate spread (lending rate minus deposit rate)
Spread
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Year
Brunei
Indonesia
Korea
Laos
Malaysia
Philippines
Singapore
Thailand
Vietnam

APPENDIX L


Interest rate spread (lending rate minus LIBOR)
Spread
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Year
Brunei
Indonesia
Korea
Laos
Malaysia
Myanmar
Philippines
Singapore
Thailand
Vietnam

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