Indonesia's Economic Performance in Comparative Perspective,

and a New Policy Framework for 2049

Wing Thye Woo
University of California, Davis
Central University of Finance and Economics, Beijing
wtwoo@ucdavis.edu

and

Chang Hong
Clark University, Worcester
chong@clarku.edu

26 August 2009
Revised 28 September 2009
Edited Chris Manning 26 November 2009
Final editing 8 December 2009
Final, final editing 1 January 2010

Abstract

Indonesia began its war for economic development in 1949 after winning the war for political independence that started in 1945. This is a speculative paper because it is the exploratory paper of the planned Indonesia 2049 project which asks whether Indonesia's war on economic development would be won after one hundred years. We compared various dimensions of Indonesia's economy with those of two oil exporters (Mexico and Nigeria), three large populous developing economies (Brazil, China and India) and three Southeast Asian neighbors (Malaysia, Philippines, and Thailand). Indonesia's post-1965 economic performance was very good when compared with its own pre-1965 period, was above average when compared with the other eight countries, and was slightly below average when compared with the East Asian economies. Our tentative conclusion is that a new economic policy framework should be adopted in the second SBY administration to ensure that Indonesia in 2049 would be close to achieving the dreams of the *Generasi 1945*. This new policy framework must go beyond the twin Washington Consensus prescriptions of "getting prices right" and "getting institutions right" to include actions like "getting the role of science right" and "getting the conception of the reform process right".

We are thankful as always to Iwan Azis, Muhammad Chatib Basri, Christopher Manning, Anwar Nasution, Mari Pangestu, Arianto Patunru and Hadi Soesastro for lessons on Indonesian society-polity-economy. This paper is dedicated to Karl Kai Yao Cai born on November 6, 2010 to Chang Hong and Feng Xiang Cai.

1-January-2010

Indonesia's Economic Performance in Comparative Perspective, and a New Policy Framework for 2049

Wing Thye Woo
University of California, Davis
wtwoo@ucdavis.edu

and

Chang Hong
Clark University, Worcester
chong@clarku.edu

I. Introduction: Looking at Indonesia through a slightly different lens

The primary difficulty in assessing Indonesia's economic performance is whether to emphasize the half-empty part of the glass or the half-full part. Because the pursuit of excellence is an integral part of meaningful social progress and spiritual satisfaction, national improvement demands that Indonesia focuses on the empty part of the glass while drawing courage from its past achievements in filling the other half. Doubtless, while it is important to know what items should fill the rest of the glass in order to create the national cocktail that contains all the material aspects required for a just and prosperous society *(masyarakat adil dan makmur)*, it is at least just as important to know how to fill up the glass without breaking the container. This is the difference between dream and actualization, between talking the talk and walking the talk.

The nature of the 'talk' and the 'walk' is, inevitably, country-specific (e.g. *Pancasila*), but there are universal aspirations on some dimensions in the various national cocktails, e.g. the desire for a higher level of productivity, cleaner air and water, an accountable government, and harmonious international relations. On how to attain universal aspirations like these, a country would do well to remember the adage that "a wise man learns from the mistakes of others as well

as from his own." As Indonesia continues to seek better ways in economic management to reach the Millennium Development Goals and achieve environmentally-sustainable development, it would benefit from knowing even more about how other countries have tackled similar problems.

In brief, comparative economic analysis would be useful in guiding not only Indonesia's choice of a development path in the second term of the Susilo Bambang Yudhoyono (SBY) administration[1] but also in assessing the development records of his predecessors, notably that of Soeharto. Meiji Japan's adoption in 1868 of the practice of "stealing-with-one's-eyes" accelerated national development because, by enabling a nation to re-assess its existing situation with more than a comparison with its own past but also with the performance of other countries, this outward look mobilized the national will to run with the best in the world.[2]

This paper is the introductory paper in a series of several papers that we intend to write under the rubric of Indonesia 2049.[3] A long-term developmental perspective is necessary in order to answer questions like: Will the war on economic development be won, or close to being won, in 2049 (one hundred years after the beginning of the campaign) under the present development policy framework? And, what development policy framework should be adopted in the second SBY administration to ensure that this war could be won and bring Indonesia in 2049 closer to achieving the dreams of the founding *Generasi 1945*?

[1] McLeod (2005) is right that the primary problem of the first three presidents after Soeharto was the failure "to regain effective government." Our assessment is that the SBY administration in its first term had succeeded in putting governance back to working order (on par with that of Soeharto), and that the task of the second term is to use the government machinery to pursue economic development under a new policy framework.

[2] The term "comparative economic analysis" makes clear that learning is not a one-way street. Indonesia's development experience certainly offers important economic lessons (both positive and negative lessons) to other countries.

[3] This Indonesia 2049 project takes its name from two considerations. First, 1949 was the year that Indonesia began its war for economic development after winning the war for political independence that started in 1945. Second, we deem it important and necessary to think well beyond the usual 5-year horizon that had characterized Soeharto's *Repelita*'s and now framing the present *Rencana Pembangunan Jangka Menengah* in shaping the future of a country.

This first paper is (figuratively speaking) our big toe tipping into the pool of collective wisdom to receive guidance from other researchers, especially those in Indonesia, to improve our understanding of the fundamental economic issues and to help us develop an appropriate framework to analyse them. This paper is not an agenda for action. It is a call for action to develop a long-term inter-disciplinary perspective (built upon comparative analysis) on what Indonesia should aim to attain by 2049, and how to reach these targets.

Selecting the comparator countries

Based on our (admittedly, inadequate) review of the economic histories of a number of countries, and of the main development indicators over the 1960-2007 period, we see five characteristics that define Indonesia.[4]

First, oil (defined here as petroleum-cum-LNG) exports exerted a great due of influence on the performance of the Indonesian economy for most of the 1960-2007 period. Oil exports accounted for over 50% of total merchandise exports in the 1972-1986 period; and state revenue from the oil industry accounted for a significant proportion of state revenue e.g. 28% in 1970, 58% in 1975, 69% in 1980, 58% in 1985 and 34% in 1990. Petroleum production started dropping steadily beginning 1997, and combined with rising domestic petroleum consumption, Indonesia became a net petroleum importer from 2004 onward.

Second, Indonesia has a very large population, 230 million people in 2009. This makes Indonesia No. 4 in the world ranking on population size (out of 221 countries; see Table 1).

Third, Indonesia is geographically large. Its land area amounts to 1.9 million km^2, putting it No. 16 in the world in terms of land mass.

[4] We use the time span of 1960-2007 because this is the period that is covered in the World Development Indicators database.

Fourth, Indonesia is one of the poorer countries in the world. Its GDP per capita of $3,987 (PPP Indonesian $) in 2007 places it in the fourth quintile of the global distribution of income; No. 121 out of 180 territories.

Fifth, Indonesia is located in an untypical portion of the topics. Jeffrey Sachs (2000) points out that the overwhelming proportion of countries within the tropical belt is poor in sharp contrast to the situation within the temperate-zone. Sachs attributes the heavy concentration of the poor in the tropics to high environmental barriers to economic growth there. Indonesia is located in a very unusual part of the tropical belt because there are a disproportionate number of countries in this tropical neighborhood that have grown rapidly in the last 30 years and achieved middle-income and high-income status (Malaysia and Singapore, respectively).

Taking the preceding five characteristics into account, we picked 3 sets of countries for comparison according to the following 3 criteria:

- countries that are extremely populous and geographically very large. China, India and Brazil fulfill this criterion.
- countries that are populous, physically large and heavily dependent on the oil (petroleum and LNG) sector for export earnings and for state revenue for most of the 1960-2007 period. The dependence of state revenue on the oil industry is proxied by the ratio of oil exports to actual state revenue because the oil sector in most developing countries is controlled by state oil companies. Mexico and Nigeria satisfy this yardstick.
- countries located in Indonesia's immediate neighborhood that are large (by Southeast Asia standard) in population and land mass, and have always been capitalist economies. Malaysia, Thailand and Philippines fit this description best.

Table 1 lays out the characteristics of the 8 comparator countries picked by the above three criteria. In 1980, Nigeria exceeded Indonesia in the degree of dependency on the oil industry for export earnings and for (potential) state revenue. The oil export to total export ratios for Nigeria and Indonesia were 91.4% and 81.1, respectively; and the oil export to state revenue ratios were 111.5% and 107.1%, respectively. In 1980, China's oil export earnings accounted for a significant share of export earnings (21.4%) but not for potential state revenue (5.3%). Malaysia was significantly dependent on the oil industry in 1980; its oil exports were 50.3% of total exports and 30.4% of potential state revenue. Malaysia, however, is small in population and land mass compared with Indonesia, Mexico and Nigeria and hence faced less administrative burden (and, arguably, also less social complexity) in economic management than these three other oil exporters.

The Philippines is similar to Indonesia in income level, but, like Malaysia, is much smaller in population and land area. India is similar to Indonesia in population, land area and income level but does not have a history of oil-shaped development.

As Indonesia is now no longer an oil exporter, perhaps its future economic development is better guided by the lessons learned from China, India and Brazil rather than Mexico and Nigeria. The lessons from Mexico and Nigeria would be invaluable, however, to understanding more about Indonesia's past economic performance and the challenges of that legacy to switching to new engines of growth.

China is the world's star performer on the growth front for the last three decades, averaging an annual growth rate that is just slightly below 10%. GDP per capita (PPP constant 2005 International $) of China and Indonesia were, respectively, $525 and $1,350 in 1980; $1,103 and $2,085 in 1990; $2,674 and $2,724 in 2000; and $4,537 and $3,349 in 2006. Given

this phenomenal catching-up by China, we will pay particular attention to the bilateral comparison of Indonesia and China to draw out the lessons that each offers to the other.

The rest of this introductory Indonesia 2049 paper will have three parts:

- An assessment of the broad macroeconomic development experience, especially in the Soeharto era of 1965-1998[5], based on the evolution of the growth, stability and welfare indicators.
- An examination of the export sector to ascertain the pace of technological progress in the overall economy.
- A proposal for a New Policy Framework that help Indonesia transit to knowledge-led growth that is environmentally-sustainable[6] and broadly-shared.

II. The Macroeconomic Picture: Successful in Growth but Less Successful in Development

Output Growth and Price Stability

Part A of Table 2 reports the annual growth rates of GDP per capita (constant local currency unit) of the nine countries in the 1961-2007 period. The average annual growth rate for Indonesia in this long time span is 3.7%, an achievement that is worse than three of the other four East Asian economies – China 6.5%, Malaysia 4.0%, Thailand 4.7% – but better than all four comparator countries outside of the region – Mexico 2.0%, Nigeria 1.2%, India 2.9%, Brazil 2.4%. If we look only at the post-Soekarno period of 1967-2007, then Indonesia's growth rate of 4.2% is exceeded only by China (7.2%) and Thailand (4.8%). Indonesia, in short, had a high, though not spectacular, growth rate in the international context.

[5] See Marks (2009) on how the policy regime of the short-lived Habibie regime differed from that of Soeharto.
[6] Garnaut (2009) has summarized Indonesia's vulnerability to climate change, and put its potential climate change policy in an international context.

The stability of the growth in these nine countries is measured by the coefficient of variation (COV),[7] which is reported in the second half of Part A in Table 2. As Indonesia's COV is exceeded by the COVs of six countries in the 1961-2007 and 1967-2007 periods, output growth in Indonesia was more stable than in most countries. Overall the comparative perspective would judge Indonesia's growth to be high and stable.

Part A of Table 2 reveals one strong lesson for growth-oriented macroeconomic management, which is that market-friendly policies and openness to foreign trade and investment promote growth. China began tentative market-oriented reforms and cautious opening of its economy in December 1978, and then greatly deepened these liberal economic policies in February 1992 after the implosion of the Soviet Union. The result is that China's growth rates in the 1992-2007 period were generally higher than in 1979-1991.[8]

In December 1991, India used a balance of payments crisis as the political opening to begin deregulation across the board (e.g. trade and investment liberalization, relaxation of price controls) and privatization of state-owned enterprises. The outcome was that Indian growth in the 1992-2007 period (5.0%) was higher than in the 1961-2007 period (2.9%) and the 1979-2007 period (3.7%). The Chinese and Indian experience made it clear that the higher growth in Indonesia after 1966 was generated by the more liberal economic policies implemented by the governments that followed Soekarno.

Part B of Table 2 compares the inflation experiences of the nine countries. It shows that even though Indonesia's inflation has fallen with each successive regime (Soekarno, Soeharto and post-Soeharto), it is high by international comparison. The average annual inflation rate of 18.8% in the Soeharto years was higher than the inflation rate in five comparator countries, and

[7] COV=(standard deviation of series)/(mean value of series)
[8] This is reflected China's average growth rate in the 1992-2007 period (9.5%) being higher than that in 1979-2007 (8.6%).

the inflation rate of 8.7% in the post-Soeharto period was higher than that in seven comparator countries.

The purchasing power parity hypothesis would predict that Indonesia's higher inflation rate would lead to a higher depreciation rate for the Rupiah. This prediction is borne out in Part C of Table 2. In the Soeharto era, Indonesia had an inflation rate higher than the inflation rates in China, India, Malaysia, Thailand and Philippines, and this outcome has correspondence in the rate of Rupiah depreciation (11.7%) being larger than the depreciation of the currencies of China (4.8%), India (5.6%), Malaysia (-0.2%), Thailand (1.5%), and Philippines (7.6%). The lesson here is that until Indonesia can lower its inflation rate, a continual weakening of the Rupiah is inevitable and necessary. The fact that this inevitable weakening of the rupiah could occur precipitously occasionally means that the rupiah is more vulnerable to speculative attacks not justified by the fundamentals. These unjustified speculative currency attacks could sometimes be ended by an extreme squeeze in liquidity temporarily (as in June 1987 and February 1991) but this shock therapy could also not work (as in August 1997 and, and even when further tightened as in October 1997) in addition to sending production into a tailspin as in 1998.[9]

Human Development Indicators

The benefits of Indonesia's higher than average growth rate are shown in Table 3 which reports the GDP per capita (PPP constant 2005 International $) of the nine countries from 1960-2006.[10] China ranked No. 9 in 1960 and 1980, and Indonesia ranked No. 8 and No. 7 in these years. China's spectacular growth rate raised its rank to No. 5 in 2006, and Indonesia's high

[9] See Cole and Slade (1996) about the 1987 and 1991 episodes which have been called Sumarlin shock treatments after the then Minister of Finance Johannes Sumarlin; and see Djiwandono (2000) about the 1998 case.
[10] The World Development Indicators database reports this series starting only 1980. We have used the growth rates in Table 2 (constructed from constant local currency units) to estimate the 1960 values. The conclusions presented here still hold broadly if the starting point for comparison is moved from 1960 to 1980.

growth rate raised its rank to No. 6. The income levels of Nigeria and Philippines in 1960 were twice that of Indonesia, but in 2006, Indonesia's income was almost twice that of Nigeria and 30% higher than in the Philippines.

A country's economic performance is of course judged by more than its growth and inflation record. In particular, it is a matter of simple social justice that an absolute increase in the welfare level of the middle and income classes is greatly valued. A relative increase in welfare of the poor in the context of absolute increases in the welfare of every group is desired provided that the means to reduce disparity in welfare does not distort work and investments so much that aggregate income growth is significantly reduced.

There are three income distribution mechanisms (a) "natural" market-based trickling-down channels, (b) "mandated" state-directed transfers, and (c) voluntary private donations. If GDP growth is high and the trickling-down mechanism fails to channel any of the large gains to the poorest groups, hard-headed social justice would require that the state-directed transfer mechanism be beefed up to increase the income of the poor so long as the tax-and-transfer scheme does not undermine the existing high growth path.

Tables 4 and 5 report several indicators of different aspects of welfare. The two obvious performance criteria are the amount of absolute increase in the index over time, and whether Indonesia's final ranking on that index is better than No. 6, Indonesia's rank in GDP per capita in 2000 and 2006.[11] We have chosen to show multiple proxies for welfare which might show a similar time trend rather display just one "best proxy" because we think that some of the variables in these nine countries were sometimes measured wrongly or inconsistently and so the

[11] For the rest of this section of the paper, GDP will refer to the GDP measured in PPP 2005 International $ as in Table 4. We will also use the word income and GDP interchangeably.

use of only one welfare proxy would not give us the general context to judge the plausibility of the value of any particular variable in a specific year.

Part A of Table 4 reports the proportion of population that is undernourished. Of the six countries for which data is available in 1971, Indonesia has the highest proportion of malnourished people (47%) – only slightly above the 46% in China whose per capita income was less than half of Indonesia's. (China was the poorest country in the group in 1971.) Indonesia made spectacular improvement in reducing malnutrition over the 1971-2004 period. Its undernourishment rate (UNR) was 6% in 2004, which is lower than in China (9%), Brazil (7%), and Thailand (17%), which were richer than Indonesia by 35%, 160% and 120% respectively. Indonesia's UNR was only marginally lower than the best performers, Mexico (5%) and Malaysia (5%), whose incomes were three-and-a-half times higher. Having lowered the UNR by the largest amount (41 percentage points) in the group, Indonesia ranked No. 3 on this welfare indicator in 2004; punching above its weight of being No. 6 in the income ranking. However, praise for superior achievement on welfare as measured by UNR can be made only cautiously.

This is because the malnutrition indicator is the only case in which Indonesia achieved a ranking above its income rank. For "life expectancy at birth" (LEB), Part B of Table 4, we chose 1967 as the base year because 1960 was an atypical year for China.[12] Life expectancy in Indonesia increased by 22 years in the 1967-2006 period to raise its cross-country rank on the LEB welfare indicator to No. 7 from No. 8. This improvement still leaves Indonesia below its income rank of No. 6.

Indonesia's infant mortality rate (IMR) dropped 102 pints over 1960-2006, an improvement that was almost matched by India, which produced a drop of 100 points, see Part B

[12] China was in the middle of a man-made starvation, which subsequently killed 30 million people, which was why China's life expectancy rose dramatically from 36.3 years in 1960 to 59.6 years in 1967.

in Table 4. Although the decline in Indonesia's infant mortality rate was the biggest absolute decrease for the nine countries, its rank of No.6 on the IMR proxy of the welfare index in 2004 is the same as its rank of No. 6 on the income index.

It is noteworthy that Philippines, whose income in 2004 is 10% lower than Indonesia's, had a higher life expectancy (71.4 years) and a lower infant mortality rate (23.6 per thousand) than Indonesia's (where were 68.2 years, and 26.4 per thousand, respectively). These two national differences in LEB and IMR are not large compared to the gaping difference in the malnutrition rates of Philippines and Indonesia (16% versus 6%). This discrepancy in the amount of national differences across welfare indicators, resulting in a large difference between Indonesia's ranking on the LEB and IMR indicators on one hand and its ranking on the UNR indicator on the other hand, might mean possible problems with the malnutrition data for Indonesia.

We have two general observations from our review of the welfare indicators in Table 4, The first observation is that while Indonesia's development strategy has raised the overall welfare of the poor in absolute terms, the international comparison suggests that the welfare of the poor could have raised more; in some cases, very much more. This point comes out clearly when we compare the proportion of the population with access to "improved sanitation facilities" in Indonesia and the Philippines. It increased from 51% in 1990 to 52% in 2006 for Indonesia; and from 58% to 78% for the Philippines.[13]

Our second observation is that the reasons for the inadequately impressive improvements in the lives of the poorest are that the government development expenditure was very inadequate in some years (especially in the 1998-2000 period of the Asian Financial Crisis), and that it has

[13] The proportion of population with access to "improved water source" rose from 72% in 1990 to 80% in 2006 for Indonesia; and from 83% to 93% for Philippines. More detailed data are available from the authors.

in general not been targeted towards the poorest people. For example, the impressively large fall in Indonesia's infant mortality rate, according to international comparison, is just in line with Indonesia's impressive income growth, the IMR in 2006 was not spectacularly better than expected. The only aspect of welfare that was possibly a spectacular success was the reduction of malnutrition -- and the deviation of UNR from the ranking in other welfare proxies raises the spectre of mis-measurement of the UNR.[14]

One aspect of welfare that is sometimes omitted is the level of educational attainment. This is a welfare indicator because it proxies the degree that an individual has been empowered to improve her productive capacity. This view has been endorsed in the Human Development Index (HDI) computed by the United Nations Development Program. The HDI is an average of three items: life expectancy, GDP per capita, and educational attainment.

Table 5 shows the level of educational attainment for the nine countries in the 1990-2005 period. Indonesia was ranked No. 6 in the persistence in enrollment in primary education in 2004[15], an outcome that is in line with its income rank and hence not noteworthy in any way. What is dismaying is that Indonesia ranked No. 7 in the enrollment rates in secondary education and tertiary education, an outcome that could slow down the pace of technological acquisition and make it harder for Indonesia to climb the value-added chain. In summary, Indonesia's investment in human capital investment has been inadequate, producing an education system that is lagging behind economic development.

[14] The small rises in the proportion of population with access to improved sanitation facilities and to improved water source in 1990-2006 reveal that public investment in basic infrastructure has not kept pace with population growth and with income growth. The large amount of public investment enabled by the huge oil revenue had not been geared towards meeting the basic needs of the population.

[15] This is consistent with Indonesia's No. 6 rank in the literacy rate because the literacy rate is based on meeting the minimum level in literacy and numeracy, a condition that is satisfied with the completion of primary education.

Assigning Grades to the Management of the Macro-economy and the Meeting of the Basic Needs of the Population

To sum up, Indonesia has certainly not punched above it weight in raising the welfare of the poor, especially the welfare of the poorest. Soeharto was in charge for thirty years in the 1960-2007 period, and so this average outcome in welfare improvement is attributable to his policy priorities and the level of his administrative ability. The Soeharto government was clearly concerned about the poor, but its policies were not pro-poor in the sense that they did not raise the welfare of the poor to be above the income rank of Indonesia.

From most accounts, the Soeharto government had focused very heavily on poverty alleviation when it first took power in 1966. After major achievements in the first two decades of the Soeharto period, the mediocre overall performance on the anti-poverty front after 30 years of Soeharto rule clearly reveals that the anti-poverty focus had declined substantially over time. It is probable that this policy shift was made easier by the fact that the probability of revived communist activities in the countryside had decreased greatly over time. In 1965, when General Soeharto assumed *de facto* political power, Indonesia had the largest communist party outside of the USSR-China bloc, with much of its strength in the form of peasant organizations.

By the historical standard of Indonesia, i.e. in comparison with the Soekarno era, Soeharto had a highly successful growth and inflation record and a good record in increasing the welfare of the poor, we give Soeharto an A+ for macroeconomic management and a B+ for poverty alleviation. By the broad international standard, i.e. in comparison with the eight selected countries, Soeharto's grade for economic growth and stabilization is reduced to A, maybe, even to A-, because the high GDP growth was marred by high inflation and the near financial crisis generated by the bankruptcy of the state-oil company (Pertamina) in 1975 in the

middle of an oil boom; and the grade for general improvement is lowered to B for the mediocre improvement in the welfare of the poor. By the more stringent East Asian performance standard, Soeharto got an A- to B+ grade for macro-management and a C+ grade for meeting the basic needs of the population, although the rate of poverty decline was rapid amongst East Asian countries through to the late 1980s (World Bank, 1990; Booth, 1993). Soeharto should have focused more on raising the investment-GDP ratio to those in China, Thailand and Malaysia (e.g. by being more welcoming to foreign direct investment in the non-oil sector earlier); more on efficient use of the state transfer mechanism to supplement the trickling-down mechanism; more investment of Indonesia's oil wealth on the poor (e.g. basic infrastructure) and in the poor to enable them to earn higher income through acquisition of skills that are available only in secondary education.

III. A Key Microeconomic Dimension: The Export Sector

Indonesia's export sector gets special attention in our cross-country analysis because the economic growth in every fast growing East Asian economy has been almost universally attributed to "export-led industrialization." This view comes from the large increases in the export-GDP ratios of these countries. The comparison of export performance across countries might therefore help to identify growth mechanisms

In analyzing Indonesia's export sector, we bear in mind two observations. The first consideration is the transformational role of exports in the best growth performers in East Asia. Their growth is marked by the steady climb of their exports up the value added chain; moving quickly out of the export of processed agricultural products into the export of manufactured products, and moving rapidly from low-tech manufactured products into high-tech manufactured

products. The second observation is the general dismal performance of non-oil exports (and of general economic performance) in large, populous oil-exporting countries.[16] It almost appears that there is a curse that comes along with a large natural resource endowment.

One easy way to assess the progress that a country is making on the expansion of its technological capability is to examine how the composition of its export is changing. There are two reasons for why we examine the composition change in export rather than the composition change in GDP. First, the cost of subsidizing the production of a high-tech product to the point that it becomes a net export is much more expensive than when the subsidized product in the GDP data substitutes for just some of the imports. The higher cost makes this subsidy-induced net export phenomenon less likely to occur. Second, the appearance of a subsidy-induced export will quickly catch the attention of foreign competitors, who would then lodge anti-dumping charges with the WTO. This policing by foreign competitors also makes the subsidy-induced net export phenomenon less likely to occur.

In applying this export-composition procedure to assess technological acquisition, we have to take into account the Dutch Disease phenomenon that is common in oil-exporting economies. The Dutch Disease literature emphasizes that because the oil export earnings can cover a large part of the country's imports, the resulting exchange rate is "overvalued" in the sense that it needs to induce only a small amount of non-oil exports in order to achieve a zero trade account balance. Such an "overvalued" exchange rate, it is often argued, militates against the appearance of a dynamic manufacturing sector and makes export-led industrialization difficult.

[16] The classic statement and study of the general dismal economic performance of populous oil-exporters is by Alan Gelb (1988).

Perhaps partly in recognition of the twin facts, one, that Indonesia faces the Dutch Disease; and, two, that Indonesia has a higher inflation rate than most of its partners, exchange rate management has generally been geared toward maintaining export competitiveness; before mid-1997, by a crawling peg with occasional large discrete devaluations; and, from 1998 onward, mostly by floating.

In the Woo, Glassburner and Naustion (1994) narrative of the Indonesian economy, the 50% devaluation of the rupiah in November 1978 in the absence of balance of payments pressures was identified as a key reason why Indonesia, unlike other populous oil exporters and Latin American countries, did not experience an external debt crisis in the 1980s. The 1978 rupiah devaluation prevented the non-oil traditional export sector from being decimated by the worsening of the Dutch Disease caused by the 1979 OPEC oil price increase, and hence allowed Indonesia to earn enough foreign exchange to service its external debt in the 1982-85 period to avoid an external debt crisis.

Table 6 summarises the change in the composition of total exports over time.[17] Each type of export product is normalised two ways: by GDP and by total exports. The export categories used in Table 6 are found in Appendix 1.

It should be noted that a very high export-GDP ratio (say, a value close to or beyond 100%) does not usually indicate that most of the goods made in the country are exported. For example, the high export-GDP ratio could be the result of the country being a regional shipping center (i.e. an entrepot) where the goods are loaded from one foreign ship (imports) into storage, and then from storage to another foreign ship (exports). Or the high ratio could have resulted from the country being highly integrated into the international production network that links the

[17] The choice of the particular years (1970, 1981, 1987, 1996, 2005) will become clear in our discussion of national experiences.

fragmented production spread across many countries, and the same item could enter a country two times or more during the production period -- resulting in double counting or more.

In light of the two preceding examples, and the fact that the export-GDP ratio is naturally exaggerated in any case because export is measured in gross value and GDP is measured as value added makes it important to emphasize two particular difficulties in drawing definite conclusions from the export-GDP ratio. First, the country (country A) in which the final stage of manufacturing is located will report a higher export value for the good than the country (country B) which had exported to it the almost-finished good even though A might have added less value than B, e.g. B manufactures hard disks and processor chips, while A merely screws both items on to the motherboard. So a comparison of export-GDP ratios does not necessarily reveal which the relative contribution of export growth to GDP growth.

The second problem is that the fragmentation of production also undermines the ranking of the technological level of exports as determined by the SITC criteria, which would in our example classify A as a producer of high-tech goods and country B as a producer of medium-tech goods.[18] The reminder is to interpret the export composition indicators with caution and with reference to other evidence.

The Indonesian Case

We highlight three features in Indonesia's export performance summarized in Figure 1 (the export-GDP ratios for the different goods) and in Figure 2 (the sectoral composition of total export). First, there has been an acceleration of exports in the last few years. The overall export-GDP ratio rose from 14.6% in 1967 to stay around 25% in the 1973-1997 period (with

[18] Another interesting implication from production fragmentation is one should not evaluate investments on the basis of sectoral linkages; see Athukorala and Santosa (1997).

substantial deviations during periods of sharp price oil changes), and then on to an unprecedented 36.2% of GDP in 2005. [19]

Second, oil export (includes LNG export) was very important in the 1970s and 1980s, usually accounting for more than 10% of GDP in the 1972–1992 period and for about 50% of total export in the 1972-1987 period. The Dutch Disease was strongest in the 1974-1985 period when oil export was about 18% of GDP and 60 to 80% of total export. The November 1978 rupiah devaluation did blunt the Dutch Disease impact that appeared with the OPEC's doubling of the oil price in 1979. Of the 11.1 percentage points increase in the export-GDP ratio in 1978-1979, 5.5 percentage points of it is due to the rise in non-oil exports, most probably induced by the 1978 devaluation.[20]

Third, the first sustained high spurt in manufactured exports (SITC 5 to 8) occurred in the second half of the 1980s. They grew rapidly from 3.1% of GDP in 1984 to 13.1% in 1993 before stagnating in 1994-1997.[21] This dramatic rise of manufactured exports increased it export share from 11% in 1984 to 51.1% in 1993. Manufactured exports re-started sustained growth in 2002 to reach 25.9% of GDP in 2005 to account for 71.6% of total exports. Most of the new manufactured exports that appeared after 1985 were in the medium-low tech and low-tech category. Of the 26 percentage points increase in the manufactured export-GDP ratio in 1985-2005, 21 percentage points came from the increase in medium-low tech and low tech goods.

[19] We discount the unusually high export-GDP ratios in 1998-2000 because they were temporary deviations caused by the interaction between, one, the fast and deep depreciation of the rupiah during this period and, two, the slower rise in the prices of domestically-produced products.

[20] This decomposition is computed from the rise in manufactured exports from 1.0% of GDP in 1978 to 1.9% in 1979, non-oil raw materials exports from 6.7% to 11.3%, and oil export earnings from 14.6% to 20.2%.

[21] James and Fujita (1997) estimated that the employment induced by manufactured exports was 1.3% of the workforce in 1980, 2.7% in 1985 and 6.7% in 1990. Creation of more jobs by increasing manufactured exports that use low-skill labor is likely to be the most effective way to improve the welfare of the poor because Alisjahbana and Manning (2006) reported that, in 2002, while the unemployment rates of the poor, near-poor and non-poor differ little (being 11.2%, 10.2% and 9.8% respectively), their underemployment rates differ greatly (being 17.3%, 15% and 10.1% respectively).

The Export Experiences of Other Countries[22]

We start with the group of other significant oil exporters (Nigeria, Mexico and Malaysia) to ascertain the impact of the Dutch Disease on the performance of the non-oil exports. The Nigerian export sector is completely dominated by oil. Since 1974, oil exports have exceeded 30% of GDP and 90% of total exports. Manufactured exports were negligible in the 1962-2002 period; and non-oil raw materials exports dwindled from 8% of GDP (which was about 80% of total exports) in 1962-68 to less than 1% of GDP in 2002 (which was below 1% of total exports). Overall, Nigeria has performed just as badly in structural transformation as in economic growth and stability.

In examining Mexican export experience (see Figures 3 and 4), two facts are important. First, the two crises in the 1980s and 1990s caused large devaluations of the Mexican peso[23], developments that enhanced non-oil exports. Second, the establishment of the North American Free Trade Area (NAFTA) -- involving Canada, United States and Mexico -- on 1 January 1994 promoted the outsourcing of US production of goods to Mexico.

. Mexico had only one brief period, 1982-85, where there could have been significant Dutch Disease. Oil exports amounted to over 50% of exports in that period but since they did not reach 10% of GDP at its height, the Dutch Disease impact was less severe than in Indonesia and Nigeria. It is noteworthy that there is a upward trend in the ratio of manufactured exports to GDP, albeit at a lower rate during the 1982-85. Manufactured exports went from 3.3% of GDP

[22] For most of the countries, the graphs showing their export performance are available upon request.

[23] The first economic crisis was the extended external debt crisis that began at the end of 1981 and last into 1987. Over this period, the Mexican peso depreciated over 9,100%, and the average annual GDP rate was only 0.1%. The second crisis (known as the "tequila crisis") saw a 125 depreciation of the exchange rate during 1995-96, and an average annual growth rate of -0.5%.

in 1982 to 5.4% in 1985, and jumped to 9.2% in 1986, pushing the share of manufactured exports from 35% in 1985 to 50% in 1986.

The next discernible jump in Mexican manufactured exports occurred when NAFTA came into being in 1994: manufactured exports were 9% of GDP in 1993, 11% in 1994, and 21% in 1995. Admittedly, the high 1995 ratio had to be temporary because prices of domestics goods had not fully responded to the large amount of peso depreciation in that year. This could partly explain why manufactured exports averaged only 12.7% in 2004-5 (the last two years in dataset) – but the 2005 value is still higher than the value of the ratio in any year before 1995.

The most notable feature of Mexican manufactured exports is the strong growth of medium-high tech and high tech products throughout the periods of macroeconomic turbulence and Dutch Disease, allowing them to replace non-oil raw materials exports in importance. The export of medium-high tech and high tech products was 0.7% of GDP in 1970, 1.7% in 1982, 3.3% in 1985, 6.1% in 1993, and 9.4% in 2005. The outcome is that the export shares of each product in 1970 and 2005 are:

- medium-high tech and high tech manufactured products 13.3% versus 56.3%
- low tech and medium-low tech manufactured products 20.7% versus 19.2%
- non-oil raw materials 56.8% versus 9.6%
- oil (includes LNG) 3.6% versus 13.4%

Malaysia is the most export-oriented country according to the export-GDP ratio; see Figures 5 and 6. Malaysia's export-GDP ratio of 54% in 1962 was much larger than the export-GDP ratios of Brazil, China, India, Indonesia, Mexico and Nigeria in 2005. Furthermore, this ratio reached 155% in 2005, with this very high value identifying Malaysia as an important node in the international production chain.

In comparing the oil export-GDP ratios of Mexico and Malaysia, one would expect Malaysia to have experienced effects more severe Dutch Disease effects than Mexico because Malaysia had a bigger oil boom from the 1979 OPEC price increase and a more durable oil boom. The Mexican oil export-GDP ratio was less than 10% in the peak 1982-85 period but Malaysia's ratio averaged 13.6% in the same period. The Mexican boom lasted from 1982 to 1985 while Malaysia had two booms: 1980-1992 and 2000-2005.

However, despite the bigger and longer oil boom in Malaysia and despite Mexico's preferential NAFTA access to the US market, in 2005, the composition of Malaysian exports is almost the same as Mexican exports, and Malaysia appears to be a much more important node than Mexico in the international production network. Medium-high tech and high tech manufactured exports accounted for 54.9% of exports in Malaysia, and 56.3% in Mexico. Medium-high tech and high tech manufactured exports amounted to 85.3% of GDP in Malaysia, and 9.4% in Mexico.

The export experiences of the Philippines and Thailand also show that they started their steady climb to permanently higher levels of manufactured exports in the 1985-1988 period, just as in Indonesia and Malaysia. This common export phenomenon across Southeast Asia supports the hypothesis that the drastic appreciation of the yen (which induced Japanese to relocate production abroad and caused US and Western Europe to look elsewhere for cheaper manufactured imports[24]) is responsible for the structural changes in the export composition of Southeast Asia.

Among the large, populous economies of Brazil, China, India and Indonesia, China showed the largest increase in the export-GDP ratio in the 1970-2005 period, from 1.8% to

[24] This explains why the bilateral US-Japanese current account imbalance was reduced but the overall US current account imbalance was largely unchanged.

34.1%, reflecting its self-isolation under the central planning regime; see Table 6. China's rapid integration into the international economy was matched by its rapid movement up the value-added ladder. By 2005, China's exports of high and medium-high tech exports was 17.6% of GDP compared with 3.6% for Brazil, 3.2% for India, and 4.9% for Indonesia. These 2005 amounts translated into high and medium-high tech exports accounting for 51.6% of China's total exports, 27% of Brazil's, 15.6% of India's, and 13.6% of Indonesia's. In export performance, China resembled the Southeast Asian economies of Malaysia, Thailand and Philippines more than Indonesia resembled them.

Explaining the Technological Transition in the Export Sector

The most pertinent observations about the rise of manufactured exports in the oil economies of Indonesia, Malaysia and Mexico are that, one, they coincided with changes in the external economic environment; and, two, the Dutch Disease was not a barrier to export-led industrialization.[25] The transition to manufactured exports in the four Southeast Asian countries were greatly helped by the massive inflow of Japanese investment after the Louvre Accord forced the Japanese Yen to appreciate from 238 Yen per USD in 1984 to 128 Yen per USD in 1988.

The secular rise in Mexico's export-GDP ratio, even during the oil boom, reflected the steady migration of production from the United States since the early 1970s. The accelerated rise in the export-GDP ratio after the inception of NAFTA in January 1994 confirms the primacy of external economic development in inducing structural transformation.

The different transformation rates of the Southeast Asian export sectors in response the same common external shock (the Louvre Accord) are largely the results of national differences

[25] Our second conclusion is supported by Coxhead and Li (2008).

in receptivity toward FDI, in maintenance of law and order[26], and in the stock of human capital. Indonesia was less welcoming to FDI than China, Malaysia, Philippines and Thailand. Indonesia also had a less educated labor force, see Table 5. The enrollment in secondary education in 1991 in Indonesia (44%) was lower than in China (48%), Malaysia (57%), and Philippines (70%) but higher than in Thailand (32%). By 2001, Thailand's secondary education enrollment rate (66%) was higher than Indonesia's (57%).

The pool of high-level creative talent in China, Malaysia, and Thailand was also larger than in Indonesia; see Table 7. In 2000, the number of researchers in Research and Development (R&D) was 212 per million people in Indonesia, 547 per million in China, 222 per million in Mexico, 276 per million in Malaysia, and 289 per million in Mexico. This outcome was most probably the result of the Indonesian government and businesses spending less on promoting R&D than in the other countries. In 2000, Indonesia spent 0.1% of GDP on R&D while China spent 0.9%, Mexico 0.4%, Malaysia 0.5%, Philippines 0.15% and Thailand 0.3%.

IV. The Need for a New Economic Policy Framework

The Soeharto economic policy framework has essentially been continued by his successors except for one big change, the decentralization of the fiscal system in 2001. The Soeharto economic policy framework has four major major characteristic. The first is fairly orthodox management of macroeconomic balances. The government budget deficit has not been a destabilising element, and this has been guaranteed by forbidding the central bank to monetise it. However, the central bank has been known to make bank reserves available to state-owned banks to enable them to extend cheap loans to state-linked bodies and private enterprises at the

[26] Thailand's export response was stronger than Philippines's in the 1985-88 period, probably, because of the Japanese perception that security was higher in Thailand.

behest of ministers.[27] This was indirect monetization of quasi-state deficits because the government was in effect guaranteeing the loans. The fact that Indonesia's inflation was generally higher than its Southeast Asian neighbors suggests that the monetization of the quasi-state deficits was not insignificant in size.[28]

The second major characteristic is the roller-coaster nature of microeconomic incentives, i.e. a constant cycle of intervention and liberalization. During normal times, there would be a steady proliferation of rent-seeking regulations (e.g. in 1996, Soeharto's grandson was put in charge of certifying that beer sold in Bali had paid the new sales tax) and nontariff barriers. While these interventions were not always motivated by rents because Soeharto had a strong streak of economic nationalism and was partial to proposals of jump-starting high-tech industries, the implementation of the trade barriers were often rent-seeking in nature. At times of balance of payments difficulties, many of these distortions would be removed wholesale,

The third major characteristic is the virtual neglect of getting the infrastructural institutions (i.e. software) of a market economy right. For example, the adjudication process of commercial disputes was widely considered to be a corrupt one[29], and the political succession process was not institutionalized. Such institutional flaws created uncertainties that discourage large long-term investments by the private sector.

The fourth major characteristic was too much reliance on trickling down to improve the welfare of the poorest segment. The fact that economic nationalism was allowed to delay Indonesia from offering the same incentives to induce FDI as Malaysia and Thailand did to

[27] For example, the central bank extended loans to the Timor (KIA) Car project of Soeharto's son, Tommy. In the 1970s, Bank Indonesia had the *Kredit Likuiditas Bank Indonesia* (Bank Indonesia's Liqudity Credit) facility to extend credit through the state-owned banks to targeted sectors.

[28] On external balance management, there were constant exchange rate adjustments to accommodate Indonesia's higher inflation rate; and constant attention on the amount of short-term external debt because the state-oil company, Pertamina, had almost defaulted on its external loans in 1975 (during the oil boom!).

[29] Transparency International rated Indonesia the most corrupted country in the world in 1995 (ranked Indonesia No. 41 out of 41 countries surveyed), and ranked Indonesia No. 126 out of 180 countries surveyed in 2009.

create low-skill jobs also suggests that the welfare of the poor was society was not always a top policy priority.

In our opinion, the primary reason why the Soeharto economic policy framework displayed the above four characteristics is because many of its core principles are based on the Washington Consensus[30], the present version of which is summed up by the twin prescriptions of "get your prices right" and "get your institutions right."[31] The adoption of the Washington Consensus was quite natural because it has reflected the mainstream development philosophy since the 1980s[32], and because it enabled economic performance under Soeharto to be superior to the economic performance under Soekarno.

The Washington Consensus framework is unfortunately inadequate in several key areas, including two that are especially important for Indonesia.[33] The non-interventionist bias of the Washington Consensus can not only wrongly deny the state its rightful role in providing an important range of public goods but also not recognize the limitations of self-help (i.e. the invisible hand) in overcoming growth obstacles. The latter makes the Washington Consensus

[30] The term "Washington Consensus" was coined in 1990 by John Williamson when he codified the development philosophy of the World Bank and the IMF into ten principles: (1) Fiscal discipline, (2) A redirection of public expenditure priorities toward fields offering both high economic reforms and the potential to improve income distribution, such as primary health care, primary education, and infrastructure, (3) Tax reform (to lower marginal rates and broaden the tax bone.), (4) Interest rate liberalization, (5) A competitive exchange rate, (6) Trade liberalization, (7) Liberalization of inflows of direct foreign investment, (8) Privatization, (9) Deregulation (to abolish barriers to entry and exit), and (10) Secure property rights. In 1996, the World Bank recruited John Williamson to be the Chief Economist for the South Asia Department.

[31] Or "market fundamentalism" and "governance fundamentalism" respectively.

[32] The theme of comprehensive deleterious effects from price distortions was discussed in Chapter 6 ("Pricing for Efficiency") of the 1983 issue of the World Bank's World Development Report (WDR), entitled Management in Development. This theme was then elaborated in the 1985, 1986 and 1987 issues of the WDR. According to a retrospective written by the Development Economics Vice Presidency (2005) of the World Bank, "during the mid to late 1990s, there was a re-evaluation of the idea that market liberalization alone would spur development." Perhaps as a result of this re-thinking, the 2002 issue of WDR was titled Building Institutions for Markets. See Woo (2004).

[33] One could argue that there are several versions of the Washington Consensus because the WDRs have highlighted a broad array of topics, and because a diversity of views exists within the World Bank, the IMF and other Washington-based organizations. Our usage of Washington Consensus refers to the variety that views development issues primarily through the lenses of price distortions and institutional imperfections.

incapable of coming up with effective solutions to issues like meeting the basic needs of the poorest segment of the population.

The second analytical inadequacy of the Washington Consensus is that it is too hooked upon trade-led growth to acknowledge that science-led growth is the ultimate engine of growth in a predominantly private market economy, and that the state can play a leading role in facilitating technological innovations. Without the recognition that trade accelerates the diffusion of technical knowledge, the state would overlook the need to supplement its free trade policies with the educational investments that would give workers the technical background necessary to absorb and apply the foreign technical know-how.

Beside the weaknesses of the Washington Consensus framework, there are other important reasons why Indonesia needs a new policy framework. At the beginning of this paper, we had likened the development task of the second SBY term to filling the empty half of the cocktail glass. We had emphasized not just choosing the right ingredients but also choosing the right procedure to load the ingredients to avoid cracking the glass. The right procedure depends on understanding the process of impact on the glass. In short, it is important for policymakers to get the right conception about the reform process in order for the reforms to succeed. In our opinion, the present prevalent conception in Indonesia of the reform process is sub-optimal for many kinds of reform. The present focus on policy sequencing should be replaced, we will argue, with a more holistic approach that takes policy interdependency into account.

In this introductory Indonesia 2049 paper, we would like to propose for discussion that the right policy framework should include getting a number of other fundamental growth policies right as well. For this paper, we will make the case that new Indonesian policy framework

should also emphasize getting the following two things right (1) getting the role of science right, and (3) getting the conception of the reform process right.[34]

Getting the Role of Science Right

The second fundamental failing of the Washington Consensus is its static view of the economic process. This failure of the Washington Consensus can be characterized as "seeing the forest but not the trees." Specifically, although the Washington Consensus imputes numerous positive growth effects to increasing the degree of trade openness as measured by the export-GDP ratio, and points out that East Asia is more trade-oriented than Latin America, it has not noticed, however, that the export composition of East Asia shows even greater economic dynamism than the rise in the export-GDP ratio. In East Asia, higher value added manufactured exports have been displacing lower value added manufactured exports (and, in some cases, agricultural exports) very rapidly, whereas in most of Latin America, the composition of manufactured exports has been more stable even when there is the rise in the export-GDP ratio, e.g. compare Malaysia and Brazil in Table 6. (Mexico is the only large country in Latin America that shows the East Asia trait of the rise in the export-GDP ratio being driven by high value added manufactured exports.)

[34] Kamarck (1976), Diamond (1997), Sachs (2000), and Demurger, Sachs, Woo, Bao, Chang and Mellinger (2002) have argued that geographical factors (e.g. disease burden, transportation costs) could be fundamental determinants of economic performance. In future work, we hope to examine how to improve upon what is usually regarded to be a satisfactory record of regional development in Indonesia; i.e. has Indonesia been "getting regional development right"? The fact that Indonesia decentralized economic decision-making greatly immediately after the demise of the Soeharto regime suggests that most Indonesians were greatly dissatisfied with the pattern of regional development produced by the centralized approach of Soeharto's economic management. While Indonesia does have a more equal regional income distribution than in some other large economies (e.g. Brazil), this is not proof that this outcome was caused largely by better economic policies rather than largely by more favorable economic structure; or proof that regional income distribution would not have been more equal under any other sets of economic policies. Of course, the post-Soeharto decentralization of economic policymaking could be improved; see Azis (2009).

In short, what has been described as trade-led growth in East Asia could also be called science-led growth instead. For many of the least developed regions in Indonesia, where agricultural would continue to be the mainstay of their economies, employing the bulk of the population, the central government should focus a large part of its increased aid to these regions to raise agricultural productivity and demand for the agricultural output through the application of science, establishing regional agriculture research centers for each of the distinct ecosystems in the least developed islands to:

- conduct research on new seed varieties (including agro biotechnology), new approaches to water and environmental management, and new approaches to agricultural mechanization.
- improve the local livestock through cross-breeding, and through better access to veterinarian services.
- enhance agriculture extension services to assist farmers in adopting new technologies.
- develop new processed food products (e.g. new fruit drinks, new vegetable stuffing) from the agricultural products of these least developed countries.

A key component of a science-led growth strategy for the provinces is the mobilisation of their universities to be drivers of growth. The central government and the international donor community should expand and upgrade these universities, especially their agricultural, scientific and technical departments. The universities should adopt incentive schemes to promote university-business partnerships that improve production techniques, and develop new products, especially those that are based on the regional resource base. The universities in the poorest provinces must of course give high priority to agricultural development by working

collaboratively with the new regional agricultural research centres to effect technology transfers to farmers.

Finally, "getting the science right" is needed not just for growth but also for environmentally-sustainable growth. By improving its scientific capability, Indonesia will also make a technological contribution to the global fight against climate change.

Getting the Reform Process Right

In discussions on economic reform in Indonesia, one concern that constantly crops up is the order that reforms should be sequenced.[35] For example, Cole and Slade (1996) and Hanson (1992) rejected for different reasons the well-known McKinnon (1982) prescription that current account opening must be completed before opening the capital account. More light can now be thrown on this Indonesian preoccupation with policy sequencing because of the rich array of reform strategies that were pursued in the 1990s by the centrally-planned economies in their transition to market economies.

In the heated debate of gradualism versus big bang, many economists have claimed that the secret to China's sustained high growth (as opposed to the extended recession in Russia) was its patient implementation of the correct reform sequence, the byproduct of which was a gradual reform pace. For example, Griffin and Khan (1993) held that China's success came from liberalizing the economy before liberalizing the politics; McMillan and Naughton (1992) contended that the success came instead from liberalizing the agricultural sector before liberalizing the industrial sector; and Olson (1992, pp.ix) held that unless institutional reforms

[35] The fiscal decentralization in 2001 sparked the warning by Ahmad and Mansoor (2002) that "proper sequencing [was necessary] to avoid jeopardizing macroeconomic stability or the effective delivery of public services." See also Fane (1994).

(e.g., establishment of a legal system) were completed, the output response to the economic liberalization would be low, if not negative.

In our opinion, "post hoc ergo propter hoc" type of rationalization is the reason for this embarrassingly large number of "correct" sequences that have been identified for China, and for the policy sequence debate in Indonesia as well. The truth is that the notion of "sequencing" is the wrong description and a wrong understanding of what really happened in China. China's reform process cannot be described as a step-by-step process. It, instead, consists of partial deregulation on a number of dimensions simultaneously, and that, over time, additional deregulation was taken in each dimension just as the number of dimensions under deregulation was being increased. The point is that a "partial deregulation" is not a "completed step."

For microeconomic liberalization reforms and institutional reforms in which implementation is a lengthy process[36], the analytical issue is usually not the optimization of the reform sequence but the optimization the coherence of the reform package. To see the logic, let us consider state-owned enterprise (SOE) reform. Because SOEs were used to guarantee full employment during the central planning period, SOE reform (including privatization of SOEs) could lead to the shedding of surplus workers and the termination of company-based pensions to retired workers. Unless the state is able to provide relief payments to the displaced workers and pensioners, their reduced welfare would trigger a political backlash that would stop the SOE reform. A social cost is incurred because the SOE reform is out of phase with the social welfare reform.

The optimal solution is to privatize the SOEs and establish the state-funded social safety nets simultaneously, but simultaneous reforms are technically infeasible in this case because it is

[36] In contrast, almost instant implementation of macroeconomic reforms to stop hyper-inflation is technically feasible, and is, in most cases, also optimal; see Fan and Woo (2009).

beyond the capability of the state to handle two such large tasks at the same time. The relevant issue here is not which sequencing of reforms is optimal because instituting social safety net reforms first before implementing SOE reform will also generate a welfare lost. With the establishment of the social safety nets, the embezzlement by managers (an endemic feature in the SOE sector) will accelerate because the managers will now pocket the payments due to the workers and pensioners, and unload these people on to the new state-funded welfare programs, rendering the welfare programs too expensive to be continued!

The basic insight from the above SOE reform example is that due to the interdependence between reform of the SOEs and reform of the social safety net system, a lack of progress on either one could constrain the continued progress of the other. This incoherence between the two reforms could be described as a "reform bottleneck". One way to avoiding the reform bottleneck is to undertake simultaneous *partial* reforms that will maintain coherence between the two reforms. The key is to keep the pace of SOE reform consistent with the pace of the reform of social safety nets.

In the aftermath of the Asian financial crisis, it has become fashionable to say that reformers must first conjure up an economically-vibrant and prudentially-supervised domestic financial system before opening the capital account. However, the reality is that without opening up to capital flow, a country is unlikely to succeed in transforming its domestic financial institutions to deal adequately with external financial risks. Without liberalizing part of the domestic financial market and allowing some foreign financial institutions to come "play" in the market, so-called "prudential financial regulations" and "financial market efficiency" will not be established. The usual sequencing strategy of "putting down regulations first and then opening up to capital flows" is not achievable in practice because it neglects the fact that there is valuable

learning-by-doing from a partially-opened capital account that would enable the regulatory authorities to improve through experience and the domestic banks to improve through heightened competition.

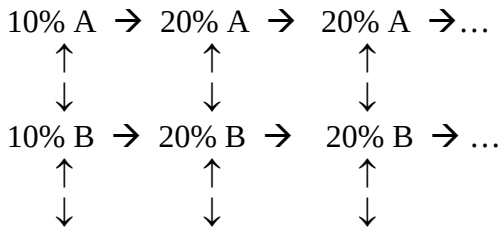
The above arguments lead us to an alternative formulation of institutional reform that not only captures the transition process in China more accurately, but also reveals the welfare implications more clearly.[37] We call this alternative formulation the "parallel partial progression" (PPP) approach to reform: (a) at the start of the reform, the government should start the reform on as many dimensions as possible; (b) and, because it is technically not possible to complete any particular institutional reform in a short time, the government should do only part of each reform in each period, e. g. complete 20 percent of required reform for each institution. The government must keep the reform of different institutions compatible so that they can enhance each other and avoid chaos.

To summarise, let A, B, and C represent three different reform policies. Under "sequencing", reform policy B would not be started until after reform policy A is completed. The mapping of the sequential reform strategy is depicted as:

A → B → C → …….

0 ----------→ time

The parallel partial progression (PPP) reform strategy would be mapped as below[38]:



[37] Fan and Woo (2009) provide a numerical example of the welfare consequences under each reform strategy.
[38] There can of course be no perfect synchronization of institutional reform in practice. The important requirement is that the progress of each reform is not too fare apart, e.g. it is fine in period 2 for A to move 20%, B 25% and C 15%, and, in period 3, for A to move 20%, B 15% and C 25%.

10% C → 20% C → 20% C → …
0 ----------→ time

Besides neglecting the interaction among reforms (the synergy that sustains the progress of each individual reform), the sequencing conception of reform strategy suffers from two other fundamental defects. First, because the sequencing literature did not adopt the structure of the economy and the dominant types of shocks as its central organizing principles, there will be a big number of exceptions to the McKinnon reform sequence, making it inapplicable as a rule of thumb. Second, the so-called optimal sequences are optimal only if the policymaker is constrained to introduce only one new policy measure at a time. This optimality disappears once simultaneous implementation of policies is allowed. If simultaneous full implementation is not technically feasible, then simultaneous partial implementation would still be an improvement over sequencing because it eliminates the costs of incoherence among policies.

We want to end this paper by stressing two points in order to avoid potential misunderstanding. First, we have not rejected the Washington Consensus framework, we have only amended it to include a greater mobilization of science to improve rural income, and the adoption of the parallel partial progression approach to guide the reform of institutions. Second, we think that Soeharto's instinct to use advanced technology to accelerate economic growth was correct, but his method of implementing his idea guaranteed its failure. Building aeroplanes could not (and did not) impart a flying start to the transition to knowledge-led growth, what is needed are painstaking efforts to improve the education system and increase enrollment in the secondary and tertiary level, and to incubate a government-business-university coalition to boost R&D activities. There is no shortcut to success.

Given the preliminary nature of this paper in the Indonesia 2049 project, its bold call for the replacement of the Soeharto economic policy framework is naturally an invitation to debate what should guide SBY's economic policy framework in his second term. The true test of the correctness of SBY's framework would be how close it would bring Indonesia in 2015 to meeting the Millennium Development Goals (MDGs). With substantial progress toward the MDGs, one would not have to be naive in order to be optimistic about Indonesia's place in the sun in 2049.

References

Ahmad, Ehtisham and Ali Mansoor, 2002, "Indonesia: Managing Decentralization," IMF Working Paper, WP/02/136, August 2002

Alisjahbana, Armida S., and Chris Manning, 2006, "Labour market dimensions of poverty in Indonesia," Bulletin of Indonesian Economic Studies, Vol. 42, No. 2, August 2006: pp.235–61

Athukorala, Prema-chandra, and Bambang H. Santosa, 1997, "Gains from Indonesian export growth: Do linkages matter?" Bulletin of Indonesian Economic Studies, Vol. 33 No. 2, August 1997, pp. 73-95

Azis, Iwan Jaya, 2009, "Institutional Factors in Decentralization: What We Have Learned," Report for a UNDP project on "Target MDGs Programme," Contract No.:10/VIII. K2/ MDGs/ 2008.

Booth, Anne, 1993, "Counting the poor in Indonesia", Bulletin of Indonesia Economic Studies, Vol. 29 No. 1, April 1993: pp. 53-83.

Cole David C. and Betty F. Slade, 1996, Building a Modern Financial System: The Indonesian Experience, Cambridge: Cambridge University Press, 1996.

Coxhead, Ian and Muqun Li, 2008, "Prospects for skills-based export growth in a labour-abundant, resource-rich developing economy," Bulletin of Indonesian Economic Studies, Volume 44, Issue 2 August 2008, pages 209 - 238

Démurger, Sylvie, Jeffrey D. Sachs, Wing Thye Woo, Shuming Bao, Gene Chang and Andrew Mellinger, 2002, "Geography, Economic Policy and Regional Development in China," (), Asian Economic Papers, Vol. 1 No. 1, Winter 2002, pp. 146-197.

Diamond, Jared, 1997, Guns, Germs and Steel: A Short History of Everybody for the Last 13,000 Years, Jonathan Cape, London.

Djiwandono, J. Soedradjad, 2000, "Bank Indonesia and the recent crisis," Bulletin of Indonesian Economic Studies Vol 36 No 1, April 2000, pp. 47–72.

Fan, Gang, and Wing Thye Woo, 2009, "The Parallel Partial Progression (PPP) Approach to Institutional Transformation in Transition Economies: Optimize Economic Coherence Not Policy Sequence," Modern China, Vol. 35 No. 4, July 2009, pp. 352-369.

Fane, George, 1994, 'The sequencing of economic deregulation in Indonesia', Chapter 6 (pp.101-117) in R. McLeod, ed., Indonesia Assessment 1994: Finance as a Key Sector in Indonesia's Development, Singapore: Institute for Southeast Asian Studies. 1994.

Garnaut, Ross, 2009, "Climate change and Indonesia: in honour of Panglaykim," Bulletin of Indonesian Economic Studies, Volume 45, Issue 1, April 2009, pages 107 - 116

Gelb, Alan and associates, 1998, Oil Windfalls: Blessing or Curse? Oxford University Press, New York.

Griffin, Keith and Azizur Rahman Khan, 1993, "The transition to market guided economies: lessons for Russia and Eastern Europe from the Chinese experience." Paper presented at the Conference on The Transition of Centrally-Planned Economies in Pacific Asia held at the Asia Foundation in San Francisco, May 7-8, 1993.

Hanson, James A., 1992, "Opening the Capital Account: A Survey of Issues and Results," WPS 901, The World Bank, May 1992

Hatzichronoglou, Thomas, 1997, "Revision of the High-Technology Sector and Product Classification", OECD Science, Technology and Industry Working Papers, 1997/2, OECD Publishing; http://dx.doi.org/10.1787/134337307632

James, William E., and Natsuki Fujita, 1997, "Employment creation and manufactured exports in Indonesia, 1980-90," Bulletin of Indonesian Economic Studies, Vol 33 No 1, April 1997, pp. 103-15.

Kamarck, Andrew M., 1976, The Tropics and Economic Development: A Provocative Inquiry into the Poverty of Nations, The John Hopkins University Press, Baltimore.

Marks, Stephen V., 2009, "Economic policies of the Habibie presidency: a retrospective," Bulletin of Indonesian Economic Studies, , Volume 45 Issue 1, April 2009, pp. 39 – 60

McKinnon, Ronald, 1982, "The order of economic liberalization: lessons from Chile and Argentina." Carnegie-Rochester Conference Series on Public Policy Vol. 17, no. 1: pp.159-86.

McLeod, Ross H., 2005, “The struggle to regain effective government under democracy in Indonesia,” Bulletin of Indonesian Economic Studies, Vol. 41, No.3, 2005: pp.367–86

McMillan, John and Barry Naughton (1992) "How to reform a planned economy." Oxford Review of Economic Policy, Vol 8, no.1 (Spring): p130-43.

Olson, Mancur (1992) "Preface." In Christopher Clague and Gordon Rausser (eds.), The Emergence of Market Economies in Eastern Europe. Cambridge, MA: Blackwell.

Sachs, Jeffrey D., 2000, “Tropical Underdevelopment,” background paper for speech at the Economic History Association 60th Annual Meeting, September 8, 2000 in Los Angeles; available on: http://www.cid.harvard.edu/cidwp/pdf/057.pdf

Development Economics Vice Presidency, 2005, Synopsis of World Development Reports (1995 - 2005); http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/0,,contentMDK:20313941~menuPK:607028~pagePK:478093~piPK:477627~theSitePK:477624,00.html

Woo, Wing Thye, 2004, "Serious Inadequacies of the Washington Consensus: Misunderstanding the Poor by the Brightest," in Jan Joost Teunissen and Age Akkerman (editors), Diversity in Development: Reconsidering the Washington Consensus, FONDAD (Forum on Debt and Development), The Hague, Netherlands, December 2004.

Woo, Wing Thye, Bruce Glassburner and Anwar Nasution, Macroeconomic Crisis and Long-Term Growth: The Case of Indonesia,1965-1990, World Bank Press, 1994.

World Bank, 1990, Indonesia: Strategy for a Sustained Reduction in Poverty, A World, Bank Country Study, Washington, DC: World Bank

Figure 1

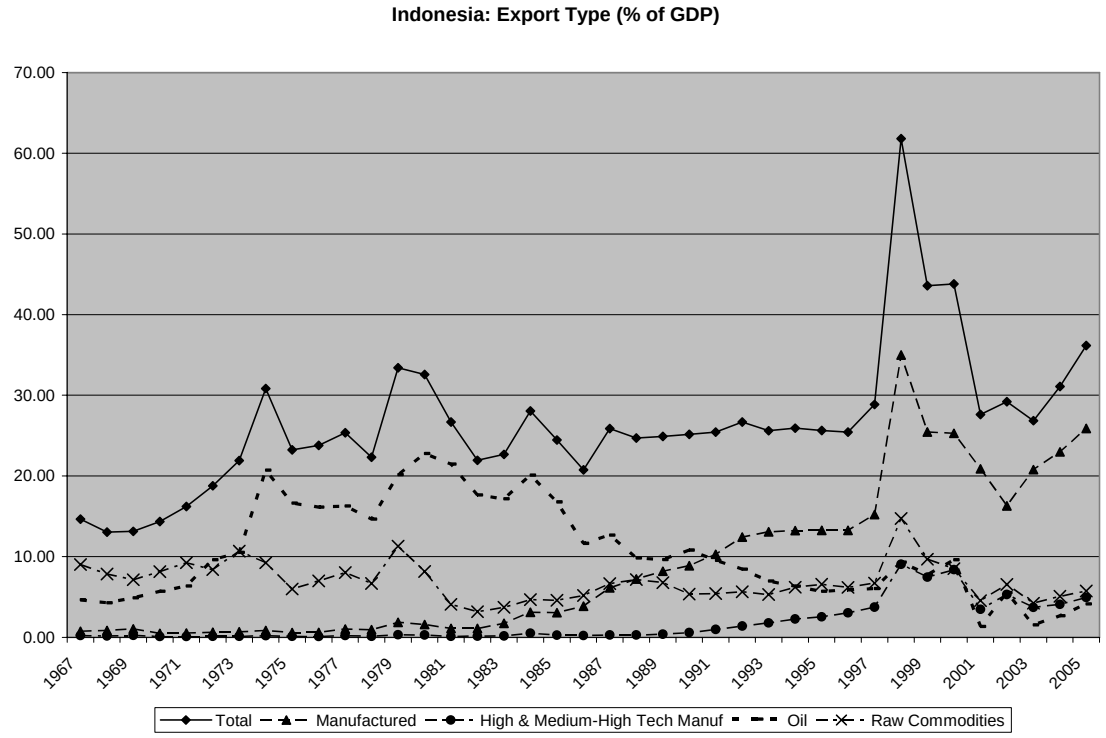


Figure 2

Figure 3

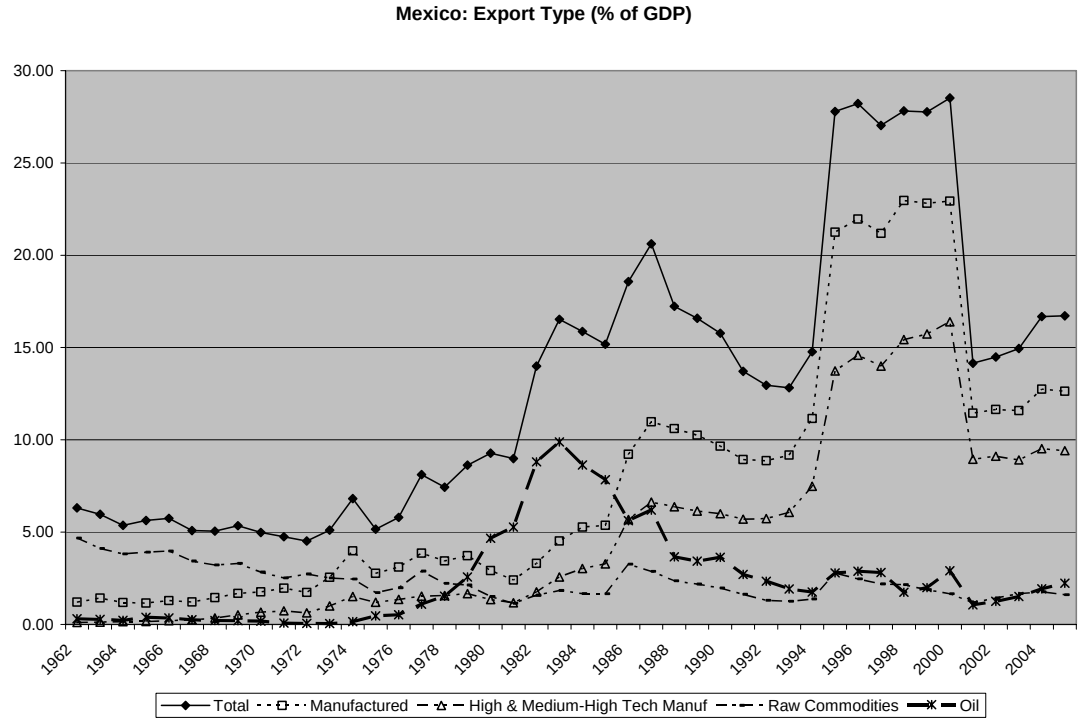


Figure 4

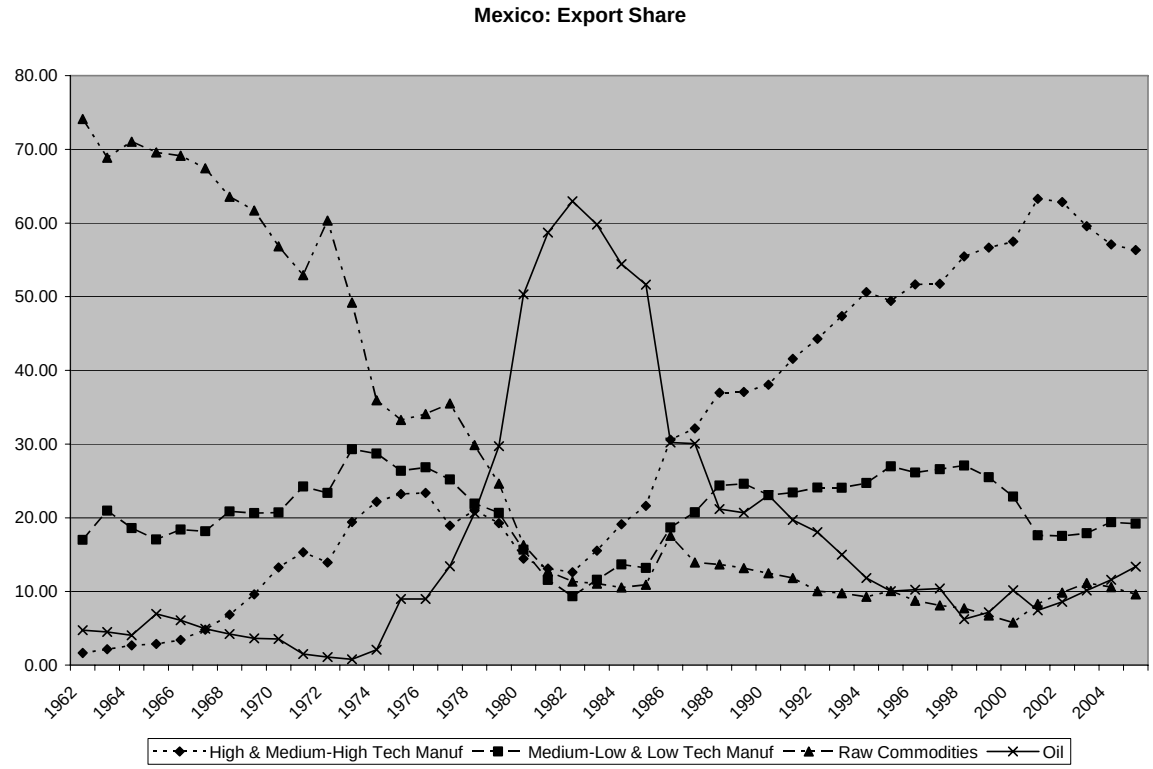


Figure 5

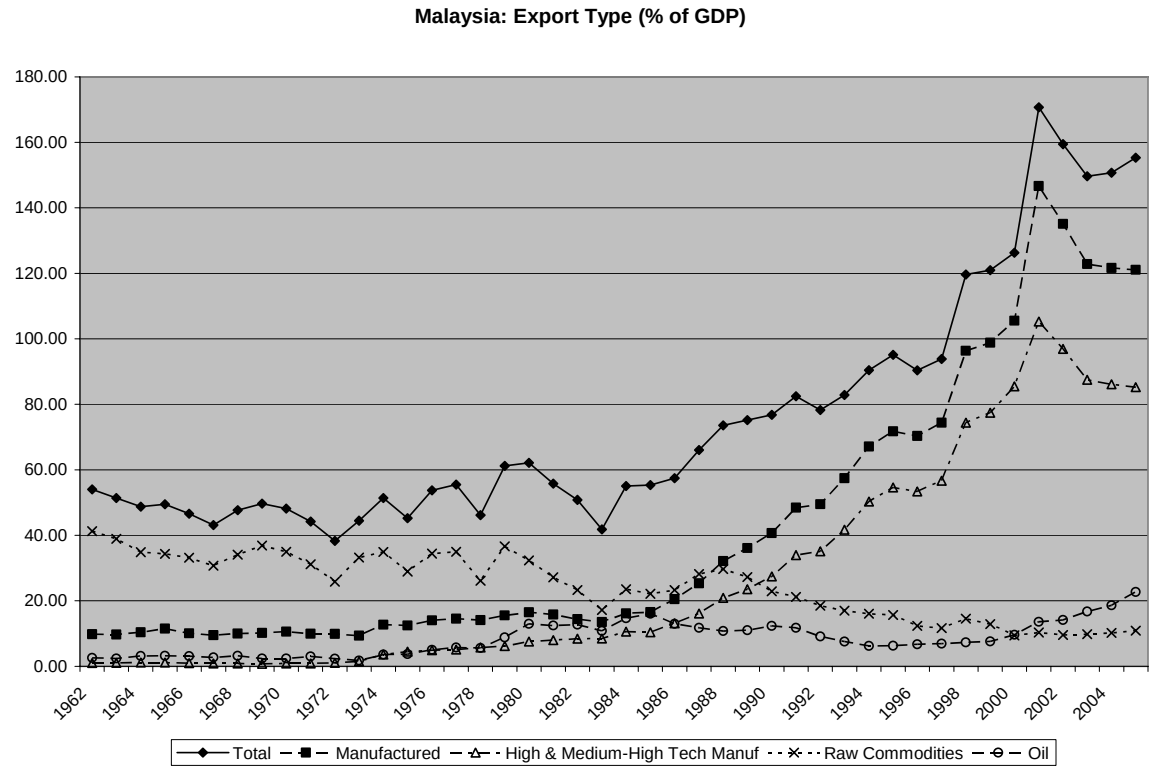


Figure 6

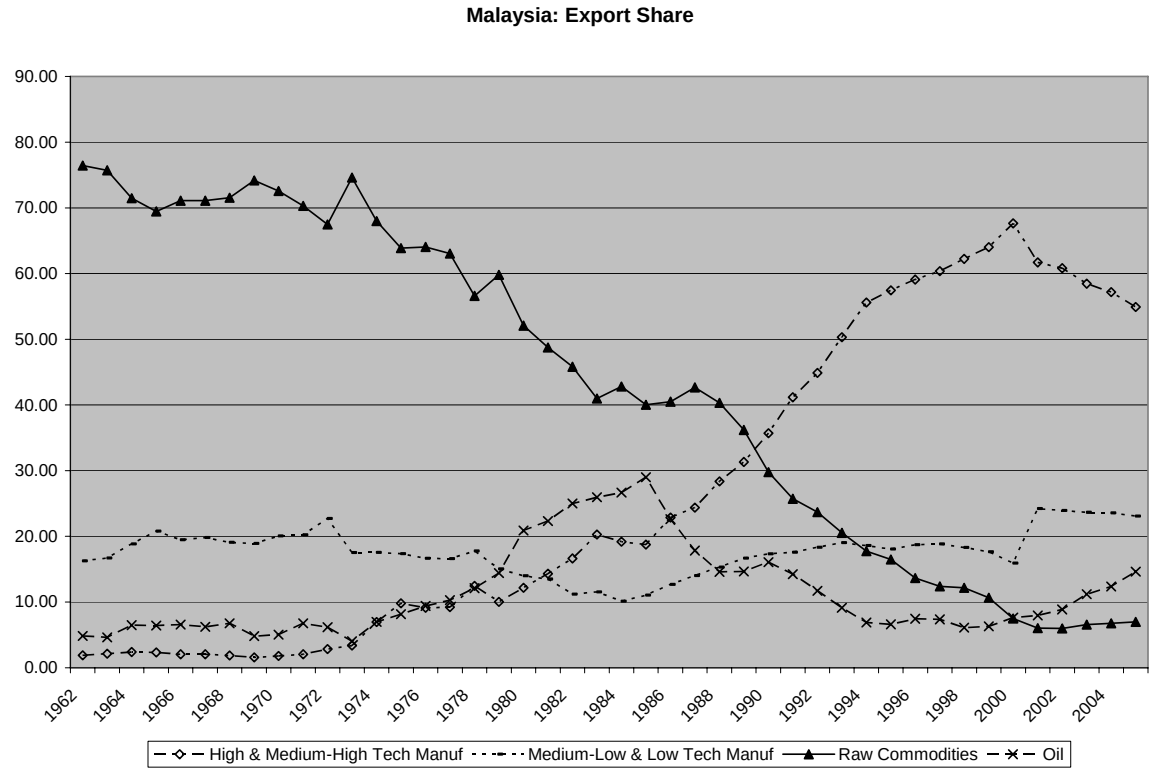


Table 1: Characteristics of the 9 Developing Countries Selected for Comparative Economic Analysis

	Population in 2006-2009 (UN estimates, million)	Population rank (out of 221 units)	Land Area (thousand sq. km)	Geographical size rank (out of 231 units)	GDP per capita in 2008 Intl. $ (IMF PPP estimate)	Income per capita rank (out of 180)	Income class designation (World Bank)	Degree of dependence on oil export earnings in 1980 (a) % of total goods export	(b) % of state revenue
Indonesia	230.0	4	1,904.6	16	3,987	121	lower-middle-income	81.1	107.1
Most Populous, and Geographically Very Large									
China	1,337.7	1	9,598.1	4	5,963	100	lower-middle-income	21.4	5.3
India	1,162.7	2	3,287.3	7	2,762	129	lower-middle-income	0.6	0.2
Brazil	191.2	5	8,514.9	5	10,326	77	upper-middle-income	1.7	0.7
Populous, Geographically Large, Developing, and Heavily Dependent on Oil Exports in 1970-2000 Period									
Mexico	109.6	11	1,964.4	15	14,560	54	upper-middle-income	50.3	30.4
Nigeria	154.7	8	923.8	32	2,134	140	low-income	91.4	111.5
Neighbouhood Context: Same Ecological and Climate Zones and same Economic System (historically a capitalist economy)									
Malaysia	28.2	43	329.8	66	14,072	60	upper-middle-income	27.5	50.4
Thailand	63.4	21	513.1	50	8,225	86	lower-middle-income	1.0	1.3
Philippines	92.2	12	300.0	72	3,546	123	lower-middle-income	0.1	0.1

Above information accessed on May 1, 2009 from these sources:
Population data from: http://en.wikipedia.org/wiki/List_of_countries_by_population
Land area data from: http://en.wikipedia.org/wiki/List_of_countries_and_outlying_territories_by_area
Income data from: http://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)_per_capita
World Bank income classification data from:
http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html
Oil export earnings is from adding SITC 33 and SITC 34 in UN Trade Database
International Financial Statistics (IFS) is the source for data on (a) total goods export (bop), and (b) state revenue (which is consolidated state revenue that was coverted into US$ with series rf in IFS).
As the oil export earnings usually go to state-owned oil companies, state revenue takes only a portion of the earnings. For example, for Indonesia in 1980, petroleum revenue accounted for 69 % of total revenue, suggesting a tax rate of about 65%.

Table 2: Macroeconomic Indicators (1 of 3)

		Indonesia	Mexico	Nigeria	China	India	Brazil	Malaysia	Thailand	Phillipines
Part A: GDP per capita, Growth Rate										
	average growth rate									
Whole Sample	*1961-2007*	3.67	2.07	1.20	6.49	2.93	2.36	3.99	4.74	1.51
Indonesia subperiods										
Post-Soekarno	*1967-2007*	4.21	1.82	1.27	7.22	3.25	2.49	4.02	4.76	1.46
Soeharto	*1967-1997*	5.09	1.74	0.85	6.72	2.52	2.86	4.59	5.47	1.20
Post-Soeharto	*2000-2007*	3.71	1.86	3.53	9.27	5.65	1.99	3.58	4.22	3.00
China subperiods										
Reform Period	*1979-2007*	3.83	1.37	0.51	8.61	3.77	1.01	3.84	4.63	0.96
Deepen Market	*1992-2007*	3.01	1.63	1.47	9.47	4.99	1.46	3.83	3.60	1.97
	coefficient of variation									
Whole Sample	*1961-2007*	1.04	1.57	6.01	1.12	1.12	1.67	0.83	0.76	1.98
Indonesia subperiods										
Post-Soekarno	*1967-2007*	0.88	1.81	5.93	0.71	0.96	1.64	0.88	0.80	2.19
Soeharto	*1967-1997*	0.44	2.10	9.97	0.85	1.20	1.57	0.65	0.56	2.85
Post-Soeharto	*2000-2007*	0.17	0.94	0.78	0.12	0.33	0.41	0.50	0.36	0.32
China subperiods										
Reform	*1979-2007*	1.06	2.65	9.77	0.33	0.82	3.37	0.98	0.92	3.70
Deepen Market	*1992-2007*	1.65	1.91	2.12	0.21	0.42	1.38	1.10	1.33	1.12

(continue next page)

Table 2: Macroeconomic Indicators (2 of 3)

		Indonesia	Mexico	Nigeria	China	India	Brazil	Malaysia	Thailand	Phillipines
Part B: Price Stability										
Data on CPI inflation for China are available only from 1987 onward, and Brazil only from 1981 onward										
	average inflation rate									
Whole Sample	1961-2007	54.77	23.52	17.06	6.42	7.58	432.66	3.22	4.91	9.87
Indonesia subperiods										
Post-Soekarno	1967-2007	17.83	26.63	18.99	6.42	7.67	432.66	3.61	5.28	10.60
Soeharto	1967-1997	18.79	32.83	21.38	11.28	8.40	683.26	4.01	6.07	12.25
Post-Soeharto	2000-2007	8.74	5.21	12.40	1.63	4.51	7.29	1.98	2.48	4.98
China subperiods										
Reform	1979-2007	11.31	32.91	21.59	6.42	7.91	432.66	3.20	4.75	10.22
Deepen Market	1992-2007	12.38	12.28	24.07	5.25	6.79	319.41	2.84	3.62	6.17
	coefficient of variation									
Whole Sample	1961-2007	3.11	1.30	1.01	1.18	0.71	1.78	0.97	1.00	0.89
Indonesia subperiods										
Post-Soekarno	1967-2007	1.41	1.19	0.92	1.18	0.72	1.78	0.87	0.95	0.86
Soeharto	1967-1997	1.47	1.04	0.91	0.67	0.71	1.29	0.87	0.89	0.81
Post-Soeharto	2000-2007	0.53	0.49	0.94	0.39	0.16	0.93	0.43	0.65	0.67
China subperiods										
Reform	1979-2007	0.87	1.08	0.89	1.18	0.40	1.78	0.63	0.84	0.91
Deepen Market	1992-2007	1.04	0.83	0.90	1.40	0.46	2.18	0.43	0.60	0.32

(continue next page)

Table 2: Macroeconomic Indicators (3of 3)

		Indonesia	Mexico	Nigeria	China	India	Brazil	Malaysia	Thailand	Phillipines
Part C: Exchange Rate Stability										
Official exchange rate, units of national currency against US$										
Data for Indonesia available only from 1968 onward										
	average rate of currency depreciation against the US$									
Indonesia subperiods										
Post-Soekarno	1968-2007	14.77	23.27	20.37	3.40	4.60	269.11	0.54	1.52	7.11
Soeharto	1968-1997	11.65	29.89	15.35	4.82	5.64	356.15	-0.16	1.50	7.68
Post-Soeharto	2000-2007	2.36	1.78	4.06	-1.04	-0.40	2.01	-1.22	-0.96	2.43
China subperiods										
Reform	1979-2007	15.56	29.66	28.49	5.94	6.01	363.85	1.65	2.17	7.24
Deepen Market	1992-2007	17.77	9.91	28.48	2.84	4.03	306.12	1.87	2.42	3.88
	coefficient of variation									
Indonesia subperiods										
Post-Soekarno	1968-2007	2.81	1.73	2.78	3.35	1.58	2.08	14.20	4.94	1.92
Soeharto	1968-1997	1.67	1.50	2.12	2.67	1.31	1.76	-29.93	3.56	1.77
Post-Soeharto	2000-2007	-51.93	17.96	-2.41	-0.37	-0.56	-1.58	-0.37	-0.73	-0.88
China subperiods										
Reform	1979-2007	2.95	1.52	2.28	2.05	1.30	1.75	5.01	4.03	1.83
Deepen Market	1992-2007	3.45	2.25	2.83	4.46	1.74	2.16	5.84	4.60	3.08

Table 3: GDP per capita, PPP (constant 2005 international $)

		Populous Oil-Exporters		Most Populous Developing Nations			Southeast Asian Neighbors		
	Indonesia	Mexico	Nigeria	China	India	Brazil	Malaysia	Thailand	Philippines
1960 indicative*	*668.3*	*4,719.6*	*1,197.7*	*297.1*	*685.5*	*3,122.3*	*2,076.1*	*897.6*	*1,620.3*
1970 indicative*	*799.0*	*6,608.3*	*1,455.0*	*344.5*	*811.1*	*4,292.1*	*2,918.8*	*1,460.2*	*1,939.3*
1980	1,350.5	9,449.5	1,749.1	525.2	868.9	7,629.8	4,891.4	2,255.1	2,619.3
1985	1,615.5	9,313.3	1,305.6	816.0	1,003.5	7,194.8	5,508.0	2,708.0	2,174.7
1990	2,085.3	9,176.3	1,463.5	1,103.2	1,206.8	7,235.3	6,645.8	4,139.5	2,431.5
1995	2,815.6	9,038.3	1,433.6	1,853.4	1,409.1	7,748.8	9,185.3	5,908.1	2,416.1
2000	2,724.2	10,966.2	1,456.5	2,673.7	1,716.7	7,936.5	10,270.7	5,728.9	2,637.1
2006	3,348.6	11,805.1	1,795.3	4,537.2	2,412.4	8,673.1	12,204.6	7,378.4	3,057.6

* The 1960 and 1979 levels are not definitive. They are meant to be indicative of disparity across countries. The 1960 and 1970 levels were obtained by using the growth rates reported in Table 1 (which were based on respective constant national price) and the 1980 income level reported in this Table.

Data for 1980 onward are from the World Development Indicators database

Table 4: Quality of Life: Nutrition, Life Expectancy and Infant Mortality and Sanitation Across Time and Space

	YR1971	YR1981	YR1992	YR1997	YR2003	YR2004
Part A: Prevalence of undernourishment (% of population), i.e. the Under-Nourishment Rate (UNR)						
Indonesia	47	24	9	6	6	6
Mexico	12	5	5	5	5	5
Nigeria	27	37	13	9	9	9
China	46	30	16	12	12	12
India	39	38	25	21	20	20
Brazil	23	15	12	10	8	7
Malaysia			5	5		5 (2005)
Thailand			29	21		17 (2005)
Philippines			21	18		16 (2005)

	YR1960	YR1965	YR1970	YR1975	YR1980	YR1985	YR1990	YR1995	YR2000	YR2006
Part B: Life expectancy at birth (LEB), number of years										
Indonesia	41.5	46.0 (1967)	47.9	52.7 (1977)	54.8	58.6	61.7	64.0	65.8	68.2
Mexico	57.3	60.3 (1967)	61.7	65.3 (1977)	66.8	69.0	70.9	72.4	74.0	74.5
Nigeria	38.7	41.0 (1967)	42.1	44.5 (1977)	45.3	46.5	47.2	47.5	46.9	46.8
China	36.3	59.6 (1997)	61.7	65.4 (1977)	66.8	68.3	68.9	69.4	70.3	72.0
India	44.3	48.0 (1967)	49.4	52.9 (1977)	54.2	56.6	59.1	61.4	62.9	64.5
Brazil	54.8	57.7 (1967)	58.9	61.6 (1977)	62.8	64.7	66.6	68.6	70.4	72.1
Malaysia	54.3	59.4 (1967)	61.6	65.3 (1977)	66.9	68.9	70.3	71.5	72.6	74.0
Thailand	55.1	58.4 (1967)	59.7	62.6 (1977)	63.9	65.7	67.0	67.6	68.3	70.2
Philippines	53.4	56.4 (1967)	57.4	60.1 (1977)	61.3	63.4	65.6	67.7	69.6	71.4
Part C: Infant Mortality Rate (IMR), infant deaths per 1,000 live births										
Indonesia	128.0	121.0	104.0	94.0	79.0	70.0	60.0	48.0	36.0	26.4
Mexico	93.2	86.3	79.0	69.2	57.8	44.1	41.5	36.1	31.6	29.1
Nigeria	165.0	157.0	140.0	120.0	117.0	120.0	120.0	120.0	107.0	98.6
China	..	..	84.0	64.2	46.5	36.6	36.3	35.1	29.9	20.1
India	157.7	143.1	130.0	118.0	113.0	97.0	80.0	74.0	68.0	57.4
Brazil	115.3	105.8	95.2	82.7	70.1	59.5	48.1	36.1	26.9	18.6
Malaysia	72.0	56.0	46.0	38.0	31.0	23.0	16.0	13.0	11.0	9.8
Thailand	103.1	84.1	73.9	61.3	46.1	34.2	26.0	17.1	11.4	7.0
Philippines	63.1	60.7	58.4	56.1	53.8	51.0	42.7	32.9	28.5	23.6

World Development Indicators

Table 5: Education Attainment of Population (1/3)

	YR1991	YR2001	YR2002	YR2003	YR2004	YR2005
Indonesia						
Literacy rate, adult female (% of females ages 15 and above)	75.3 (1990)	..	..		86.8	..
Literacy rate, adult male (% of males ages 15 and above)	88.0 (1990)	..	..		94.0	..
Persistence to last grade of primary, female (% of cohort)	..	88.7	87.1	..	82.8	81.4
Persistence to last grade of primary, male (% of cohort)	..	83.3	85.7	..	88.1	77.7
School enrollment, secondary, female (% gross)	40.5	56.0	57.6	60.7	63.0	61.9
School enrollment, secondary, male (% gross)	48.0	57.3	58.4	61.5	63.5	62.6
School enrollment, tertiary, female (% gross)	..	12.5	13.9	14.3	14.7	15.0
School enrollment, tertiary, male (% gross)	..	16.3	16.1	18.0	18.5	19.0
China						
Literacy rate, adult female (% of females ages 15 and above)	68.1 (1990)	86.5 (2000)	..	..	..	
Literacy rate, adult male (% of males ages 15 and above)	87.0 (1990)	95.1 (2000)	..	..	..	
Persistence to last grade of primary, female (% of cohort)	..	..	..	..	..	
Persistence to last grade of primary, male (% of cohort)	..	..	..	..	..	
School enrollment, secondary, female (% gross)	42.0	63.9	..	69.1	..	75.8 (2006)
School enrollment, secondary, male (% gross)	55.9	66.0	..	71.0	..	75.2 (2006)
School enrollment, tertiary, female (% gross)	2.0	..	..	14.2	..	21.3 (2006)
School enrollment, tertiary, male (% gross)	3.8	..	..	16.7	..	21.8 (2006)
Brazil						
Literacy rate, adult female (% of females ages 15 and above)	..	86.5 (2000)	..	..	88.8	..
Literacy rate, adult male (% of males ages 15 and above)	..	86.2 (2000)	..	..	88.4	..
Persistence to last grade of primary, female (% of cohort)	..	84.5 (2000)	..	..	..	
Persistence to last grade of primary, male (% of cohort)	..	75.8 (2000)	..	..	..	
School enrollment, secondary, female (% gross)	..	111.7	114.6	107.2	110.6	110.6
School enrollment, secondary, male (% gross)	..	101.6	104.4	96.8	100.8	100.5
School enrollment, tertiary, female (% gross)	11.9	20.1	22.9	25.4	27.1	28.8
School enrollment, tertiary, male (% gross)	10.6	15.5	17.4	19.2	20.5	22.2

Note: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.

Table 5: Education Attainment of Population (2/3)

	YR1991	YR2001	YR2002	YR2003	YR2004	YR2005
India						
Literacy rate, adult female (% of females ages 15 and above)	33.7	47.8	..	..	..	..
Literacy rate, adult male (% of males ages 15 and above)	61.6	73.4	..	..	..	..
Persistence to last grade of primary, female (% of cohort)	..	63.5	..	76.3	72.9	..
Persistence to last grade of primary, male (% of cohort)	..	59.7	..	81.2	73.1	..
School enrollment, secondary, female (% gross)	31.1	38.6	40.9	44.8	46.1	48.6
School enrollment, secondary, male (% gross)	52.1	53.6	54.7	55.4	56.9	59.0
School enrollment, tertiary, female (% gross)	4.2	8.0	8.5	8.8	9.0	9.1
School enrollment, tertiary, male (% gross)	7.8	11.6	12.2	12.9	13.4	12.8
Mexico						
Literacy rate, adult female (% of females ages 15 and above)	85.0 (1990)	88.7 (2000)	88.7	..	89.6	90.2
Literacy rate, adult male (% of males ages 15 and above)	90.3 (1990)	92.6 (2000)	92.0	..	92.4	93.2
Persistence to last grade of primary, female (% of cohort)		90.1	92.3	91.5	92.4	93.3
Persistence to last grade of primary, male (% of cohort)	..	87.9	90.4	89.3	90.8	91.0
School enrollment, secondary, female (% gross)	53.1	75.6	78.7	83.4	84.5	85.6
School enrollment, secondary, male (% gross)	53.7	73.4	75.7	79.2	82.0	83.8
School enrollment, tertiary, female (% gross)	12.5	19.8	21.1	22.3	23.5	24.5
School enrollment, tertiary, male (% gross)	17.0	21.2	22.4	23.7	25.1	26.1
Nigeria						
Literacy rate, adult female (% of females ages 15 and above)	43.7	..	..	..	60.1	..
Literacy rate, adult male (% of males ages 15 and above)	67.7	..	..	..	78.2	..
Persistence to last grade of primary, female (% of cohort)	..	..	..	64.1	..	..
Persistence to last grade of primary, male (% of cohort)	..	..	..	61.4	..	..
School enrollment, secondary, female (% gross)	20.0	21.7 (1999)	..	..	29.0	29.2
School enrollment, secondary, male (% gross)	27.8	24.5 (1999)	..	..	36.7	35.6
School enrollment, tertiary, female (% gross)	..	5.4 (1999)	..	6.7	6.7	8.3
School enrollment, tertiary, male (% gross)	..	7.1 (1999)	..	12.6	12.7	12.0

Note: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.

Table 5: Education Attainment of Population (3/3)

	YR1991	YR2001	YR2002	YR2003	YR2004	YR2005
Malaysia						
Literacy rate, adult female (% of females ages 15 and above)	77.3	85.4 (2000)	..	..	..	..
Literacy rate, adult male (% of males ages 15 and above)	88.6	92.0 (2000)	..	..	..	..
Persistence to last grade of primary, female (% of cohort)	96.2	..	97.3	..	..	..
Persistence to last grade of primary, male (% of cohort)	95.3	..	98.0	..	..	..
School enrollment, secondary, female (% gross)	58.1	67.6	68.6	75.4	76.5	72.3
School enrollment, secondary, male (% gross)	55.6	62.7	63.0	67.2	68.3	66.0
School enrollment, tertiary, female (% gross)	..	27.9	31.2	36.0	34.2	32.3
School enrollment, tertiary, male (% gross)	..	23.1	25.0	26.5	27.1	24.9
Philippines						
Literacy rate, adult female (% of females ages 15 and above)	93.2 (1990)	92.7 (2000)	..	93.6	..	..
Literacy rate, adult male (% of males ages 15 and above)	94.0 (1990)	92.5 (2000)	..	91.6	..	..
Persistence to last grade of primary, female (% of cohort)	..	79.8	78.5	77.3	77.4	75.4
Persistence to last grade of primary, male (% of cohort)	..	71.1	68.8	67.6	66.3	65.9
School enrollment, secondary, female (% gross)	72.0	80.6	85.7	87.9	89.9	89.5
School enrollment, secondary, male (% gross)	69.3	73.5	77.7	79.6	81.2	80.3
School enrollment, tertiary, female (% gross)	..	..	34.4	33.0	32.3	30.9
School enrollment, tertiary, male (% gross)	..	..	26.5	25.8	25.3	25.2
Thailand						
Literacy rate, adult female (% of females ages 15 and above)	..	90.5 (2000)	..	..	..	..
Literacy rate, adult male (% of males ages 15 and above)	..	94.9 (2000)	..	..	..	..
Persistence to last grade of primary, female (% of cohort)	..	..	..	..	..	..
Persistence to last grade of primary, male (% of cohort)	..	..	..	..	..	..
School enrollment, secondary, female (% gross)	31.9	65.9	68.7	69.1	74.6	80.0
School enrollment, secondary, male (% gross)	33.3	67.4	68.1	68.3	68.7	74.5
School enrollment, tertiary, female (% gross)	..	41.8	43.0	45.2	47.2	48.7
School enrollment, tertiary, male (% gross)	..	37.0	39.0	39.5	40.0	43.3

Note: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.

Table 6: Change in the Composition of Exports

year	Export Type/GDP (in %) total export	total manufactured export	*high tech & medium-high tech manufactured export*	non-oil raw material export	oil and LNG export	Export Type/ Total Export (in %) total manufactured export	*high tech & medium-high tech manufactured export*	non-oil raw material export	oil and LNG export
Brazil									
1970	7.1	0.8	*0.2*	6.2	0.0	11.9	*3.4*	87.1	0.5
1981	9.3	3.3	*1.6*	5.3	0.5	35.8	*16.7*	57.1	4.9
1987	10.0	4.8	*1.8*	4.7	0.3	48.2	*18.4*	47.2	3.4
1996	6.1	3.3	*1.2*	2.7	0.1	53.3	*19.0*	43.4	0.9
2005	13.4	7.3	*3.6*	5.0	0.8	54.4	*27.0*	37.3	6.0
China									
1970	1.8	0.8	*0.1*	1.0	0.0	45.3	*6.0*	54.3	0.3
1981	10.3	5.2	*0.6*	2.8	2.3	50.5	*6.0*	27.0	22.1
1987	18.2	11.5	*2.6*	3.9	1.6	63.5	*14.1*	21.7	8.6
1996	29.9	26.7	*10.8*	2.5	0.5	89.4	*36.2*	8.4	1.6
2005	34.1	31.8	*17.6*	1.7	0.5	93.4	*51.6*	5.1	1.4
India									
1970	3.7	1.8	*0.2*	1.8	0.0	49.5	*5.1*	49.0	0.9
1981	3.6	2.1	*0.2*	1.4	0.0	59.0	*6.8*	40.2	0.4
1987	4.8	3.0	*0.4*	1.5	0.4	61.4	*7.9*	30.2	7.8
1996	9.8	7.2	*1.1*	2.5	0.1	72.9	*11.1*	25.2	1.4
2004	20.6	13.8	*3.2*	4.4	2.0	67.0	*15.6*	21.5	9.6
Indonesia									
1970	14.3	0.5	*0.1*	8.2	5.7	3.4	*0.6*	56.8	39.6
1981	26.7	1.1	*0.1*	4.1	21.5	4.1	*0.5*	15.3	80.5
1987	25.9	6.1	*0.3*	6.6	12.7	23.7	*1.1*	25.7	49.0
1996	25.4	13.3	*3.0*	6.2	5.9	52.1	*11.9*	24.3	23.1
2005	36.2	25.9	*4.9*	5.8	4.1	71.6	*13.6*	15.9	11.5
Malaysia									
1970	48.2	10.6	*0.9*	35.0	2.4	22.0	*1.8*	72.6	5.0
1981	55.8	15.8	*8.0*	27.2	12.5	28.3	*14.3*	48.7	22.3
1987	66.0	25.4	*16.1*	28.2	11.8	38.4	*24.4*	42.7	17.8
1996	90.4	70.3	*53.4*	12.3	6.7	77.8	*59.1*	13.7	7.5
2005	155.3	121.1	*85.2*	10.9	22.7	78.0	*54.9*	7.0	14.6
Mexico									
1970	5.0	1.8	*0.7*	2.8	0.2	35.5	*13.3*	56.8	3.5
1981	9.0	2.4	*1.2*	1.1	5.3	26.7	*13.1*	12.7	58.7
1987	20.6	11.0	*6.6*	2.9	6.2	53.2	*32.1*	13.9	30.1
1996	28.2	22.0	*14.6*	2.5	2.9	77.8	*51.7*	8.7	10.2
2005	16.7	12.6	*9.4*	1.6	2.2	75.5	*56.3*	9.6	13.4
Nigeria									
1970	10.2	0.4	*0.0*	3.4	6.4	3.5	*0.2*	33.4	62.9
1981	31.1	0.2	*0.0*	0.7	30.2	0.6	*0.1*	2.3	97.1
1987	34.2	0.6	*0.3*	1.4	32.2	1.7	*0.8*	4.1	94.2
1996	49.5	0.8	*0.1*	2.2	46.5	1.7	*0.2*	4.4	93.9
2002	31.5	1.6	*0.1*	0.3	29.6	5.0	*0.3*	0.9	94.0
Philippines									
1970	18.6	1.8	*0.1*	16.3	0.3	9.8	*0.5*	87.9	1.6
1981	19.4	7.2	*2.9*	11.5	0.3	37.2	*15.0*	59.4	1.5
1987	20.7	12.2	*5.0*	7.7	0.4	58.9	*24.1*	37.4	2.0
1996	29.8	24.8	*17.7*	4.2	0.5	83.2	*59.3*	14.0	1.6
2004	91.3	83.3	*69.6*	6.7	1.2	91.2	*76.2*	7.3	1.3
Thailand									
1970	10.6	1.9	*0.0*	8.6	0.0	17.7	*0.4*	81.1	0.2
1981	20.7	6.6	*1.2*	14.0	0.0	32.0	*5.6*	67.3	0.2
1987	24.1	12.0	*3.3*	11.7	0.2	49.7	*13.8*	48.7	0.8
1996	33.3	24.2	*14.5*	8.2	0.4	72.6	*43.7*	24.8	1.2
2005	62.4	48.2	*29.5*	10.4	2.7	77.3	*47.2*	16.7	4.3

Table 7: Indicators of Research and Innovation Capacity (1/2)

	YR1981	YR1985	YR1991	YR1996	YR2000	YR2005
Indonesia						
Scientific and technical journal articles	..	72.0 (1986)	89.0	141.0	182.0	205.0
Research and development expenditure (% of GDP)	..	..	..	..	0.1	..
Researchers in R&D (per million people)	112.1 (1982)	129.8	..	..	212.5	..
China						
Scientific and technical journal articles	1,100.0	1,943.0	6,186.0	10,526.0	18,479.0	41,596.0
Research and development expenditure (% of GDP)	..	..	..	0.6	0.9	1.3
Researchers in R&D (per million people)	..	..	..	447.1	547.3	852.0
Brazil						
Scientific and technical journal articles	1,438.0	1,465.0	2,640.0	3,813.0	6,407.0	9,889.0
Research and development expenditure (% of GDP)	..	..	..	0.7	0.9	0.8
Researchers in R&D (per million people)	..	..	..	..	367.5	461.0 (2004)
India						
Scientific and technical journal articles	11,725.0	9,586.0	9,517.0	9,753.0	10,276.0	14,608.0
Research and development expenditure (% of GDP)	..	..	..	0.6	0.8	0.7 (2004)
Researchers in R&D (per million people)	..	..	..	153.5	110.8	..
Mexico						
Scientific and technical journal articles	648.0	740.0	1,082.0	2,124.0	2,971.0	3,902.0
Research and development expenditure (% of GDP)	..	..	..	0.3	0.4	0.5
Researchers in R&D (per million people)	..	225.7 (1984)	..	212.8	222.3 (1999)	464.2
Nigeria						
Scientific and technical journal articles	780.0	757.0	719.0	435.0	400.0	362.0
Research and development expenditure (% of GDP)	..	..	..	..	..	..
Researchers in R&D (per million people)	..	17.1	..	..	..	..

World Economic Indicators

Table 7: Indicators of Research and Innovation Capacity (2/2)

	YR1981	YR1985	YR1991	YR1996	YR2000	YR2005
Malaysia						
Scientific and technical journal articles	..	186 (1986)	260.0	362.0	460.0	615.0
Research and development expenditure (% of GDP)	..	..	..	0.2	0.5	0.6 (2004)
Researchers in R&D (per million people)	..	..	..	89.7	276.0	502.9 (2004)
Philippines						
Scientific and technical journal articles	..	151 (1986)	148.0	158.0	185.0	178.0
Research and development expenditure (% of GDP)	..	..	..	..	0.15 (2002)	0.14 (2003)
Researchers in R&D (per million people)	..	..	156 (1992)	..	..	..
Thailand						
Scientific and technical journal articles	..	226 (1986)	298.0	387.0	663.0	1249.0
Research and development expenditure (% of GDP)	..	..	..	0.1	0.3	0.3 (2004)
Researchers in R&D (per million people)	..	..	..	103.8	289.4 (2001)	291.6 (2003)

World Economic Indicators

APPENDIX 1: EXPORT CATEGORIES

The exports are classified according to the SITC system:

- SITC 0: Food and live animals
- SITC 1: Beverages and tobacco
- SITC 2: Crude materials, inedible, except fuels
- SITC 3: Mineral fuels, lubricants and related materials
- SITC 4: Animal and vegetable oils, fats and waxes
- SITC 5: Chemicals, dyes, pharmaceuticals, and perfumes
- SITC 6: Leather, rubber, cork and wood products, textiles, metallic and non-metallic manufactures
- SITC 7: Industrial machinery, office machinery, telecommunications equipment, electrical machinery, transportation equipment.
- SITC 8: Prefabricated buildings, furniture, travel goods, clothing, footwear, professional and scientific equipment.
- SITC 9: Commodities and transactions not elsewhere classified

We clustered some of the above product categories and defined these clusters as follows:

- SITC P = SITC 33 (Petroleum, petroleum products and related materials) + SITC 34 (Gas, natural and manufactured); and we refer to *SITC P as the "oil sector" where oil includes LNG (liquefied natural gas)*
- SITC N = SITC 0 to SITC 4 excluding SITC 33 and SITC 34 (SITC N covers food and live animals, beverages, tobacco, raw materials, mineral fuels, oils and fats excluding Petroleum and Gas related products, i.e. Non-petroleum and non-gas natural resources); and we refer to *SITC N as the "non-oil raw materials sector" and*
- *Manufactured sector* = SITC 5 + SITC 6 + SITC 7 + SITC 8

We then identified the technology level of the products *within the manufactured sector* (technology level of goods within SITC 5 to 8) according to the 4-way grouping of technology level in Hatzichronoglou (1997): (1) high technology level, (2) medium-high technology level, (3) medium-low technology level, and (4) low technology level.

Examples of products within each technology level are given below.

- High technology level (high-tech): Aerospace, Computers, office machinery, Electronics-communications, Pharmaceuticals
- Medium-high technology level (medium-high tech): Scientific instruments, Motor vehicles, Electrical machinery, Chemicals, Other transport equipment, Non-electrical machinery
- Medium-low technology level (medium-low tech): Rubber and plastic products, Shipbuilding, Other manufacturing, Non-ferrous metals, Non-metallic mineral products, Fabricated metal products, Ferrous metals
- Low tech export (low tech): Paper printing, Textile and clothing.