TRADE LIBERALIZATION AND FDI INCENTIVES IN INDONESIA: THE IMPACT ON INDUSTRIAL PRODUCTIVITY

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INTRODUCTION

CONFRONTED with declining oil prices and mounting debt servicing, the Indonesian economy has been going through drastic structural adjustment since the mid-1980s. The ongoing program for structural adjustment has been directed at a wide area of the economy and has been composed of various policies such as tax reform, financial liberalization, export promotion, import liberalization, and the relaxation of controls on and increased incentives for foreign direct investment (FDI). This paper attempts to measure the change in productivity in Indonesia's industrial sectors since the mid-1980s and to examine the impact of the import liberalization and FDI policies on such productivity change.

Section I decomposes industrial growth into the contributions of capital, labor, and total factor productivity (TFP); also the sectoral difference in TFP growth will be examined. A brief review of the successive import liberalization policies will be given in Section II along with an examination of the resultant change in the effective rate of protection (ERP) for manufacturing industries. Section III explains the trend of FDI in relation to the relaxation of controls and newly introduced incentives. Section IV quantitatively examines the contribution of these import liberalization and FDI policies to the TFP growth in nine manufacturing sectors using regression analysis. The main points of the discussion are summarized in the concluding remarks.

I. MEASUREMENT OF TOTAL FACTOR PRODUCTIVITY

Studies on the TFP of the Indonesian economy to date are limited both in number and in sectoral detail. This is simply due to the unavailability of appropriate and large-scale estimates for the country's capital stock.[1] Ikemoto [4] measured the TFP of Asian countries in the 1970s. He found that for Indonesia TFP growth contributed 3.1 per cent of the 7.8 per cent average annual growth during the

[1] Keuning [7] provides the only published large-scaled estimation of the Indonesian capital stock. It classifies industries into twenty-two sectors (five manufacturing) and gives capital stock data for 1975, 1980, and 1985 at 1980 constant prices. The Central Bureau of Statistics, Indonesia, is working on an estimation, but this has not been finalized yet.

TABLE I

TFP GROWTH FOR INDONESIA, 1985–90

(%)

	Growth Rate			Distribution Ratio to Capital	Annual TFP Growth
	Value Added	Labor	Capital Stock		
Agriculture	3.0	4.4	11.8	80.0	−12.5
Mining	2.5	4.9	8.3	93.5	−8.1
Manufacturing	10.7	5.8	10.0	80.2	2.1
Except oil refining	12.0	5.8	10.0	79.0	3.8
Oil refining	7.1	5.8	9.8	93.1	−3.7
Utilities	15.0	14.0	7.9	84.0	8.1
Construction	8.2	−0.3	9.4	45.9	4.2
Trade, restaurant	8.4	3.4	9.7	79.3	−0.1
Transport, communication	7.3	3.4	11.0	69.3	−2.3
Banking, real estate, etc.	10.1	13.8	9.9	79.2	−0.9
GDP	6.3	4.0	9.7	71.7	−2.7

Sources: Calculated from [6, various issues] [5]; Indonesia, Central Bureau of Statistics, Internal preliminary estimation of capital stock.

Notes: 1. Imputed rents, public service, and other services are excluded from the calculation.
2. Labor is defined as the number of workers. Value added and capital stock are measured at 1983 constant prices.
3. Distribution ratio to capital is defined as a ratio (per cent) of the sum of operating surplus and depreciation against the value added minus net indirect tax.
4. Since the data of workers were not separately available for "manufacturing except oil refining" and "oil refining," the growth rate of workers in manufacturing as a whole was applied to both sectors.

first half of the decade, and 1.8 per cent of the 7.5 per cent average annual growth during the latter half. His findings seem reasonable since trade liberalization and increased FDI occurred mainly in the early period of the decade. Another estimate made by the World Bank [13] showed an annual rate of 1.5 per cent TFP growth for the period of 1960–89. This rate is among the lowest in East and Southeast Asian countries.

Analysis of Indonesia's TFP since the implementation of its structural adjustment program has not been done yet; therefore the estimation of TFP in this paper will cover the latter half of the 1980s and will be made at two different classification levels using two different capital stock estimates. The first estimate is given using the industrial classification of the *National Accounts Statistics* published by the Central Bureau of Statistics, Indonesia (CBS) and relies on the preliminary results of the capital stock estimation by the CBS. The second estimate classifies manufacturing into nine sectors and uses the capital stock data compiled for this purpose from the data contained in *Industrial Statistics* published by the CBS.

Table I gives the average annual TFP growth rates for the eight industrial sectors from 1985 to 1990. In the table the TFP was calculated by the accounting method since the sample size was too small to apply the production-function approach. In the accounting method, TFP growth for the whole period is first calculated by subtracting the capital and labor contributions from the value-added growth, and then converted to the average annual rate. The distribution ratio between capital and labor was derived from the *Indonesian Input-Output Table, 1985* [5]. Overall TFP growth rate was negative at −2.7 per cent. The TFP growth rate was positive at 3.8 per cent in the manufacturing sector except for oil refining. The utility sector and the construction sector also experienced positive growth at 8.1 per cent and 4.2 per cent respectively. Though the TFP growth rates in the other sectors were negative, it should be noted that the TFP growth rates were underestimated for some sectors due to the limitation of data and possibly due to the exogenous determination of the distribution ratio between labor and capital used in the accounting method. One problem with the data is the distribution ratio. If a sector has a large portion of self-employed, the distribution ratio to capital will be high because the income of such self-employed is classified as operating surplus in the input-output table. This might be the case for rice farming,[2] quarrying, and in petty trade. Another problem is the change in operation rate of capital and the underemployment of labor. Such change is not reflected in the data due to the unavailability of information. Underemployment might be serious in the sectors based in rural areas.

Table II shows the differences in TFP growth for the nine manufacturing sectors from 1985 to 1990. The TFP growth rates for 1987–90, measured for the analysis in Section IV, are also shown for comparison. The TFP growth rates for both periods are given at the average annual rate for comparison. From 1985 to 1990, the annual TFP growth for the whole of manufacturing was 3.6 per cent. Among the sectors, the TFP growth rates in the basic metal products sector and the paper / paper products sector were quite high. However, the figure for the basic metal products sector should be discounted to some extent because the operation ratio in 1985 likely was low.[3] The main export sectors also benefited from positive TFP growth, the rates for the textile sector and the wood products sector being 7.3 per cent and 3.6 per cent respectively. The TFP growth rates were negative in most of the capital-intensive and labor-intensive sectors involved primarily in supplying the domestic market.

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[2] The distribution ratio to capital in rice farming is 79 per cent according to the definition applied here. On the other hand, according to Tabor [10], the percentage of farm households in 1983 which were landless was 3.1 per cent, those with less than 0.25 ha was 23.3 per cent and those with 0.25 ha to 0.49 ha was 22 per cent. Even if we assume in the extreme case that the incomes of such farmers are all included in the compensation to employees, we can at least say that more than half of the wages to farmers are included in the operating surplus. This causes the overestimate of the distribution ratio to capital.

[3] Though data for the operation ratio is not available, there is an indication of an under-utilization of capital in 1985. The ratio of real output to real mid-year capital stock was 3.3 in 1985, 5.1 in 1987, and 6.0 in 1990, the difference between 1985 and 1987 being larger.

TABLE II

TFP GROWTH OF MANUFACTURING SECTORS, 1985–90

(%)

Sector (ISIC Code)	Average Annual Growth Rate				
	Value Added	Labor	Capital Stock	TFP	
				1985–90	1987–90
Food, beverage, tobacco (31)	13.1	3.5	15.4	−1.0	4.0
Textiles, garments, leather (32)	20.3	14.0	16.7	7.3	2.5
Wood products (33)	20.8	17.5	19.3	3.6	−12.8
Paper and paper products (34)	26.0	9.0	20.2	13.7	2.0
Chemicals, rubber, petroleum (35)	9.0	9.1	16.5	−10.7	0.5
Nonmetallic mineral products (36)	6.7	5.3	10.7	−4.3	1.5
Basic metal products (37)	23.2	14.9	12.6	15.0	−3.7
Metal products, machinery (38)	17.0	7.8	21.1	−3.3	4.8
Other manufacturing (39)	19.0	20.1	19.6	−1.5	−2.7
Manufacturing total	15.6	9.6	14.2	3.6	2.4

Sources: Calculated from [6, various issues]; Indonesia, Central Bureau of Statistics, *Indikator Ekonomi,* various issues.

Notes: 1. The way of expressing the amount of change is as follows: "1985–90" shows the change of the 1990 figure over the 1985 figure, i.e., it is the sum of change in 1986, 1987, 1988, 1989, and 1990.
  2. Growth of capital from 1985 to 1990 was measured as the growth rate of the 1990 mid-year figure over the 1985 mid-year figure to take into account time lag between investment and operation. The resulting figure was then converted into the average annual growth rate.
  3. All data are in real terms at 1983 constant prices. Value added was deflated by the manufacturing implicit deflator of the national accounts.
  4. Capital stock was estimated by a simplified benchmark year method. First, nominal net fixed capital formation of each sector was deflated by the implicit deflator of gross fixed capital formation. Then, the average of the incremental capital-output ratio (ICOR) of each sector during 1985–90 was estimated. Assuming this ICOR is identical with the capital-output ratio in 1987, capital stock for 1987 was estimated as the product of ICOR and the value added. Using this as the benchmark, the data for other years were calculated.
  5. The distribution ratio between capital and labor for 1985–90 was calculated as the average ratio between compensation to employees and the operating surplus in 1986 and 1990. The average for 1988 and 1990 was used for the period of 1987–90.

A comparison of the figures for 1985–90 and those for 1987–90 gives some indication of the degree of change and sectoral differences in TFP growth, although a direct comparison of the figures is not possible because the base years for growth calculation are different. The average annual rate of TFP growth for the whole of manufacturing for 1985–90 was 3.6 per cent compared with 2.4 per cent for 1987–90.[4] Also the number of sectors with negative TFP growth are smaller

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[4] The figures are not immune from the influence of the difference in their distribution ratios between labor and capital, although the difference is very small. The distribution ratio to labor for 1985–90 is 0.2108 and the one for 1987–90 is 0.2005.

in the 1987–90 period. All the sectors with negative TFP growth for 1985–90 turned to positive growth in 1987–90, with the exception of the "other manufacturing" category. At the same time, however, the TFP growth of the wood products sectors and the basic metal products sector turned negative. In other words, relatively high TFP growth was observed in the export sectors and in the sectors whose domestic demand increased rapidly in the early part of the 1985–90 period, while growth was moderate and diffused to other sectors during the later period.

II. TRADE LIBERALIZATION AND EFFECTIVE RATE OF PROTECTION

A. Trade Liberalization Policy

Indonesia in the mid-1980s had to cope with two important economic problems which were closely related to the country's trade regime. One was to lower the high cost of domestic production prevalent in a wide area of its industries (the so-called high-cost economy problem) and the other was the attainment of a smooth access to inputs at internationally compatible prices especially for export industries. The solution of these problems would provide a firm basis for export promotion, since it would ensure that export industries stood on an "equal footing" with competitors in other countries in the area of the purchasing inputs. Thus the focal point of import liberalization in the mid-1980s was on the attainment of the static efficiency of resource allocation rather than on the dynamic efficiency of fostering new leading industries in the long run. Consequently the policy was in practice composed of three kinds of measures, i.e., tariff reduction, reduction of non-tariff barriers (NTBs) such as the import licensing system, and improvement of institutional systems for more efficient management.[5]

Import liberalization started in March 1985 with the simplification of the tariff ladder and a major reduction in tariff rates. The highest tariff rate, for instance, was reduced from 225 per cent to 60 per cent. Further minor tariff revisions were implemented in May and October 1986, in January and December 1987, and in January 1988. For a considerable number of commodities, the revisions also included the simultaneous abolishment of NTBs and the introduction of tariffs, i.e., the "tariffication" of NTB, for the temporary protection of the affected industries. This trend is well reflected in the trend of nominal tariff rates in Table III. The average tariff rate weighted by the import value was cut from 22 per cent to 13 per cent in 1985, but it rose slightly in 1988 to 15 per cent. In May 1990 a further major reduction in tariff rates took place, and the unweighed average rate fell as low as 22 per cent compared with 27 per cent in 1985. At the same time the highest tariff rate was in principle lowered to 40 per cent. It is also important to note that the tariff rates on some manufactured goods for consumption were reduced for the first time even after the introduction of import liberalization in 1985 in order to promote more competition in the domestic

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[5] For trade liberalization policy measures and the figures, reference was mainly to General Agreement on Tariffs and Trade [2], Kohama [8], and Nasution [9].

TABLE III

NOMINAL TARIFF RATE AND COVERAGE OF NTB

A. Nominal Tariff Rate

(%)

	Pre-1985	1985	1988	1990	1992
Average rate:					
Unweighted	37	27	24	22	20
Import weight	22	13	15	11	9
Output weight	29	19	18	17	13
Effective rate	n.a.	4.9	5.1	6.2	4.8

B. Coverage of NTB

(%)

	1986	1987	1988	1990	1992
Output value coverage	41	38	29	25	22
Manufacturing	68	58	45	33	31
Agriculture	54	53	41	39	30
Import value coverage	43	25	21	15	13

Sources: [2]; World Bank estimates.
Notes: 1. Nominal tariff includes surcharges.
2. "Effective" rate is defined as the ratio of tariff revenue against non-oil-imports.
3. For the calculation of "output value coverage," the 1985 output weight was applied to 1986. The 1987 output weight was applied for other years.

market. Tariff reductions up to 1988 were directed only at intermediate and capital goods in order to enhance exports.

The dominant form of NTB in Indonesia has been the import licensing system. Under the scheme only the licensed agents can import specific commodities in line with government guidance. In other words, it is a form of quantity control though the upper limit on the amount that can be imported is not always publicly announced and subject to government judgment. The system has been gradually replaced with tariffs following successive revisions of the system in May and October 1986, January 1987, November 1988, and June 1990. The number of commodities under this system decreased from 32 per cent in 1986 to 14 per cent in 1990. For manufactured goods, as shown in Table III, the output value coverage was quite high at 68 per cent in 1986, but decreased almost to half by 1990. These numbers clearly show the government's efforts to enforce efficient production on domestic producers through the tariffication of the import licensing system and the reduction of tariffs.

Two important improvements in the institutional system should also be briefly mentioned. One was the entrustment of customs clearance activity to a Swiss company, Société Général de Surveillance. This drastically reduced in uncertainty and the time required for customs clearance from more than a week to a couple

of days and contributed both to the planned production and the reduction of input inventories of domestic producers. But the services of this company were suspended recently due to the high costs. The other improvement was the introduction of the BAPEKSTA[6] scheme in May 1986 alongside the ongoing drawback system. Under the drawback system, an export industry can get repayment of the tariff on imported raw materials only after the product is exported. However, under the BAPEKSTA scheme an export industry which satisfies certain conditions is exempted from tariff payments at the time when it imports raw materials to be used for export production.

B. *Effective Rate of Protection*

This section examines the impact of nominal tariff reduction on the level of actual protection of Indonesian industries by looking at the change in ERP.[7] There are several ERP estimates for Indonesia which cover the period after 1985: Fane and Phillips [1] for 1987, Wymenga [14] for 1989, Warr [11] for 1987, and an internal estimation by the World Bank which covers a number of years. Although all the estimates use the 1985 input-output table [5] which covers 138 trade sectors, most of them are not comparable since the estimation methods are different[8] from one another except for Fane and Phillips, and Wymenga.

Table IV gives the available and comparable time-series data of ERP focusing on the period after 1985. Data on the nominal rate of protection (NRP) are also added for comparison. Comparison with the 1975 and 1987 figures in column (1) is basically to show the impact of the major tariff reduction in 1985, since the tariff revisions during the period of 1975–84 remained minor. The ERP for export industries was low from the beginning and the reduction was slight. The ERP for competitive import industries was high at 67 per cent in 1975 and was

6 BAPEKSTA was originally the abbreviation of the government agency's name, Badan Pelayanan Kemudahan Ekspor dan Pengolahan Data Keuangan (Agency for Export Facility Services and Financial Data Processing), but is now also used to refer to the scheme managed by this agency. In 1988 a quarter of the exports utilized this scheme. It also had the additional effect of giving bargaining power to export industries in the purchasing of domestic raw materials, since the international price data were readily available from the agency. See Hill [3].

7 ERP is defined as the net tariff protection for value added of an industry, and is in principle measured by subtracting the tariff imposition on the input materials from the nominal tariff on the output. For the calculation, an input-output (I-O) table and NRP using the I-O classification are required. The measure assumes fixed input coefficients which sometimes is not very relevant to a rapidly changing developing country.

8 The difference mainly arises from the different treatment of two technical questions: (1) the measurement of the free trade price for the estimation of the nominal rate of protection and (2) the treatment of nontraded goods. Regarding the first, there are several alternatives such as the application of the tariff rate specified in the tariff schedule, the application of the "effective" tariff rate calculated as a rate of tariff revenue against the import value, or the application of the international price. The selection will make a big difference when a country has a considerable amount of NTBs. As for the second, there are Balassa's naive method, Corden's method which decomposed the nontraded goods into factors of production and the traded goods, and the Fane and Phillips's method of applying Singapore prices in some cases. Warr [11] gives a comparison of these methods for Indonesia.

TABLE IV

EFFECTIVE RATE OF PROTECTION

(%)

	(1) ERP		(2) NRP			(3) ERP		
	1975	1987	1987	1990	1992	1987	1990	1992
Exports	10	8	−1	−1	−1	−2	−1	−1
Imports	66	29	—	—	—	—	—	—
Competitive	67	37	17	15	15	39	35	32
Noncompetitive	25	0	—	—	—	—	—	—
Manufacturing	—	—	17	13	12	68	59	52
Food, beverage, tobacco	—	—	14	13	12	122	126	120
Textiles	—	—	32	12	12	102	35	34
Wood products	—	—	2	15	−5	25	33	33
Nonmetal products	—	—	17	14	13	57	49	44
Engineering	—	—	40	38	28	152	139	82
Miscellaneous	—	—	40	26	26	124	79	80

Sources: For column (1), [11, Tables 5 and 6]; other data are World Bank estimates.

reduced drastically to 37 per cent by 1987. For noncompetitive import industries, it became zero by 1987. For the period from 1987 to 1992, as listed in columns (2) and (3) of the table, both NRP and ERP showed slight decreases for competitive import industries. Among manufacturing sectors, ERP for the textile industry decreased drastically from 102 per cent in 1987 to 34 per cent in 1992. The engineering sector and the miscellaneous sector also experienced sizable reductions in protection. However, ERPs for other sectors remained almost at the same levels. The wood industry, whose main products (veneer and plywood) were already competitive in the early 1980s, was still protected at about 30 per cent due to the remaining protection for other types of wood products for the domestic market. The food industry continues to be protected at a high ERP probably to protect the domestic suppliers of agricultural raw materials. In sum the reduction of NRPs in 1985 considerably reduced the ERP of the industries competing with imports, but tariff reductions after 1986 reduced ERP only gradually with the exception of the textile, engineering, and miscellaneous manufacturing sectors.

III. THE TREND OF FDI AND POLICY INCENTIVES

FDI in Indonesia had remained stagnant until the mid-1980s because of the strengthened regulations maintained during the oil boom.[9] Deregulation was begun in August 1984. This was followed by a succession of economic policy packages containing new incentives. These were mainly in the form of reduced regulations rather than tax exemptions. Deregulation covered a wide area such as relaxing regulations on staff sent from a parent company, simplifying application

[9] For FDI policy and figures up to 1990, see Watanabe [12].

procedures, widening the range of industries eligible for FDI, and lowering the cost of access to raw materials. Important revisions were made in December 1987 which relaxed the upper limit of capital payment to export-oriented industries, permitted the establishment of trading companies for export purposes, and extended the transition period in export industries for satisfying the majority code of Indonesian capital from ten to fifteen years. In 1989 the range of industries open to FDI increased. Accordingly the government changed its method of announcing such opened sectors from listing the closed sectors (negative list method) to listing the opened sectors (positive list method). At the same time the minimum requirement of capital payment was lowered.

During the same period, the drastic international structural adjustment triggered by the yen's appreciation after the Plaza accord was taking place in East and Southeast Asia. The first wave was the increase of FDI from Japan mainly to Thailand and Malaysia; the second wave was from the Republic of Korea and Taiwan whose currencies had appreciated with their growing trade surpluses. These floods of FDI gradually brought on a rise in labor cost and were limited by a shortage of infrastructure, especially in Thailand. These problems relatively improved the investment climate in Indonesia.

Thanks to the coincidence of deregulations policies and the emergence of favorable international conditions, the flow of FDI into Indonesia began to increase dramatically. Approved FDI reached U.S.$1.5 billion in 1987, U.S.$4.5 billion in 1988, U.S.$4.8 billion in 1989, U.S.$8.8 billion both in 1990 and 1991, and U.S.$10.3 billion in 1992 before decreasing in 1993 to U.S.$8.0 billion. FDI during these years focused on export-oriented manufacturing industries. According to Watanabe [12], FDI approved on condition that 65 per cent or more of its production be for export accounted for 31 per cent of the total number of projects in 1987; this number rose to 70–80 per cent during the next three years. Within the industrial sectors, FDI was prominent in the textile industry, paper industry, and chemical industry; these were followed by the basic metals industry and the processed metals, and machinery industries.

Generally, these export-oriented joint ventures have been internationally competitive from their start. Such joint ventures utilize relatively capital-intensive techniques and efficient production management know-how. Therefore it is natural to assume that the efficient production systems brought in by FDI have contributed to the growth of TFP, even after discounting the impact of the quantitative increase in capital. Again it should be stressed that the increase of FDI was not caused by Indonesia's FDI policy per se but by the combination of FDI policy and many other related deregulation policies.[10]

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[10] Other related policies are trade liberalization including the BAPEKSTA scheme and deregulation in the banking sector. Especially the deregulation of activities by foreign banks increased the supply of capital to joint ventures and the supply of export credit. The lowered reserve ratio of banks from 15 per cent to 2 per cent also contributed to the increase of financial resources.

TABLE V

TFP Growth and ERP for Manufacturing

(%)

Manufacturing Sectors	Average Annual Growth Rate (1987-90)				TFP Growth Rate (1987-90)	ERP	
	Output	Value Added	Labor	Capital Stock		1987	1989
1. Food, beverage, tobacco	13.1	17.6	4.2	16.2	12.4	116.6	138.1
2. Textiles, garments, leather	28.5	24.7	20.5	23.9	7.8	84.6	93.2
3. Wood products	21.1	14.9	24.6	22.4	−33.6	18.6	−1.4
4. Paper and paper products	28.9	27.5	`12.1	29.4	6.1	16.4	17.2
5. Chemical products	18.6	16.5	14.7	16.7	1.4	65.6	34.3
6. Oil refining	18.6	16.5	14.7	16.7	1.4	−1.2	−1.2
7. Nonmetallic products	10.2	10.6	11.6	8.6	4.7	60.6	71.6
8. Basic metal products	32.3	15.9	26.0	18.0	−10.7	10.9	9.6
9. Metal works, machinery	22.0	21.7	12.2	19.7	15.2	118.5	113.2
10. Other manufacturing	31.6	23.9	32.1	22.5	−8.0	95.6	108.7
11. Manufacturing total	24.4	18.6	14.2	17.4	7.5	68.8	64.3

Sources: ERP data are cited from Wymenga [14, Table 6]. Others are calculated from the same sources as Table II.

Notes: 1. Wymenga separates sectors 5 and 6, but data other than ERP were not separable. Therefore, the aggregate figures were applied to both sectors.
2. Outputs were deflated by estimating the corresponding deflators from the wholesale price indices.
3. Growth of capital from 1987 to 1990 was measured as the growth rate of the 1990 mid-year figure over the 1987 mid-year figure to take into account the lag between investment and operation. The resulting figure was then converted into the average annual growth rate.
4. See also notes 1 and 3 of Table II.

IV. QUANTITATIVE ASSESSMENT OF POLICY IMPACT ON TFP

This section empirically examines the impact of the above-described import liberalization and FDI policies on the growth of TFP in Indonesia's manufacturing industries. For this purpose, a cross-industry regression analysis will be carried out to explain sectoral differences in TFP growth using sectoral differences in the indicators of policy changes.[11] As an indicator of the import liberalization, the ERP data will be used. The change in the import licensing system and the introduction of the BAPEKSTA scheme cannot be incorporated into the analysis

[11] In practice, there is also a reverse causality. Sometimes a government lowers the tariff rate of a commodity after it became competitive.

TABLE VI

RESULTS OF REGRESSION ANALYSIS ON TFP DETERMINANTS

Eq. (1) $TFP8790 = -3.1895 + 0.0030 \cdot FDI8789$ (0.49)	$\bar{R}^2 = -0.105$
Eq. (2) $TFP8790 = -1.3569 + 0.5892 \cdot DERP$ (1.67)	$\bar{R}^2 = 0.183$
Eq. (3) $TFP8790 = 2.8121 + 28.00 \cdot GRERP$ (3.21)	$\bar{R}^2 = 0.597$
Eq. (4) $TFP8790 = -8.7438 + 0.8086 \cdot DERP + 0.0079 \cdot FDI8789$ (2.26) (1.49)	$\bar{R}^2 = 0.479$
Eq. (5) $TFP8790 = -2.5784 + 31.54 \cdot GRERP + 0.0065 \cdot FDI8789$ (4.09) (1.87)	$\bar{R}^2 = 0.659$

Notes:
1. $TFP8790$=TFP growth rate (1987–90), $GRERP$=ratio of decrease of ERP (1987–89), $DERP$=decrease of ERP (1987–89), $FDI8789$=approved FDI (cumulative of 1987, 1988, and 1989), ( )=t value, and $\bar{R}^2$=coefficient of determination (adjusted for degree of freedom).
2. Samples are nine manufacturing sectors listed in Table V (with No. 5 "chemical products" and No. 6 "oil refining" being combined for which the average ERP was used).
3. FDI figures are in billion rupiah and are deflated by the investment deflator.

because of the difficulty of quantification. As an indicator of FDI policy, the accumulated amounts of FDI at the approval base will be used.[12] The period of 1987–90 was chosen for the present analysis because the comparable time-series sectoral ERP data are available only from Wymenga [14] for 1987 and 1989 at ten-sector classification. Termination was intentionally set at 1990 to use data showing obvious change in TFP. This will not cause problems since the tariff reduction in June 1990 would have changed ERP only toward the end of 1990. The data used for regression and the related data are given in Table V. As the TFP growth rates, the change for the whole period of 1987–90 are used.

The specification of the equations hypothetically assumes that the larger the ERP reduction or the amount of accumulated FDI, the greater the TFP improvement. In other words, the sign condition for ERP and FDI are positive. Two indices were prepared to represent the ERP change. The first is the ratio of ERP reduction (*GRERP*), calculated as the ratio of decrease of ERP from 1987 to 1989 against the ERP in 1987. The second is the magnitude of ERP reduction (*DERP*), given by the decrease of ERP from 1987 to 1989. The reason for preparing the two indicators is that it is difficult to conclude at the start which variable of the two provides more pressure for TFP growth. For FDI, a one-year time lag was assumed to take into account the gestation period. The samples are the manufacturing sectors listed in Table V which total nine since the chemical products sector and oil refining sector have been combined for this analysis.

The results of the regression analysis are given in Table VI. Equations (1) through (3) each examined the impact of FDI and ERP to see whether a single

[12] The FDI data on the realization base are not available.

explanatory variable played a decisive role. FDI alone did not have much impact on TFP growth because the coefficient of FDI in equation (1) was not significant. The coefficients of both *DERP* and *GRERP* were significant, but the explanatory power (the coefficient of determination after the adjustment for degree of freedom) of equation (3) was much higher than that of equation (2). This suggests that the ratio of ERP reduction was more influential on TFP growth than the magnitude of ERP reduction. The combination of FDI and ERP in equations (4) and (5) gave better results. The coefficients of equation (5) were more significant with higher *t* values than those of equation (4). Moreover, the explanatory power of equation (5) was larger at 0.659. These regression results indicate that the ratio of ERP reduction and the increase of FDI played important roles in TFP growth, and also that the impact of ERP reduction was more crucial than the impact of FDI increase.

A few comments should be added regarding the impact of other factors which could not be incorporated into the present regression analysis. Indonesia's currency devaluation and the introduction of the BAPEKSTA scheme in 1986 might have contributed to the increase of value added of export-oriented manufacturing sectors since export prices in rupiah increased while input prices did not increase much or even decreased due to the BAPEKSTA scheme. Management of the exchange rate after 1986 helped to avoid deterioration in export competitiveness by maintaining the stability of the real effective exchange rate.[13] The reduction of NTBs should have also contributed to TFP growth since it would have increased the pressure of competition as did the reduction in ERP.

CONCLUDING REMARKS

The primary problem facing the Indonesian economy by the mid-1980s was to lessen its dependency on petroleum by developing other modern sectors. Since then various package policies have been implemented to cure the inefficiencies or so-called high-cost economy in the modern sectors. This paper has shown that the growth of the manufacturing sectors after 1985 has accompanied the improvement in TFP, though this has not been dramatically successful. TFP growth rates were high in the export-oriented manufacturing sectors during the early period; then such TFP growth diffused, though to the moderate degree, to a wider area of manufacturing toward 1990. Also, cross-industry analysis for 1987–90 showed that TFP growth benefited more from the reduction of ERP than from the increase in FDI. The results suggest that import liberalization and FDI policies were useful for improving the efficiency of the manufacturing sectors. More comprehensive quantitative analyses covering the whole period of drastic policy change after 1985 and including a wider variety of policy variables remain for future studies.

[13] According to the estimate made by Y. Okamoto of the Institute of Developing Economies, the real effective exchange rates since 1986 are as follows (1980=100): 167.8 (1986), 221.1 (1987), 231.1 (1988), 226.3 (1989), 225.0 (1990), and 235.9 (1991).

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