

STRUCTURAL CHANGES IN INDONESIAN INDUSTRY AND TRADE: AN INPUT-OUTPUT ANALYSIS

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This study evaluates the current achievement of industrialization in Indonesia and clarifies what the major challenges are for sustaining industrialization. This is done by examining structural changes in the economy from the period before to the period after economic crisis using the method of input-output (I-O) analysis. After tracing the history of economic development in Indonesia, changes in industry and trade between 1995 and 2000 are viewed using skyline chart analysis, industrial linkage analysis, and growth-factor decomposition analysis. Results indicate that from 1995 to 2000, the manufacturing industry expanded the share of production, strengthened export orientation, and lowered import dependency. However, these phenomena appear to have resulted primarily from slumps in growth factors other than export demand as well as sharp declines in the value of the rupiah. This study shows that the current decrease of investment is a bottleneck in industrialization and indicates an urgent need for Indonesia to improve the investment environment, particularly for foreign investors.

INTRODUCTION

INDONESIA achieved dynamic economic growth from the late 1980s, particularly between the mid-1990s and the outbreak of an economic crisis in 1997. The country experienced unprecedented economic chaos and recession due to a currency crisis in Asia and the collapse of the Soeharto regime in the period from 1997 to 1998.

This study analyzes structural changes in the Indonesian economy before and after the 1997–98 crisis and looks at the political transformation from the perspective of the country's industrial and trade performance. For this purpose, this study takes into account the industrial structure as a whole but also focuses on the manufacturing industry as a driving force for economic development. This is done in order to identify the current stage of industrial development in Indonesia and what the challenges are for further industrialization.

For analysis of industrial and trade structures, input-output tables are used. Since I-O tables for Indonesia are prepared every five years, the approach taken in this study may not be completely adequate for a detailed analysis of the period in which

there were drastic changes. However, I-O analysis has advantages in that it provides a comprehensive examination of changes in the structure of production, demand, and comparative advantage. For this study, the Indonesian input-output table of 2000 which was released at the end of 2003 is used together with three earlier editions (1985, 1990, and 1995) in order to analyze changes in the industrial and trade structure between 1995 and 2000 and to identify what level of industrialization Indonesia reached.¹

Section I looks at the trajectory of Indonesian economic development from the mid-1960s when the Soeharto administration started through the high growth period, the 1997–98 economic crisis, and the post-Soeharto period. Using skyline charts and measuring industrial linkage effects, Section II describes structural changes in Indonesian industry and trade in the period of the economic crisis and the collapse of the Soeharto regime. The growth factor decomposition method is employed in Section III to identify sources of change in the Indonesian economy. Finally, Section IV provides clarification of the stage of industrialization Indonesia has reached and shows what challenges the country faces in order to achieve further industrialization. This study is intended to provide the new Indonesian government (which took office in October 2004) with suggestions for how the current industrialization stage should be appraised and recommendation regarding what industrialization strategies and supportive institutions may be required from now on.

I. ECONOMIC DEVELOPMENT IN INDONESIA: GROWTH, CRISIS, AND THE POST-SOEHARTO ERA

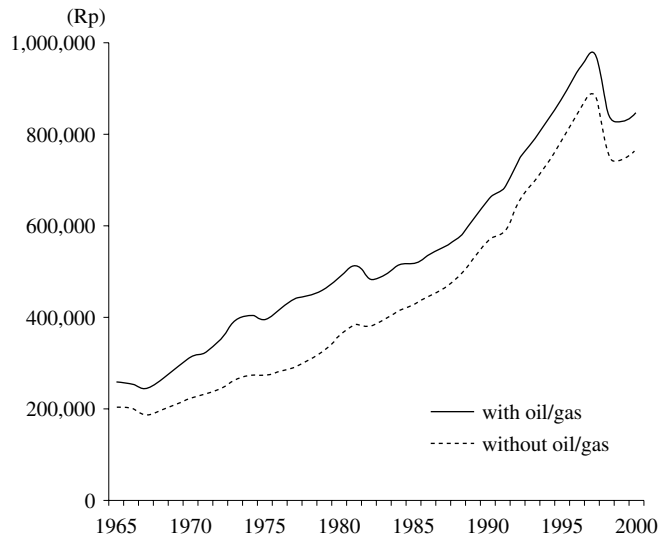
After recovering from an unstable political and economic situation in the early 1960s, Indonesia maintained a high growth rate of about 7% per annum until 1997, when it was affected by the East Asian economic crisis. Figure 1 shows that per capita GDP increased fourfold during 1966–97, but sharply dropped in 1998 due to the economic crisis. Table I shows a comparison of the annual average growth rates of real GDP in Indonesia from the 1960s with those of its neighboring countries, all developing countries, and the whole world. Until 1997, performance in Indonesia was no less impressive than that of its neighbors. However, in the 1997–98 economic crisis, Indonesia experienced the largest decline in growth compared to neighboring East Asian countries. During 1998–2000, Indonesia also fell behind other Asian countries in recovering from the economic crisis.

Table II shows the growth and sectoral share of GDP between 1996 and 2000.²

¹ For similar studies on Indonesia covering periods up to the mid-1980s or 1990, see for example Akita (1991, 1997), Hayashi (1996, 1997), Ishida (2002), and Poot (1991). Ishida includes the years up to 1999 including I-O tables up to 1995 and manufacturing statistics from 1996 through 1999.

² The division into several subperiods seen in Table II is based on Hill (1996, pp. 14–17) with some modifications following 1986. For details, see Hayashi (2002, pp. 110–14).

Fig. 1. GDP per Capita in Indonesia: 1965–2000 (1983 prices)



Source: Van der Eng (2002: 182–83), updated for 1999 and 2000 with data from the BPS (2003, *National Income of Indonesia*).

TABLE I
GDP GROWTH RATES IN INDONESIA AND NEIGHBORING COUNTRIES

	(Annual average, %)					
	1960–70	1970–80	1980–90	1990–97	1997–98	1998–2000
Indonesia	4.1	7.9	6.4	7.4	–13.1	2.8
Malaysia	6.5	7.8	6.0	9.2	–7.4	7.2
Philippines	4.9	5.9	1.7	3.1	–0.6	3.9
Singapore	9.8	8.9	7.4	8.8	–0.9	7.9
Thailand	8.2	6.9	7.8	6.7	–10.5	4.5
China	3.6	6.2	9.3	11.2	7.8	7.5
Vietnam	n.a.	n.a.	n.a.	8.4	5.8	5.8
Developing countries	5.3	5.4	2.9	3.3	1.8	3.9
World	5.5	3.7	3.1	2.5	2.2	3.4

Source: Calculated from the World Bank (2003).

Note: GDP data is in real terms (1995 prices).

Indonesia maintained high economic growth during the 1970s, largely because of the rapid expansion of oil production and a sharp hike in oil prices after 1973. During this decade, high oil revenues appeared to lead the government into nationalist economic policies that were somewhat inward-looking, restrictive, and pro-*pribumi* (native) in trade, foreign investment, and business. However, after 1982, the Indonesian economy slowed down when oil prices started to fall. Export earn-

TABLE II
GROWTH AND SECTORAL SHARE OF GDP IN INDONESIA: 1966–2000

	(%)					
	Agriculture	Industry ^a		Service	GDP	
		Manufacturing	Total		Excl. Oil and Gas	Incl. Oil and Gas
Growth rate: ^b						
1966–70	3.2	8.9	10.8	3.6	4.7	7.4
1970–81	4.2	10.2	10.3	8.9	7.5	7.1
1981–86	3.3	8.9	6.6	5.5	5.2	3.0
1986–96	3.6	11.3	11.9	7.9	8.3	7.4
1996–2000	1.0	0.7	–0.8	–2.5	–1.2	–1.3

1966–96	3.7	10.2	10.3	7.3	7.0	6.5
1966–2000	3.4	9.0	8.9	6.1	6.0	5.6
Sectoral share: ^c						
1966–70	42.4	11.9	17.6	40.0	100	
1970–81	34.5	14.6	23.7	41.8	100	
1981–86	27.8	17.6	26.6	45.6	100	
1986–96	21.8	22.8	32.8	45.4	100	
1996–2000	17.9	26.8	38.9	43.2	100	
Sectoral contribution to GDP growth: ^d						
1966–70	28.9	22.5	40.4	30.7	100	
1970–81	19.2	19.8	32.5	49.6	101	
1981–86	17.7	30.1	33.8	48.3	100	
1986–96	9.5	31.0	47.0	43.2	100	
1996–2000	14.9	15.6	–25.8	–90.0	–101	

Source: See Fig. 1.

^a Industry includes manufacturing, mining, utilities, and construction.

^b The growth of GDP represents the annual average growth rate based on 1983 constant prices in each period.

^c The sectoral share is calculated as an average for respective years in each period.

^d The contribution of each sector group to GDP growth is weighted by the respective sectoral GDP shares.

ings decreased, and foreign debt repayments became more difficult. Real GDP growth rate fell to 3% per annum in the period of 1981–86, and the economic slowdown induced the government to prepare a series of economic reforms. It quickly introduced macroeconomic adjustment programs such as devaluation of the rupiah in 1983, reduction of government expenditure, cancellation of large-scale national projects, and reforms of tax and financial systems.

A further fall in oil prices in 1986 required the government to implement microeconomic reforms, which enhanced export-oriented manufacturing and foreign direct investment (FDI). Such changes in economic policies contributed to an acceleration of economic growth that lasted until the onset of the economic crisis of

1997. During the decade from 1986, Indonesia's annual average growth in GDP exceeded 8%. This was driven by a rapid expansion of the manufacturing industry, which contributed to more than 30% of the total growth. This high economic growth, along with deregulation measures, stimulated business activities in the private sector.

The economic crisis originating in Thailand in 1997 quickly spread to Indonesia, and this was a major factor in the collapse of the 32-year-old Soeharto regime in May 1998. In 1997, the currency turmoil triggered capital flight, and this caused further collapse of the rupiah along with a sharp increase in energy and food costs. This drove inflation up 78% in 1998, and in turn made macroeconomic instability worse. Year-on-year GDP growth rate slowed to 4.3% in 1997, and the economy contracted by 13.1% in 1998. Output declined in 1998 across almost all sectors, with construction (-36.5%) and banking/finance (-34.0%) most seriously affected. GDP of the manufacturing industry (non-oil/gas) shrank by 11.4% in 1998. Despite recovering in 1999 (0.9% growth) and 2000 (5.0% growth), real GDP decreased at an annual average rate of 1% during 1996–2000. In the period of prime focus for this study, the Indonesian economy experienced a growth pattern significantly different from that in the previous period.

From a sectoral viewpoint, the manufacturing industry, with more than 10% growth annually, has been the main driving force of economic growth in Indonesia since the mid-1960s. Agriculture's share of GDP declined from 42% to 18% between 1966 and 2000. By contrast, the share of manufacturing increased from 12% to 27% in the same period and exceeded that of agriculture in 1991. From the mid-1990s to 2000, contraction of agriculture and expansion of manufacturing remained unchanged even in the period surrounding the economic crisis.

II. CHANGES IN THE INDUSTRIAL AND TRADE STRUCTURE OF INDONESIA

A. *Changes in the Industrial and Trade Structure: A Skyline Analysis*

How did the industrial and trade structure of Indonesia change during a course ranging from the high economic growth period in the mid-1990s to the economic crisis period of 1997–98, the collapse of the Soeharto era, and finally through the post-crisis period? This section examines structural changes in the industry and trade as well as industrial linkage effects primarily between 1995 and 2000, using Indonesian I-O tables.³

As indicated in Table III, 160- to 180-sector tables prepared by BPS (Badan Pusat Statistik: Statistic Indonesia, the Central Statistics Agency) are integrated

³ To precisely identify the characteristics of structural changes between 1995 and 2000, the previous two periods, 1985–90 and 1990–95, are observed in this study for comparison.

TABLE III
SECTOR CLASSIFICATION FOR THE INDONESIAN INPUT-OUTPUT TABLES (41 SECTORS)

Sectors	1985 Code	1990 Code	1995 Code	2000 Code
Agriculture, forestry, & fishery:				
1 Agriculture, forestry, & fishery	1-38, 104	1-31, 44, 96	1-35, 49, 53, 104	1-34, 49, 53, 106
Mining:				
2 Mining, oil, & gas	39-51, 102	32-43, 95	36-48, 103	35-48, 105
Manufacturing (incl. oil & gas)				
Manufacturing (excl. oil & gas)				
Resource-intensive (incl. oil & gas)				
Resource-intensive (excl. oil & gas)				
3 Petroleum & gas refineries	101, 103	94	102	104
4 Processed foods	52-55	45-48	50-52, 54	50-52, 54
5 Animal & vegetable oils	56	49	55, 56	55, 56
6 Other foods, beverages, & cigarettes	57-74	50-65	57-72	57-73
7 Sawmill, plywood, & wood products	84-86, 88, 89	74-76, 78, 79	82-84, 86, 87	84-86, 88, 89
8 Wooden furniture & fixtures	87	77	85	87
9 Pulp, paper, & paper products	90, 91	80-82	88-90	90-92
10 Tires & rubber products	105, 106	97, 98	105, 106	107, 108
11 Ceramic & earthenware products	108	100	108	110
12 Glass & glassware products	109	101	109	111
13 Other nonmetallic products	110, 112	102, 104	110, 112	112, 114
14 Cement	111	103	111	113
Labor-intensive:				
15 Yarn spinning	75	66	73	74, 75
16 Textile weaving	76	67	74	76
17 Made-up textile products (excl. apparel)	77	68	75	77
18 Knitting	78	69	76	78
19 Wearing apparel	79	70	77	79
20 Carpets & rugs	80, 81	71	78	80
21 Footwear & leather products	82, 83	72, 73	79-81	81-83
22 Printing & publishing	92	83	91	93
23 Miscellaneous manufacturing products	135-138	128-131	136-139	138-141
Capital-intensive:				
24 Fertilizers & pesticides	94	85, 86	93, 94	95, 96
25 Basic chemicals (excl. fertilizers)	93, 95	84, 87	92, 95	94, 97
26 Other chemicals	96-100	88-93	96-101	98-103
27 Plastic products	107	99	107	109
28 Basic iron & steel	113	105, 106	113, 114	115, 116
29 Nonferrous basic metal	114	107, 108	115, 116	117, 118
Machinery industry:				
30 Metalworking products	115-119	109-112	117-120	119-122
31 Machinery & apparatus (excl. electrical)	120	113, 114	121, 122	123, 124

TABLE III (Continued)

Sectors	1985 Code	1990 Code	1995 Code	2000 Code
32 Electrical machinery & apparatus	121	115, 116	123, 124	125, 126
33 Radio, TV, comm., & IT equipment	122	117	125	127
34 Home electrical appliances	123	118	126	128
35 Other electrical apparatus	124, 125	119, 120	127, 128	129, 130
36 Shipbuilding	126	121	129	131
37 Railway vehicles	127	122	130	132
38 Automobiles & motorcycles	128–130	123–125	131–133	133–135
39 Aircraft	131	126	134	136
40 Precision equipment	132–134	127	135	137
Service & others:				
41 Service & others	139–170	132–161	140–172	142–175

Source: Prepared based on I-O tables of BPS (various years).

Note: This study integrates 160- to 180-sector I-O tables into tables of 41 sectors; 38-sector manufacturing is further classified into 4 groups: resource-intensive, labor-intensive, capital-intensive, and machinery.

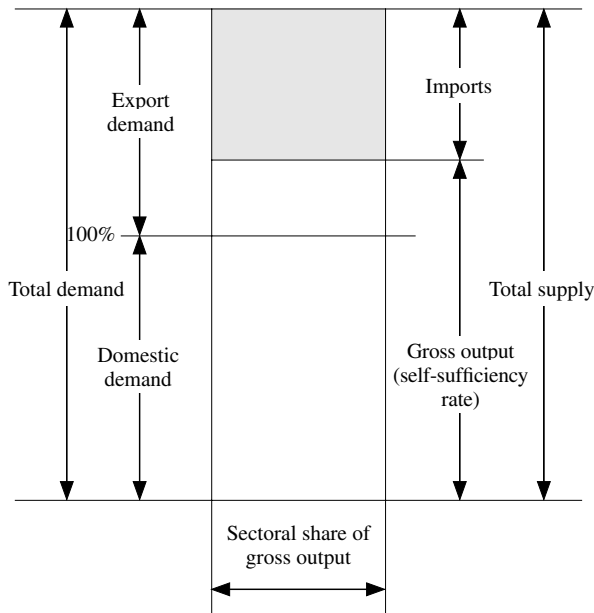
into 41-sector tables in order to focus on structural changes in the manufacturing industry. To further understand changes in the economy, this study also uses a 7-sector classification, where 38 sectors in manufacturing are integrated into 4 sectors. Since the traditional dichotomy between light industry and heavy/chemical industry does not seem to reflect characteristics of manufacturing in Indonesia, this study adopts a classification based on the work of Feridhanusetyawan and Aswicahyono (2003, p. 142), Hill (1996, p. 158), and Ohkawa and Kohama (1993, p. 142). In this classification, the manufacturing industry is categorized into four groups as follows: (1) resource-intensive, (2) labor-intensive, (3) capital-intensive, and (4) machinery industry groups. This is done with consideration of industrial specificity in Indonesia, production factors, and commodity groups of respective goods.⁴

Understanding structural changes in industry and trade with economic development in a country requires analysis of direct economic effects that appear as changes in output of an industry. Indirect economic effects that induce repeated transactions for intermediate goods in other industries must also be viewed.⁵ Skyline analysis

⁴ While wooden furniture and fixtures (sector no. 8) and plastic products (sector no. 27) are classified into the resource-intensive group, these sectors are also labor intensive. Similarly, other foods, beverages, and cigarettes (sector no. 6) categorized in the resource-intensive group includes wheat which is fully dependent on imported materials. The classification used in this study is not perfect nor does it contain mutually exclusive categories. It is, however, a conventional rubric that can be used for a broad understanding of trends.

⁵ For example, expansion of domestic demand may increase the demand for and the production of cars. In turn, this increases the demand for steel sheets used in making automotive bodies, electrical

Fig. 2. Explanation of Skyline Charts



can, with the use of I-O tables, produce charts illustrating direct and indirect effects of domestic demand, exports, and imports on the production of each industry (Tokutsu and Fujikawa 2001, pp. 61–75). Current prices in I-O tables are converted to 1993 constant prices for purposes of drawing the skyline charts.⁶

Figure 2 includes an explanation of how to read skyline charts. The height of the column in each sector represents the proportion of domestic to total demand or supply expressed as 100%. The left-hand side of the figure represents total demand consisting of domestic demand and exports. The right-hand side indicates total supply that includes gross output and imports. The former is equal to the latter. This

parts and components, plastic parts for meters, tires, glass panes, and other auto parts. This then further increases the demand for input materials necessary for the production of these intermediate goods. “Indirect effects” refers to this chain of demand for intermediate goods generated by an increase in final demand.

⁶ This study deflates the Indonesian I-O tables by 1993 prices by taking into account drastic changes in prices during our observed years of 1995 and 2000. Constant prices in I-O tables are also for a growth factor decomposition analysis that is used in the latter part of this article. However, due to constraints on price data, I-O tables are deflated as follows: Sectoral GDP deflators are used to obtain constant price data for the service industry as nontradable goods and for the agriculture industry as quasi-nontradable goods, respectively. For mining (including oil and gas) and manufacturing industries as tradable goods, sectoral wholesale price indices of exports, imports, and domestic products are employed to deflate values of exports, imports, and remaining items, respectively.

chart shows the effects of direct and indirect generation of gross output that is induced by final demand. The width of the column denotes the sectoral share of gross output.

Figures 3 and 4 include skyline charts for the whole industry (41 sectors) and for the manufacturing industry (38 sectors), respectively. These figures clearly and comprehensively illustrate changes in industrial and trade structure during the period of 1985 to 2000.⁷

Figure 3 shows that the share of the agriculture industry that includes forestry and fishery (sector no. 1) declined in its production share between 1995 and 2000. This tendency has continued since 1985. Due to an increase in supply resulting from buoyant international oil and gas markets, the mining industry that includes oil and gas (sector no. 2) increased its production share in 2000. This followed a decline in its share of gross output during 1985–95. The output share of the service industry (sector no. 41), the largest one in the 41 sectors, contracted between 1995 and 2000. This led to a return to the level of 1985. In 2000, the agriculture and service industries had a low proportion of exports to production. However, their self-sufficiency ratios recorded nearly 100%, a figure similar to those in or before 1995. In 2000, the mining industry was strongly export-oriented, while its self-sufficiency ratio declined relative to that in or before 1995.

In contrast, following past trends, the manufacturing industry (sector nos. 3–40) expanded its share of gross output between 1995 and 2000. In 2000, export ratios rose, and the number of sectors with high export ratios increased.⁸ The decrease in the size of the shaded area in the chart between 1995 and 2000 implies that there was a decline in import dependency.⁹

Skyline charts with focus on the manufacturing industry in Figure 4 indicate that the resource-intensive group still occupied more than 50% of output in manufacturing in 2000, in spite of a tendency toward decline. While the output share of the labor-intensive group peaked in 1995 at 17%, the share of the machinery industry group rose from 16% in 1995 to 20% in 2000.

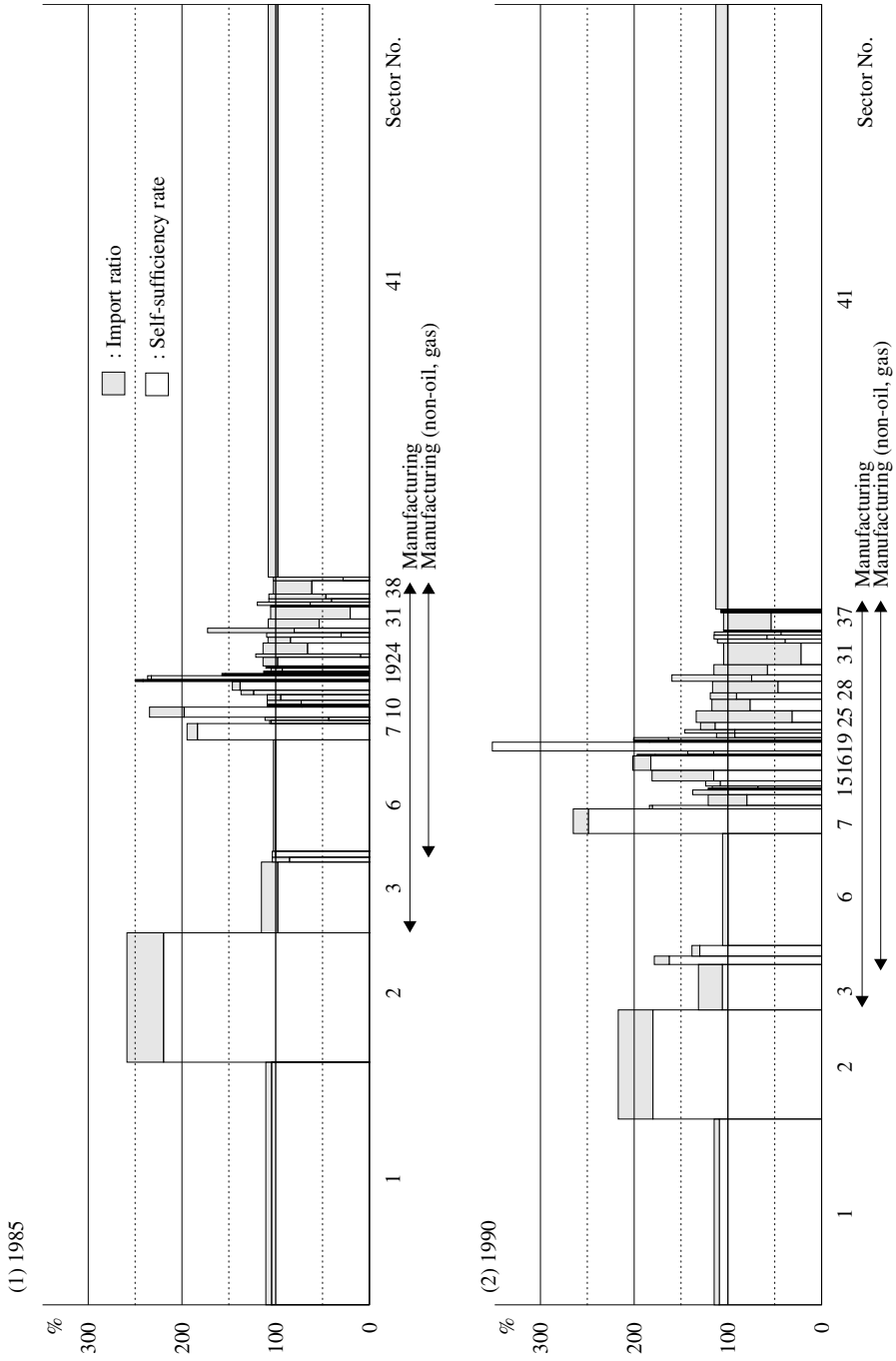
In the resource-intensive group, processed foods (sector no. 4) together with animal and vegetable oils (sector no. 5) expanded the share of their output in the manu-

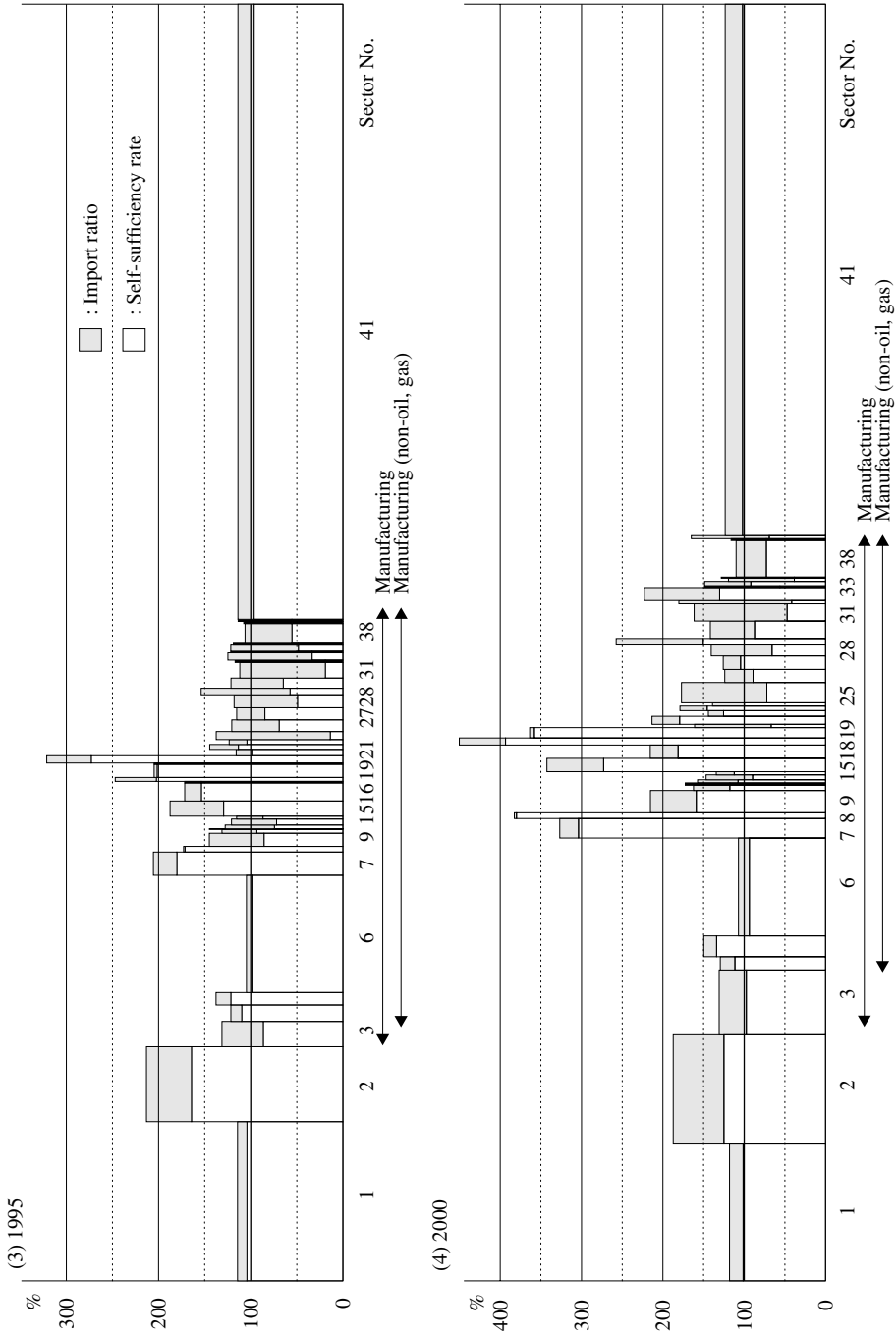
⁷ The agriculture industry (including forestry and fishery), the mining industry (including oil and gas), and the service industry are placed in this order in accordance with the sectoral sequence used in the Indonesian I-O tables. With regard to the manufacturing industry, 38 sectors are sorted based on the conventional classification group sequence: resource-intensive, labor-intensive, capital-intensive, and machinery industry.

⁸ According to BPS statistical data, exports of manufacturing goods in 2000 were recorded at US\$42 billion. The amount of manufacturing exports in 2000 was substantially larger than US\$34.6 billion in 1998, US\$33.3 billion in 1999, US\$37.7 billion in 2001, and US\$38.7 billion in 2002.

⁹ Since I-O tables used here are of a competitive import type, it cannot be made clear in this study whether a decline in import dependency resulted from a decrease in imports of intermediate goods or a decrease in imports of final goods.

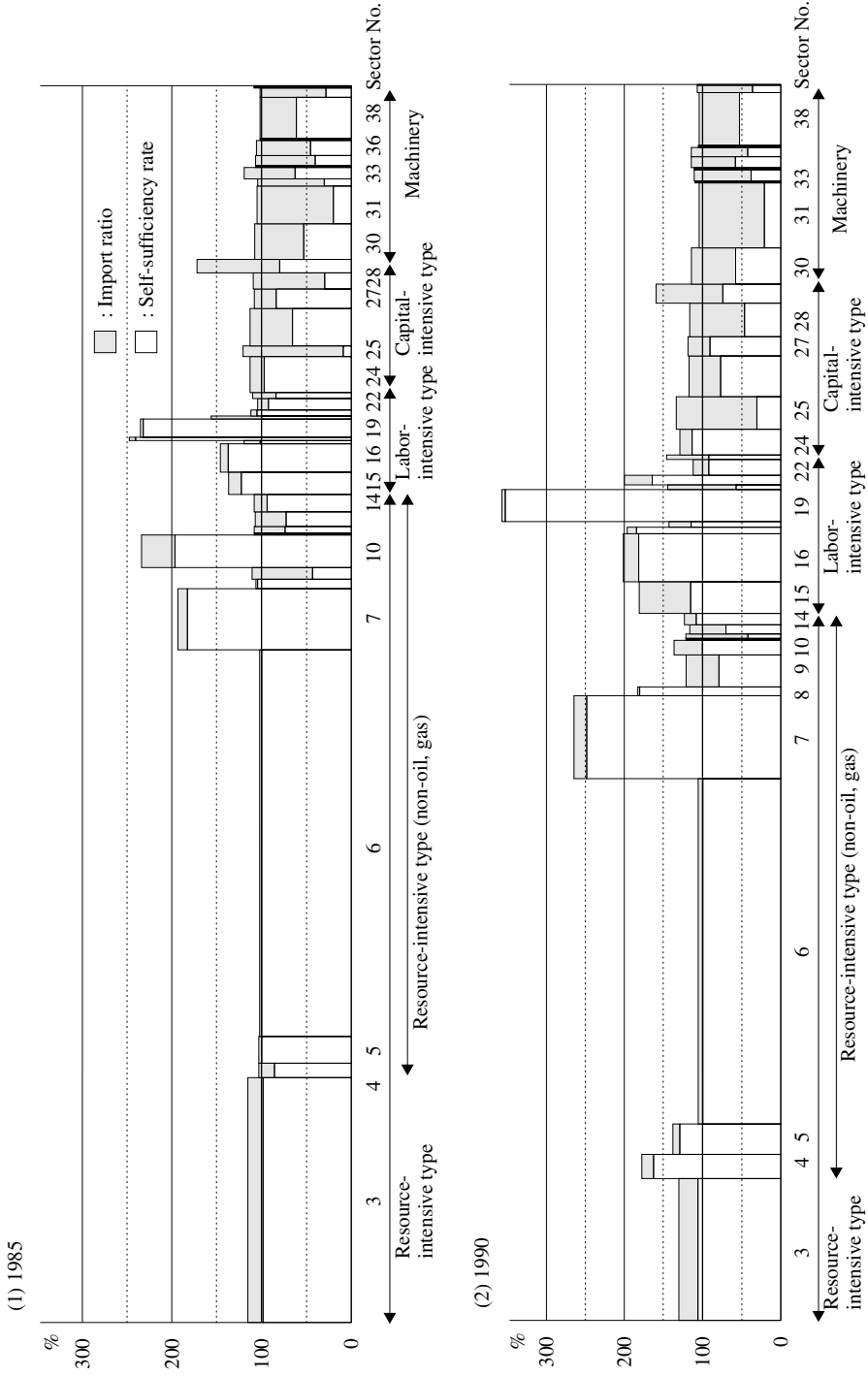
Fig. 3. Skyline Charts for the Indonesia Economy (1993 prices)

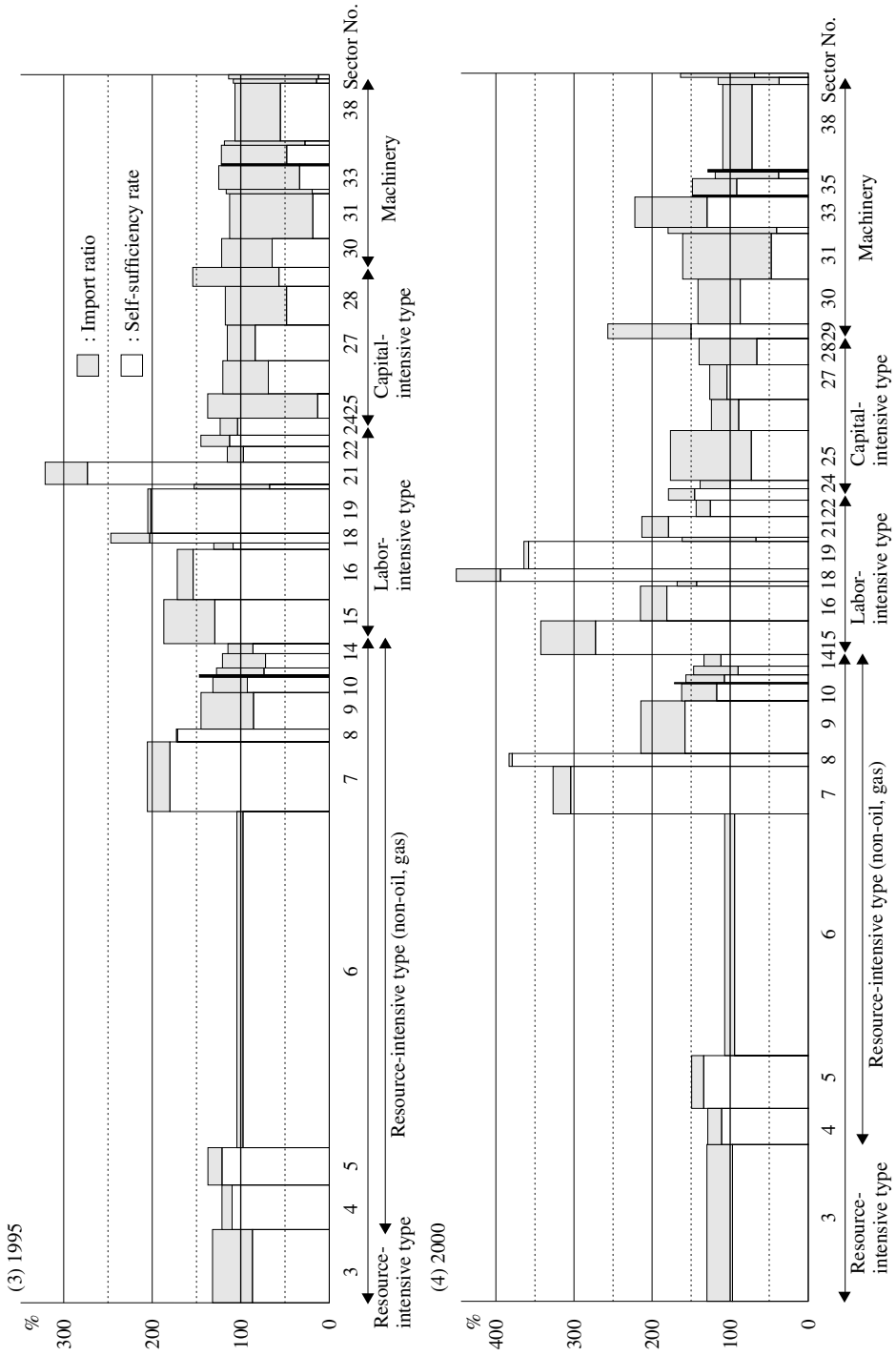




Source: See Table III.

Fig. 4. Skyline Charts for the Indonesia Manufacturing Sector (1993 prices)





Source: See Table III.

facturing industry during 1995–2000. Owing to the rupiah devaluation in 2000, these two sectors attained more than 100% self-sufficiency and intensified their export-oriented structure.¹⁰ Other foods, beverages, and cigarettes (sector no. 6) decreased output share from 27% in 1995 to 20% in 2000. However, this sector occupied the largest production share in the manufacturing industry, supplying products made of local resources to the domestic market.¹¹ In the same resource-intensive group, the wood and paper industry developed through export promotion. Due largely to the depreciation of the rupiah, the export ratio of sawmill, plywood, and wood products (sector no. 7), wooden furniture and fixtures (sector no. 8), and pulp, paper, and paper products (sector no. 9) drastically went up between 1995 and 2000. These sectors supplied roughly two to four times the number of products to foreign market as they did to domestic markets.¹² For example, in response to the expanding demand for printing paper, Asia Pulp & Paper Co. Ltd., headquartered in Singapore and the largest paper manufacturer in the Southeast Asian region, boosted its exports of PPC (plain paper copier) paper produced by its mills in Indonesia. This contributed to a year-on-year increase of 16.5% in exports of paper and paper products in 2000.

The textile industry is classified as labor-intensive group (sector nos. 15–21), and it declined in its share of gross output, dropping from 14% to 11% between 1995 and 2000. Yarn spinning (sector no. 15), textile weaving (sector no. 16), and wearing apparel (sector no. 19) became more export-oriented but decreased their shares of gross output. The textile industry in Indonesia seems to be weaker when compared with neighboring countries such as the People's Republic of China (PRC) or with other domestic industries in Indonesia. This decrease in share of output along with a remarkable decline in investment in the textile industry from the early 1990s is no doubt closely related. The rise in the export ratio of the textile industry can be explained by an year-on-year increase of 15.2% in exports of textile products/wearing apparel to neighboring countries and the U.S. in 2000 due to the depreciation of the rupiah.

Figure 4 shows that the width of the capital-intensive group (sector nos. 24–29)

¹⁰ The exchange rate recovered from an extremely low level of Rp 15,000 per US dollar in 1998 to Rp 7,000 at the end of 1999. However, the rupiah weakened again to nearly Rp 10,000 at the end of 2000.

¹¹ In the fast-growing manufacturing industry, other foods, beverages, and cigarettes (sector no. 6) substantially decreased their output share (from 31% in 1985 to 20% in 2000). However, the weight of the sector in gross output in the economy as a whole remained almost constant between 8.6% in 1985 and 7.6% in 2000.

¹² Many sectors in the wood and paper industry had high export and self-sufficiency ratios, which would represent their roles in foreign currency acquisition/saving and local resource utilization. These sectors are, however, related to forest destruction in Indonesia that has accelerated since the 1997–98 economic crisis and the collapse of the Soeharto regime in 1998. With regard to excessive deforestation and institutional changes for forestry management, refer to Kato's paper in this special issue.

in skyline charts became slightly larger during 1995–2000. Basic chemicals excluding fertilizers (sector no. 25), which is one of the major sectors in the capital-intensive group, expanded its share in gross output over time. In this sector, the shift to export-oriented industrialization was also confirmed in 2000, when the size of external demand almost caught up with domestic. The self-sufficiency ratio for this sector went from 15% in 1995 to 70% in 2000. The rise in this self-sufficiency ratio seems to reflect large-scale investments in petrochemical projects from the early 1990s such as the olefin center project by Chandra Asri, the purified terephthalic acid project by Mitsui Chemicals, and the styrene monomer plant expansion project by Tomen Corporation. The production share of basic iron and steel (sector no. 28) continued to increase until 1995 but decreased in 2000 due to the shrinkage in domestic demand caused by the economic crisis. This sector has a heavy reliance on demand in Indonesia, and a reduction of domestic demand stimulated it to increase the proportion of export in 2000. The iron and steel sector has a low self-sufficiency ratio, and this shows a substantially high level of import-dependency at roughly 70% in 1995 and 2000.

In Figure 4, the width of skyline charts for the machinery industry (sector nos. 30–40) grew from 16% in 1995 to 20% in 2000. The sector of metalworking products (sector no. 30) showed a slight increase in the proportion of output in the manufacturing industry after the economic crisis and gradually strengthened its export-oriented nature. Machinery and apparatus excluding electrical (sector no. 31), which is generally considered as a key to industrialization, slightly expanded its production share in gross output along with a rise in its export ratio during 1995–2000. However, its self-sufficiency ratio remained low at roughly 50% in 2000. Buoyed by the devaluation of the rupiah, the sector that includes radio, TV, communication, and IT equipment (sector no. 33) increased its share of gross output by increasing exports.¹³ In 2000, automobiles and motorcycles (sector no. 38), which needs a wider range of supporting industry, recovered to the pre-crisis level. This occurred after a sharp decline in domestic demand in 1998 and 1999 due to the economic crisis. The width of this sector in skyline charts (Figure 4) became larger. Despite serious damages from the crisis, this sector continued to expand its share in gross output. Although the height of the automobile/motorcycle sector in skyline charts did not grow, its shaded part became smaller during 1995–2000. This decline in the ratio of imports to exports is likely the result of a cutback in imports of intermediate goods caused by the drastic rupiah devaluation. The national car project launched in 1996, which included various highly controversial problems, intensified

¹³ In 2000, Indonesian exports of electrical and electronic equipment increased by 97.7% over the previous year through a surge in the export of printed-circuit boards for computers in addition to conventional main export items (TV and radio sets for example). This reflected a rise in world demand for IT products. Although these exports declined in 2001 in response to the downturn of an IT bubble, they picked up again in 2002 and 2003.

price-cutting competition in the auto market in Indonesia and led the auto industry to recognize a strong need for the development and utilization of domestic supporting industries. This may also explain the decrease in import dependency of the sector.

The above skyline analysis employing I-O tables reveals structural changes in the Indonesian economy within the pre- and post-crisis period. It shows that during 1995–2000, the agriculture and service industries decreased their relative shares in gross output, while the manufacturing industry expanded. Further, within the same period, many sectors in the manufacturing industry increased their export ratios and reduced import dependency.

B. *Industrial Linkage Effects*

Interindustrial linkages may influence industrial structure and economic development in a country. Production activities in one sector may have effects that directly and indirectly induce those in other sectors. Hirschmann (1958) called the effects of interindustrial linkages that induce the production in downstream industries “forward linkage effects” and those that induce the production in upstream industries “backward linkage effects.” A unit increase in final demand for an industry with strong interindustrial linkages can induce a larger increase in production and thus promote economic development.

As seen in Table IV, this study uses a degree of sensitivity index for measuring forward linkage effects and a dispersion power index for measuring backward linkage effects.¹⁴ In the table, indices with an asterisk (*) represent sectors with strong interindustrial linkage effects.

Based on the results in Table IV, many of the sectors can be classified into one of three groups. The first group consists of primary products for intermediate input with strong forward linkage effects. Agriculture, forestry, and fishery (sector no. 1) and mining, oil, and gas (sector no. 2) are sectors with a high degree of sensitivity index. The second group consists of industries producing industrial products for intermediate input with strong forward and backward linkage effects. Categorized here are petroleum and gas refineries (sector no. 3), pulp, paper, and paper products (sector no. 9), textile weaving (sector no. 16), basic chemicals (sector no. 25), and basic iron and steel (sector no. 28). The third group is made up of industries producing industrial goods for final demand with strong backward linkage effects. This group includes processed foods (sector no. 4), animal and vegetable oils (sector no. 5), other foods, beverages, and cigarettes (sector no. 6), sawmill, plywood, and

¹⁴ The degree of sensitivity index representing forward linkage effects is measured by using the ratio of the sum of the i th row of the inverse matrix to the industry average. The dispersion power index, representing backward linkage effects, is measured by using the ratio of the sum of the j th column of the inverse matrix to the industry average. Sectors with indices larger than 1 have high forward or backward linkages.

TABLE IV
FORWARD AND BACKWARD LINKAGE EFFECTS OF INDONESIAN ECONOMY

	Backward Linkage Effects (Index of Dispersion Power)				Forward Linkage Effects (Degree of Sensitivity Index)			
	1985	1990	1995	2000	1985	1990	1995	2000
1 Agriculture, forestry, & fishery	0.74091	0.77384	0.79104	0.75655	3.44631*	2.54271*	2.60359*	2.65845*
2 Mining, oil, & gas	0.72558	0.74055	0.69663	0.69942	2.28774*	2.45019*	2.10199*	4.30473*
3 Petroleum & gas refineries	0.94364	1.02065*	0.90931	0.69999	1.81754*	1.42383*	1.11062*	1.80282*
4 Processed foods	1.27642*	1.25357*	1.17054*	1.14988*	0.61696	0.60616	0.60401	0.56996
5 Animal & vegetable oils	1.16907*	1.06043*	1.10009*	1.08066*	0.59997	0.68073	0.72215	0.84509
6 Other foods, beverages, & cigarettes	1.24824*	1.16207	1.10449	1.02264*	0.80083	0.82326	0.89899	0.90456
7 Sawmill, plywood, & wood products	1.08062*	1.03423*	1.13369*	1.05694*	0.84597	0.96678	1.17455*	0.87543
8 Wooden furniture & fixtures	1.06542*	1.22659*	1.25059*	1.24565*	0.57465	0.58476	0.57231	0.52663
9 Pulp, paper, & paper products	1.09699*	1.11959*	1.15290*	1.06079*	0.95831	1.23334*	1.23860*	1.07035*
10 Tires & rubber products	1.33657*	0.96588	1.14421*	1.00902*	0.98800	0.67053	0.66994	0.61447
11 Ceramic & earthenware products	0.95951	1.04166*	0.94414	1.02285*	0.57552	0.58663	0.57466	0.51749
12 Glass & glassware products	0.90132	0.95455	0.87941	0.88410	0.65140	0.61237	0.66263	0.60171
13 Other nonmetallic products	1.01990*	1.06293*	0.97708	0.99551	0.62485	0.65131	0.64733	0.56537
14 Cement	1.16023*	1.17369*	1.00199*	0.95158	0.71964	0.65294	0.62967	0.58229
15 Yarn spinning	1.00835*	0.90743	0.91312	1.04331*	1.27195*	1.39485*	1.54910*	1.42754*
16 Textile weaving	1.16426*	1.10197*	1.03533*	1.09864*	1.07668*	1.19101*	1.15617*	0.86900
17 Made-up textile products (excl. apparel)	1.16524*	1.25809*	1.22340*	0.99975	0.58126	0.59619	0.58395	0.54517
18 Knitting	1.11503*	0.99503	0.98764	1.45357*	0.70902	0.60136	0.60173	0.54052
19 Weaving apparel	1.14361*	0.96704	1.18771*	1.26692*	0.57969	0.59694	0.58983	0.52088
20 Carpets & rugs	1.08883*	0.96704	0.97280	1.07448*	0.63943	0.60931	0.58777	0.53390
21 Footwear & leather products	1.14402*	1.02451*	0.91688	0.98020	0.70924	0.69993	0.65893	0.64967
22 Printing & publishing	0.98124	1.13403*	0.98124	0.95387	0.61109	0.63191	0.62912	0.57352
23 Miscellaneous manufacturing products	1.01864*	0.98939	0.95782	0.93640	0.65815	0.60584	0.60103	0.53098
24 Fertilizers & pesticides	0.88960	0.97815	0.96071	1.07196*	0.70184	0.67983	0.64708	0.56058
25 Basic chemicals (excl. fertilizers)	0.83545	0.81415	0.86104*	0.96574	0.94300	1.62621*	1.25866*	1.48389*
26 Other chemicals	0.91281	0.99349	1.07747*	0.96475	0.90939	0.90872	0.85107	0.75701
27 Plastic products	0.77056	0.95430	0.94812	0.93908	0.81112	0.76397	0.80441	0.69184
28 Basic iron & steel	1.13755*	1.04757*	0.89981	1.01779*	0.81959	1.05436*	1.16149*	0.87316

TABLE IV (Continued)

	Backward Linkage Effects (Index of Dispersion Power)				Forward Linkage Effects (Degree of Sensitivity Index)			
	1985	1990	1995	2000	1985	1990	1995	2000
29 Nonferrous basic metal	1.27860*	1.13139*	0.95128	1.07952*	0.70440	0.91609	0.88009	0.67697
30 Metalworking products	0.94798	1.03659*	0.99504	0.85923	0.81459	0.79056	0.76949	0.81385
31 Machinery & apparatus (excl. electrical)	0.79110	0.78076	0.84697	0.71912	0.82847	0.81922	0.80336	0.73824
32 Electrical machinery & apparatus	0.90991	0.92138	1.05605*	1.49586*	0.67417	0.61908	0.60748	0.54627
33 Radio, TV, comm., & IT equipment	0.97747	0.95203	0.97680	1.46482*	0.71510	0.66527	0.64469	0.55318
34 Home electrical appliances	0.96762	0.96430	1.00991*	1.42842*	0.60808	0.60265	0.58512	0.53446
35 Other electrical apparatus	0.96286	1.06408*	0.95804	1.00496*	0.84689	0.90164	1.04689*	0.74662
36 Shipbuilding	0.81254	0.89921	1.19383*	0.63406	0.59531	0.59751	0.57996	0.55847
37 Railway vehicles	0.83092	0.88026	0.97840	0.70236	0.70479	0.69917	0.64742	0.54071
38 Automobiles & motorcycles	1.02848*	0.93894	0.97205	0.82135	0.90446	0.77306	0.77994	0.74717
39 Aircraft	0.72363	0.83162	0.87963	0.64802	0.67410	0.69598	0.64539	0.59896
40 Precision equipment	0.76622	0.72597	0.90159	0.82647	0.58684	0.59522	0.61610	0.55115
41 Service & others	0.90312	0.89790	0.90126	0.91378	5.81367*	5.87856*	6.50270*	6.39695*

Source: See Table III.

* shows strong linkage effects.

wood products (sector no. 7), wooden furniture and fixtures (sector no. 8), made-up textile products except apparel (sector no. 17), knitting (sector no. 18), wearing apparel (sector no. 19), carpets and rugs (sector no. 20), footwear and leather products (sector no. 21), electrical machinery and apparatus (sector no. 32), radio, TV, communication, and IT equipment (sector no. 33), home electrical appliances (sector no. 34), and other electrical apparatus (sector no. 35). The lineup of sectors categorized into the above three groups is somewhat consistent with that of Chenery and Watanabe (1958). Their study measured interindustrial linkage effects employing 29-sector I-O tables of the U.S., Japan, Norway, and Italy.

Table IV shows that the resource-intensive group producing food-related products, wood-related products, and rubber-related products has had a strong impact on the production of respective upstream input products such as domestic primary products and natural resources. In addition, the textile industry, which was classified as a labor-intensive group, has strong backward linkage effects. Without substantial changes in 2000, these resource-intensive and labor-intensive industries have maintained a strong influence on the production of input goods.

Many sectors in the machinery industry group are not likely to have strengthened backward linkage effects during 1985–2000. If backward linkage effects had been intensified by the mid-1990s, they would have induced larger production and promoted more dynamic economic development during the high growth period. The machinery industry, without backward linkages, shows insufficient development of supporting industry. If Indonesia had shown more enthusiasm in attempting to invite foreign investment and thus develop interindustrial linkages, it would have participated more actively in the international production/distribution network as discussed by Kimura in this special issue. However, backward linkages were intensified in several sectors in the machinery industry such as electrical machinery and apparatus (sector no. 32), radio, TV, communication, and IT equipment (sector no. 33), home electrical appliances (sector no. 34), and other electrical apparatus (sector no. 35) between 1995 and 2000. Based on industrial promotion policies for electrical and electronic sectors, measures such as the exemption from import duty for input goods may have contributed to a rise in backward linkage effects.

III. CHANGES IN GROWTH FACTORS

A. *Growth Factor Decomposition Analysis*

In this section, factors that caused output changes in each sector in Indonesia are identified by using the growth factor decomposition method with focus on the period of 1995–2000. Taking advantage of characteristics of I-O data, the growth factor decomposition method provides a quantitative explanation for the sources of change in output from the demand side for a certain period.

By comparing I-O tables (1993 prices) between two different time points, output change is decomposed into the following five factors: import substitution (IS); technological changes (TC); domestic final consumption (private consumption + government expenditure: FC), investment (including inventory changes: FI); and changes in exports (EX).¹⁵ This can be expressed as follows:

$$\text{Output Change} = \text{IS} + \text{TC} + \text{FC} + \text{FI} + \text{EX}.$$

B. Before and After the Economic Crisis (1995–2000): Investment as a Negative Growth Factor

Tables V and VI show that following a high growth pattern, Indonesia recorded low or negative growth between 1995 and 2000. During the period that includes the economic crisis and the collapse of the Soeharto regime, an annual average growth rate of gross output in the whole economy was merely 2%, with an increase of 86 trillion rupiah (Rp) (0.7% per annum [p.a.] and Rp 27 trillion, respectively excluding oil and gas). Consumption (–0.5% p.a.) and investment (–0.8% p.a.) became factors of negative growth. Export demand (1.6% p.a.) and technological changes (1.8% p.a.) underpinned the Indonesian economy during 1995–2000.

The service industry (sector no. 41), the largest sector in the Indonesian economy, experienced a negative growth of 0.9% per year, with a decrease of Rp 18 trillion in output. Changes in technology (1.4% p.a.) and export demand (1.0% p.a.) worked as growth factors, but decreasing domestic demand resulted in the reduction of this sector. The agriculture industry (sector no. 1) shrank at 1% per year, since all factors except for domestic private consumption and export (0.3% and 0.5% p.a., respectively) contributed to the minus growth. By contrast, the sector that includes the mining industry as well as oil and gas (sector no. 2) increased gross output by Rp 30 trillion at an average growth rate of 9.8% annually. This was due to devaluation of the rupiah and a rise in oil prices in the world market. This growth was also supported by the positive effects of technological change (9.2% p.a.) and import substitution (1.0% p.a.) through the start of operating new oil-resource facilities constructed from the early 1990s.

Gross output of the manufacturing industry in Indonesia grew at 5.2% on an annual average and increased by Rp 80 trillion (3.6% and Rp 50 trillion, respectively excluding oil and gas), thanks to the expansion of export demand (3.2% p.a.).¹⁶

¹⁵ Further information regarding the growth factor decomposition method may be found in Akita (1991, 1997), Akita and Nabeshima (1992), and Chenery (1980). Technical details are available in the Appendix of Hayashi (2004, pp. 98–100).

¹⁶ According to Table V which is based on I-O tables, the annual average growth rates of the agriculture and manufacturing (excluding oil and gas) industries between 1995 and 2000 are –1.0% and 3.6%, respectively. Table II, based on GDP data, shows that the growth rates of those industries between 1996 and 2000 are 1.0% and 0.7%, respectively. These differences can be attributed to the following four factors: (1) The annual average growth rate based on I-O tables is calculated

Further, domestic demand, import substitution, and technological changes contributed slightly to output growth in the manufacturing industry. This may have resulted from a combination of factors such as export growth and import restraints through rupiah devaluation and recovery from the economic crisis. However, investment demand as a factor for negative growth reduced gross output in the manufacturing industry at an annual average rate of 0.7%, and this tendency may have a negative effect on sustainable growth potential in the manufacturing industry in the future.

In the resource-intensive group, petroleum and gas refineries (sector no. 3) that were promoted by the weak rupiah and favorable international market had a large impact on output growth. The resource-intensive group excluding oil and gas increased gross output at an average of 1.5% annually. This was fueled by export demand (2.2% p.a.) and technological change (1.0% p.a.). Export demand served as a strong growth factor in industries which process domestic primary commodities and natural resources such as animal and vegetable oils (sector no. 5), wooden furniture and fixtures (sector no. 8), pulp, paper, and paper products (sector no. 9), and tires and rubber products (sector no. 10). The labor-intensive group grew at an average of 0.4% annually primarily due to the expansion of export demand. Export expansion made a strong contribution to the growth of output in knitting (sector no. 18) and carpets and rugs (sector no. 20). Overall, the drastic depreciation of the

between 1995 and 2000, while that based on GDP data is calculated between 1996 and 2000. The starting years used for calculation are different for these two data sets. Based on GDP data, the annual average growth rates of agriculture and manufacturing between 1995 and 1996 are 3.2% and 11.6%, respectively. The latter grew much faster than the former in this period. Where the calculation period based on GDP data conforms to that based on I-O tables, the annual average rates of growth for agriculture and manufacturing between 1995 and 2000 are 1.4% and 2.8%, respectively. Similar to the calculation using I-O tables, the growth of manufacturing is higher than that of agriculture. (2) The data of I-O tables that cover both value added and transactions of intermediate goods are, of course, not equal to GDP data that are based on calculations of value added only. (3) Due to devaluation of the rupiah, the output of manufacturing as tradable goods looks relatively larger, whereas that of agriculture as quasi-nontradable goods looks relatively small. Thus, in comparison with GDP data covering only value added, the data of I-O tables including transactions of intermediate goods seem to amplify the relative enlargement of manufacturing and reduction of agriculture. (4) The absence of adequate individual deflators corresponding to 160–180 sectors in the I-O tables requires us to adopt the deflating method explained earlier.

Incidentally, I-O tables cannot identify detailed changes that occurred between 1995 and 2000. To complement this weakness, the growth rates of agriculture and manufacturing are calculated for 1995–96, 1996–97, 1997–98, 1998–99, and 1999–2000, and these are based on GDP data (excluding oil and gas) used in Table II. In each of these periods, the growth rates for agriculture are 3.2%, 0.3%, 0%, 2.1%, and 1.6%, respectively, and those for manufacturing are 11.6%, 5.3%, –11.4%, 3.8%, and 6.2%, respectively. These figures illustrate the contrast between agriculture and manufacturing industries; the former has continued to be in the period of low growth with slight damages from the economic crisis, and the latter has gradually recovered from the crisis after achieving a high growth rate in the pre-crisis period and after facing serious damages from the crisis. Such ups and downs in the manufacturing industry before and after the crisis observed here are consistent with the results of Ishida (2002, pp. 335–40) using industrial statistics for 1995–99.

TABLE V
SOURCES OF OUTPUT GROWTH IN INDONESIA (ANNUAL AVERAGE GROWTH RATE): 1995–2000

	Growth Rate (%)	Growth Factor Decomposition (%)					
		Import Substitution	Tech. Change	Domestic Final Demand			
				Consumption (C)	Investment (I)	C + I	
						Export	
Agriculture, forestry, & fishery	-1.0	-1.0	-0.4	0.3	-0.4	-0.1	0.5
Mining, oil, & gas	9.8	1.0	9.2	0.5	-0.8	-0.3	-0.2
Manufacturing (incl. oil & gas)	5.2	0.7	1.5	0.5	-0.7	-0.2	3.2
Manufacturing (excl. oil & gas)	3.6	0.6	0.3	0.1	-0.7	-0.6	3.3
Resource-intensive (incl. oil & gas)	4.8	-0.3	3.2	0.4	-0.5	-0.1	2.1
Resource-intensive (excl. oil & gas)	1.5	-0.8	1.0	-0.4	-0.6	-1.0	2.2
Labor-intensive	0.4	0.2	0.0	-2.1	-0.2	-2.4	2.6
Capital-intensive	5.1	2.7	-3.0	1.4	-0.3	1.1	4.3
Machinery industry	10.6	2.7	1.3	2.3	-1.8	0.5	6.1
Service & others	-0.9	-0.7	1.4	-1.6	-1.0	-2.6	1.0
Total (including oil & gas)	2.0	-0.1	1.8	-0.5	-0.8	-1.3	1.6
Total (excluding oil & gas)	0.7	-0.3	0.8	-0.7	-0.8	-1.5	1.8
1 Agriculture, forestry, & fishery	-1.0	-1.0	-0.4	0.3	-0.4	-0.1	0.5
2 Mining, oil, & gas	9.8	1.0	9.2	0.5	-0.8	-0.3	-0.2
3 Petroleum & gas refineries	22.8	2.0	14.7	4.8	-0.2	4.6	1.6
4 Processed foods	-0.1	-0.9	2.2	-2.5	0.1	-2.4	0.9
5 Animal & vegetable oils	13.0	0.6	5.9	2.8	0.0	2.8	3.6
6 Other foods, beverages, & cigarettes	-1.5	-1.1	0.9	-0.6	-0.9	-1.5	0.2
7 Sawmill, plywood, & wood products	-2.6	-0.1	-4.0	-0.7	0.2	-0.5	2.1
8 Wooden furniture & fixtures	6.3	-0.1	0.4	-1.9	-2.2	-4.1	10.1
9 Pulp, paper, & paper products	12.4	-0.1	0.8	0.7	0.1	0.8	10.8
10 Tires & rubber products	6.3	-0.7	4.9	-1.1	-1.6	-2.7	4.8
11 Ceramic & earthenware products	-8.6	-0.6	-3.5	-3.4	-0.2	-3.6	-0.9
12 Glass & glassware products	8.0	-1.4	2.3	2.6	-1.1	1.6	5.5

13	Other nonmetallic products	-2.9	-3.8	-0.8	-1.8	-0.8	-2.6	4.3
14	Cement	7.8	0.9	5.7	-1.6	-0.6	-2.2	3.4
15	Yarn spinning	-0.1	2.6	-2.6	-4.2	0.0	-4.2	4.1
16	Textile weaving	-2.6	-1.4	0.7	-3.0	0.2	-2.9	0.9
17	Made-up textile products (excl. apparel)	-1.0	0.2	2.0	-2.9	-1.1	-4.1	0.8
18	Knitting	10.3	-0.4	0.6	-0.8	-0.1	-1.0	11.0
19	Wearing apparel	-4.1	-0.3	-0.7	-4.3	-0.7	-5.0	1.9
20	Carpets & rugs	10.5	-1.1	2.1	3.4	-0.3	3.1	6.4
21	Footwear & leather products	2.0	1.2	1.8	2.3	0.3	2.6	-3.6
22	Printing & publishing	4.5	-0.2	1.8	-0.4	-1.2	-1.7	4.6
23	Miscellaneous manufacturing products	5.3	-1.1	-0.6	1.4	-0.4	1.0	5.9
24	Fertilizers & pesticides	-9.1	-3.4	-6.4	-0.7	0.3	-0.4	1.2
25	Basic chemicals (excl. fertilizers)	21.3	10.7	-1.6	0.6	0.8	1.5	10.8
26	Other chemicals	4.8	2.9	-1.5	2.6	-0.3	2.3	1.0
27	Plastic products	4.9	0.3	-1.1	4.1	-1.0	3.1	2.6
28	Basic iron & steel	-3.7	0.5	-5.7	-0.4	-0.8	-1.2	2.7
29	Nonferrous basic metal	2.5	0.9	-5.6	0.4	-0.3	0.1	7.1
30	Metalworking products	13.6	1.1	7.6	-0.4	0.4	0.0	4.8
31	Machinery & apparatus (excl. electrical)	6.3	0.8	-1.2	-0.1	-4.8	-4.9	11.6
32	Electrical machinery & apparatus	9.7	-4.6	-0.6	-0.9	-1.4	-2.2	17.1
33	Radio, TV, comm., & IT equipment	10.1	1.5	-1.8	-3.1	-0.3	-3.4	13.8
34	Home electrical appliances	-3.6	-0.6	0.8	-7.3	0.4	-6.9	3.1
35	Other electrical apparatus	4.3	1.2	-7.2	6.1	-0.9	5.2	5.1
36	Shipbuilding	21.2	12.9	10.5	-1.1	-0.1	-1.2	-1.0
37	Railway vehicles	6.1	-7.3	14.3	-0.9	-5.0	-5.9	5.0
38	Automobiles & motorcycles	13.2	4.1	2.6	7.5	-1.8	5.7	0.9
39	Aircraft	14.6	12.9	4.2	-0.9	-2.9	-3.8	1.3
40	Precision equipment	7.9	15.3	-4.1	-5.2	-5.2	-10.4	7.0
41	Service & others	-0.9	-0.7	1.4	-1.6	-1.0	-2.6	1.0

Source: See Table III.

Note: Calculations are based on 1993 prices.

TABLE VI
SOURCES OF OUTPUT GROWTH IN INDONESIA (CHANGED OUTPUT): 1995-2000

	Changed Output	Growth Factor Decomposition (Changed Output)					Export
		Import Substitution	Tech. Change	Domestic Final Demand		C + I	
				Consumption (C)	Investment (I)		
Agriculture, forestry, & fishery	-5,215	-5,105	-1,947	1,600	-2,141	-541	2,378
Mining, oil, & gas	29,412	3,095	27,852	1,585	-2,399	-814	-720
Manufacturing (incl. oil & gas)	80,408	11,153	23,005	7,521	-10,234	-2,713	48,964
Manufacturing (excl. oil & gas)	50,994	8,593	4,085	1,352	-9,982	-8,630	46,946
Resource-intensive (incl. oil & gas)	39,364	-2,568	25,843	3,288	-4,121	-832	16,920
Resource-intensive (excl. oil & gas)	9,950	-5,128	6,923	-2,881	-3,868	-6,749	14,903
Labor-intensive	947	465	-118	-5,095	-552	-5,647	6,247
Capital-intensive	10,692	5,711	-6,333	2,882	-528	2,355	8,958
Machinery industry	29,405	7,544	3,612	6,446	-5,035	1,411	16,838
Service & others	-18,132	-14,743	27,769	-31,023	-19,983	-51,006	19,847
Total (incl. oil & gas)	86,473	-5,600	76,679	-20,317	-34,758	-55,075	70,469
Total (excl. oil & gas)	27,647	-11,255	29,907	-28,071	-32,106	-60,177	69,172

Source: See Table III.

Note: Calculations are based on 1993 prices.

rupiah contributed to the expansion of exports in the resource-intensive and labor-intensive groups.

In a similar fashion, the capital-intensive group realized an annual average output growth of 5.1%, mainly with the support of vigorous export demand (4.3% p.a.). Domestic consumption (1.4% p.a.) and import substitution (2.7% p.a.) also functioned as positive growth factors. It is remarkable that basic chemicals (sector no. 25) had positive growth factors other than those related to technological change. This may be explained by the contribution of new or additional large-scale petrochemical projects implemented by FDI from the early 1990s.

The machinery industry group achieved an annual output growth of more than 10% led by export demand (6.1% p.a.), domestic demand (2.3% p.a.), import substitution effects (2.7% p.a.), and technological changes (1.3% p.a.). The sectors in which export demand served as a key growth factor are machinery and apparatus excluding electrical (sector no. 31), electrical machinery and apparatus (sector no. 32) and radio, TV, communication, and IT equipment (sector no. 33). Domestic demand stimulated the growth of production in the sector of automobiles and motorcycles (sector no. 38). Import-substitution effects were a significant growth factor in shipbuilding (sector no. 36) and precision equipment (sector no. 40). Technological change contributed to the growth of gross output in metalworking products (sector no. 30), shipbuilding (sector no. 36), and automobiles and motorcycles (sector no. 38). Technological factors boosted output growth in the transport equipment industry such as in the sector of automobiles and motorcycles. A series of deregulation measures introduced by the government and efforts made by assembler and supplier firms, many of which are foreign-affiliated firms, may have encouraged this industry to overcome a bad slump and upgrade its level of technology.

However, investment demand in the machinery industry group became a stronger negative growth factor than in any other group, reducing gross output at an annual average rate of -1.8%. Particularly, in machinery and apparatus excluding electrical (sector no. 31), railway vehicles (sector no. 37), and precision equipment (sector no. 40), investment demand decreased output at annual rates of -4.8%, -5.0%, and -5.2%, respectively. This problem may overshadow development of the machinery industry in the future.

In 2000, the post-crisis and post-Soeharto period, export in the Indonesian manufacturing industry was promoted by devaluation of the rupiah, expansion of the world economy, progress in trade liberalization through AFTA, APEC, and WTO, and efforts of individual private businesses. However, between 1995 and 2000, many sectors in the manufacturing industry experienced a slowdown in growth due to stagnation and decline in domestic demand.

Table VII, covering periods from 1985, shows that domestic demand of large markets in Indonesia had a strong and consistent impact on output growth. However, the leading role of domestic demand in the growth of production appeared to

TABLE VII
SOURCES OF OUTPUT GROWTH IN INDONESIA (ANNUAL AVERAGE GROWTH RATE): 1985-90 AND 1990-95

	Growth Rate (%)	Growth Factor Decomposition (%)					
		Import Substitution	Tech. Change	Domestic Final Demand			Export
				Consumption (C)	Investment (I)	C + I	
1985-90:							
Agriculture, forestry, & fishery	3.5	0.0	-2.6	4.3	0.3	4.6	1.4
Mining, oil, & gas	5.7	0.1	-0.8	1.1	3.2	4.3	2.2
Manufacturing (incl. oil & gas)	11.6	-0.6	-0.6	5.8	2.4	8.3	4.5
Manufacturing (excl. oil & gas)	13.8	-0.5	0.7	6.5	2.5	9.0	4.7
Resource-intensive (incl. oil & gas)	8.1	-0.5	-1.5	5.4	1.0	6.4	3.6
Resource-intensive (excl. oil & gas)	10.9	-0.3	0.4	6.5	0.5	7.1	3.7
Labor-intensive	22.2	-3.7	2.2	9.3	0.5	9.9	13.8
Capital-intensive	17.3	4.0	0.6	6.3	1.7	8.1	4.6
Machinery industry	14.8	-2.7	0.4	4.9	10.5	15.3	1.8
Service & others	10.4	-0.1	-0.1	5.2	3.6	8.8	1.7
Total (including oil & gas)	9.1	-0.2	-0.7	4.8	2.7	7.5	2.5
Total (excluding oil & gas)	10.0	-0.2	-0.3	5.4	2.7	8.0	2.5
1990-95:							
Agriculture, forestry, & fishery	9.4	-0.5	-0.9	8.7	1.0	9.6	1.2
Mining, oil, & gas	5.1	-0.4	-1.9	2.2	0.8	3.0	4.4
Manufacturing (incl. oil & gas)	14.3	-0.6	0.7	8.7	1.6	10.3	4.0
Manufacturing (excl. oil & gas)	15.7	-0.5	1.2	9.1	1.6	10.7	4.2
Resource-intensive (incl. oil & gas)	12.9	-0.4	0.7	9.3	1.2	10.5	2.0
Resource-intensive (excl. oil & gas)	15.2	-0.1	1.7	10.1	1.3	11.4	2.1
Labor-intensive	21.0	0.6	0.8	9.0	0.7	9.7	9.8
Capital-intensive	13.8	-1.1	1.0	8.3	1.5	9.8	4.2
Machinery industry	13.9	-2.1	0.3	6.9	3.7	10.6	5.1
Service & others	13.2	-0.3	1.1	7.5	3.0	10.6	1.7
Total (incl. oil & gas)	12.4	-0.4	0.5	7.7	2.1	9.8	2.5
Total (excl. oil & gas)	13.4	-0.4	0.9	8.2	2.3	10.5	2.4

Source: See Table III.

Note: Calculations are based on 1993 prices.

weaken during 1995–2000 under the negative impact of the economic crisis. Along with domestic demand, export demand contributed to output growth in Indonesia from 1985. In the period of 1995–2000, export demand, supported by the drastic devaluation of the rupiah, underpinned the Indonesian economy and manufacturing industry. This provided compensation for the reduction in domestic demand. There is no doubt that an export-oriented strategy has been a key factor in the acceleration of industrialization in Indonesia since the mid-1980s, when deregulation programs were initiated.

A problem in the manufacturing industry is that during the observed period of 1985–2000, investment demand became increasingly weak as an engine of growth. An annual growth rate of gross output in the manufacturing industry stimulated by investment demand was 2.4% between 1985 and 1990 but dropped to 1.6% between 1990 and 1995. Investment demand finally had a negative impact on output growth in manufacturing between 1995 and 2000, reaching an annual rate of –0.7%.

Sustainable investment, particularly that led by FDI, is required to improve manufacturing technology and strengthen competitiveness of the Indonesian manufacturing industry in the international market. Since investment in the manufacturing industry generally needs a long gestation period, it takes a long time to actually carry out investment after investment plans have been prepared. Currently, investment cannot work as a growth factor, and if this situation continues, future medium- and long-term industrialization in Indonesia may be seriously impaired.

IV. THE CURRENT STAGE OF INDUSTRIALIZATION AND CHALLENGES FOR THE FUTURE

A. *The Current Stage of Industrialization*

This study has clarified the current stage of industrialization in Indonesia following the 1997–98 economic crisis and the collapse of the Soeharto regime. I-O analysis was used including examination of changes in the industrial and trade structure, industrial linkage effects, and sources of output growth.

The period of 1985–95, from the launch of structural adjustment in the microeconomic sector to the height of the economic boom, the production shares of the agriculture industry and the mining industry including oil and gas consistently declined in gross output, while those of the service industry and the manufacturing industry continued to increase. The manufacturing industry in this period intensified its export-oriented nature. Between 1995 and 2000, a period of special interest in this study, the agriculture industry and service industry decreased their shares in gross output, while the manufacturing industry expanded its share in gross output. The resource-intensive, labor-intensive, capital-intensive, and machinery industry groups have diversified natures in their production and trade. The first group occu-

pied about 50% of total output in the manufacturing industry and each of the remaining three groups accounted for 10–20%. However, many sectors in these four groups tended to decrease their import dependency and increase their export orientation. Many sectors in the resource-intensive and labor-intensive groups had a structure prone to induce production in their upstream sectors. By contrast, the effects that induce the production of intermediate goods did not clearly emerge even in 2000 in many sectors except for the electrical and electronic sectors of the machine industry group.

Export demand together with domestic demand supported the manufacturing industry after the mid-1980s and played a leading role in the promotion of output growth during 1995–2000. This shift may have resulted from the substantial depreciation of the rupiah and a slump in other growth factors. Unlike the situation before 1995, domestic consumer demand became a negative growth factor during 1995–2000. Investment demand also became a negative growth factor. Ratios of gross fixed capital formation to GDP in Table VIII show that a drop in investment continued from the 1997–98 economic crisis.

Based on this analysis, a long-term trend of progress in industrialization in Indonesia during 1985–2000 can be confirmed. On the other hand, however, it can also be seen that industrialization in Indonesia has developed structural weaknesses such as a decline in investment demand and a delay in the strengthening of interindustrial linkages. Since Indonesia is viewed as a single object in this study, its performance of industrialization would be more deficient if compared with neighboring East Asian economies. Industrialization in Indonesia may appear to be moving backward if it is compared with the recent remarkable progress in industrialization and international specialization of neighboring countries.

These contrasting impressions on industrialization may be further explained by several factors. First, the depreciation of the rupiah is likely to lead to an overestimate of gross output in the manufacturing industry in tradable goods and an underestimate of the agriculture and the service industries in quasi-nontradable or nontradable goods. Second, devaluation of the rupiah could enhance price competitiveness of Indonesian products and thus boost exports. Third, the economic crisis and currency devaluation reduced domestic demand, made L/C (letter of credit) opening difficult, and pushed import prices up. This forced Indonesia to decrease imports. Fourth, Indonesia has lagged behind its neighboring East Asian counterparts in terms of participation in international production and distribution networks that are rapidly developing in the East Asian region (see Kimura's paper in this special issue). This relatively lower participation in international specialization networks may result in a lower import ratio than before. Fifth, the current decline of FDI into Indonesia and an increase in withdrawal of such investments from Indonesia (see Table VIII) leads to a drop in investment in manufacturing and a delay in the strengthening of interindustrial linkages. Sixth, as a positive factor, the manu-

TABLE VIII
FOREIGN DIRECT INVESTMENT AND GROSS FIXED CAPITAL FORMATION: INDONESIA AND ITS NEIGHBORING COUNTRIES

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Indonesia:												
FDI/GFCF	1.6	3.4	4.3	5.0	4.8	4.3	7.6	9.2	7.7	-1.5	-9.7	-13.9
GFCF/GDP	22.7	28.3	27.0	25.8	26.3	27.6	28.4	29.6	28.3	25.4	20.1	21.8
Malaysia:												
FDI/GFCF	7.6	16.0	22.4	23.9	19.2	14.5	10.8	11.8	11.9	11.2	22.5	16.4
GFCF/GDP	28.7	33.0	36.4	36.6	38.9	40.2	43.6	42.5	43.1	26.8	21.9	25.6
Philippines:												
FDI/GFCF	0.2	5.2	6.0	2.1	9.6	10.5	9.0	7.8	6.1	16.6	4.0	9.3
GFCF/GDP	17.5	23.1	20.0	20.9	23.8	23.6	22.2	23.4	24.4	21.1	18.8	17.8
Singapore:												
FDI/GFCF	14.0	46.8	33.6	12.5	23.1	36.1	31.3	24.5	29.1	20.7	42.5	19.7
GFCF/GDP	42.2	32.3	33.6	35.5	34.7	33.6	33.4	38.1	38.7	37.6	34.1	30.0
Thailand:												
FDI/GFCF	1.5	7.1	4.9	4.8	3.6	2.4	3.0	3.1	8.2	28.2	24.4	12.7
GFCF/GDP	27.2	40.4	41.6	39.3	39.6	40.0	41.1	41.1	33.8	22.4	20.8	22.0
China:												
FDI/GFCF	1.8	3.9	4.2	8.5	17.0	17.3	14.7	14.3	14.6	13.1	10.9	9.7
GFCF/GDP	29.5	25.5	27.5	31.2	37.5	36.0	34.7	34.4	33.8	35.3	35.9	36.5
Vietnam:												
FDI/GFCF	n.a.	n.a.	n.a.	n.a.	n.a.	49.0	44.3	36.9	31.0	22.8	19.2	15.1
GFCF/GDP	n.a.	n.a.	n.a.	n.a.	n.a.	24.3	25.4	26.3	26.7	27.0	25.7	27.6

Source: See Table I.

Note: FDI/GFCF is the ratio of FDI inflow to gross fixed capital formation; GFCF/GDP is the ratio of gross fixed capital formation to GDP.

facturing industry (in particular the machinery industry), which suffered a setback in the 1997–98 economic crisis after achieving high-speed growth between the mid-1990s and 1997, has been returning to the level of output last seen in the peak year of 1997. This recovery in the manufacturing industry has raised its share of production in gross output and intensified its export orientation.

Given these factors, the evaluation of the stage of industrialization in Indonesia presented in this study may be biased by temporarily disturbing factors such as the currency devaluation and the sudden contraction of the domestic market. Further, with a view of the manufacturing industry based on the Indonesian I-O table in 2000, gross output and exports may be overestimated and imports may be underestimated. It may be necessary to reevaluate the stage of industrialization in Indonesia using the I-O table in 2005. This table may be relatively free of the bias factors mentioned above.

The most serious concern may be that inflow of investment into the Indonesian manufacturing industry has decreased considerably in recent years. Since such a tendency would structurally impede further progress of industrialization in Indonesia, a discussion on the promotion of investment is necessary.

B. Challenges for the Promotion of Industrialization

The Indonesian economy, which suffered sharp setbacks through periods of institutional changes including an unprecedented economic crisis and the collapse of the Soeharto regime, has returned to a path toward economic growth of around 4% annually since 2000. It would appear that Indonesia must seek economic development sufficient to generate employment and reduce poverty. For this, further progress in industrialization is necessary. Several challenges for Indonesia may be expected as it seeks to promote industrialization as a driving force for economic growth.

Analysis presented in this study indicates that the downturn in manufacturing investment is a major bottleneck for further industrial development in Indonesia. One of the main reasons for such sluggish investment is a decrease in inflow of FDI into Indonesia. The Indonesian government, which had adhered to a policy of “Indonesianization” for 20 years following the Malari incident of January 1974, decided in June 1994 to permit foreign investors to hold 100% of shares. However, the Indonesian government may also need to recognize that Indonesia has not offered a favorable economic environment that will allow foreign investment to operate without fear. Table VIII suggests that since 1998, withdrawal of foreign investment from Indonesia has exceeded inflow. Further, similar to neighboring countries except for the Peoples Republic of China and Vietnam, the ratio of gross fixed capital formation to GDP has declined since the economic crisis.

In order to advance toward further industrialization, Indonesia must continue capital formation at sufficient levels. To this end, it is important to attract FDI that can play an essential role in transferring production and management technology

from abroad. It is also important to promote capital formation and help to positively develop institutions necessary for improvement in foreign investment systems and the investment climate. The Indonesian government officially declared year 2003 as the “Year of Investment” and extended it to year 2004. However, the election year of 2004 came with no concrete investment promotion measures. There was also no formulation of a new law on investment that would guarantee national treatment for foreign investment.¹⁷ The introduction of tax holidays, which would be an incentive for foreign investors, was not implemented because the Ministry of Finance feared such a proposal would result in a drop in tax revenues.

To improve the investment climate, it is necessary to correct various institutional flaws that have disturbed investment activities. These include tax systems, customs clearance/duties systems, labor law and labor-management relations, operation of laws and legal systems, decentralization, infrastructure development as well as reform of narrowly defined investment systems.¹⁸

In January 2002, Rini Mariani Suwandi, Minister of Industry and Trade, formulated an industrial policy package called the Industrial Revitalization Plan (IRP). In March 2004, Dorodjatun Kuntjoro-jakti, Coordinating Minister for Economic Affairs, announced a list of 15 items for export promotion. The latter plan is intended to exempt imported input goods that will be incorporated in export goods from the value added tax (VAT). It will also expedite import procedures through the streamlining of port management. Whether or not these programs can stimulate the manufacturing industry may depend not only on the ingredients that make up policies introduced but also on the institutional capabilities of the Indonesian government to

¹⁷ The Indonesian government announced “The Economic Policy Package Pre- and Post-IMF,” known as the “white paper,” in September 2003. One of the main aspects of this package was that the government declared to submit a new law on investment to the parliament by December 2003 and thus improve investment climate. However, such has not been realized as of December 2004.

¹⁸ Under the existing tax systems in Indonesia, prepayment and tax refund are left largely to the discretion of tax officers. This kind of tax-related problem has often been pointed out as a business impediment in Indonesia. The poor capacity of loading, unloading, and transloading at Tanjung Priok port (Jakarta) is a bottleneck prohibiting efficient trade operation. This is caused not only by a lack of physical capacity but also by institutional flaws such as inefficient cargo handling, a product of operation by a monopolistic shipping agent. The new labor law enacted in 2003 has been regarded by employers as an extremely unfavorable law in terms of its strict rules regarding dismissal of personnel. The enforcement of the two decentralization laws in 2002 allows local governments to impose various taxes and charges on private business (tax on site expansion, charges on private power generation, etc.). The transfer of the responsibility for customs operation from the central government to local governments has resulted in a delay in customs clearance and an increase in corruption at local ports. A recent case in which a famous foreign-affiliated financial company received an unfair sentence of bankruptcy has undermined public confidence in the execution of laws and the judicial system in Indonesia. The Indonesian government must address problems that are considered institutional obstacles to foreign investment coming into Indonesia. Removal of such obstacles would appear to be the best alternative. See Juwana’s paper for economic laws and institutions, Matsui’s paper for decentralization, and Mizuno’s paper for labor-management relations, all of which are in this special issue.

implement them properly. In order to establish a manufacturing industry capable of competing with those in neighboring Asian economies, the new administration of Indonesia must recognize that the promotion of investment, in particular FDI, is essential. It must further strengthen institutions responsible for improving the foreign investment system and investment environment.¹⁹

The promotion of industrialization needs upgrading of business competitiveness in the private sector parallel with the development of an effective investment system. It is necessary to improve the investment climate, attract FDI, and develop business competitiveness through the strengthening of governance capacity in the financial and corporate sector (see Sato's paper in this special issue).

¹⁹ Working with the Indonesian Chamber of Commerce and Industry (KADIN) and the U.S. Chamber of Commerce, Jakarta Japan Club (JJC) has prepared recommendations for the new Indonesian administration regarding improvement in the investment climate. These recommendations involve areas such as (1) tax systems, (2) labor, (3) customs clearance and duties, (4) infrastructure, and (5) investment and industrial policies.

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