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Changing Comparative Advantage and Factor Intensities in ASEAN Manufacturing, with Special Reference to Labour-Intensive Industrialization

Report prepared for the United Nations Industrial Development Organization, Vienna

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1. Introduction

The Association of Southeast Asian Nations (ASEAN), comprising Indonesia, Malaysia, the Philippines, Singapore, Thailand and (since January 1984) Brunei,[1/] is an increasingly prominent economic and political bloc. The Association comprises a diverse group of countries, which have littel in common other than geographic proximity, a common interest in regional economic and political cooperation, and a policy environment which, to varying degrees, is emphasising the desirability of outward-looking trade and industrialization strategies. In terms of resource endowments, economic structure, size, per capita income, history, political systems, and trade orientation there are enormous differences among the countries.

It is useful to regard the original five ASEAN countries (that is, excluding Brunei) across a spectrum of diverse economic characteristics, ranging from Singapore at one extreme to Indonesia at the other. Singapore is an extremely poorly endowed country (in terms of natural resources) but high per capita income. It has evolved from a historically significant entrepot port to an industrialized city state which, while maintaining "open frontiers", has a large and interventionist government. By contrast, Indonesia is a large, poor, well-endowed nation, which maintains substantial barriers to international commerce and extensive public ownership, and in which there is almost universally a strong idealogical predisposition towards non-price government intervention.

1/ Throughout the paper, Brunei will be excluded since it has virtually no manufacturing industry.

The other three countries occupy intermediate positions within this spectrum. Malaysia, second in per capita income to Singapore, has developed on the basis of its good natural resource endowment, fairly open economy, and reasonably good infrastructure and public administration. Thailand, in many respects the most successful of the ASEAN's "big four" (that is, excluding Singapore), has performed very well since the mid 1960s. Despite persistently adverse movements in its terms of trade since the early 1970s, it now has one of the most competitive manufacturing sectors in the region. Finally, the Philippines has the poorest resource endowment after Singapore (although much superior), and a trade policy environment more akin to Indonesia. Adventurous macro-economic policies and overseas borrowings have, combined with political instability, resulted in real per capita GDP in 1985 being approximately the same as that in 1975.

Two important trasformations dominate the region's trade and industry policies and structures since 1970.[1/] The first is the growing outward orientation of trade policies. All countries have, at least to some degree, promoted policies which have either actively encouraged, or removed the biaser agents, the development of an export-oriented industrial sector. Singapore is, of course, the most rigorous proponent of such a strategy. Following its

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1/ For general reviews of the region's industrialization, see Fung (1985), Hoffmann and Tan (1980), and Spinanger (1986) on Malyasia, Bautista, Power and Associates (1979) and Yoshihara (1985) on the Philippines, and McCaurtey (1979) on Indonesia. Ariff and Hill (1985) provide an overview of ASEAN industrialization until the early 1980s.

separation from the Federation of Malaysia, and building on its free trade status, it began to promote manufactured exports in the late 1960s while retaining very few import barriers. Malaysia has maintained its open trade policies, inherited from the colonial era, although the commodity boom of the 1970s induced an early (and probably premature) shift into import substitution in a range of heavy industries. Apart from Singapore, Malysia has been the most successful exponent of export processing zones (EPZs) in ASEAN. The Thai economy has also been a fairly open one, with much greater emphasis on exports in the 1970s, largely in the absence of EPZs.

The Philippines has stood out from the other countries in the region, in that it was the first to promote industry actively, even before Korea (ROK) and Taiwan (ROC). But it stuck to inward-looking policies for too long, commencing its push for exports only in the early 1970s, more than a quarter of a century after the first industrial promotion policies. While initially these export-incentives resulted in rapid export growth, the transition to a more sustained export performance has been hampered by powerful rested interests established during the import substitution era, and by a faltering economy. Indonesia also stands in sharp control to the rest of ASEAN since it began to promote exports only when the commodity boom subsided in the early 1980s. In the 1970s there was little incentive to export for several reasons: domestic demand was growing extremely rapidly following the stagnation in the 1960s; the trade and regulatory regimes conferred a substantial bias towards domestic market sales and imposed additional cost penalties; and the "Dutch disease" effects of the commodity boom - through a real appreciation in the rupiah - resulted in a squeeze on the non-oil tradeable goods sector.

The second major transformation relates to industrial structure. In the early stages of economic development, the manufacturing sector typically consists mainly of simple resource-based processing activities (rice milling, rubber smoking, etc.), and simple consumer goods. Subsequently, as production and marketing skills develop, unskilled labour-intensive[3/] manufactures - often for export - become more important. Finally, as real wages rise, and the stock of human capital is augmented by investments in education and research, technology and skill (human capital) intensive industries emerge as the main source of growth.

From the perspective of this three-stage transition process the ASEAN countries also differ markedly. Singapore has already begun to enter the third stage, in which higher value added activities become more prominent, and in which it is losing its comparative advantage in low-wage industries. Malaysia, the Philippines and Thailand have already developed extensive labour-intensive industries, many for export but, with the possible exception of Malaysia, have yet to move into higher value added activities on a large scale. Indonesia, finally, has only just commenced the phase of rapid, labour-intensive industrialization, and many of these industries are not yet internationally competitive.

3/ Hereafter, "unskilled labour-intensive" manufactures will be abbreviated simply as "labour-intensive" manufactures. The qualification "unskilled" is of some importance, however, as some high value added manufactures are also skilled labour-intensive. These latter activities will later be referred to as " skill-intensive" manufactures.

The purpose of this paper is to examine the process of industrialization in ASEAN, with special reference to the relationship between changing factor endowments, and the pattern of manufacturing production and trade. In what industries might these countries be expected to have a comparative advantage (both static and dynamic)? Will the composition of manufacturing production differ from that of trade and, if so, why? How should policy factors, both domestic and foreign, be incorporated in the analysis?

The paper's organization is as follows: Section 2 provides a background to the study. It includes an overview of industrial progress and policies in the region. Next, there is a discussion of the relevant indicators and measures of comparative advantage, which may be used to anticipate likely changes in manufacturing patterns. Finally, there is some assessment of the quality of the data base used in this study. In Section 3 there is an examination of resource endowments in the ASEAN countries, using the indicators identified in the previous section. These include both economy-wide indicators (for example, land-labour ratios) and industry-specific measures (for example, value added per employee). The main features of the changing pattern of production and trade are also analyzed.

Section 4 continues the approach of the previous section but adopts a more disaggregated approach. Approximately 12 industries are selected for more detailed examination, with special reference to Indonesia and Singapore. The industries chosen are mainly those of actual or potential export interest to the ASEAN countries. Since Indonesia and Singapore are at either end of the "ASEAN industrial spectrum", the analysis is of relevance to the region as a whole. Finally, in section 5, the interaction of the policy environment and industrialization is summarized.

2. ASEAN Industrialization and the Measurement of Comparative Advantage

2.1 ASEAN Industrialization

The diversity of ASEAN manufacturing is illustrated in Table 1. For comparative purposes, India, a large inward-looking country, and Korea, a smaller export-oriented nation, are included, along with the lower-middle income group (adopting the World Bank's definition). Indonesia differs from the other countries in practically every respect. Until the recent slowdown, it had the fastest growing manufacturing sector - for the period 1973-1984 by far the quickest, higher even than Korea, and almost three times that of the lower-middle income group. Although smaller than India or Korea, it is now a moderately large industrial nation by developing country standards, and by far the largest in ASEAN. But in other respects it is the least developed industrially: it has the lowest share of manufacturing in GDP (lower even than India); its per capita manufacturing value added (hereafter referred to as MVA) is much below its neighbours; and its manufactured exports are extremely small, both as a percentage of total merchandise exports and on a per capita basis.

Apart from high growth rates, Singapore differs from Indonesia in practically every respect. Manufacturing is about one-quarter of GDP, MVA per capita exceeds $1,500, and manufactures are the major commodity export. As noted, the other three countries assume intermediate position between these two extremes. The Philippines has a large and sophisticated industrial infrastructure, but it failed to make the transition out of inward-looking industrialization. Consequently, it is the only ASEAN country whose manufacturing sector has grown more slowly than that of the lower middle income group. Its push for manufactured exports has had some impact, however,

Table 1:

Comparative indicators of industrialization, ASEAN and selected Asian developing countries

	GNP per capita, $ 1984	Manufactruring growth annual average % 1965-73	1973-84	Manufacturing Output 1984, as % of GDP	Agriculture	Manufacturing Output $ 1984 millions	$ 1984 per capita	Manufactures, 1983, $ as % of merchandise exports	imports	Manufactured exports per capita, $, 1984
ASEAN										
Indonesia	540	9.0	14.9	13	50	11,155	70	8	63	11
Malaysia	1,980	n.a.	8.7	19	90	5,756	376	22	72	236
Philippines	660	8.5	4.3	25	100	8.811	165	50	60	50
Singapore	7,260	19.5	7.6	25	2,500	3,994	1,597	57	56	5,485
Thailand	860	11.4	10.0	19	83	8,170	163	32	64	47
Other Asia										
India	260	4.0	5.9	15	43	29,219	39	52	49	7
Korea	2,110	21.1	11.5	28	200	23,691	591	91	51	664
Lower Middle Income Countries	740	8.5	5.9	17	77	n.a.	n.a.	21	63	n.a.

Note: Some data refer to a year earlier than that mentioned. Per capita manufactured exports were derived from 1984 total exports and population, and 1983 share of manufactures in total exports.

Source: World Bank, World Development Report 1986, Washington, 1986.

and these products now account for half of all merchandise exports. Manufacturing has grown very rapidly in both Malaysia and Thailand, and now generates about 20 per cent of GDP. The countries' industrialization paths have differed historically. Malaysia industrialized initially through its agro-processing industries, supplemented in the 1970s by its rigorous promotion of export processing zones (hereafter EPZs).[4/] Thailand developed rapidly, very much as an industrial late-comer, and is now an efficient exporter of a wide range of labour and resource-intensive manufactures.

While a detailed analysis of the industrial policy environment in ASEAN is beyond the scope of this paper, it will be useful to sketch the main policy parameters. Attention is focused on the essentially micro, industrial organization aspects of policy development, although in many respects the conclusive macro-economic policy environment holds the key to ASEAN's industrial success. Three principal industrial policy instruments have been important in these countries. These are the trade regime, including the overall rate of effective protection for manufacturing, and variations within the sector; regulartory policy, including a wide range of non-price controls through licensing; and state enterprises, as a direct means of achieving resource allocation objectives. Table 2 provides a necessarily greatly simplified summary at these instruments in each country.[5/]

4/ In Malaysia the term used is actually Free Trade Zones. For consistency, however, EPZs are adopted, as the term used elsewhere in the region.

5/ Table 2 is based on a wide variety of sources. On protection policy, the best single reference is Findlay and Garnmet (eds) (1986). McCauley (ed) (forthcoming) provides the most thorough treatment of regulatory policy. There is no single comprehensive treatment of state enterprises in the region, but many country studies provide useful information. These include Gillis (1982), McCauley (1978), and Hill (1982) on Indonesia; Briones (1985) on the Philippines; Mallon (1982) on Malaysia; and Pillai (1983) and Lim (1983) on Singapore.

Table 2: Intervention Policies in ASEAN: Main Features

	Trade regime	State enterprices	Licensing and regulatory regime
Indonesia	anti-export bias; huge dispersion in effective rates	large number, many inefficient	extensive, costly, often "efficiency inpeding"
Malaysia	historically open but recent increase in protection	historically few, but increase in 1970s; some being privatised	generally less than other ASEAN, except Singapore
Philippines	anti-export bias; huge dispersion in effective rates	historically few, but rapid increase in late 1970s; many inefficient	extensive and costly though less so than Indonesia
Singapore	open with very few restrictions	considerable number, but generally professionally managed and profitable	considerable, but usually "efficiency promoting"
Thailand	fairly open, although substantial protection for some industries	limited importance	intermediate case between Indonesia and Singapore

Three fairly distinct trade regimes may be identified in the region, as noted. The clearest case is Singapore, with almost no barriers to international commerce.[6/] The Malaysian and Thai economies remain fairly open, although effective rates of protection in excess of 50 per cent for some industries are not uncommon. However, the two countries do appear to be moving in opposite directions - Thailand increasingly adopting more liberal policies, while Malaysia has in recent years imposed greater import barriers. The third group, Indonesia and the Philippines, is by far the most protectionist. Not only does manufacturing receive protection far in excess of the country average - in effect penalizing other sectors - but effective rates of several hundred per cent and cases of negative value added at international prices are not uncommon.

The role and performance of state enterprises also vary considerably in the region. Indonesia has the largest state enterprise sector, partly as a consequence of the nationalizations in the 1950s and 1960s, and partly because of widespread concern about the dominant role of non-indigenous groups (principally Chinese) in the domestic private sector. By contrast, in the Philippines there were historically few such enterprises - again mainly for historical reasons - but their number grew rapidly from the late 1970s. It was at this time that the government began a program substituting equity for debt, in the case of state-owned banks, for poorly performing firms whose

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6/ The only two areas of significant protection - alcoholic beverages and tobacco products - have been imposed for health rather than the usual industrial promotion reasons.

owners were politically powerful. More important than the size of the state enterprise sector in ASEAN is its economic efficiency. These firms also figure prominently in Singapore, although the government is now in the processing of divesting some of its public share portfolio. But all evidence indicates that state enterprises in Singapore are professionally managed and that, except for those supplying public goods (for example, the Housing Development Board), they are profitable. Consequently it is performance rather than the size of the sector which is the distinguishing characteristic in the region.

Unlike the trade regime and state enterprises, it is very difficult to measure both the scope and effects of the regulatory and licensing system. However, in many respects this may be the most crucial variable in determining industrial performance. Here also, it is not so much size as the means of intervention which is crucial. Singapore has one of the largest government sectors in the region as a share of GDP, including all the statutory authorities in the public sector. What distinguishes Singapore from, for example, Indonesia is that public sector intervention generally takes the form of what may be termed "market facilitating " measures which supplement the market, and make it work more efficiently. By contrast, government regulation of business is extensive in the Philippines and, especially, Indonesia, but it frequently takes the form of direct controls, complex in nature, and administered by poorly-equipped regulatory agencies. The effect in many cases is that regulatory objectives are not fulfilled, and that firms incur increased operating costs. In both Malaysia and Thailand, government regulation is a good deal less pervasive than Indonesia and the Philippines, and there is less reliance on direct controls.

The industrial policy environment has had a major impact on both the growth and composition of ASEAN manufacturing. We will return to a discussion of the effects of these policy instruments in later sections.

2.2 Indicators of Comparative Advantage

According to the static theory of comparative advantage, countries will specialize in the production and export of goods and services embodying factor inputs which those countries possess in greatest relative abundance. Initially theory - the so-called Heckscher-Ohlin-Samuelson theorem - posited a two-factor model, including a homogeneous input, labour, and physical capital. According to the theory, capital-abundant and labour-scare economies would then be expected to export mainly products whose production functions dictated capital-intensive technologies, while the reverse would apply for labour-rich, capital-scare developing countries.

For the purposes of empirical investigation, the original theory requires modification in at least three respects.[7/] First, the assumption of two factors is unrealistic. It is appropriate to divide capital into two categories, physical and human. The former is usually an internationally mobile factor, and is therefore not a major determinant of the location of production activities. However, the latter is not as mobile, owing to restrictions on permanent labour movements. It is therefore appropriate to

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7/ For a recent survey and synthesis of trade theories see Corden (1985).

envisage two factor inputs, (unskilled) labour and human capital (or skilled labour). Secondly, and related to the first point, an additional input encompassing research and development (R+D) expenditures, and technological capacity, should be incorporated. This factor also recognizes the importance of the product cycle as a determinant of production location. At the early stage of product development, in which intensive R+D capacity is often required determined by the availability of technological inputs. As the "mature" stage of product development is reached, R+D capacity becomes less important, and production costs, particularly labour, become more significant.

Finally, perhaps the most important omission in the simple two-factor model is natural resources, both agricultural and mineral. Natural resources obviously determine the location of extractive and cultivation industries. They also frequently determine the location of early stage processing activities, whether for reasons of transport cost reductions, perishability, or the on-site availability of complementary inputs (such as expensively traded energy sources).

For these reasons, in assessing the relevance of changing resource endowments to changing comparative advantage it is appropriate to include the following factors of production:

(i) labour (more precisely, unskilled labour)

(ii) skilled labour (or human capital),

(iii) technology, R+D

(iv) agricultural resources, and

(v) mineral resources.

In practice, and because the distinction between (ii) and (iii) is often somewhat blurred in developing countries, the following simplification is adopted:

(i) labour,

(ii) skilled labour and technology, and

(iii) natural resources.

This is the classification to be used in the following sections.

In addition to the theoretical modifications, two further factors must be introduced to explain production and trade patterns. The first of these is government intervention. This encompasses both domestic interventions, discussed above, and external barriers. Since there is less - though still considerable - scope for intervention in export markets, it is likely that export patterns will better reflect changes in underlying comparative advantage. Production patterns will be affected not only by domestic interventions, but also by the presence of "home goods", that is, goods which are expensively or minimally traded (for example, cement, publishing).

It is also necessary to take account of relative distance in understanding multilateral trading patterns. Most studies of multilateral trade flows have found this to be a factor of considerable importance (see Drysdale and Garnaut, 1982). Relative distance is especially relevant to the pattern of ASEAN export specialization because of these countries' proximity to the dynamic economies of Japan and the three Northeast Asian NICs (Korea, Taiwan, Hong Kong). Japan and, to a lesser extent, its neighbours, are rapidly losing their comparative advantage in labour-intensive activities, and are in the process of shifting from net exporters to net importers of these products. Similarly, as resource-poor economies, they are large importers of natural resource based goods, notwithstanding very high agricultural protectionism in some cases (on which see Anderson and Hayami, 1986).

Returning to the earlier discussion of factor inputs, what are the appropriate measures? For labour-intensive industries, three have been used:

(i) value added per employee,

(ii) share of labour costs in total costs, and

(iii) capital - labour ratios.

A labour-intensive industry is one which is below average in the case of the first and third measures, and above average for the second. Neither is an entirely satisfactory measure of labour intensity, but the most widely used and appropriate is the first.

The third, though in use, is unsatisfactory for three reasons. The most important is that the estimates of capital refer to book value rather than current (or replacement) value estimates of capital, and thus there are obvious problems in undertaking comparisons between capital stock of different vintages. In addition, several countries do not collect estimates, of capital stock in their industry surveys and, when they do, there is not always a breakdown between total capital stock and machinery and equipment. The second measure is unsatisfactory because labour costs could be high because of intensive use of human capital (skilled labour) rather than unskilled labour, so it is not an unambiguous indicator of labour intensity. For these reasons, and because of its wide use in empirical testing (see, for example, Lary (1968) and Tuong and Yeats, (1980), the first measure is used, even though it also has some drawbacks.[8/] It has the added advantage that it may be

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8/ The two most important are that product market distortions (for example, differencial rates of effective protection) may give a misleading picture of factor intensities, and that the measure is susceptible to trade cycle fluctuations in profitability (and hence value added).

decomposed into two components: wage value added which, in a competitive labour market, is an indicator of skill intensity, and non-wage value added, a proxy for physical capital intensity.

For skill and technology intensity, a number of indicators are available. The most comprehensive, the converse of labour intensity, is above average value added per employee. This may be supplemented by several other measures. In the case of technology intensity, the most common is R+D expenditure as a percentage of total sales. This measure needs to be used with caution in the case of developing countries, however, because the R+D activity may take place in the innovating country, and be exported abroad. Moreover, in many countries reliable R+D data are not available. For skill intensity, the most widely used supplementary measure is the "skill ratio", developed by Keesing (1967), which measures the ratio of professional and technical employees to production workers.

Natural resource endowments are reflected in a number of indicators. Mutual resources may be measured by total land area, arable land, forested land, and specific mineral reserves. As indicators of comparative advantage, these measures are usually expressed relative to total population, total workforce, and manufacturing activity.

2.3 The Data

It is useful, finally, to review briefly the quality and coverage of data used in this paper. The trade statistics are reasonably accurate, especially on the export side. Considerable import smuggling is thought to occur in the two inward-looking, archipelago states, Indonesia and the Philippines, but since our analysis is mainly with reference to exports, this presents no major

problems. There have been revisions to the Standard International Trade Classification (SITC), but the data base employs a consistent classification. The major limitation of the trade statistics is the slow reporting of some countries. For example, Malaysia has yet to report for years after 1982, and it is therefore not possible to obtain ASEAN aggregates for this period.

Production statistics present more difficulties. Among the ASEAN countries, only Indonesia and Singapore publish comprehensive statistics, reasonably promptly, on an annual basis. Publication of industrial statistics in the other three countries is seriously delayed. For this reason the more disaggregated analysis (section 4 below) is restricted to Indonesia and Singapore. Even for the latter two countries there are limitations, especially in the case of Indonesia: The cut-off point in the annual survey of firms is rather high (firms employing less than 20 workers are excluded); the definition of large and medium firms (the subject of the annual survey) was changed in 1974, so comparisons with earlier years may be misleading; and important sub-sectors are excluded, most notably the huge, state-owned oil refining sector (thought to account for about 20 per cent of MVA), some other large state enterprises, and several estate-based processing activities. In the case of Singapore the cut-off point is lower (less than 10 workers), and the data more comprehensive. But it is difficult to obtain supplementary information on pertinent questions such as ownership.

Like all studies of trade and industrialization, there is a problem obtaining a trade-production concordance, because the trade data are presented using the SITC, whereas the production data follow the International Standard Industrial Classification (ISIC). Moreover, the trade data refer to sales,

while the most useful production data are for value added. For these reasons, the two sets of data are not directly comparable, especially as the standard trade definition of manufactures (SITC 5 to 8, less SITC 68) is much less comprehensive than the national accounts definition for production (ISIC 3).[9/] Wherever possible, in the disaggregated analysis, roughly comparable industrial categories (that is, SITC and ISIC) have been chosen for analysis, but the definitions are not identical.

3. Factor Intensities and Resource Endowments in ASEAN Manufacturing

3.1 Resource Endowments

General resource endowments provide an indication of underlying comparative advantage in the five countries. The indicators assembled refer to natural resources, as well as skills and technological capacity. For comparative purposes, three additional developing countries are included in the analysis, along with two neighbouring developed countries, Japan and Australia (Table 3). The additional countries highlight the enormous diversity in the Western Pacific region in terms of resource endowments.

Several imoprtant conclusions emerge from the comparison. In the case of natural resources Singapore (and Hong Kong) is in a category of its own,

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9/ The contrasting definitions for manufactures are of considerable relevance to industrial indicators in ASEAN. For example, in the case of manufactured exports, growth rates, percentage of manufactured exports, and revealed comparative advantage indices all very considerably depending on which definition is selected (see Hill, 1986).

Table 3: Relative Resource Endowments, ASEAN and Selected Regional Countries

	(1) Land and Resources						(2) Wages, skill, R+D					
	total land area ('000 ha) (1)	Population densities: total area (2)	Population densities: arable land (3)	Population densities: forest & wood (4)	Oil resources: per capita (5)	Oil resources: per $'000 MVA (6)	Skill ratio (7)	average monthly wages in manufacturing, 1982, ($): all industries (8)	average monthly wages in manufacturing, 1982, ($): garments (9)	scientists, engineers, etc. engaged in R+D per 1 mil persons (10)		expenditure as % of GDP (11)
ASEAN												
Indonesia	181,157	1.16	0.10	0.78	75	2,800	n.a.	88.2	63.4	100	(1975)	0.15
Malaysia	32,855	2.21	0.07	1.45	200	1,200	12.0 (1980)	n.a.	n.a.	n.a.		n.a.
Philippines	29,817	0.57	0.15	0.23	2	18	13.1 (1983)	n.a.	n.a.	148	(1975)	0.15
Singapore	57	0.02	n	n	0	0	32.1 (1984)	219.4	192.1	311	(1978)	0.16
Thailand	51,177	1.04	0.35	0.32	n.a.	n.a.	9.4 (1982)	n.a.	n.a.			
Other Asia												
India	297,319	0.41	0.22	0.09	n.a.	n.a.	n.a.	68.0	50.8	87	(1976)	0.50
Hong Kong	99	0.02	n	n	0	0	16.6 (1984)	277.2	282.9	n.a.		n.a.
Korea	9,819	0.25	0.05	0.16	n	n	24.7 (1984)	276.4	181.8	677		0.60
Regional Developed Countries												
Australia	761,793	49.47	3.01	6.88	150	110	34.8 (1981)	1,312.4	1,155.0	2,516	(1976)	0.97
Japan	37,103	0.31	0.04	0.21	0.6	0.4	26.4 (1984)	1,082.7	592.2	4,556	(1979)	1.96

Sources and Notes:

Land data from FAO, 1984 Production Yearbook, volume 38, Rome, 1985. Population densities refer to ha. per persons. Oil reserves from Anderson and Smith (1981), and refer to 1978 reserves, and corresponding population and MVA.

Skill ratio from ILO, 1985 Yearbook of Labour Statistics, 45th edition, Geneva, 1985. The ratio is the manufacturing workforce in occupational categories 1,2 and 3 (professional, administrative, clerical, etc. employees) divided by that in categories 7, 8 and 9 (unskilled production labour, etc).

Wage data from ILO, ibid. Hourly wages have been converted to monthly wages assuming a 40 hour working week; daily wages have been covered assuming 23 days per month. Wages have been converted to US dollars and the average exchange rate for 1982 from the IMF, International Financial Statistics.

R+D personnel and expenditure from UNESCO, Statistical Yearbook 1982, Paris, 1982. The date for Korea and Singapore exclude the military sector.

n = negligible (less than 0.01);
n.a. = not available

possessing virtually no such resources. However, its proximity to its better endowed neighbours might still confer some comparative advantage in processing industries, to the extent that the latter countries are regarded as Singapore's "hinterland". Within ASEAN, Indonesia and Malaysia have the best resource endowments, on a per capita basis, with regard to total land area, forest areas, and oil reserves (the latter generally being a reliable proxy for total mineral reserves). The data also indicate that the Philippines lies between the resource-poor Northeast Asian pattern and the better-endowed ASEAN group. Increasingly, its comparative advantage might be expected to shift out of natural resource based activities, especially in view of its continuing rapid population growth. Thailand, although more densely populated than either Indonesia or Malaysia, has the highest per capita arable land supplies, which is reflected in its strong food crop export performance.

The second section of table 3 includes several indicators of skill, technology and wage levels. Although the data are approximate, and rather patchy, they are at least indicative of general trends. For example, Singapore has a much higher percentage of its manufacturing work force in skilled occupations than its neighbours and, indeed, Northeast-Asian developing countries. Its wage levels are also appreciably higher, whichever series is used.[10/] In terms of R+D personnel, Singapore is also hignest

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10/ Note that in table 3 two wage series are provided, the all manufacturing average and that for an unskilled labour-intensive industry - garments - in order to allow for the fact that intra-industry compositional differences may affect the average. And it turns out, although wages in garments are generally lower, the relativities between countries are broadly similar, with the notable exception of Japan.

although it is considerably lower than others in terms of R+D expenditure, possibly because the very large defence sector is excluded from the R+D estimates.

What do the relative resource endowments indicate about likely comparative advantage and export specialization in ASEAN? Indonesia and Malaysia have the best overall natural resource endowment; Thailand is comparatively high for agriculture resources; the Philippines is considerably poorer; while Singapore's is virtually non-existent, apart from the proximity factor. For non-natural resource based products, all available indicators suggest that, except for Singapore and possibly Malaysia, all countries possess at least a potential comparative advantage in labour-intensive activities. Singapore is the only country in the region which has the capacity to develop international competitiveness in skill and technology-intensive activities in the near future. It needs to be emphasized that these indicators are at best only approximate, but they do provide a basis for understanding the changes to be analyzed below.

3.2 Factor Intensities in ASEAN Manufacturing

In the case of factor intensities in the manufacturing sector, value added per employee is selected, and related indicators where possible. The procedure was as follows: industrial statistics for the five ASEAN countries were chosen for similar years; in each case factor intensity indicators were calculated at the 3-digit ISIC level;[11/] as an additional cross-check on the

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11/ Note that capital-labour ratios are not provided by Indonesia and Malaysia.

reliability of factor intensity rankings, United States data were also included. In four out of six countries the data are for 1981. For the Philippines and Thailand the data refer to 1980 and 1979 respectively, since reliable data for more recent years were not available.

The detailed calculations are presented in Appendix Tables A.1 to A.4, for each country and factor intensity classifications. It needs to be emphasized that what is of interest is not absolute values, which will obviously vary among countries according to their stage of development. Rather, the relevant comparison is the ranking of industries between countries: is the ranking consistent between countries? Lary (1968) established that this was broadly the case for developed countries in the early 1960s. The same conclusion might be expected to hold for the ASEAN countries except in cases where government distortions are very extensive, and where infant industrial development renders comparisons between the same apparent industrial groups difficult. To facilitate comparisons the rankings are summarized for each country, according to whether the industries exhibit above or below average wage and non-wage value added per employee (Figures 1 to 6). Thus industries in the top right quadrangle have above average skill and physical capital intensity, while those in the bottom left quadrangle are below average according to both measures. In the remaining two cases, industries are above average according to one measure only. Since the data in these figures relate to rankings, the slight differences in years are of no consequence.

Does a consistent pattern of rankings emerge between countries? It is not necessary to conduct rigorous statistical tests to determine that, with a few exceptions, the rankings are broadly similar across countries. In most cases, industries which are above average with respect to both attributes include petroleum refining, basic chemicals, other chemicals, iron and steel,

Figure A: Classification of Industries: Indonesia

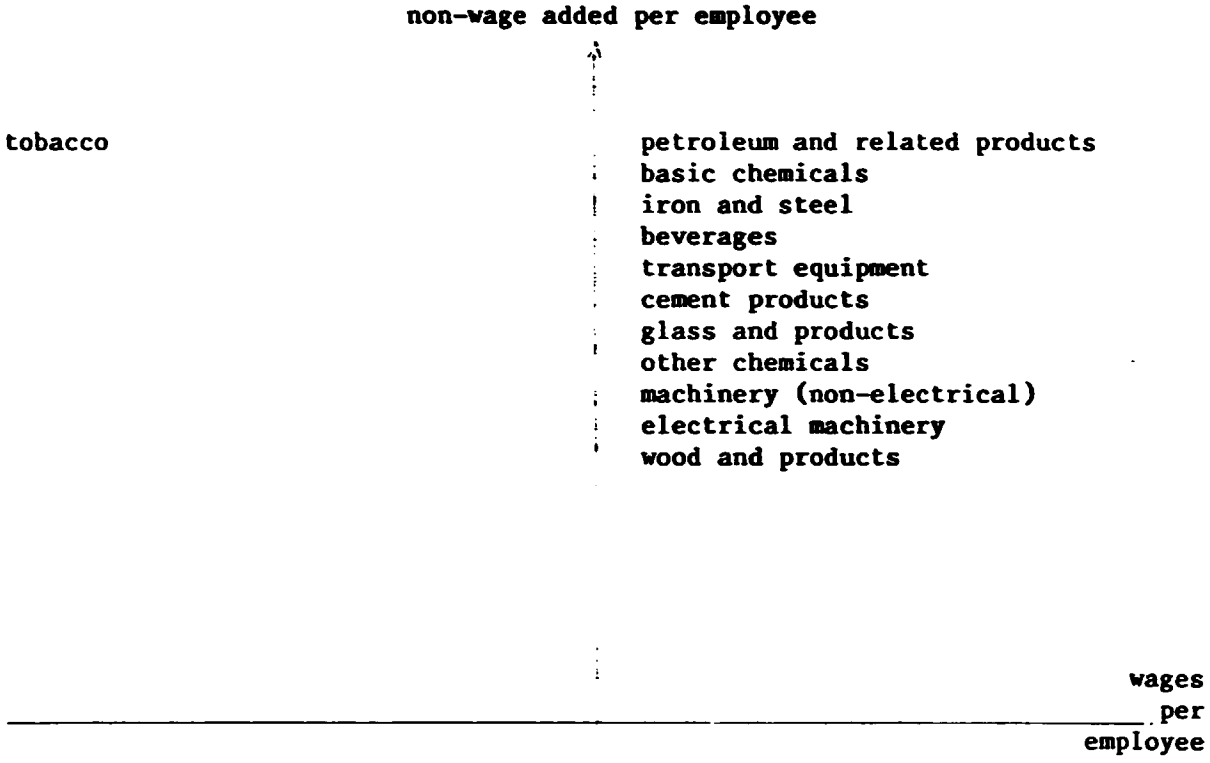


Figure B: **Classification of Industries: Malaysia**

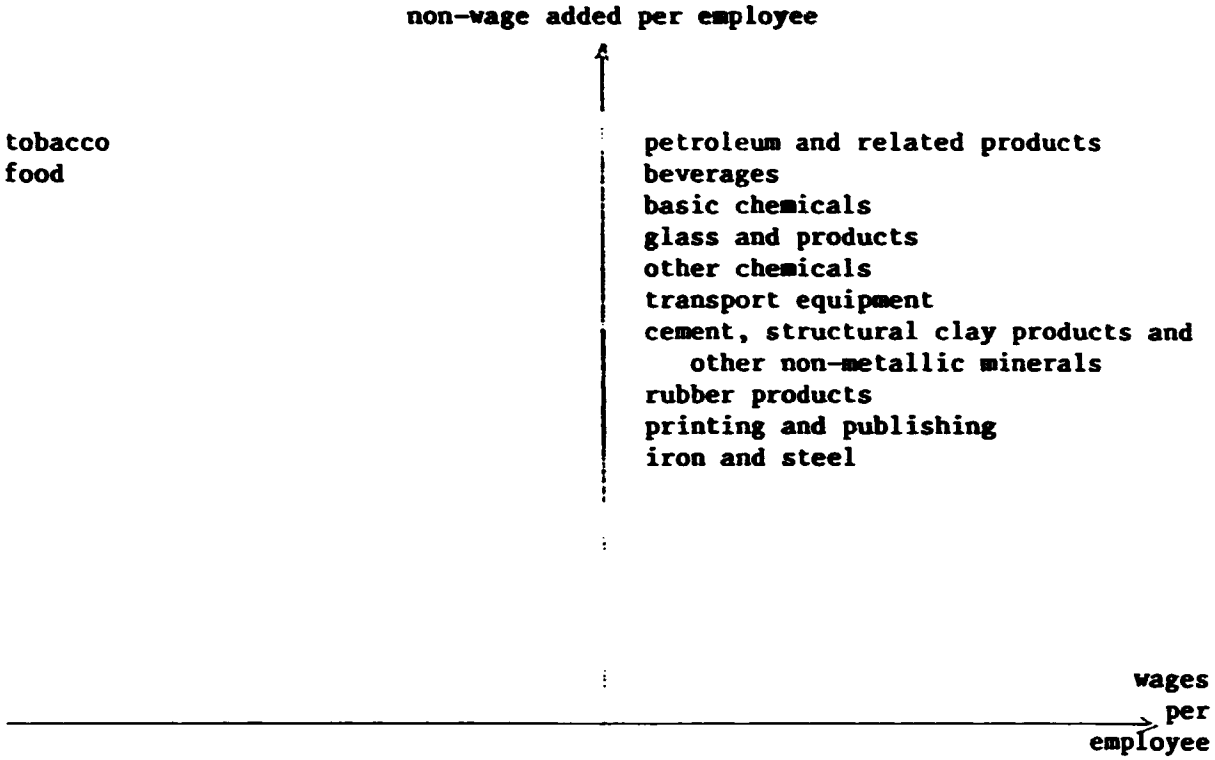


Figure C: Classification of Industries: Philippines

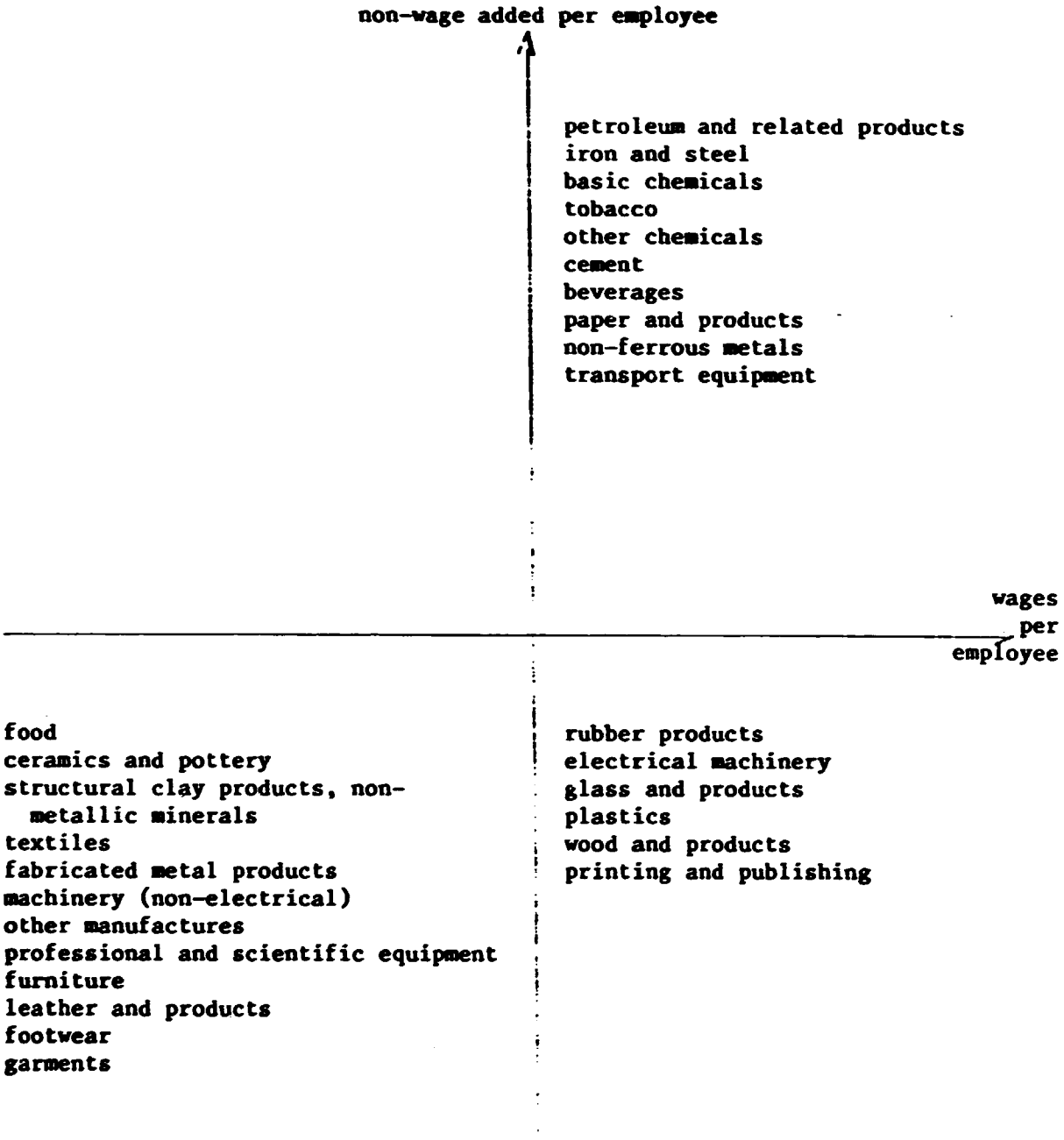


Figure D: Classification of Industries: Singapore

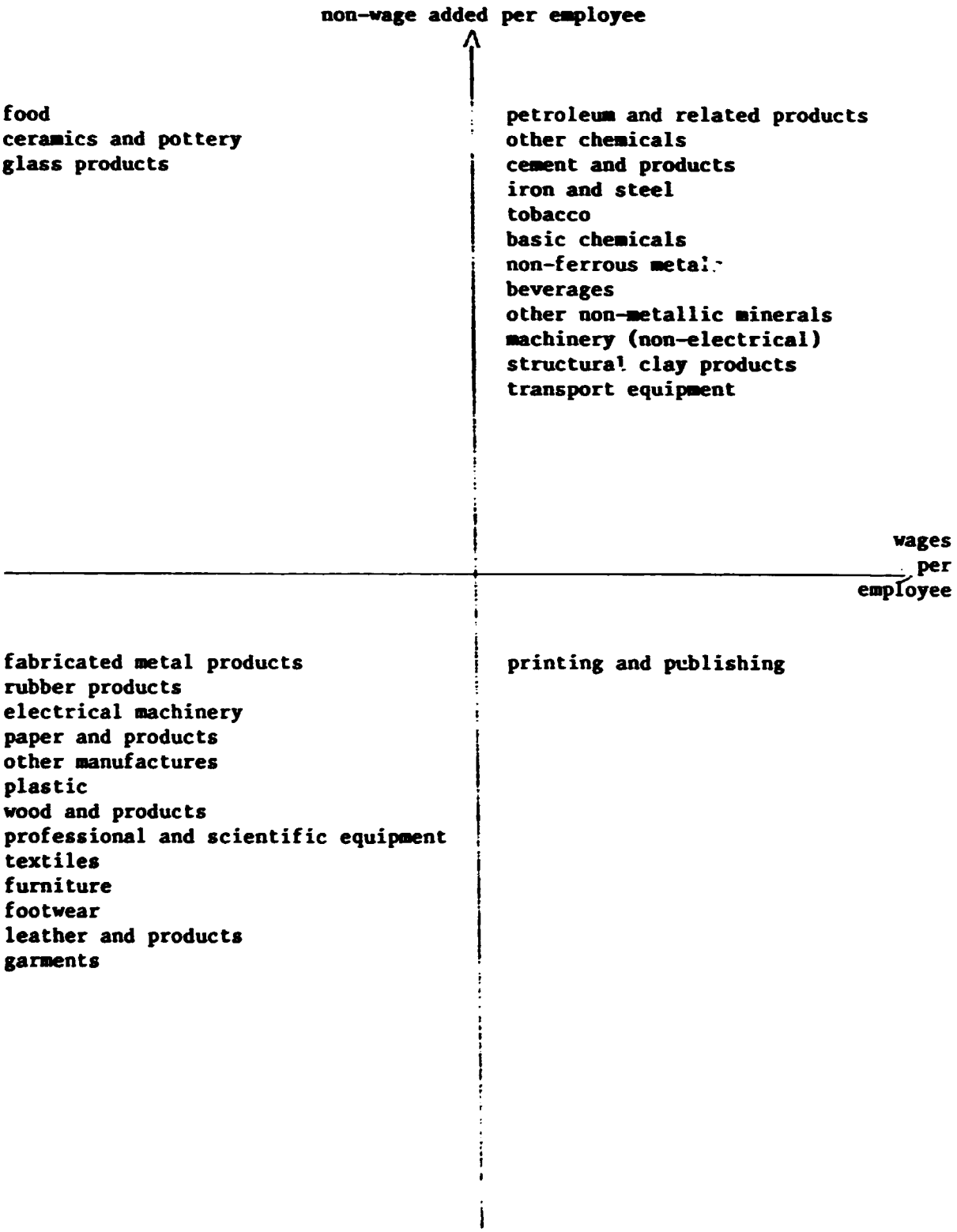


Figure E: **Classification of Industries: Thailand**

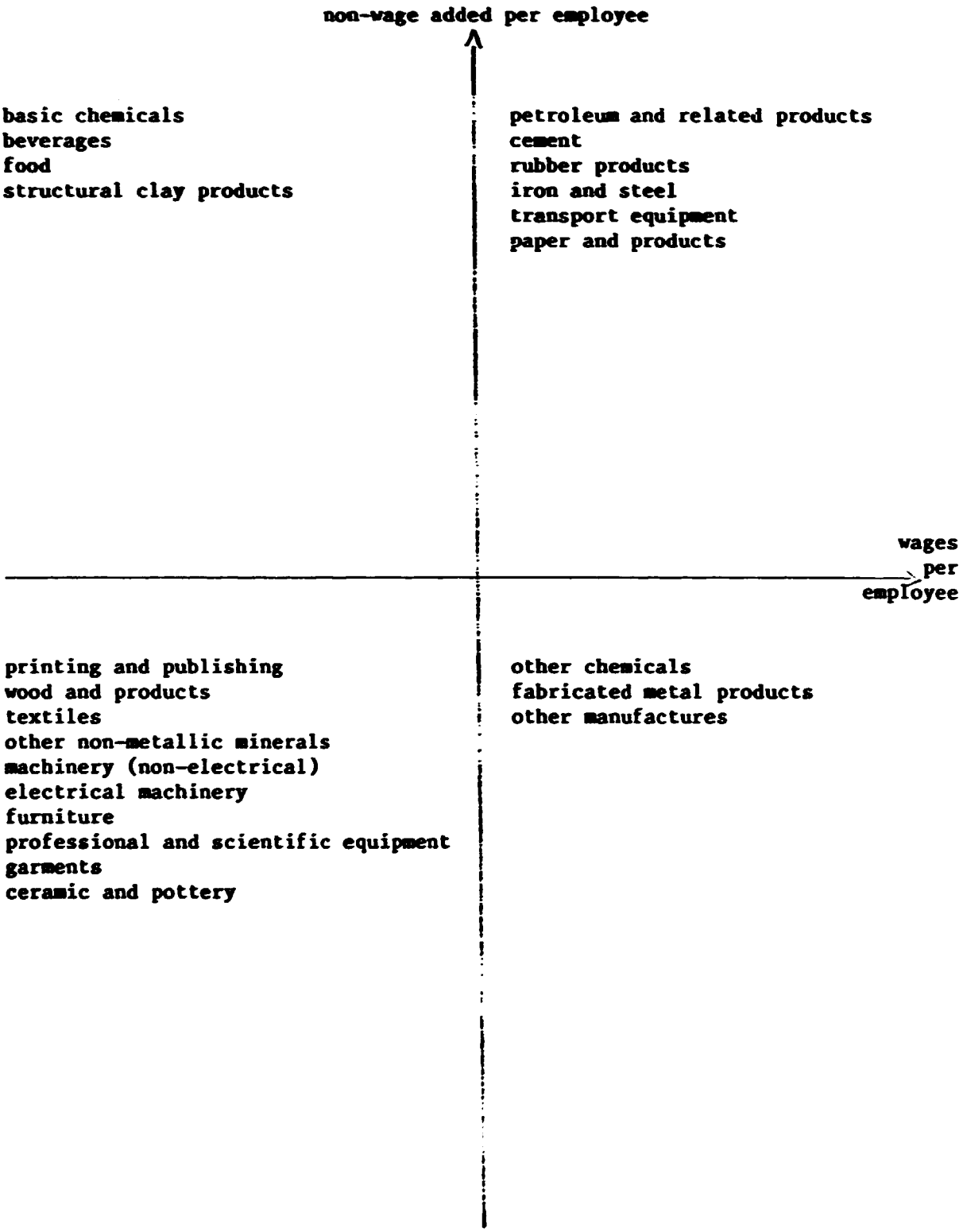
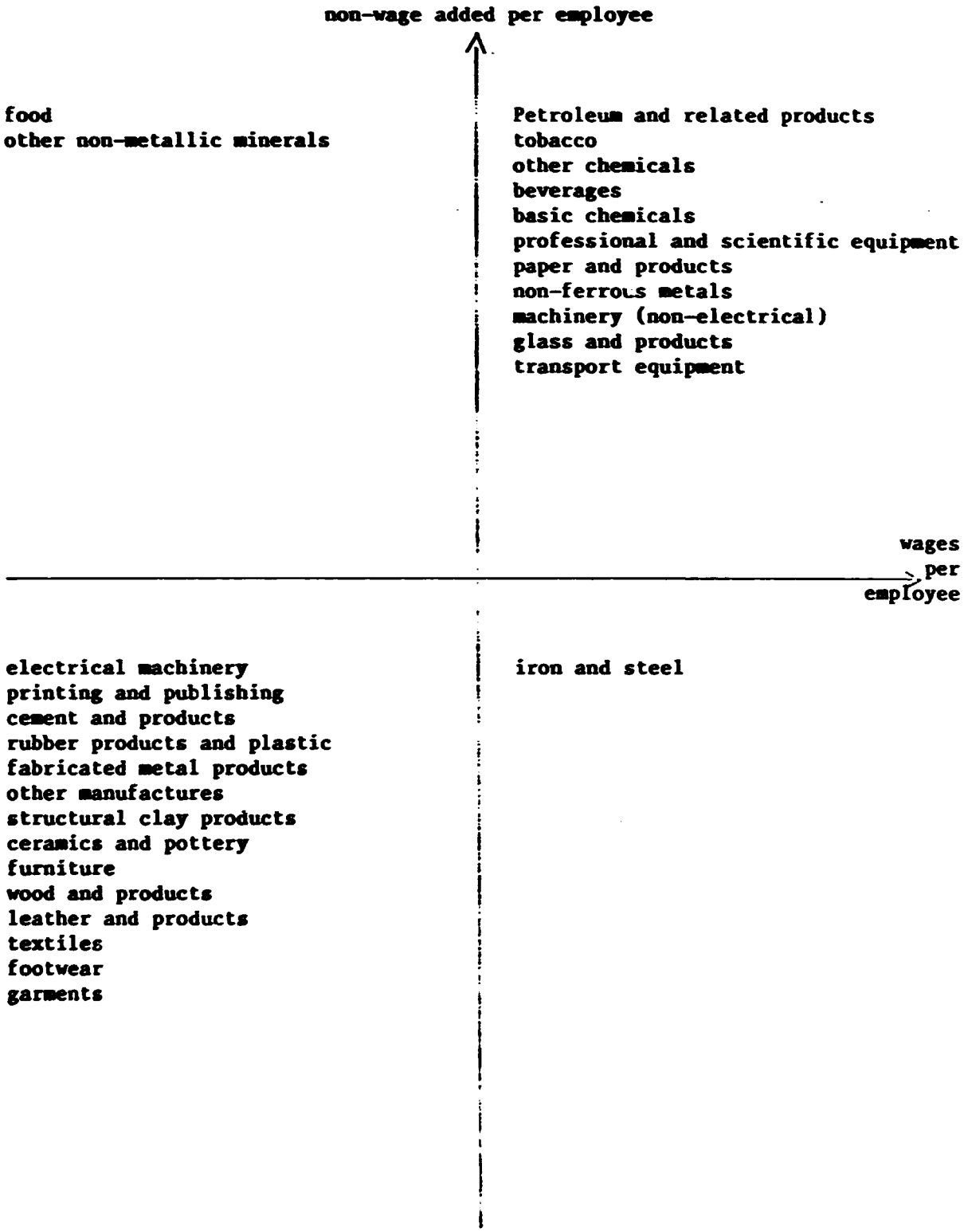


Figure F: Classification of Industries: United States



transport equipment, non-electric machinery, and glass and glass products. Conversely, the following industries are generally below average on both measures: textiles, garments, footwear, other manufactures (toys, musical instruments, bags, etc), leather products, furniture and ceramics and pottery. In a few cases there are industries which are above average on one indicator, and below for the other. In the latter, there is no consistent pattern, however, and the majority of industries are either above or below average in both characteristics.

The analysis so far indicates the type of industries likely to be of export interest to the ASEAN countries at a general level. For example, Indonesia has a reasonably good resource base and an abundance of unskilled labour, and it might therefore be expected to specialize in industries which intensively use either or both factors. A similar conclusion applies to Malaysia, except that comparatively high and rising real wages will encourage a shift out of labour-intensive manufactures in the near future. For Thailand and the Philippines the pattern will be similar, with less emphasis on resource-based industrialization, espcially so in the latter. Finally the advanced industrial sector and poor resource base in Singapore would suggest a move towards higher value added industries. In the next section these trends will be assessed for manufacturing as a whole and the major categories. Subsequently the analysis will focus on particular products.

Trade in Manufactures: The General Pattern

As already noted, the push for manufactured exports commerced seriously in Singapore during the mid 1960s, in Malaysia, the Philippines and Thailand in the early 1970s, and in Indonesia a decade earlier. The reorientation of

trade patterns has occurred remarkably quickly, and for sharper than the changing structure of manufacturing production. Whereas domestic demand expansion and import replacement were the major sources of demand growth prior to the 1970s, export expansion has become quite a significant source for certain industries in all but Indonesia. The push for manufactures is illustrated most clearly in their dramatic rise in the percentage of total merchandise exports.[12/] In the early 1960s, ASEAN displayed a typically heavy reliance on primary commodity exports (Table 4). In 1962, for example, manufactures constituted 11 per cent of the total. But this figure is misleading because of the much higher share for Singapore; for Indonesia they were less than one per cent. A decade later the early push for export was already evident, but the overall ASEAN share was still less than 20 per cent.

It was in the following decade that the sharpest increase occurred. While the share of manufactures in world trade remained largely unchanged, the shares for all ASEAN countries except Indonesia increased dramatically. In the Philippines and Singapore they are now more than half the total of merchandise exports, in Thailand more than one-third, and Malaysia one-quarter. Indonesia, of course, is very much the exception to this pattern. In very recent years, however, there has been an appreciable rise in the share, and in 1985 (using preliminary Indonesian reports) they constituted about 10 per cent of the total. It must be recognized that declining primary commodity prices have contributed to the rising share of manufactures. But the volume effect has been far more important for the period as a whole.

12/ Unless otherwise indicated, manufactures comprise SITC 5-8 less SITC 68.

Table 4: Manufactures in ASEAN Merchandise Exports
(percentage of total merchandise exports)

	1962	1972	1982	Latest year
Indonesia	0.3	2.1	3.9	5.4
Malaysia	5.4	11.1	23.1	n.a.
Philippines	4.7	9.2	49.6	50.4
Singapore	29.4	44.2	56.9	57.3
Thailand	3.1	15.7	27.7	34.1
ASEAN	11.1	18.7	29.7	n.a.
World	55.2	64.9	65.1	n.a.

Note: In this and other tables, latest year refers to 1983 for Indonesia and the Philippines, and 1984 for Singapore and Thailand.

Source International Economic Data Bank, Australian National University, for this table and all following tables containing trade statistics.

How do the ASEAN countries compare to other developing country exporters? It is not always possible to get entirely accurate estimates of global trade because of the problem of non-reporting countries. Nevertheless, except for China in the 1970s and the slow reporting after 1982, the non-reporting countries have generally been small exporters. Among developing country exporters Asian developing countries have been by far the most significant, accounting for about half of manufactures from 1972 to 1982 (Table 5, first section); beyond 1982 the non-reporting problems emerge. Among Asian developing countries, the three Northeast Asian NICs (Hong Kong, Korea and Taiwan) have been the dominant exporters. But it is notable that ASEAN's share of developing country exports more than doubled over the decade 1972-1982, and is continuing to rise. Within ASEAN important trends are also evident. In 1972 Singapore accounted for most (two-thirds) of the exports; all the other countries each contributed less than one per cent of total developing country exports. A decade later, Singapore's share had fallen to a little over one-half, and Malaysia, the Philippines and Thailand had become quite significant.

To analyse these trends in more detail, two additional steps are necessary. First, it is necessary to develop a commodity classification consistent with the earlier discussion of factor intensities and resource endowments. For the purposes of this paper, the classification developed by Krause (1982) is most suitable. Krause identified four factors of production - natural resources, unskilled labour, technology and human capital - and identified commodities according to their dominant factor input. Dominant in this context refers to factors which are most intensively used in the commodities' production, or which determine the location of production. A sequential classification system was used, identifying first natural resource

Table 5: Exports of manufactures by developing countries
($ million, or percentage of all developing countries)

	1972		1982		1983
	All Manufactures				
Developing countries	19,353	(100)	109,427	(100)	92,788
Asian developing countries	9,642	(49.8)	55,129	(50.4)	57,237
ASEAN	1,451	(7.5)	19,848	(18.1)	18,498
Indonesia	37	(n)	868	(n)	1,618
Malaysia	191	(n)	2,781	(2.5)	n.a.
Philippines	95	(n)	2,484	(2.3)	2,503
Singapore	964	(5.0)	11,834	(10.8)	12,388
Thailand	163	(n)	1,881	(1.7)	1,989
	Resource-Intensive Manufactures				
Developing countries	3,085	(100)	8,636	(100)	6,953
Asian developing countries	1,013	(32.8)	2,429	(28.1)	2,590
ASEAN	208	(6.7)	1,400	(16.2)	1,708
Indonesia	2	(n)	354	(4.1)	770
Malaysia	64	(2.1)	209	(2.4)	n.a.
Philippines	52	(1.7)	184	(2.1)	205
Singapore	398	(12.9)	351	(4.1)	360
Thailand	106	(3.4)	301	(3.5)	372
	Labour-Intensive Manufactures				
Developing countries	9,446	(100)	56,315	(100)	46,083
Asian Developing Countries	6,028	(63.8)	32,937	(58.5)	34.037
ASEAN	599	(6.3)	10,931	(19.4)	10,108
Indonesia	13	(0.1)	352	(0.6)	657
Malaysia	54	(0.6)	1,883	(3.3)	n.a.
Philippines	27	(0.3)	2,019	(3.6)	2,057
Singapore	398	(4.2)	5,400	(9.6)	6,135
Thailand	106	(1.1)	1,278	(2.3)	1,260

based goods, then labour-intensive products, the latter based on the Lary criterion of value added per employee. The remaining two categories refer to higher value added (per employee) activities, the technology-intensive industries being distinguished by those which have a higher percentage of R+D expenditure in the total. This distincition is of some importance for developed ccuntries, but is less relevant to developing countries; these two categories are therefore combined in the following analysis.

The second step is to outline the basic tools to be employed in the analysis of the trade data. Essentially, three such tools will be used. Since each is well known and widely used it is not necessary to discuss their characteristics in any detail here; the essential properties will be outlined when the data are presented.

The three are:

(i) Net trade balance ratio, defined as:

$$\frac{Xij - Mij}{Xij + Mij}$$

Where X and M refer to exports and imports respectively,
i refers to country, and
j refers to commodity.
Thus, Xij refers to country i's exports of commodity j.

(ii) Revealed comparative advantage index, defined as:

$$\frac{Xij}{Xi} \quad \frac{Xwj}{Xw}$$

Where X, i and j are as for (i), and w refers to world.
Thus, Xwj refers to world exports of commodity j.

(iii) Export intensity index, defined as:

$$\frac{Xab}{Xa} \quad \frac{Mb}{Mx - Ma}$$

Where X, M and w are defined above, and a and b refer to countries.
Thus, Xab refers to exports from country a to country b for a particular commodity, or group of commodities.

Returning to the earlier discussion, there is some specialization in the ASEAN export drive, although perhaps not as much as might have been expected. For example, ASEAN's share of developing country manufactured exports rose by almost 250 per cent from 1972 to 1982 (Table 5). By contrast, the share of labour-intensive manufactures increased by more than 300 per cent over this period. ASEAN's share of resource-intensive manufactures is slightly smaller than that for all manufactures, but it is notable that ASEAN is the dominant Asian exporter, unlike the situation a decade earlier. The much higher share, within Asian developing countries, is indicative of greatly increased export substitution. Whereas previously the ASEAN countries were exporting much of the natural resources in unprocessed form, in many cases to Northeast Asia, by the 1980s most of the processing was taking place domestically.

The growth rates for manufactured exports are not always particularly useful because some of the series start from very small initial bases. But it is useful to highlight several important features (Table 6). First, in the initial five year period (1962-67), there was little growth, confirming over earlier comments regarding the timing of the export thrust.[13/] In fact, allowing for inflation and population growth, real per capita exports of

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13/ The high growth rate for Indonesia is, of course, entirely misleading because of that country's miniscule manufactured exports over the period.

Table 6: Growth of ASEAN manufactured exports
(annual average growth)

	1962-67	1967-72	1972-77	1977-82
	Total Manufactures			
Indonesia	64.9	8.4	38.6	35.3
Malaysia	-0.7	29.2	37 .	24.3
Philippines	13.7	13.9	51.7	26.6
Singapore	0	24.0	30.3	26.7
Thailand	10.2	48.6	31.8	23.8
ASEAN	2.4	24.1	33.6	26.3
	Resource-Intensive Manufactures			
Indonesia	25.5	75.9	63.7	70.4
Malaysia	22.8	40.0	15.7	9.4
Philippines	14.3	7.7	18.6	8.6
Singapore	-0.3	26.4	25.7	18.1
Thailand	4.8	45.5	24.2	20.2
ASEAN	10.0	24.5	21.6	20.4
	Labour-Intensive Manufactures			
Indonesia	64.9	1.7	38.2	39.9
Malaysia	2.4	25.1	53.9	32.0
Philippines	10.9	25.3	80.2	30.6
Singapore	1.1	28.6	34.7	25.0
Thailand	14.4	49.5	33.6	23.2
ASEAN	4.0	29.3	40.5	27.2
	Skill and Technology Intensive Manufactures			
Indonesia	73.4	10.6	36.4	8.5
Malaysia	-8.4	27.8	37.2	16.0
Philippines	14.9	24.9	48.6	16.9
Singapore	-0.6	23.2	27.6	29.3
Thailand	5.0	54.2	37.1	26.5
ASEAN	-0.1	23.5	30.0	26.4

manufactures declined. Secondly, the really big push for exports occurred in the 1970s, the very high growth rates for Malaysia and the Philippines reflecting the policy reorientation and the introduction of export incentive packages. Thirdly, the lower growth in the final period is essentially a reflection of the larger volume of exports, and of the fact that the earlier rates from a small base were not sustainable, especially in the case of labour-intensive manufactures. It does not indicate any diminution in the export drive. Finally, the growth rates for the skill and technology intensive category are of little meaning, except for Singapore, because of the small export quantities.

Which are the major markets for ASEAN manufactured exports? It is useful to divide these markets into five countries or groups. These are the three major OECD markets, the United States, Japan, and the European Economic Community; the fast growing although still relatively small market of the Northeast Asian NICs; and intra-ASEAN trade. It is important to note that over 70 per cent of intra-ASEAN trade is directed through Singapore (Rieger, 1985), for processing, re-export, or purchase by toursits. Consequently, a good deal of this trade will eventually flow on to OECD and other markets. In Table 7 ASEAN's exports of manufactures are presented for each major market, and the two categories of special interest, labour-intensive and resource-intensive categories. The data are presented for the latest year available. Since Malaysia is yet to report for years after 1982 the ASEAN total is for 1982, and the individual countries therefore do not sum to the ASEAN total.

Several important features of the data warrant attention. One is that the United States has been crucial to ASEAN's export drive. It has been the largest market for all countries except Indonesia; in fact, its imports from

Table 7: ASEAN Exports of manufactures by destination
($ billion, latest year)

		Export Market					
		Japan	USA	EEC	NICs	ASEAN	World
Indonesia	total	100.9	288.6	250.6	132.0	622.0	1,617.7
	ULI	28.1	109.5	91.2	15.3	353.9	656.5
	RI	55.7	168.6	128.9	97.2	166.8	770.3
Malaysia	total	154.9	1,013.7	539.1	185.4	604.3	2,780.9
	ULI	92.8	875.4	354.4	134.3	299.0	1,882.9
	RI	23.0	20.2	36.5	17.3	82.3	208.8
Philippines	total	264.7	1,137.7	413.8	169.7	301.5	2,503.4
	ULI	167.9	1,013.2	332.9	108.2	270.3	2,056.6
	RI	32.5	64.7	57.7	20.2	12.0	204.8
Singapore	total	584.8	3,987.9	1,733.9	980.3	3,060.7	13,791.0
	ULI	330.2	1,951.6	819.3	454.1	1,122.6	6,494.1
	RI	5.3	15.5	66.7	30.4	87.8	338.7
Thailand	total	168.7	718.2	490.4	183.8	365.9	2,482.0
	ULI	60.3	547.6	339.2	82.1	274.3	1,624.4
	RI	50.6	87.8	91.6	63.5	15.5	387.9
ASEAN	total	2,065.8	4,738.1	2,949.5	1,516.7	3,934.9	19,848.3
	ULI	739.4	3,458.9	1,879.7	804.5	1,715.8	10,931.5
	RI	151.5	176.3	241.3	220.8	248.5	1,399.7

ASEAN are similar to the combined total of Japan and the EEC. Significantly, the United States has been especially important as a market for labour-intensive manufactures, being almost twice as large as the next biggest OECD market, the EEC, and much greater than the combined EEC-Japan total. The American market is particularly important for labour-intensive manufactures from the Philippines and Singapore. Correspondly Japan has played a surprisingly small role in ASEAN exports, despite its proximity to the region. In all countries it is a smaller export market than the EEC; in some, the Northeast Asian NICs are larger buyers. Indicative of Japan's poorer resource base, it is notable that resource-intensive manufactures are more important than labour-intensive manufactures for some ASEAN countries. A final feature is the substantial intra-regional trade. For manufactures this group comprises about 20 per cent of the total, although the share is somewhat lower in the case of labour-intensive manufactures because complementarity with the industrialized OECD group is greatest for these products. As for averall trade, the most intense pattern of manufactured exports occurs between Singapore on the one hand, and Indonesia and Malaysia on the other. For Thailand and, especially, the Philippines, extra-regional markets are of much greater importance.

What has been the balance of payments impact of the export drive in ASEAN? Have the export industries been highly import-intensive, as some critics contend, with few linkages to the rest of the economy? The trade balance ratios provide at least some indication, as well as trends in export-specialization. The ratio remains negative for ASEAN manufacturing as a whole, and for each country, for the whole manufacturing sector (Table 8). During the decade 1962-1972 there was, in fact, remarkably little change,

Table 8: Trade balance ratios in ASEAN manufactured exports

	1962	1972	1982	Latest year
(1) All Manufactures				
Indonesia	a	- .94	- .85	- .73
Malaysia	- .80	- .69	- .50	n.a.
Philippines	- .87	- .81	- .33	- .31
Singapore	- .19	- .37	- .13	- .09
Thailand	- .94	- .74	- .44	- .46
ASEAN	- .61	- .63	- .38	n.a.
(2) Resource-Intensive Manufactures				
Indonesia	a	- .89	.37	.65
Malaysia	- .67	.56	.11	n.a.
Philippines	.57	.63	.61	.68
Singapore	- .02	- .10	- .19	- .28
Thailand	.12	.49	.46	.43
ASEAN	- .04	.20	.17	n.a.
(3) Labour-Intensive Manufactures				
Indonesia	a	- .91	- .66	- .42
Malaysia	- .77	- .60	- .18	n.a.
Philippines	- .86	- .66	.06	.04
Singapore	- .25	- .33	.01	.03
Thailand	- .91	- .49	- .04	- .04
ASEAN	- .58	- .48	- .08	n.a.
(4) Skill and Technology Intensive Manufactures				
Indonesia	a	- .96	- .97	- .96
Malaysia	- .83	- .85	- .79	n.a.
Philippines	- .99	- .96	- .87	- .88
Singapore	- .21	- .43	- .21	- .16
Thailand	- .99	- .96	- .86	- .85
ASEAN	- .69	- .76	- .61	n.a.

a Indonesia did not report details for 1962
n negligible, i.e., within the range - .01 to + .01

indicating not only that these exports were fairly unimportant, but also that in the early stages of manufacture for export many activities were very import-intensive. Thereafter the ratio changed extremely rapidly. In the decade 1972-1982 it more than halved for the Philippines and Singapore, and Singapore, is now approaching the point of being a net exporter of manufactures. In Malaysia the decline was less sharp - perhaps partly because of the heavy reliance on highly import-intensive electronics - but still substantial. Indonesia again differs from the other countries, in that the trade balance ratio is high and negative; nevertheless, in very recent years it has clearly started to decline.

As would be expected, the ratios vary considerably between countries and among the major factor intensity groupings. Indeed, to a quite remarkable extent the patterns accord with each country's resource endowment and comparative advantage. It will be useful to briefly examine the pattern for each factor intensity classification, as revealed in Table 8.

In the case of resource-intensive manufactures, all countries but Singapore have a positive ratio. Singapore's ratio, though negative, is not as high as might be expected because it imports considerable quantities of unprocessed primary commodities for processing and export. However, it is becoming increasingly negative, a trend which is likely to continue as the other countries undertake more processing domestically, and as it increasingly loses its comparative advantage in these industries, some of which are labour-intensive, or pollution-intensive, or space-intensive, or a combination of all three. In the other countries, with the partial exception of Malaysia, they have been able to build on their "latent" comparative advantage in resource-based products by developing local competence in the processing and international marketing of these products, and through government policies

which restrict or prohibit the export of primary commodities in unprocessed form. The most notable example of the latter is the Indonesian government's ban on the export of logs, a factor contributing to the remarkable change in the ratio for that country.

The most extraordinary change since 1972 has been in the labour-intensive group. All countries except Singapore were large net importers of these products in 1962; a decade later the situation had not changed noticably, except in the case of Thailand. Thereafter followed an extremely rapid transformation: the Philippines and Singapore were net exporters of these goods by 1982, and Thailand nearly so. The ratio for Malaysia also fell sharply. Even in Indonesia, the most inward-looking economy, the ratio has begun to fall appreciably. The significance of these changes needs to be emphasized: all countries except Singapore have an abundance of unskilled labour; after the incentives package was altered, and as commercial and marketing experience developed, ASEAN's export specialization has closely followed the path predicted by the theory of comparative advantage.

Quite the opposite picture - but again consistent with theory - emerges for skill and technology intensive manufactures. All countries remain large net importers of these products, and for the region as a whole there was little change in the ratio during the two decades 1962-1982. Here also, Indonesia and Singapore are contrasting extremes. Singapore is clearly the most advanced industrially in the region, and the ratio is appreciably lower than in the other four countries. By contrast, Indonesia's exports of these products are negligible. In the other three countries there has been a slight decline in the ratio. But there is little indication of a substantial fall in the ratio (or an expansion in these exports) in the near future.

These changes are corroborated by movements in the revealed comparative advantage indices (RCAs) over the same period. Although providing a less complete picture than the trade balance ratios, in some respects the RCAs are a better indicator of changes in comparative advantage. This is because the trade balance ratios also incorporate many domestic distortions which occur on the import side, and so may obscure the "real pattern". The RCAs reveal a broadly similar pattern of changing export specialization (Table 9). Note that the index ranges from zero to infinity, although values in excess of 10 would be most unusual. The RCAs have increased steadily for most countries and categories since the early 1960s. As before, it is evident that the Philippines and Singapore have progressed further along the export drive than the other three countries, and that skill and technology intensive manufactures are unimportant, except for Singapore. The data also suggest that, whereas resource-intensive manufactures were significant in the growing export specialization between 1962 and 1972, labour-intensive manufactures were the primary stimulus in the following decade. In fact, the RCA for the former fell in three of the countries, and was held up for ASEAN as a whole only by the very rapid increase for Indonesia.

4. Changing Patterns of Industrialization: Selected Case Studies

The purpose of this section is to extend the analysis of the previous section by examining development in a range of industries in the region. These industries include several labour-intensive and resource-based activities of export interest to most of the ASEAN countries. In addition, some industries which have figured prominently in the push for a "second

Table 9: Revealed comparative advantage in ASEAN manufactured exports

	1962	1972	1982	Latest year
		(1) All Manufactures		
Indonesia	.01	.03	.06	.11
Malaysia	.10	.17	.35	n.a.
Philippines	.09	.14	.76	.72
Singapore	.53	.68	.87	.79
Thailand	.06	.24	.42	.47
ASEAN	.20	.29	.45	n.a.
	(2) Resource-Intensive Manufactures			
Indonesia	n	.04	.68	1.44
Malaysia	.17	1.26	.74	n.a.
Philippines	1.37	1.70	1.56	1.63
Singapore	.56	.75	.72	.60
Thailand	.45	1.31	1.88	2.26
ASEAN	.46	.90	.89	n.a.
	(3) Labour-Intensive Manufactures			
Indonesia	.01	.04	.09	.17
Malaysia	.10	.18	.93	n.a.
Philippines	.07	.16	2.40	2.33
Singapore	.65	1.06	1.55	1.45
Thailand	.11	.59	1.12	1.20
ASEAN	.24	.45	.97	n.a.
	(4) Skill and Technology Intensive Manufactures			
Indonesia	n	.03	.02	.02
Malaysia	.08	.09	.12	n.a.
Philippines	.01	.03	.10	.08
Singapore	.43	.52	.65	.57
Thailand	.01	.03	.08	.11
ASEAN	.15	.18	.24	n.a.

round" of import substitution, but which have no immediate export prospects, have been selected. The focus is on Indonesia and Singapore, both because of their better quality industrial statistics and because they are at either ends of the "ASEAN spectrum" with regard to many industrial characteristics.

4.1 Indonesia

In the case of Indonesia the industries selected differ in many respects. They include labour-intensive industries now becoming increasingly export-oriented (garments and, to a lesser extent, textiles and electronics); a resource-based export industry (plywood); a resource based industry with little export success (leather); other labour-intensive industries which have yet to develop substantial exports (footwear, furniture, toys, plastic goods); a resource-based heavy industry, now expanding its exports (fertilizer); and some industries which are targeted for futher import substitution (automotive products, and iron and steel). In each case industry performance and characteristics will be examined, followed by the export pattern.

4.1.1 Labour-Intensive Industries

The labour-intensive nature of the industries selected for examination is confirmed in the industrial statistics series for Indonesia (Table 10). All six industries exhibit below average value added per employee in at least one of the years, and in most cases for both. A surprising exception is the footwear industry, in which the ratio was three times the industry average in 1975. The explanation was the establishment of the huge foreign-owned Bata plant which, despite its location in a labour-intensive industry was capital-intensive compared to much of Indonesian industry at an early stage of

Table 10: Characteristics of Selected Indonesian Industries, 1975 and 1984

Industry	Value added per employee 1975 Rp '000	1975 as % of all industry	1984 Rp' 000	1984 as % of all industry	Growth Value added per employee 1975-84	Growth as % of all industry	Rates Value added 1975-84	Rates as % of all industry	Wages per employee 1975 Rp '000	1975 as % of all industry	1984 Rp '000	1984 as % of all industry
Weaving (32112)	292.9	46	2,403.7	64	26.3	121	15.9	56	127.3	75	598.5	67
Garments (32210)	245.0	39	1,960.5	52	26.0	119	64.0	227	111.3	65	704.8	79
Leather tanning and finishing (32310)	506.1	80	5,387.1	144	30.1	138	70.4	250	146.0	86	809.9	90
Footwear (324)	2,050.3	325	3,558.2	95	6.3	29	8.1	29	364.4	213	1,284.0	143
Plywood (33113)	503.2	80	1,769.5	47	15.0	69	63.6	225	80.2	47	676.5	75
Furniture (33210)	344.6	55	1,301.3	35	15.9	73	17.3	61	217.6	127	676.7	75
Fertiliser (35120)	7,847.3	1,246	19,532.6	523	10.7	49	11.8	81	766.3	449	3,376.2	377
Plastic products (356)	364.7	58	2,161.5	58	21.9	100	32.6	116	154.7	91	646.1	72
Iron and steel (371)	380.5	60	35,311.8	945	65.4	300	97.1	344	123.5	72	1,931.0	215
Electrical apparatus and supplier (38330)	3,079.3	489	4,652.5	125	4.7	22	36.5	130	293.5	172	1,591.4	178
Motor cycles (assembly and manufacture) (38440)			10,605.6	284							1,838.4	205
Motor vehicles (bodies and parts) (38460)	443.9	70	2,844.5	76	22.9	105	41.3	146	254.3	149	1,053.0	118
Toys and sporting goods (39030-40)	249.9	40	601.2	16	10.2	47	12.0	43	116.6	68	320.2	36
All industries	630.0		3,736.2		21.8		28.2		170.7		896.1	

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Table 10: (continued)

	Other Characteristics						
	Production workers as a % of all paid employees		Ownership: % of value added, 1983			4-firm concentration ratio, 1983	effective protection, 1980
	1975	1984	Government	Domestic private	Foreign		
Wearing (32112)	89	88	9	70	21	35	509
Garments (32210)	90	90	0	99	1	46	- 19
Leather tanning and finishing (32310)	83	84	15	85	0	64	70
Footwear (324)	87	83	3	59	38	71	21
Plywood (33113)	89	86	0	89	11	22	22
Furniture (33210)	84	86	0	96	4	25	n.a.
Fertilizer (35120)	64	61	100	0	0	68	1
Plastic products (356)	84	87	0	85	15	26	385
Iron and steel (371)	82	69	59	13	28	78	57
Electrical apparatus and supplier (38330)	75	78	9	41	50	54	64
Motor cycles (assembly and manufacture) (38440)		78	0	94	6	72	117
Motor vehicles (bodies and parts) (38460)	86	81	0	74	26	64	2,948
Toys and sporting goods (39030-40)	95	94	0	100	0	80	185
All industries	84	82	18	68	14		133

development; by 1983 the industry assumed its expected (below-average) ranking. It is notable that several of the industries of potential export interest - garments, furniture and toys - are very labour-intensive, as indicated by their very low ratios. The low skill characteristics of these industries are generally confirmed, as evident in below average wages and higher percentage of (semi or unskilled) production workers in their workforce.

Other industrial characteristics are of relevance to the analysis. Those available and included in the presentation include ownership shares (as a percentage of each industry's value added), four-firm concentration ratios (that is, the share of the four largest firms in each industry's value added), and effective protection estimates prepared in an unpublished study by Parker (1985).[14/] What are the main characteristics of these labour-intensive industries in Table 10? The first is predominant private ownership; in all but two cases 10 per cent or more of industry value added is produced by privately-owned firms. State firms are generally unimportant. Foreign firms are significant in two cases. The first is footwear, already referred to, which is unusually high for special historical reasons. The second is electronics, where higher foreign ownership is largely explained by knowledge of, and access to, international marketing channels.[15/]

14/ Note that these effective protection estimates incorporate the effects of non-tariff barriers, which are pervasive in Indonesian industry.

15/ Note that the foreign ownership shares are probably understated in table 10 because joint venture firms have been allocated equally between partnership groups. To the extent that foreign partners effectively retain actual control is somewhat greater.

A second important characteristic is that seller concentration is fairly low. The average for all manufacturing is approximately 70 per cent, which is high even by developing country standards. But in virtually all labour-intensive industries it is less than 50 per cent, and in some it is between 20 and 30 per cent. These lower ratios accord with industry characteristics, especially the lower barriers to entry, which arise out of lower absolute capital requirements and the absence of product differentiation factors (with a few exceptions, such as electronics).

The export record of these industries is highly variable and reflects Indonesia's indifferent export performance until recent years. Growth rates for Indonesia's manufactured exports need to be treated with even more caution owing to the very small initial year figures; anything less than about 30 per cent per annum might be considered slow. For what they are worth, extremely high rates have been recorded for some products, notably textiles, clothing, plastics and footwear (Table A.5). But Indonesia is hardly a significant exporter by developing country standards. In 1972 its exports were so small as to hardly warrant attention. By the 1980s it accounted for about one per cent of developing country textile and clothing exports, and a little over two per cent for electronics. In other industries its share was negligible.

The changing trade balance ratios perhaps give a clearer picture of Indonesia's export performance. In virtually all industries there has been a substantial change in the 1980s. The most dramatic of all has been clothing, which has been transformed from an almost exclusive net importer in 1972 to a

very substantial net exporter (Table 12). There has also been a very sharp change in textiles, although the country is still a net importer. Electronics, an industry which barely existed in Indonesia before the mid 1970s has also been transformed, although given the import-intensive nature of the industry in ASEAN, a negative ratio is to be expected. The negative ratios for the other industries indicate there is still a good deal of scope for simple export promotion activities in a range of industries.

Despite these promising developments, Indonesia's export performance is still a very patchy one. It is useful to underline this conclusion with reference to development in several of these industries. Differences between the textiles and clothing industries illustrate this point. Wearing is an old established industry which, until the change of government in 1966, consisted overwhelmingly of hand and simple power looms (Hill, 1983). Thereafter, a virtual thechnological revolution in the industry occurred: output quadrupled in the decade 1968-1978, and modern technology was introduced rapidly. However, the industry was a good deal less successful in managing the transition from import replacement to export growth, until very recently. As the industry reached the limits of import replacement, there was no automatic "export spill-over" effect; growth decelerated sharply, and was below average for the period 1975-1984. One explanation for the poor performance is, simply, that the industry became accustomed to producing for the domestic market, and that was in effect a seller's market until the late 1970s. Another, related explanation is the extraordinarily high effective protection the industry received (see Table 10).

Table 12: Trade balance ratios in ASEAN manufactured Exports: Selected items

	1962	1972	1982	Latest year
		Textiles (SITC 65)		
Indonesia	a	- .97	- .65	- .11
Malaysia	- .80	- .68	- .35	n.a.
Philippines	- .76	- .49	- .46	- .62
Singapore	- .25	- .54	- .44	- .44
Thailand	- .97	- .33	.26	.18
ASEAN	- .59	- .61	- .30	n.a.
		Iron and Steel (SITC 67)		
Indonesia	a	a	- .99	- .99
Malaysia	- .93	- .87	- .97	n.a.
Philippines	a	- .97	- .91	- .87
Singapore	- .35	- .74	- .57	- .58
Thailand	- .99	- .92	- .91	- .88
ASEAN	- .80	- .86	- .83	n.a.
		Petroleum Products (SITC 332)		
Indonesia	a	.39	- .58	- .55
Malaysia	- .11	- .24	- .78	n.a.
Philippines	- .75	- .21	- .89	- .53
Singapore	.07	.52	.49	.64
Thailand	- .1	.46	- .1	- .1
ASEAN	.12	.36	n	n.a.
		Fertilizers, manufactured (SITC 561)		
Indonesia	a	a	- .88	- .50
Malaysia	- .99	- .82	- .94	n.a.
Philippines	a	a	- .1	- .1
Singapore	.15	- .14	.04	- .15
Thailand	- .1	- .1	- .1	- .1
ASEAN	- .75	- .77	- .68	n.a.
		Plastics (SITC 581)		
Indonesia	a	a	- .1	- .1
Malaysia	- .93	- .87	- .88	n.a.
Philippines	a	- .99	- .86	- .89
Singapore	- .45	- .53	- .48	- .27
Thailand	- .1	- .96	- .89	- .78
ASEAN	- .87	- .85	- .79	n.a.

Table 12: continued

	1962	1972	1982	Latest year
		Leather (SITC 611)		
Indonesia	a	.93	.95	.96
Malaysia	- .95	- .80	- .90	n.a.
Philippines	a	- .91	- .94	- .1
Singapore	- .21	- .72	- .79	- .69
Thailand	.05	.88	.80	.79
ASEAN	- .48	- .05	- .18	n.a.
		Leather Manufactures (SITC 612)		
Indonesia	a	.67	- .65	- .78
Malaysia	.12	- .32	.13	n.a.
Philippines	- .99	- .97	- .77	- .84
Singapore	- .44	- .50	- .65	- .42
Thailand	- .98	- .68	.49	.66
ASEAN	- .45	- .27	- .32	n.a.
		Veneers and Plywood (SITC 631)		
Indonesia	a	a	.1	.1
Malaysia	- .16	.95	.87	n.a.
Philippines	.99	.1	.1	.1
Singapore	.15	.52	.32	.41
Thailand	.32	.65	.75	.89
ASEAN	.77	.78	.74	n.a.
		Electrical Machinery (SITC 729)		
Indonesia	a	a	- .41	- .54
Malaysia	- .78	- .86	- .04	n.a.
Philippines	a	- .90	- .25	- .09
Singapore	- .04	- .34	- .12	- .08
Thailand	- .98	- .97	- .89	- .69
ASEAN	- .55	- .50	- .13	n.a.
		Furniture (SITC 821)		
Indonesia	a	a	- .71	- .36
Malaysia	- .28	- .38	- .15	n.a.
Philippines	.49	.58	.97	.97
Singapore	- .09	.04	.17	- .05
Thailand	- .91	- .69	.81	.76
ASEAN	- .19	- .27	.40	

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Table 12: continued

	1962	1972	1982	Latest year
		Clothing (SITC 841)		
Indonesia	a	- .99	.93	.89
Malaysia	- .87	.06	.61	n.a.
Philippines	- .21	.86	.97	.96
Singapore	- .38	.50	.27	.27
Thailand	- .72	.56	.97	.96
ASEAN	- .55	.43	.63	n.a.
		Footwear (SITC 851)		
Indonesia	a	.01	- .10	- .25
Malaysia	- .10	.68	.37	n.a.
Philippines	- .45	.94	.98	.96
Singapore	- .24	.34	- .51	- .64
Thailand	- .93	- .75	.93	.96
ASEAN	- .25	.44	.27	n.a.
		Toys, Sporting Goods (SITC 894)		
Indonesia	a	a	- .91	- .91
Malaysia	- .91	- .86	- .39	n.a.
Philippines	- .1	- .28	.65	.52
Singapore	- .51	- .39	- .11	- .03
Thailand	- .80	- .83	- .49	- .30
ASEAN	- .67	- .53	- .13	n.a.
		Vehicle Parts (SITC 73289)		
Indonesia	a	a	- .1	n.a.
Malaysia	- .76	- .96	- .99	n.a.
Philippines	a	- .1	- .97	- .99
Singapore	- .22	- .49	- .56	- .38
Thailand	a	- .1	- .1	- .99
ASEAN	- .55	- .85	- .88	n.a.
		Motorcycle Parts (SITC 73292)		
Indonesia	a	a	- .98	- .99.
Malaysia	- .65	- .97	- .97	n.a.
Philippines	a	a	- .1	n.a.
Singapore	- .13	- .58	- .87	- .64
Thailand	a	- .99	- .53	- .47
ASEAN	- .43	- .92	- .95	n.a.

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The push for textiles exports[16/] began with the November 1978 devaluation, which was designed to restore the competitiveness of the non-oil tradeables goods sector in the wake of the 1970s commodity boom. But the effects were fairly quickly overtaken by the second-round oil price increases, so there was little progress until the early 1980s, when it became evident that there was likely to be a secular decline in commodity prices, particularly oil. A major new policy was the introduction of the Sertifikat Ekspor (SE, or Export Certificate) scheme, which provided a generous system of payments - albeit in the context of an administratively complex program - for exporters in certain industries. In April 1983 there was another large devaluation of over 40 per cent (followed by yet another in September 1986). An additional reform was the April 1985 package, in which the government sought to simplify customs procedures - generally acknowledged to be a major difficulty for firms engaging in trade - under which verification procedures were handed over to a large Swiss firm. The result was greatly improved, and less corrupt, customs procedures.

Additional measures in the case of textiles took the form of informal pressure by the government on several large Japanese textiles companies to increase exports. This pressure resulted in some increase in exports, but it is widely acknowledged that these sales were not conducted on a fully commercial basis. Despite these measures, and the modest rise in exports, the

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16/ Some yarn exports are included in the textile figures in Table 12, but they are very small.

record in textiles is still a disappointing one. Very high protection rates, compounded by upstream and expensive import replacement in the synthetic fibres industry (with compulsory downstream domestic sourcing) appear to be major constraints on the development of an export-oriented textiles industry.

The record for garments is a good deal more encouraging. The industry was a very small one in the mid 1970s, but it has subsequently grown extremely rapidly, at over double industry's average growth rate, and it is now by far the most important labour-intensive export. Like textiles it has benefited from the government's promotional measures (the devaluation, the SE scheme). The explanation for its much better performance is that it is a far more labour-intensive industry, which therefore accords with Indonesia's comparative advantage, and that the industry was not nurtured by extremely high protection in the 1970s. Indeed, the evidence (Table 10) suggests it has received negative effective protection conferred on textiles. In other words, the industry has grown rapidly as much in spite of as because of government intervention.

As an indication of the industry's growth, Indonesia is now afflicted by quotas for its garment exports. While undoubtedly inhibiting the growth at some sections of the industry, and having adverse psychological repercussions, it would be a mistake to overstate the importance of these quotas. For one thing, in a perverse sense, the quotas actually confer some protection on the Indonesian industry, since they restrain exports from the still very competitive Northeast Asian countries. Moreover, many of Indonesia's export quotas remain unfilled, in part because the government has been slow to

allocate these quotas domestically.[17/] Another problem facing the industry is that the government, on joining the GATT in 1985, has been required to abolish the SE scheme, as it was considered an export subsidy. The new measures, including import rebates, are far less generous to exporters. Nevertheless, the industry is very important in Indonesia's export drive. As commerical and market-skills develop, Indonesia is likely to become a major garment exporter. Interestingly, foreign ownership in the industry is minimal, although foreign buyers play an important role.

Electronics exports have also been encouraged by Indonesia's low wages which, after the September 1986 devaluation, are approximately $1 - 1.50 per day for production workers. These exports grow rapidly, and by 1985 exceeded $ 120 million. However, several aspects of the operating environment have inhibited development, and the industry's future is not encouraging. With the partial exception of Singapore, the industry is essentially a labour-intensive assembling and packaging activity. Its principal features are, first, high levels of foreign ownership, resulting from vertical integrated international operations of large multinational corporations; and secondly, the requirement that import and export flows proceed smoothly. The industry has therefore flourished in cases where governments have established efficient export

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17/ In discussions with leading garment exporters in September 1986 it was revealed that it is not uncommon for quotas to be allocated three months or more into the quota year. It is also not uncommon for quotas already issued to be revoked.

processing zones and permitted full foreign ownership. These industry requirements explain the industry's heavy concentration in East Asia, and particularly Malaysia and Singapore.[18/]

These requirements also explain Indonesia's much smaller exports. Full foreign ownership has not been permitted since the 1974 political protests resulted in a change in government policy towards foreign ownership. The country has two EPZs - the small Jakarta zone (on which see Warr, 1983), and the proposed Batam Island zone. The latter was originally to be developed as a free port in competition to Singapore, but the supporting physical infrastructure has never been developed. Despite the reforms introduced in the last four years, the electronic industry has thus largely by-passed Indonesia.

In fact, the recent measures, far from encouraging the industry's development, have not been sufficient to prevent the closure of the country's two largest electronic exporters, Fairchild and National Semi-conductor, which, in response to a world over-supply in production capacity, both ceased production in 1986.[19/] Consequently, Indonesia's exports of these products

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18/ In 1983, for example, developing Asian countries accounted for 85 per cent of United States semi-conductor imports under Tariff Items 806.30 and 807.00. Malaysia was the single largest exporter, accounting for 31 per cent of the total, followed by the Philippines with 18 per cent. Indonesia accounted for just two per cent (Grunwald and Flamm, 1985, p.76).

19/ The following is based on discussions with executives from the companies in September 1986.

will decline very sharply in 1986. The reasons for the closures are instructive. Competitive pressures in the industry began to intensify in 1984, both because new suppliers entered the industry and because technological development resulted in some portions of the industry relocating from low-wage, off-shore locations to the home country. It was therefore inevitable that some production plants would be closed, in less competitive countries. In the case of the Indonesian plants direct (in-factory) production costs were in fact about 20 per cent lower than similar plants in ASEAN. However, the Indonesian operations were penalized by much higher operating costs outside the factory, including a wide range of government levies, and by slower export-import procedures, even after the introduction of the customs reform. The experience of Indonesia's electronics industry is therefore particularly instructive: the international market for labour-intensive manufactures is likely to become increasingly competitive, especially given the entry of Asia's two giants, China and India, and government measures which penalize exporting firms will have to be removed.

Indonesia's other labour-intensive manufactures - footwear, furniture, toys and plastics - are of little significance. In each case exports are very small and Indonesia remains a net importer of each (Table 12). This is a somewhat puzzling situation, since in most cases the requisite inputs are locally available, in reasonable quality and price. In the case of furniture, for example, Indonesia supplies about 70 per cent of the world's rattan, but most of it has been shipped out in unprocessed or early processed form, with the result that most of the other ASEAN countries are much larger furniture exporters (see Table A.6). In early 1986 the government imposed a ban on rattan exports, which may encourage increased domestic processing. If the ban

is introduced in as similarly a clumsy fashion as that on log exports, however, the expected benefits may not materialize (see below). In footwear exports, also, the export effort has hardly begun. A recent unpublished survey conducted for the department of Labour suggests an important constraint on the industry's growth is the availability of good quality material for fashion and athletics footwear. According to the report, recent reform measures, intended to liberalize imported inputs for export-oriented activities, are not working smoothly. In addition, because of under-utilization in the industry, the Capital Investment Coordinating Board has placed a ban on new investments in Java, thus excluding potential new export-oriented investments from the industry.

4.1.2 Resource-Intensive Industries

The record in the case of resource-intensive manufactures is somewhat better. Indonesia has good supplies of tropical timber, much of it barely exploited[20/]. Following the phased-in introduction of the ban on the export of logs, in the early 1980s, plywood exports began to grow very quickly, and now approach $1 billion. ASEAN countries now constitute about two-thirds of

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20/ The population/forests ratio in Table 3 somewhat undertake Indonesia's effective timber endowment, given the country's extremely uneven distribution of population (two-thirds of the population reside on Jawa, with only seven per cent of the land area). Virtually all the timber is in the Outer Islands, for which the ratio is approximately three times that of Indonesia as a whole, and one of the highest in the region.

developing countries' plywood exports; Indonesia alone exports one-half. In production aspects plywood represents a labour-intensive industry, in accord with the country's comparative advantage. With respect to ownership, concentration, and skill requirements, the industry also resembles other labour-intensive activities.

The welfare implications of the industry's rapid growth are somewhat more complex, however. The growth represents, in effect, export substitution, and there has been a commensurate decline in log exports. The export ban was introduced very hastily, and led to indiscriminate deforestation, poor forest management, and high wastage rates. While the goal of increased value added was sensible, alternative policy measures, including the development of forest management skill and processing facilities, might usefully have accompanied the introduction of the ban.

Another resource-based, comparatively labour-intensive industry (though less so than plywood) is leather and leather products. Many of the industry's characteristics are well suited to Indonesia: labour intensity, low skill intensity (see Table 10), the considerable livestock population in the Outer Islands, and the pollution associated with early stage processing activities (well-suited to the sparsely populated regions in the Outer Islands). Developments in the industry illustrate the problems of developing export oriented industries in Indonesia. The country exports leather, and has the highest positive trade balance ratio in ASEAN. Conversely, Indonesia is a substantial net importer of leather manufactures, as is the case for many of the country's second stage processing industries. The high effective protection conferred on the leather industry is one explanation for the unsatisfactory record of leather manufactures. Another is that the

complementary inputs, in addition to natural resources (in this case, hides), such as production, design and marketing skills, are not well developed.

Another resource-based industry, though different in other respects, is fertilizers. The government has designated this a strategic industry since the early 1970s, in view of the heavy emphasis accorded the food crop sector. Fertilizer production has also been hastened by the development of natural gas fields, as a feed-stock for the industry. Most of the industry is under the control of state enterprises, the principal exception being the ASEAN Aceh Fertilizer plan, which is one of the ASEAN Industrial Joint Venture projects. The industry is dominated by the huge PUSRI plant in the province of South Sumatra.

Unlike plywood, fertilizer is a highly capital-intensive industry, as indicated by the fact that value added per employee was more than five times the industry coverage in 1983 (Table 10). Indonesia remains a net importer of fertilizer products, although with recent additions to capacity, it is likely that exports will expand. PUSRI was acknowledged to be an efficiently managed enterprise in the 1984 World Development Review, although little is publically reported about its operations. Given the industry's resource linkages, and the scale economies associated with the large internal market, the industry micgt be expected to accord with Indonesia's long-run comparative advantage.

4.1.3 Skill and Technology Intensive Industries

As would be expected, Indonesia's skill and technology-intensive industries are barely developed. However, encouraged by the rapidly rising oil revenue in the 1970s, and by a desire to promote "industrial deepening", the current Five Year Plan (1984/85 - 1988/89) envisages rapid growth of a

range of heavy industries. It is most unlikely that ambitious growth rate targets will be met: in the current economic recession, and with little prospect of developing export industries, the growth of these industries will depend essentially on the speed of import replacement.

One high priority industry is iron and steel. In the mid 1970s the industry consisted of a few firms producing simple steel products, as reflected in its below average value added per employee (Table 10). Following the commodity price boom, the government announced its decision to develop a primary steel manufacturing capacity. The decision took the form of a modernization and rehabilitation project for the state-owned steel mill, Krakatau Steel, located on the north cost of Java, west of Jakarta. This plant was to have been established with Russian assistance in the 1960s, but plans did not progress following the freeze in diplomatic relations after 1965 (Arndt, 1975). The revised plant became operational in the early 1980s. The transformation of the industry is indicated by the high government ownership, high concentration, very high capital intensity, and high skill content (Table 10). In the current expansion stage, additional manufacturing capacity is being added. This stage is rather controversial since it is being undertaken by interests closely associated with the current political leadership, who have also been given the sole import license for a range of steel products. As a consequence, steel prices in Indonesia are about 30 - 40 per cent above world prices, hence penalizing downstream (often labour-intensive) industries.

The automotive industry has also received considerable government promotion, and until recently it was growing at above average rates.[21/]

21/ As Table 10 illustrates, the motorcycle industry hardly exissted in 1975.

Three features of the regulatory environment are significant. The first is the extra ordinarily high effective protection given to it (Table 10), including a complete ban on the import of completely built up (CBU) vehicles and motorcycles. The second is the government's push for higher local content in the industry, and in particular increased sub-contracting as a means of developing small and medium supplier firms (Thee (ed) (1985). Thirdly, foreign ownership in the production (assembly) stage is no longer permitted, although every major producer has a licensing arrangement with a foreign supplier.

As a result of the regulatory regime, the industry is extraordinarily fragmented and inefficient. In the case of the passenger vehicle industry, for example, in 1983 there were 40 assemblers, associated with foreign firms from 12 countries, producing 50 makes and 140 models (Hill, 1984, p. 16). In several cases, the output of firms was less than 100 units per year. In other sections of the industry notably utility vehicles and motor vehicles - market fragmentation is less serious. Given the country's limited engineering capacity, the high prices for important inputs (especially steel), and the market fragmentation, it is not surprising that exports are negligible. In fact, Indonesia exports no vehicle parts and only a few motorcycle components, on an irregular basis. There is no prospect for developing an export-oriented industry in the near future. However, the large domestic market for utility vehicles and motorcycles may provide the basis for some export industries in the longer run, providing technical skills are developed and policy reforms are instituted.

4.2 Singapore

Singapore's industrialization may be recounted a good deal more quickly, as its industrial base is small and the record is less complicated by perverse government intervention. The story is essentially one of initial reliance on labour-intensive and resource processing industries, followed by the more recent emergence of higher value added industries. Throughout the last decade and a half, petroleum refining has been the single most important industry. The same basic indicators will be employed as in the previous section. The coverage of industrial statistics is somewhat less comprehensive, in that estimates of ownership, concentration, and effective protection are not readily available. The unavailability of the latter two are of no consequence: there is virtually no protection in most industries, and concentration measures are of little significance for an extremely small open economy. Although ownership estimates are not available, both foreign and state ownership are very extensive (see Chia (1982) on the former, and Pillai (1983) on the latter).

4.2.1 Labour-Intensive Industries

Textiles, clothing and footwear have been important industries in Singapore's export-oriented industrialization, although less so than in the other East Asian NICs. The characteristics of these industries in Singapore accord broadly with those elsewhere in the region: below average value added per worker (especially for clothing and footwear), and below average skill intensity and (physical) capital-labour ratios (Table 11). Unfortunately the Singapore census does not distinguish between wearing, and the more capital-intensive spinning industry, which explains the higher ratios for this industry.

Table 11: Characteristics of Selected Singapore Industries, 1975 and 1984

Industry	Value added per employee 1975 as % of all industry (S$ '0)	Value added per employee 1984 as % of all industry (S$ '0)	Growth Value added per employee 1975-84	Growth Value added per employee as % of all industry	Rates Value added 1975-84	Rates Value added as % of all industry	Wages per employee 1975 as % of all industry (S$'0)	Wages per employee 1984 as % of all industry (S$'0)
Spinning and weaving (32112)	746.1	1,880.7	10.8	113	-1.6		459.2	1,136.4
Garments (322)	513.0	1,417.8	12.0	125	16.5	118	299.2	921.3
Leather products (323)	533.3	1,430.0	11.6	121	12.8	91	359.3	910.7
Footwear (324)	612.2	1,564.2	11.0	114	5.7	41	376.1	888.4
Plywood and veneers (33113)	918.9	2,566.5	12.1	126	1.7	12	555.1	1,387.4
Furniture (332)	815.3	1,749.7	8.9	92	22.2	159	485.0	982.9
Petroleum refining and related products (353/4)	18,161.5	26,508.3	4.3	45	5.2	37	1,984.2	4,200.8
Plastic products (357)	856.3	2,663.0	13.4	140	20.5	146	424.6	1,150.2
Iron and steel (371)	3,554.7	7,553.0	8.7	91	10.4	74	877.9	2,405.1
Semi-conductors (3844)	1,531.4	3,764.0	10.5	109	7.6	55	536.6	1,565.3
Ships and tankers (38511-2)	2,091.9	3,060.7	4.3	45	-2.3		859.3	1,895.3
Motor vehicle parts and accessories (385-33)	1,165.2	3,250.4	12.1	126	19.4	138	461.7	1,480.0
Toys (3903)	792.5	2,168.4	11.8	123	16.2	116	329.5	962.6
All industries	1,781.0	4,047.6	9.6		14.0		616.4	1,474.2

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Table 11: (continued)

Industry	Machinery & equipment per worker 1/ 1975 (S$'0)	1975 as % of all industry	1984 (S$'0)	1984 as % of all industry	Production worker as % of all paid employees 1975	Production worker as % of all paid employees 1984	Direct exports as % of total sales, as % of all industries 1975	Direct exports as % of total sales, as % of all industries 1984
Spinning & weaving (32112)	1,256.6	122	1,415.0	52	86	80	61	50
Garments (322)	105.0	10	181.2	7	89	88	69	74
Leather products (323)	137.3	13	275.3	10	86	71	53	33
Footwear (324)	134.0	13	622.4	23	98	77	39	25
Plywood & veneers (33113)	989.4	96	1,278.9	47	85	79	76	58
Furniture (332)	253.6	25	434.4	16	81	80	26	31
Petroleum refining and related products (353/4)	22,636.4	220	72,732.2	2,651	45	38	66	65
Plastic products (357)	786.4	77	1,940.1	71	81	80	26	22
Iron and steel (371)	3,626.3	353	4,177.2	152	72	70	11	7
Semi-conductors (3844)	378.2	37	911.7	33	82	77	91	95
Ships and tankers (38511-2)	459.6	45	1,523.9	56 a/	80	72	67	43
Motor vehile parts and accessories (38533)					74	81	68	85
Toys (3903)	214.6	21	581.9	21	91	83	98	85
All Industries	1,027.5		2,743.9		79	76	58	61

1/ Available only at 3-digit ISIC level.

a/ Note: not clear from original either 56 of 156

Singapore's export performance in these industries is reasonably good but not outstanding. Singapore's export growth has been higher in other industries, and growth in these three industries appears to have slackened off in the late 1970s (Table A-5). Nor does Singapore stand apart from the other ASEAN countries: both the Philippines and Thailand export more footwear, and Thai textiles exports have been greater in some years (Table A.6). Finally, in both textiles and footwear, Singapore remains a substantial net importer (Table 12).

Several aspects of Singapore textiles, clothing and footwear exports deserve comment. The first is that the trade balance ratios need to be interpreted carefully. In particular, positive ratios may indicate very strong import barriers as much as they may suggest competitive export industries. Since Singapore is much an open economy, imports are also substantial, expecially so far certain products (for example, expensive international brand-name footwear) imported for the tourist industry. Secondly, for a variety of reasons the textile industry never developed a strong base in Singapore. There was no influx of textile enterpreneurs in the 1950s and 1960s, as occurred in Hong Kong, and the government saw no reason to develop the industry. Thirdly, although the garments industry is somewhat better developed, it is noticeable that the trade balance ratio for Singapore is the lowest in the region, and that it is declining over time. It is likely that Singapore will become a net importer, as high wages and other labour market changes (on which see Pang (1985)) increase Singpore's comparative disadvantage in the future.

No general pattern is evident in the case of the other labour-intensive industries. All of them - furniture, electronics, plastics and toys - generally conform to the pattern of below average capital and skill intensity. But in other respects they differ substantially. Although furniture production has increased quite quickly, it has not developed into an export-oriented industry. Exports as a percentage of sales are well below the all-manufacturing average, and the trade balance ratio shows no clear trend. The industry is unlikely to expand significantly in the future, given its labour-intensive nature, and given also the export bans on raw materials in neighbouring countries as they develop their own industries. Similarly, there is little prospect for the toy industry, which has historically been better developed in Northeast Asia. The trade balance ratio is also negative, probably again because of tourism.

One of the most interesting industries in Singapore is electronics. As elsewhere in the region, it was initially a labour-intensive industry in Singapore, being attracted by the country's investment incentives, liberal foreign investment policies, and efficient trade procedures. The labour-intensive stages of the industry are given essentially internationally mobile. However, unlike other countries in the region, as Singapore industrialized, the electronics industry developed a local manufacturing capacity.[22/] Why was Singapore able to retain much of the industry, in its

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22/ The following is based on interviews with executives in the Singapore electronics industry in early 1986.

more advanced form, when other countries were not? In the late 1970s, as real wages began to rise and investment incentives to expire - a similar situation to Malaysia almost a decade later - large electronic companies, mostly foreign-owned, were faced with the decision of whether to upgrade their manufacturing facilities or move off-shore. Many firms took the former course of action, prompted by the desire to establish a regional base for operations, and encouraged by the attractive business climate, and by greatly expanded investments in research and education.

The result has been extremely rapid, export-oriented growth. The industry has been one of the fastest growing in the country, and over 90 per cent of all semi-conductor production has been exported (Table 11). The impressive export performance is such that in recent years Singapore has accounted for almost 30 per cent of developing country electronic exports, marginally higher even than Malaysia's successful record (Table A.6). Singapore is still a net importer, but this is likely to change as the country moves in to component manufacture, a regional distribution base, and even new product development. The Singapore electronics industry is an excellent example of a host country providing a conducive environment for multinational corporations to upgrade from first phase export-oriented manufacturing.

4.2.2 Resource-Intensive Industries

Singapore's resource-based industries, leather, plywood, and petroleum refining, provide an interesting contrast. As in Indonesia, plywood is very much a labour-intensive industry, while value added per worker in petroleum

refining is far in excess of the industry average.[23/] Both are export-oriented industries, based on Singapore's processing and entrepot trading activities, with inputs coming mainly from Indonesia and Malaysia. In the case of petroleum exports, ASEAN exports and imports are similar, with all but Singapore having a negative trade balance ratio. Singapore was the first country in the region to establish an efficient refining industry, based on its superior marketing and engineering skills. These factors also provided the basis for Singapore's plywood industry, but because capital outlays and skilled technical inputs are less important, there has been greater processing at source in this industry.

Singapore's resource-based industries have been greatly affected by moves for greater local processing in the other ASEAN countries. In the case of petroleum, virtually all the crude for local market consumption in Indonesia was being refined domestically by 1984, following the rapid expansion of the state-owned oil company, Pertamina. The result was a significant decline in capacity utilization in Singapore's industry, to as low as 60 per cent in 1985, and supplementary crude processing from as far away as China. Singapore has benefited from the refining expansion capacity in the other ASEAN countries in the sense that its service-related activities (repairs, finance and so on) have expanded, but the industry's below average growth rate from 1975 to 1984 is indicative of future prospects. Similarly, in the case of plywood, export bans and improved local processing capacity

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23/ Data are not available for Indonesia's petroleum refining industry, but this would certainly be the case.

have been resulting in a relocation of the industry away from Singapore. In fact, real growth in the Singapore industry between 1975 and 1984 was negative. Finally, in the leather industry, also, there has been little growth, and the trade balance ratios remain negative in both sub-sectors.

4.2.3 ill and Technology-Intensive Industries

The prospects for Singapore's higher value added industries are mixed. The country never had an extensive iron and steel industry, most activities consisting of forging and shaping of imported steel. The local industrial base was too small to stimulate the industry initially, and more recently substantial excess capacity has emerged in the region; the resulting competitive pricing has rendered new investments unattractive. A final factor is that import barriers in the region's steel markets are generally very high. As Table 11 illustrates, the industry is mainly domestic-market oriented. Although Singapore's steel exports are the largest in ASEAN, they are small in absolute terms, and the trade balance ratio is negative.

Singapore's transport equipment industry is also unlikely to grow rapidly. The ship-building industry has historically been important, as an adjunct to the country's entrepot trade. It encompasses a wide range of activities, generally as the low value added and of the market, but including some quite large motorized vessels. The industry is well-suited to Singapore as a skilled labour-intensive activity (it has below average value added per worker, but above average wages - see Table 11). However, since the mid 1970s the industry has contracted, partly as other countries have promoted their own ship-building industry, and partly because Singapore's role as an entrepot trade centre has declined. Conversely, Singapore's service-related activities

in the shipping industry have been expanding. As in other industries, services growth has partly counteracted manufacturing decline.

Unlike shipping, vehicle parts and accessories have been growing strongly. Singapore has virtually no vehicle assembling industry. The latter developed before and during the Malaysian Federation, and continued after Singapore's independence. The government's decision to phase out the industry was probably a wise one, in view of the small local market and the fact that regional markets (for CBU vehicles and, increasingly, for CKD kits) have been closed off. Nevertheless, parts and accessories continue to be quite significant. These activities are broadly within Singapore's comparative advantage, since the capital intensity is about average, and there is considerable scope for up-grading. Although Singapore is still a net importer of these products, it is gradually becoming more export-oriented. In 1984 85 per cent of the industry's output was exported (Table 11), and Singapore has by far the lowest negative trade balance ratio. The industry has considerable regional export potential, p-oviding high market barriers are not erected.

4.3 The Other ASEAN Countries

The other three ASEAN countries generally assume intermediate positions between Indonesia and Singapore in their industrial development. Earlier sections identified general trends in each country's industrial sector. It will be useful here to make some additional comments, especially concerning the products of export interest to each, and based on Tables 12, A.5, and A.6.

Malaysia's export performance across a wide range of manufactures has been especially good, until recently (see Fong 1986), and export growth rates in almost every case have been high. Electronics has been the leading

labour-intensive export. The industry expanded dramatically following the government's decision to establish Free Trade Zones in the early 1970s (see Spinanger (1984) and Warr (1985)). By the early 1980s it had emerged as one of the region's - and world's - largest suppliers of assembled electronics products, in 1982 accounting for 28 per cent of developing country exports. It is interesting that such a labour-intensive industry developed in a fairly high wage developing country with a strong resource base, rather than in some of the region's labour surplus countries. The explanation appears to be a combination of factors: an attractive investment package (including general tax incentives, 100 per cent foreign ownership), good supporting infrastructure, efficient customs procedures, and sensible location of zones. Electronics is a good example of a country exploiting its comparative advantage in an industry by introducing facilitating supplementary measures.

Other Malaysian industries have also grown strongly, including textiles, clothing, and footwear. In plywood, especially, Malaysia is one of the world's largest suppliers among developing countries. In each of these industries there are positive trade balance ratios, although there is still considerable scope for export expansion. Since the late 1970s the government has also begun to promote a wide range of heavy industries although these developments are not yet reflected in the trade statistics.

Philippine export performance in a relatively small range of products has been fairly good, until the recent economic decline. Although initial export growth was high, the transition to a more sustained export drive has not been achieved, nor has the government developed effective EPZs, despite grandiose schemes, and those that are in operation require large public subsidies (Warr 1985). This fact may explain why electronics exports have not developed as elsewhere. Plywood and other resource-based industries have

developed, but their growth potential has been constrained by the country's poorer resource endowment. The country's best record has been in other footloose labour-intensive industries, which combine extensive labour inputs with established design and marketing skills. A good example is furniture, of which the Philippines is the region's largest exporter, accounting for over eight per cent of developing country exports. The country is also the largest ASEAN exporter of footwear. Similarly, clothing exports have grown rapidly, although they are inhibited somewhat by the long-established though inefficient textile industry. The continuing World Bank structural adjustment program may encourage the development of a more efficient textile industry.

Thailand, as noted, is something of a late-comer to manufactured exports and, like Indonesia, has not developed an extensive system of EPZs. Lacking the strong resource endowment of Indonesia and Malyasia, its export drive has focused heavily on labour-intensive industries. The "late-comer effect" has also resulted in fewer vested interests to retain inefficient and highly protected industries. One consequence is that it has one of the most efficient textile industries in the region: it is the largest textile exporter in some years, and it is the only country with a positive trade balance ratio. It is also a significant exporter of several other labour-intensive manufactures, including garments. There is no indication that Thailand is on the verge of moving up to higher value added industries to any extent.

5. Summary and Conclusions

The five ASEAN countries have been among the fastest growing developing countries during the last two decades. Although all countries except Thailand have experienced a serious economic recession since 1984, and the Philippine

economic problems are deep-seated, the region's economy is likely to rebound in the near future. An important ingredient of the region's good economic performance has undoubtedly been the adoption of more outward-looking strategies, or at least the removal of some of the policy biases against exports.

An important feature of the region's export-oriented industrialization has been that export specialization has broadly reflected the countries' resource endowments. The four large countries have comparatively good natural resource endowments - with the partial exception of the Philippines - and Singapore has historically been an important processing and trading centre. As would be expected, resource-based industrialization provided the initial impetus to export growth. But in all five countries - rapidly in Singapore, much more slowly in Indonesia - this gave way to labour-intensive industrialization in a wide range of "footloose" activities. In Singapore the transition to higher value added industries has already commenced.

Four main sets of factors explain the region's rapid industrialization, and the transition to more outward-looking structures. First, the macroeconomic environment has generally been stable and predictable, the political systems have been conducive to investment and growth, and public investments in social and physical infrastructure have been very substantial.[24/] These ingredients for successful development may

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24/ Clearly all three assertions have to be severely qualified in the case of the Philippines, however.

seem so obvious as not to require restatement. But their absence in many developing regions contracts sharply with the ASEAN bloc.

The second is that industrial policy has broadly supported the development of a reasonably competitive manufacturing base. It is easy enough to point to instances of perverse intervention retarding industrial development. But excesses - in the form of extremely high protection, ineffective and costly regulations, and inefficient state enterprises - have generally been matched by policies which are conducive to growth and efficiency. And in many instances government intervention has been designed to overcome market failure, and to make markets work more effectively. Singapore is perhaps the best example of the latter.

Thirdly, while there may have been instances of governments "overdoing" export promotion policies, in most cases these measures have been fairly effective. Export processing zones are clearly very much a "second-best" means of export promotion. But at leasts these institutions and other schemes designed to put exporters on an effective free trade footing, have hastened the transition to a more outward-looking strategy, and exposed firms to the rigours of international competition. Similarly, measures to encourage greater domestic processing of natural resources have often been introduced in a clumsy and costly fashion, but they have at least encouraged manufactures to focus more on international markets.

Finally, the international trading environment, while a lot less accomodating and a lot more competitive than a decade ago, has not been a serious obstacle to expanded exports. In the three major export destinations - the EEC, Japan and the United States - import barriers remain fairly low.

There are obviously some sentive and important "exemptions", most notably in the important textiles, clothing and footwear industries. But even here, there are many cases of export quotas not-being filled. A crucial feature of ASEAN international commerical diplomacy must clearly be efforts to ensure that major OECD markets remain fairly open.

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Table A.1: Factor Intensity Measures: (1) Value Added per Employee

Industry (Code)	Indonesia, 1981 Value (Rp '000)	Rank	Malaysia, 1981 1/ Value (M$ '0)	Rank	Philippines, 1981 1/ Value (P'0)	Rank	Singapore, 1981 1/ Value (S$ '000)	Rank	Thailand, 1981 1/ Value (B '00)	Rank	Code	United States, 1981 1/ Value ($)	Rank
Food (311-312)	2,192	14	2,207	8	3,095	14	3,529	13	1,308	10	20 (less 208)	5,024	8
Beverages (313)	5,292	6	5,026	2	7,117	7	5,103	8	1,671	7	208	7,480	4
Tobacco (314)	3,003	12	2,331	6	13,069	4	6,983	5	n.a.		21	10,523	2
Textiles (321)	1,226	21	1,023	21	2,057	21	1,706	24	773	15	22	2,479	25
Garments (322)	771	24	605	27	982	27	1,106	28	373	21	23	2,049	28
Leather and products (323)	1,659	17	827	25	1,291	25	1,143	27	n.a.		31 (less 314)	2,381	26
Footwear (324)	1,315	19	847	24	979	28	1,332	26	n.a.		314	2,240	27
Wood and products (331)	3,052	11	1,125	20	2,399	18	2,117	20	809	14	24	2,667	24
Furniture (332)	728	25	724	26	1,229	26	1,560	25	439	20	25	2,755	23
Paper and products (341)	1,504	18	1,399	16	6,682	8	2,305	19	1,563	8	26	5,091	7
Printing and publishing (342)	1,703	16	1,680	12	2,190	19	2,738	16	849	13	27	3,886	18
Basic chemicals (351)	11,419	2	3,205	3	18,719	3	5,798	6	2,129	5	218-2	7,465	5
Other chemicals (352)	3,686	8	2,399	5	9,112	5	7,940	2	1,271	11	28(less281-2)	9,591	3
Petroleum and related products (353-354)	n.a.	1	59,974	1	144,941	1	48,625	1	n.a.	1	29	17,569	1
Rubber and products (355)	2,371	13	1,901	10	3,827	12	2,519	17	2,478	4	30	3,762	19
Plastics (356)	897	23	973	22	2,993	16	2,024	23	n.a.				
Ceramics and pottery (361)	916	22	1,320	17	2,997	15	3,247	14	265	23	326	2,967	22
Glass and products (362)	4,568	7	2,659	4	3,839	11			n.a.		321-3	4,300	14
Cement and products (363)	6,643	5			8,544	6	7,107	4	3,140	2	327	3,916	17
Structural clay products (364)	497	28	1,987	9	2,402	17	4,540	11	1,324	9	325	3,210	21
Other non-metallic minerals (369)	519	27					4,928	9	626	17	328-9	4,584	13
Iron and steel (371)	8,382	3	1,780	11	23,987	2	7,208	3	2,504	3	331-2	4,604	12
Non-ferrous metals (372)	n.a.		1,545	13	6,192	9	5,637	7	n.a.		333-9	4,760	9
Fabricated metal produts (381)	1,946	15	1,167	18	1,977	22	2,761	15	940	12	34	3,927	16
Machinery(non-electrical)(382)	3,386	9	1,491	15	2,146	20	4,761	10	512	18	35	4,681	11
Electrical machinery (383)	3,248	10	1,524	14	3,769	13	2,356	18	495	19	36	4,069	15
Transport equipment (384)	7,728	4	2,244	7	6,022	10	4,146	12	1,935	6	37	4,741	10
Professional and scientific equipment (385)	708	26	1,133	19	1,839	23	2,037	22	342	22	38	5,150	6
Other manufactures (390)	1,229	20	872	23	1,717	24	1,079	21	637	16	39	3,378	20
All Industries (3)	2,691		1,587		3,724		3,451		1,178			4,133	

Table A.2: Factor Intensity Measures: (2) Employment costs per employee

Industry (Code)	Indonesia, 1981 Value (Rp '000)	Rank	Malaysia, 1981 1/ Value (M$ '0)	Rank	Philippines, 1980 1/ Value (P'0)	Rank	Singapore, 1981 1/ Value (S$ '000)	Rank	Thailand, 1979 1/ Value (B '00)	Rank	United States, 1981 1/ Value ($)	Rank
Food (311-312)	562	17	470	17	701	23	1,027	16	191	14	1,581	19
Beverages (313)	1 164	3	732	5	1,674	5	1,457	8	157	17	1,984	10
Tobacco (314)	249	27	373	22	1,148	13	1,603	4	n.a.		1,995	8
Textiles (321)	419	21	454	18	825	19	870	21	172	16	1,219	25
Garments (322)	416	23	287	27	523	27	643	28	150	18+1	944	28
Leather and products (323)	429	20	309	26	739	22	670	27	n.a.		1,112	26
Footwear (324)	735	12	362	23	480	28	709	26	n.a.		986	27
Wood and products (331)	583	16	501	15	959	17	934	19	197	13	1,384	22
Furniture (332)	432	19	507	13	622	26	835	23	153	18	1,301	24
Paper and products (341)	798	10	429	21	1,370	9	984	17	302	6	1,989	9
Printing and publishing (342)	686	13	580	9	1,062	14	1,125	14	228	10	1,623	17
Basic chemicals (351)	1,293	2	800	2	1,964	3	1,621	3	189	15	2,322	4
Other chemicals (352)	988	5	649	8	2,242	2	1,456	9	374	5	2,164	5
Petroleum and related products (353-354)	n.a.	1	1,756	1	3,611	1	3,268	1	n.a.	1	2,678	1
Rubber and products (355)	630	15	502	14	1,177	12	978	18	278	8	1,598	18
Plastics (356)	417	22	357	24	1,019	16	787	25	n.a.			
Ceramics and pottery (361)	482	18	431	20	671	25	1,105	13	108	22	1,506	21
Glass and products (362)	976	6	667	7	1,475	8			n.a.		1,913	11
Cement and products (363)	960	8			1,855	4	1,391	10	687	2	1,740	16
Structural clay products (364)	227	28	522	11	845	18	1,294	12	228	10	1,516	20
Other non-metallic minerals (369)	354	26					1,499	7	135	21	1,746	15
Iron and steel (371)	969	7	685	6	1,199	10	1,573	5	500	3	2,540	2
Non-ferrous metals (372)	n.a.		762	3	1,505	7	1,649	2	n.a.		2,098	6
Fabricated metal produts (381)	638	14	452	19	788	21	1,037	15	239	9	1,820	14
Machinery(non-electrical)(382)	804	9	510	12	1,034	15	1,351	11	141	20	2,044	7
Electrical machinery (383)	756	11	481	16	1,186	11	856	22	202	12	1,837	13
Transport equipment (384)	1,069	4	737	4	1,563	6	1,520	6	291	7	2,420	3
Professional and scientific equipment (385)	396	24	572	10	796	20	872	20	84	23	1,891	12
Other manufactures (390)	396	24	354	25	673	24	790	24	428	4	1,363	23
All industry (3)	563		494		914		1,043		235		1,871	

1658M

Table A.3: Factor Intensity Measures: (3) Non-wage value added per employee

Industry (Code)	Indonesia, 1981 Value (Rp '000)	Rank	Malaysia, 1981 1/ Value (M$ '0)	Rank	Philippines, 1980 1/ Value (P'0)	Rank	Singapore, 1981 1/ Value (S$ '000)	Rank	Thailand, 1979 1/ Value (B '00)	Rank	United States, 1981 1/ Value ($)	Rank
Food (311-312)	1,630	14	1,737	7	2,394	13	2,502	13	1,117	9	3,443	6
Beverages (313)	4,128	6	4,294	2	5,443	7	3,646	8	1,514	7	5,496	4
Tobacco (314)	2,754	8	1,958	5	11,921	4	5,380	5	n.a.		8,528	2
Textiles (321)	807	19	569	21	1,232	18+1	836	24	601	15	1,260	26
Garments (322)	355	24	318	26	459	28	463	28	223	21	1,105	28
Leather and products (323)	1,230	16	518	23	552	26	473	27	n.a.		1,269	25
Footwear (324)	580	21	485	25	499	27	623	26	n.a.		1,254	27
Wood and products (331)	2,449	12	624	19	1,440	18	1,183	22	612	14	1,283	24
Furniture (332)	296	26	217	27	607	25	725	25	286	19	1,454	23
Paper and products (341)	706	20	970	15	5,312	8	1,321	19	1,261	8	3,102	8
Printing and publishing (342)	1,017	17	1,100	11	1,128	21	1,613	16	621	13	2,223	15
Basic chemicals (351)	10,121	2	2,405	3	16,755	3	4,177	6	1,940	5	5,143	5
Other chemicals (352)	2,698	9	1,750	6	6,870	5	6,484	2	897	11	7,427	3
Petroleum and related products (353-354)	n.a.	1	58,218	1	141,330	1	45,357	1	n.a.	1	14,891	1
Rubber and products (355)	1,741	13	1,399	10	2,650	11	1,541	17	2,200	3	2,164	17
Plastics (356)	480	22	616	20	1,974	16	1,237	21	n.a.			
Ceramics and pottery (361)	434	23	889	16	2,326	15	2,052	14	157	23	1,461	22
Glass and products (362)	3,592	7	1,992	4	2,364	14			n.a.		2,387	12
Cement and products (363)	5,683	5			6,689	6	5,716	3	2,453	2	2,176	16
Structural clay products (364)	270	27	1,465	9	1,557	17	3,246	11	1,096	10	1,694	21
Other non-metallic minerals (369)	165	28					3,429	9	493	16	2,838	9
Iron and steel (371)	7,413	3	1,095	12	22,788	2	5,635	4	2,004	4	2,069	19
Non-ferrous metals (372)	n.a.		783	17	4,687	9	3,988	7	n.a.		2,662	10
Fabricated metal products (381)	1,308	15	715	18	1,189	20	1,724	15	701	12	2,107	18
Machinery(non-electrical)(382)	2,582	10	981	14	1,119	22	3,410	10	371	17	2,637	11
Electrical machinery (383)	2,492	11	1,043	13	2,583	13	1,500	18	293	18	2,232	14
Transport equipment (384)	6,659	4	1,507	8	4,459	10	2,626	12	1,643	6	2,321	13
Professional and scientific equipment (385)	312	25	561	22	1,043	24	1,165	23	258	20	3,259	7
Other manufactures (390)	833	18	518	23	1,044	23	1,289	20	209	22	2,015	20
All industry (3)	2,128		1,093		2,810		2,408		943		2,262	

1658M

Table A.4: Factor Intensity Measures: (4) Fixed assets per employee 2/

Industry (Code)	Indonesia, 1981 Value (Rp '000)	Rank	Malaysia, 1981 1/ Value (M$ '0)	Rank	Philippines, 1980 1/ Value (P'0)	Rank	United States Value ($)	Rank
Food (311-312)	4,592	9	1,351	11	803	7	2,019	14
Beverages (313)	5,874	7	1,170	14	490	14	4,181	6
Tobacco (314)	2,164	20	1,478	6	n.a.		2,610	12
Textiles (321)	4,270	10	1,395	8	529	12	1,604	19
Garments (322)	602	27	122	28	140	23	251	27
Leather and products (323)	1,479	23	180	27	n.a.		205	25
Footwear (324)	1,105	24	348	26	n.a.		244	26
Wood and products (331)	2,886	16	1,080	16	242	19	1,987	15
Furniture (332)	1,016	26	455	25	292	18	630	23
Paper and products (341)	10,652	4	1,155	15	2,587	2	5,624	5
Printing and publishing (342)	2,610	18	873	22	418	16	1,213	22
Basic chemicals (351)	14,293	3	3,075	2	2,364	3	9,168	2
Other chemicals (352)	4,091	11	1,246	13	344	17	6,791	3
Petroleum and related products (353-354)	48,223	1	65,096	1	n.a.	1	15,241	1
Rubber and products (355)	2,447	19	1,385	9	1,253	5	2,212	13
Plastics (356)	3,100	13	1,047	18	n.a.			
Ceramics and pottery (361)	3,770	12	2,508	5	548	11	1,142	23
Glass and products (362)	5,945	6			n.a.		3,195	9
Cement and products (363)	19,245	2	2,725	3	1,090	6	3,394	8
Structural clay products (364)	3,027	15	1,051	17	509	13	2,850	10
Other non-metallic minerals (369)			985	20	224	21	2,630	11
Iron and steel (371)	9,853	5	2,592	4	2,081	4	5,990	4
Non-ferrous metals (372)	3,823	12	1,399	7	n.a.		4,078	7
Fabricated metal produts (381)	1,616	22	1,227	12	448	15	1,626	17
Machinery(non-electrical)(382)	2,617	17	1,374	10	219	22	1,616	18
Electrical machinery (383)	2,003	21	643	23	608	10	1,296	20
Transport equipment (384)	5,281	8	971	21	690	9	1,975	16
Professional and scientific equipment (385)	1,088	25	996	19	231	20	1,290	21
Other manufactures (390)	142	28	580	24	763	8	833	24
All industry (3)	3,580		1,698		697		2,157	

Notes and Sources, Tables A-1 - A-4

Notes: 1. Malaysia, the Philippines, Singapore and Thailand adopt the same code as Indonesia, with the following exceptions:
(a) The Phillippines has an additional category, 386, manufacture of furniture and fixtures, primarily of metal.
(b) Singapore: plastics are 357 (not 356), rubber products 356 (not 355), transport equipment 385 (not 384), structural clay products 363 (not 364). There are also separate categories for electrical machinery and appliances (383) and electronics (384).

2. In all cases except the Philippines, the date refer to machinery and equipment per employee. The Philippines data refer to all fixed assets.

Coverage: The Malaysian data refer to West (Peninsula) Malaysia only. Singpaore and Thailand data refer to firms employing 10 or more workers; for Indonesia the cut-off point is 20. The Philippines and United States data purportedly include all firms. In several instances important industries have been excluded; e.g., petroleum Indonesia and Thailand.

Sources: Indonesia: Statistik Industri 1981, Biro Pusat Statistik Jakarta.
Malaysia: Unpublished data from the Annual Survey of manufacturing establishments, kindly processed by Ms. F. Rani, Kuala Lumpur.
Philippines: 1980 Annual Survey of Establishments: Manufacturing, National Census and Statistics Office, Manila.
Singapore: Report on the Census of Industrial Production, Department of Statistics, Singapore.
Thailand: Report of the 1980 Industrial Census, Whole Kingdom, National Statistics Office, Bangkok.
United States: 1981 Annual Survey of Manufactures, Bureau of the Census, Washington.

Table A.5: Growth of ASEAN manufactured exports: Selected
(annual average growth)

	Textiles	Iron and steel	Petroleum products	Fertilizer	Plastics	Leather	Leather manufactures	Veneers and plywood	Electrical machinery	Furniture	Clothing	Footwear	Toys and sporting goods	Vehicle parts	Motorcycle parts
Indonesia															
1972-77	7.1	-	42.7	-	-	31.3	-32.6	-	-	-	250.4	-14.0	-	-	-
1977-82	70.1	19.7	6.2	-21.9	86.1	21.2	46.4	81.6	34.6	31.6	89.3	64.4	17.4	94.8	-51.8
Malaysia															
1972-77	29.7	5.7	7.5	-6.2	26.1	33.2	29.6	15.9	137.0	52.7	43.6	25.9	41.8	0.8	6.9
1977-82	18.1	10.6	21.1	24.0	14.3	-21.2	28.2	8.7	67.6	8.6	21.9	7.3	56.6	6.2	29.1
Philippines															
1972-77	29.9	37.0	13.2	-	107.7	-	126.7	10.7	70.0	66.0	117.3	53.8	63.3	-5.4	-
1977-82	10.6	30.3	-4.3	-33.5	12.9	-	17.7	8.1	39.4	26.9	21.9	43.4	51.3	135.8	-0.7
Singapore															
1972-77	17.2	40.6	35.6	16.8	39.7	8.7	15.5	22.0	55.4	47.0	21.7	15.1	41.4	26.3	3.6
1977-82	12.4	25.1	17.9	26.7	18.1	9.2	28.2	13.1	14.8	30.4	16.8	13.0	20.1	3.8	-7.4
Thailand															
1972-77	38.8	2.7	-39.3	-	35.6	22.4	35.4	57.4	57.1	107.0	47.9	77.9	42.9	-30.1	48.4
1977-82	15.1	38.6	5.4	-	27.2	-.1	67.7	-1.9	10.6	44.3	32.1	117.3	25.5	69.2	-14.5
ASEAN															
1972-77	25.5	33.6	34.7	32.3	40.2	22.5	11.4	18.9	60.4	57.8	35.9	24.7	42.9	24.6	7.8
1977-82	15.0	25.2	16.3	12.2	17.8	7.1	40.4	20.3	28.4	28.9	24.0	32.2	26.5	4.3	0

1650M

Table A6: Exports of Selected Manufactures by Developing Countries
($ million, or percentage of all developing countries)

	1972		1982		1983
			Textiles		
Developing Countries	3,109.9	(100)	9,166.0	(100)	9,529.8
Asian Developing Countries	1,855.3	(59.7)	5,229.0	(57.0)	5,936.2
ASEAN	147.0	(4.7)	922.4	(10.1)	858.7
Indonesia	2.2	(n)	43.5	(n)	120.4
Malaysia	16.0	(0.5)	135.0	(1.5)	n.a.
Philippines	9.1	(0.3)	55.8	(n)	43.9
Singapore	86.5	(2.8)	343.3	(3.7)	382.4
Thailand	33.2	(1.1)	344.7	(3.8)	311.9
			Plywood		
Developing Countries	585.5	(100)	1,405.9	(100)	1,526.6
Asian Developing Countries	443.7	(75.8)	999.9	(71.1)	1,202.1
ASEAN	132.9	(22.7)	795.4	(56.6)	1,091.3
Indonesia	n.a.	(n)	316.4	(22.5)	737.7
Malaysia	52.7	(9.0)	167.7	(11.9)	n.a.
Philippines	38.0	(6.5)	93.3	(6.6)	110.6
Singapore	40.6	(6.9)	203.5	(14.5)	226.3
Thailand	1.6	(n)	14.3	(1.0)	16.7
			Electrical Machinery		
Developing Countries	501.4	(100)	4,932.3	(100)	4,032.8
Asian Developing Countries	381.0	(76.0)	4,190.7	(85.0)	3,369.8
ASEAN	81.3	(16.2)	3,015.3	(61.1)	1,971.3
Indonesia	n.a.	(n)	116.9	(2.4)	116.9
Malaysia	1.4	(n)	1,383.3	(28.0)	n.a.
Philippines	1.3	(n)	96.2	(2.0)	173.0
Singapore	78.0	(15.6)	1,410.4	(28.6)	1,670.6
Thailand	0.5	(n)	8.6	(n)	10.8
			Furniture		
Developing Countries	149.1	(100)	863.6	(100)	736.2
Asian Developing Countries	45.6	(30.6)	300.3	(34.8)	335.8
ASEAN	5.5	(3.7)	193.4	(22.4)	212.7
Indonesia	n.a.	(n)	2.2	(n)	4.1
Malaysia	0.8	(n)	10.1	(1.2)	n.a.
Philippines	1.7	(1.1)	71.6	(8.3)	83.6
Singapore	2.9	(1.9)	74.6	(8.6)	81.8
Thailand	0.1	(n)	35.0	(4.1)	43.2

Table A6: continued

	1972		1982		1983
			Clothing		
Developing Countries	2,840.0	(100)	13,686.8	(100)	13,370.9
Asian Developing Countries	2,220.5	(78.2)	9,941.4	(72.6)	9,866.5
ASEAN	105.1	(3.7)	1,426.9	(10.4)	1,360.8
Indonesia	n	(n)	116.9	(n)	157.2
Malaysia	10.6	(n)	174.2	(1.3)	n.a.
Philippines	2.3	(n)	305.8	(2.2)	317.7
Singapore	79.1	(2.8)	459.2	(3.4)	477.0
Thailand	13.0	(n)	370.7	(2.7)	408.8
			Footwear		
Developing Countries	558.4	(100)	2,960.2	(100)	3,041.1
Asian Developing Countries	304.1	(54.5)	1,461.2	(49.4)	1,512.0
ASEAN	14.2	(2.5)	172.7	(5.8)	153.5
Indonesia	n	(n)	2.6	(n)	2.7
Malaysia	5.2	(n)	23.5	(n)	n.a.
Philippines	1.2	(n)	62.1	(2.1)	55.1
Singapore	7.2	(1.3)	26.9	(n)	21.3
Thailand	n	(n)	57.6	(1.9)	74.4