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**Export Competition Among  
Asian NIEs, 1991-96:  
An Assessment**

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**Economics Department  
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**EXPORT COMPETITION AMONG ASIAN NIES, 1991-96:  
AN ASSESSMENT**

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**October 1998**

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## EXPORT COMPETITION AMONG ASIAN NIES, 1991-96: AN ASSESSMENT

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## EXECUTIVE SUMMARY

### *Introduction*

1 A major contributing factor to the success of the Asian Newly Industrialised Economies (ANIEs) of South Korea, Taiwan, Singapore, Hong Kong and Malaysia has been their robust export performance. Much of the export growth is underpinned by a significant expansion of manufactured exports, reflecting the rapid industrialisation of these economies.

2 This paper employs the technique of shift-share analysis to assess the comparative export performance of ANIEs in the major markets of the US, the EU and Japan over 1991-96. When applied to the study of export competition, the technique of shift-share analysis compares a home country's exports to third-country markets with like exports from some selected reference competing economies. A country is said to have experienced positive net shifts in exports to a market if its exports exceed that implied by the average export growth of the reference competing economies with the same export structure, and conversely for negative net shifts.

### *Export Structures and Markets of the ANIEs*

3 Export competition can be expected to be intense if the economies overlap significantly in both the commodity and market composition of their exports. The ANIEs' exports were dominated by manufactured goods (SITC 5-8), particularly machinery and transport equipment (SITC 7) which comprises mainly electronics. The ANIEs also exhibited similar patterns in terms of export markets. The US, EU and Japan are the main destinations for the ANIEs' manufactured exports.

### *Overall Assessment*

4 The results of shift-share analysis show that, between 1991 and 1996, Malaysia emerged as the top export competitor among the ANIEs in the combined markets of the US, the EU and Japan. Over the period, it recorded the largest positive net shifts in manufactured exports of \$17.4 billion. Singapore came in a close second with positive net shifts of \$14.8

billion, while Hong Kong, Taiwan and South Korea all recorded substantial negative net shifts in manufactured exports. Countries experiencing positive net shifts in exports gain market shares at the expense of those experiencing negative net shifts. Thus, between 1991 and 1996, Malaysia and Singapore had gained market shares at the expense of Hong Kong, South Korea and Taiwan.

### ***Export Performance by Broad Commodity Section***

5 Singapore's robust export performance to the US, the EU and Japan was skewed towards the transport & machinery equipment (SITC 7) category, which comprised largely electronics. Indeed, SITC 7 exports accounted for a significant 78% of Singapore's positive net shifts in manufactured exports to the three markets combined. However, Malaysia's export performance was comparatively more balanced, with SITC 6, 7 and 8 exports contributing the major share of the net shifts.

6 The Northeast Asian NIEs of Hong Kong, South Korea and Taiwan, on the other hand, recorded substantial negative net shifts in SITC 7 exports in most of the major markets. Only South Korea experienced significant positive net shifts in SITC 7 exports to the EU, due largely to exports of cars rather than of electronics.

### ***Export Competition in Machinery & Transport Equipment***

7 Given the importance of machinery & transport equipment (SITC 7) in Singapore's total exports, we examined in detail Singapore's export competitiveness in this product category vis-à-vis the other ANIEs. Singapore performed better than average in all three major markets of the US, EU and Japan, as reflected by the positive net shifts.

8 Besides Singapore, Malaysia is the only other economy with positive net shifts in all three markets. In contrast, Korea experienced a loss in market shares in its exports to both the US and Japan, but a gain in market share in the EU. Taiwan and Hong Kong performed worse than average in all three markets.

9 Analysis at the levels of 2- and 3-digit SITC products shows that Singapore's strong export performance in all three markets was invariably dominated by office & data machines (SITC 75) comprising primarily disk drives (SITC 752). Its exports of electrical machinery (SITC 77), comprising largely semiconductors (SITC 776), also performed comparatively well, particularly in the EU and Japanese markets

10 Malaysia also performed strongly in its exports of office and data machines (SITC 75) to the US and EU markets, and of electrical machinery (SITC 77) and telecommunications apparatus (SITC 76) to all three markets. These trends reflect Malaysia's increasing importance as a direct competitor to Singapore in electronics exports. However, the fact that Malaysia has also become a more important export market to Singapore in these same commodities over the period suggests some degree of complementarity between the two economies. The rapid expansion of the electronics industry in Malaysia over the last few years has led to increased sourcing of electronic parts and components from Singapore.

11 The sources of divergence in SITC 7 export performance among the ANIEs could be attributed to the industry mix effect (IME), the competitive effect (CE) and the interaction effect (IE), thus:

$$\text{Net Shifts in Exports} = \text{Industry Mix Effect} + \text{Competitive Effect} + \text{Interaction Effect}$$

Several key observations can be made. First, Singapore's favourable export performance in machinery & transport equipment (SITC 7) could be largely attributed to its favourable export mix or structural advantage. Second, Singapore's exports of office & data machines (SITC 75) to the US and EU grew faster than for the ANIEs as a whole. The same is true of Singapore's exports of electrical machinery (SITC 77) to Japan and the EU. These exports are said to enjoy a competitive advantage. Third, the structural and competitive advantages of Singapore's exports to the US and EU also combined to give rise to a positive interaction effect. Singapore is said to

enjoy a revealed comparative advantage vis-à-vis the other ANIEs in SITC 75 exports in the US and EU markets.

12 By comparison, Malaysia's positive net shifts in SITC 7 exports, the next largest after Singapore's, were largely derived from its faster than average growth or competitive advantage. Active promotion of the industry by policy makers in recent years has led to such exports growing faster than the reference economies. In due course, it is likely that Malaysia will also gain a major foothold in this industry, and hence compete with Singapore head on.

### ***Regional Economic Crisis and Export Competition***

13 In light of the current Asian economic crisis, we updated the analysis on export performance of the ANIEs. Between 1996 and 1997, Taiwan was the only economy among the ANIEs experiencing significant positive net shifts in manufactured exports (SITC 5-8) to the US. Hong Kong's export position was relatively unchanged. Korea, Malaysia and Singapore, on the hand, registered negative net shifts as their manufactured exports to the US grew at a relatively slower rate or even contracted.

14 Similarly, Japanese import statistics show that Singapore's exports to Japan did not perform well, recording a negative net shift between 1996 and 1997. In contrast, Malaysia and South Korea enjoyed positive export net shifts in 1997, which raised their relative market shares.

15 The relatively poor performance of Singapore's manufactured exports in the US reflected its loss of competitiveness in the two key electronics exports, namely, data processing machines and semiconductors. Singapore's exports of disk drives were also affected by the problem of over-supply in the industry. The impact on Singapore was the most severe as it exports much more data processing machines than the other ANIEs. Similarly, the problem of overcapacity in the semiconductor industry and the subsequent decline in chip prices were partly responsible for the lacklustre performance of Singapore's exports of electronics valves.



### ***Conclusions and Implications***

16 Notwithstanding Singapore's impressive export performance in 1991-96, the regional economic crisis has had an adverse impact on Singapore's competitiveness in the US and Japanese markets. The loss in market shares reflects the intense competition posed by producers from crisis-hit economies following the substantial depreciation of their currencies, although this may have been partially offset by the credit crunch faced by manufacturers in these economies.

17 In the face of rising competition from the ANIEs as well as emerging economies, Singapore manufacturers would have to sharpen their competitive edge to maintain their market share. First, they would have to boost their competitiveness by raising labour productivity through greater emphasis on skills development and training. This would help reduce unit labour costs, and moderate the upward cost pressures precipitated by Singapore's shortage of land and labour.

18 Second, Singapore's manufacturers must continue to move up the value-added chain and be ahead of competitors in exporting new and high-tech products. This calls for the rapid development of Singapore's hi-tech industry in order to make up for the export losses due to the traditional industries' moving offshore and also to improve Singapore's overall export competitiveness.

19 Finally, Singapore should further diversify its export destinations and explore new markets to gain the "first-mover advantage". With increasing intensity of export competition in the industrial markets, Singapore's exporters must have a keener eye for opportunities available in fast-growing markets of the developing economies.

## 1 INTRODUCTION

1.1 A major factor underpinning the success of the Asian Newly Industrialised Economies (ANIEs) of South Korea, Taiwan, Singapore, Hong Kong and Malaysia has been their robust export performance. With the adoption of export-oriented developmental strategies, the ANIEs experienced robust export growth averaging 11% p.a. over the last 15 years. As a group, the ANIEs more than doubled its share of world exports, from 5% in 1980 to 11% in 1996. Much of the growth was based on a significant expansion of manufactured exports, reflecting the rapid industrialisation of these economies.

1.2 Indicative of the ANIEs' rising share in world manufactured exports has been their export penetration into major markets such as the US, the European Union (EU) and Japan. For example, the ANIEs accounted for 19% of total US imports of transport and machinery equipment in 1996, up from 10% in 1981. The US, the EU and Japan together absorbed a significant 45% of ANIEs' total manufactured exports in 1996. While these trends show the ANIEs' success in making inroads into the major industrial markets, they do not reveal the relative export competitiveness among the ANIEs nor the sources of divergence in competitive position.

1.3 This paper employs the technique of shift-share analysis to assess the comparative export performance of ANIEs in the major markets of the US, the EU and Japan over 1991-96. It updates and expands earlier work by Voon (1998), who analysed the export competitiveness of the ASEAN economies vis-à-vis China in the US market over 1990-94, and Herschede (1991), who focused on the Japanese market over 1982-87. Data from national sources at the 3-digit Standard Industrial Trade Classification (SITC) for manufactured exports (SITC 5-8) are used in the study. For Korea and Taiwan, trade data are in Harmonised System and have to be matched to the SITC system. Given Hong Kong's and Singapore's high level of re-exports, which amounted to about 85% and 41%

of total exports respectively in 1996, only domestic exports of manufactured goods are considered for the two economies.

1.4 Section 2 of the paper briefly explains the methodology of shift-share analysis. Section 3 compares the ANIEs' exports by commodity section and major markets, and assesses their degree of similarity and, hence, competition. Section 4 presents the main results of our analysis while Section 5 examines export competition in machinery and transport equipment (SITC 7) – Singapore's key exports – in greater detail and the major sources of divergence in export performance among the ANIEs. As the Asian financial crisis may have adversely affected the comparative export performance of the ANIEs, Section 6 extends the analysis to the recent period using more readily available *import* data of the two key markets of US and Japan. Finally, the paper concludes with some policy implications for Singapore in Section 7.

## 2 SHIFT-SHARE ANALYSIS IN EXPORT COMPETITION

2.1 When applied to the study of export competition, the technique of shift-share analysis compares a home country's exports to third-country markets with like exports from some selected reference competing economies.<sup>1</sup> A country is said to have experienced **positive net shifts** in exports to a market if its exports exceed that implied by the average export growth of the reference competing economies assuming they have the same export structure, and conversely for **negative net shifts**. These net shifts in export market shares can be attributed to 3 major sources of divergence: (a) **industry mix effect**, (b) **competitive effect**, and (c) **interaction effect**. Appendix 1 provides a formal derivation of the decomposition.

2.2 **Industry Mix Effect** captures that portion of the export divergence that is due to the difference between the weight of a particular commodity in the home country's exports and that of the reference competing economies' exports to a given market. A positive effect results when the proportion of the commodity in the home country's exports to the market is greater than that of the reference competing economies, and if there is growth in the reference competing economies' exports of the commodity to the market. For example, the industry mix effect for Singapore's electronics exports to Japan will be positive if the composition of electronics goods in Singapore's total domestic exports to Japan is greater than that of ANIEs, and, *at the same time*, the growth of ANIEs' electronics exports to Japan is positive. In this instance, Singapore is said to have a **structural advantage** in the export of electronics products to Japan. Conversely, a **structural disadvantage** is associated with a negative industry mix effect.

2.3 **Competitive Effect** measures the effect of differential export growth of the commodity between the home country and the reference

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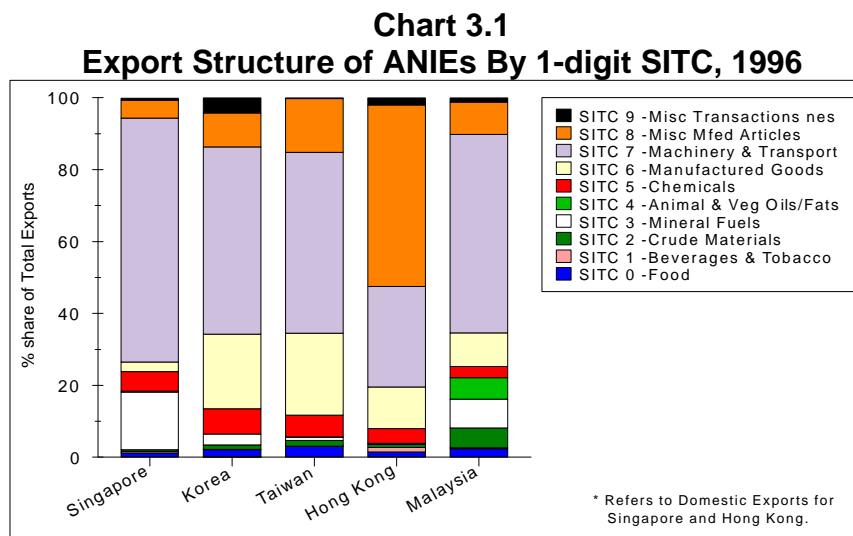
<sup>1</sup> In this study, the reference competing economies refer to the ANIEs, i.e., South Korea, Taiwan, Hong Kong, Malaysia and Singapore.

competing-economies. Thus, even if the mix of exports to a particular market may be the same, the difference in growth rates of individual commodity exports of the home country vis-à-vis the reference competing economies can contribute to a net shift in export market shares. A positive competitive effect occurs when the home country's export of a commodity to a market grows faster than that of the reference competing economies, and vice versa for negative effect. In the former instance, the home country is said to have a **competitive advantage** in the export of the commodity to the particular market, while in the latter it is said to have a **competitive disadvantage**.

2.4 **Interaction Effect** measures that portion of the net shift in export market share arising from the difference in export structures interacting with the difference in export growth rates between the home country and the reference competing economies. A positive (negative) effect results when the home country possesses an export structure that either concentrates in those commodities whose exports to a given market grow faster (slower), or de-emphasises those commodities whose exports grow slower (faster) than like exports of the reference economies. For example, if the growth of Singapore's manufactured exports *and* its share in Singapore's total exports to Japan are *both* greater, or *both* less, than those of the ANIEs, the interaction effect will be positive. Singapore is then said to have a **revealed comparative advantage** in these exports to Japan. Otherwise, it is said to have a **revealed comparative disadvantage**.

### 3 EXPORT STRUCTURES AND MARKETS OF THE ANIES

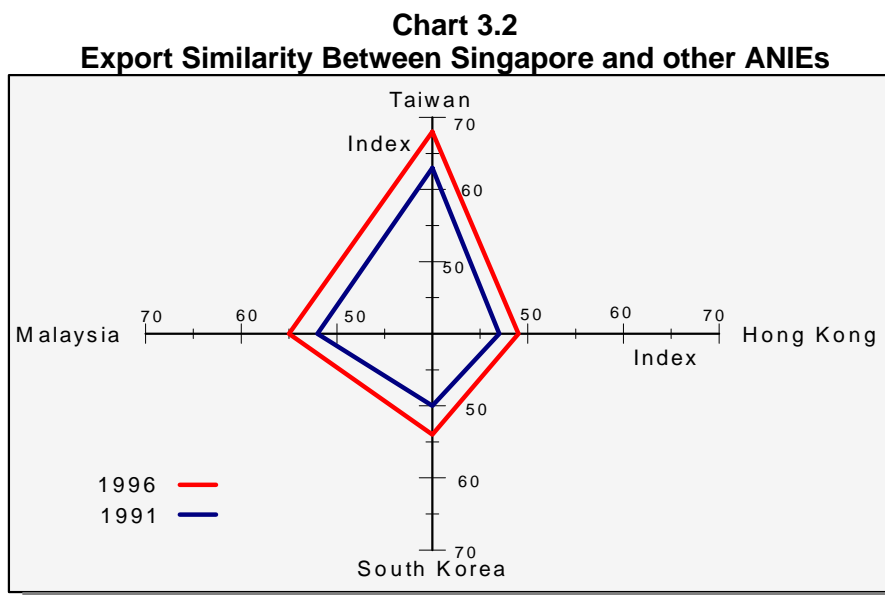
3.1 The choice of the ANIEs as the reference competing economies in this paper stems from the high degree of similarity in their export structures and markets. Export competition can be expected to be intense if the economies overlap significantly in both the commodity and market composition of their exports.



3.2 As shown in Chart 3.1, the ANIEs' exports were dominated by manufactured goods (SITC 5-8), particularly machinery and transport equipment (SITC 7) which comprises mainly electronics. In 1996, the share of manufactured goods in total exports ranged from 77% for Malaysia to 94% for Taiwan. Among the ANIEs, exports of SITC 7 accounted for the largest share of total exports in Singapore (68%), followed by Malaysia (55%) and South Korea (52%). While the prevalence of manufactured exports and, in particular SITC 7 exports, in each of the ANIEs may indicate a high degree of similarity in export structure, there exists considerable diversity in products within a one-digit SITC commodity section. For example, there are a total of 166 products at the 3-digit levels within the SITC 5-8 commodity sections.

3.3 To better assess the degree of export competition, the paper computes an index of export similarity for each ANIE with reference to

Singapore's export mix<sup>2</sup>. The index takes a value between 0 and 100: the higher the value, the greater the export similarity. As shown in Chart 3.2, the indices for all the other ANIEs have increased between 1991 and 1996, reflecting the growing similarity of their exports with Singapore's over time. Among the ANIEs, Taiwan's exports matched Singapore's the most, with its export similarity index being the highest at 68 in 1996, up from 63 in 1991. This was followed by exports from Malaysia (55), South Korea (54) and Hong Kong (49).



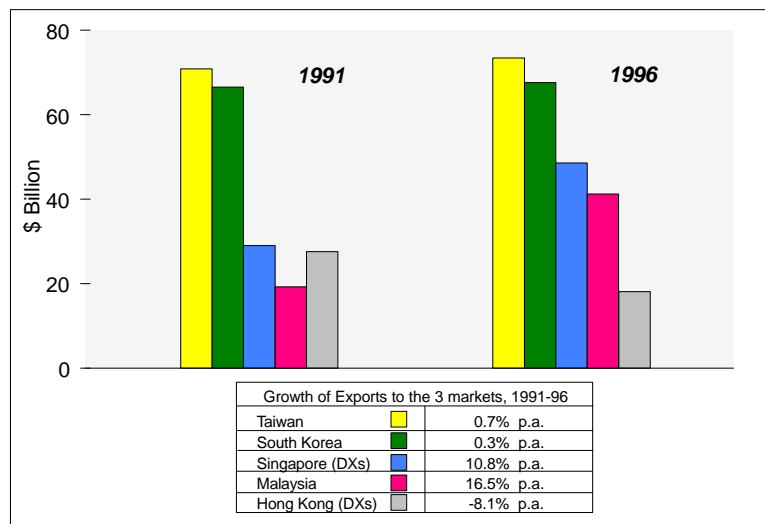
3.4 The paper has excluded emerging markets such as the Philippines and Indonesia because of their relatively low export similarity with Singapore. For example, the export similarity indices for the Philippines and Indonesia were just 31 and 26 in 1995 respectively. The focus on Malaysia and the first generation NIEs of Hong Kong, Korea and Taiwan is also consistent with studies employing other measures of competitiveness, such as revealed comparative advantage (RCA).<sup>3</sup>

<sup>2</sup> The export similarity index between country A and country B in exporting to the world C is computed as  $S(AB,C) = \{\sum_i \text{Minimum}[X_i(AC), X_i(BC)]\}100$ , where  $X_i(AC)$  is the share of commodity i in A's exports and  $X_i(BC)$  is the share of commodity i in B's exports to the world C.  $S(AB,C)$  takes a value between 0 and 100. The higher the index, the greater the export similarity between countries A and B.

<sup>3</sup> For example, Poa and Leu (1998) showed that apart from Malaysia, Singapore does not show any sign of similarity in export pattern with the rest of ASEAN economies.

3.5 The ANIEs also exhibited similar patterns in terms of export markets. The US, EU and Japan are the main destinations for the ANIEs' manufactured exports. Together the three markets accounted for 58% of Singapore's manufactured exports in 1996, compared with 49% for Malaysia, 48% for Taiwan, 41% for South Korea and 50% for Hong Kong. Between 1991 and 1996, Malaysia's manufactured exports to the three industrialised markets grew the fastest, at an average 16.5% p.a., followed by Singapore's (10.8% p.a.) and Taiwan's (0.7% p.a.). (See Chart 3.3.)

**Chart 3.3**  
**ANIEs' Exports of Manufactures (SITC 5-8) to the US, EU and Japan**



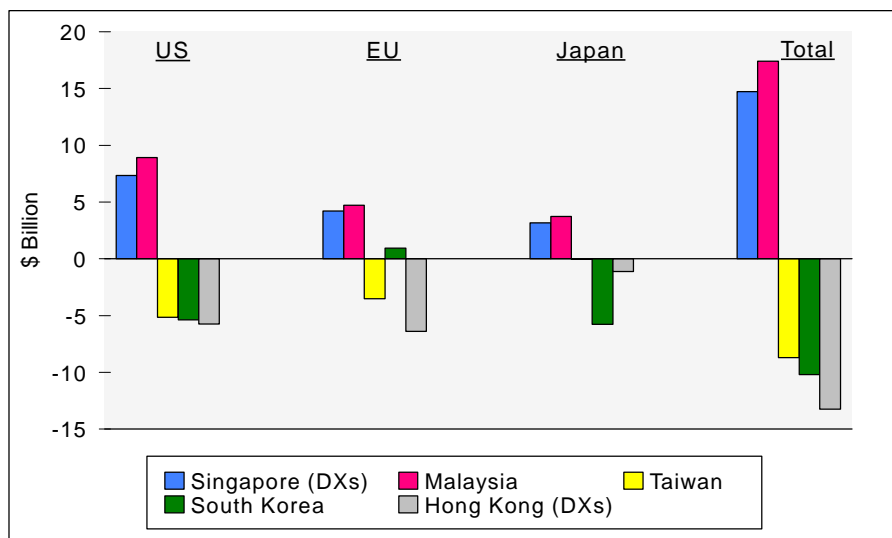


## 4 MANUFACTURED EXPORT COMPETITION, 1991-96

### Overall Assessment

4.1 The results of shift-share analysis show that, between 1991 and 1996, Malaysia emerged as the top export competitor among the ANIEs in the combined markets of the US, the EU and Japan. (See Chart 4.1.) Over the period, it recorded the largest positive net shifts in manufactured exports of \$17.4 billion. This implies that the increase in Malaysia's exports to the three markets was \$17.4 billion greater than what it would have experienced if it had the same export growth and export mix of all ANIEs in these markets. Singapore came in a close second with positive net shifts of \$14.8 billion, while Hong Kong, Taiwan and South Korea all recorded substantial negative net shifts in manufactured exports.

**Chart 4.1**  
**Net Shifts in Manufactured Exports (SITC 5-8) to Major Markets, 1991-96**

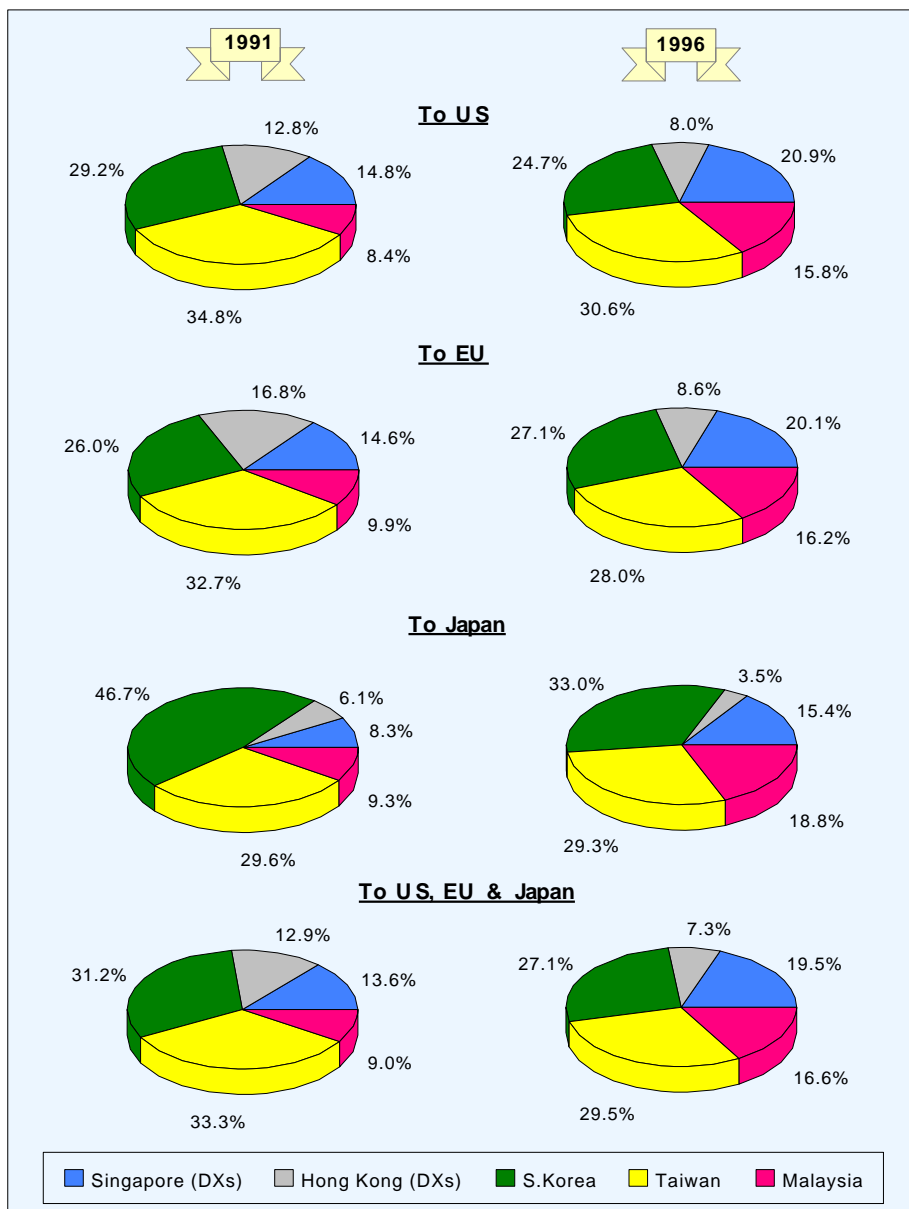


4.2 Countries experiencing positive net shifts in exports gain market shares at the expense of those experiencing negative net shifts. Thus, between 1991 and 1996, Malaysia and Singapore had gained market shares at the expense of Hong Kong, South Korea and Taiwan. In particular, Malaysia's share of the ANIEs' manufactured exports to the US, the EU and Japan combined rose from 9.0% in 1991 to 16.6% in 1996. Likewise, Singapore's share increased from 13.6% to 19.5%. In contrast, Hong Kong's

share declined from 12.9% in 1991 to 7.3% in 1996, Korea's from 31.2% to 27.1% and Taiwan's from 33.2% to 29.5%.

4.3 Singapore recorded positive net shifts in exports in each of the three markets individually, as did Malaysia. (See Chart 4.2.) As a result, they gained market shares in the US, the EU and Japan. On the other hand, reflecting their negative net shifts in exports, Hong Kong and Taiwan lost market shares in each of the three markets. Korea lost market shares in the US and Japan, but gained market share in the EU.

**Chart 4.2  
Comparative Shares in ANIEs' Manufactured Exports, 1991 and 1996**



### **Export Performance by Broad Commodity Section**

4.4 Singapore's robust export performance to the US, the EU and Japan was skewed towards the transport & machinery equipment (SITC 7) category, which comprised largely electronics. Indeed, SITC 7 exports accounted for 78% of Singapore's positive net shifts in manufactured exports to the three markets combined. (See Table 4.1.) Although SITC 7 exports also contributed to more than half of its positive net shifts, Malaysia's export performance was relatively more balanced, with SITC 8 exports contributing about one-third and SITC 6 exports another 10%. More significantly, Malaysia was the only country among the ANIEs which gained relative shares in every broad category of manufactured exports in the three markets.

4.5 The Northeast Asian NIEs of Hong Kong, South Korea and Taiwan, on the other hand, recorded substantial negative net shifts in SITC 7 exports in most of the major markets. Only South Korea experienced significant positive net shifts in SITC 7 exports to the EU, due largely to exports of cars rather than of electronics. These SITC 7 exports more than offset its large negative net shifts in SITC 8 exports, mainly clothing and footwear, for an overall positive net shift in the EU market. In fact, unlike Taiwan and Hong Kong, South Korea recorded substantially larger negative net shifts in SITC 8 exports than its SITC 7 exports to all the three major markets.

4.6 For both Taiwan and Hong Kong, their substantial negative net shifts in SITC 7 exports were almost entirely attributed to their poor performance in the US and EU markets. Hong Kong, which experienced the largest negative net shifts in total manufactured exports, was also the only country with negative net shifts in every major export category and in all three markets.

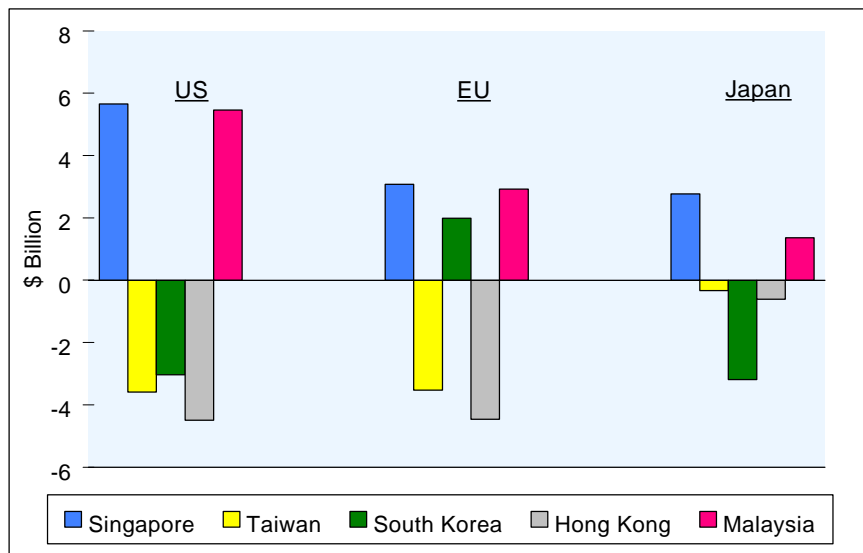
**Table 4.1**  
**Decomposition of Net Shifts by 1-Digit SITC Classification, 1991-96**  
(S\$ mil)

<b>Exporters</b>	<b>Total Manufactured Exports (SITC 5-8)</b>	<b>Manufactured Goods by Chemicals (SITC 5)</b>	<b>Machinery &amp; Transport Equipment (SITC 6)</b>	<b>Misc. Manufactured Articles (SITC 7)</b>	<b>Misc. Manufactured Articles (SITC 8)</b>
<b>US Market</b>					
Malaysia	8,921	253	321	5,462	2,886
Singapore	7,356	-268	114	5,657	1,853
Taiwan	-5,141	-186	-217	-3,591	-1,147
Korea	-5,387	227	-105	-3,034	-2,475
Hong Kong	-5,749	-26	-112	-4,494	-1,118
<b>EU Market</b>					
Malaysia	4,725	130	144	2,927	1,523
Singapore	4,217	114	-37	3,076	1,063
Taiwan	-3,498	-268	-70	-3,523	363
Korea	941	167	229	1,987	-1,442
Hong Kong	-6,384	-144	-266	-4,467	-1,507
<b>Japanese Market</b>					
Malaysia	3,756	35	1,262	1,360	1,099
Singapore	3,179	-31	-13	2,770	453
Taiwan	-59	-20	-158	-331	449
Korea	-5,759	52	-1,024	-3,189	-1,599
Hong Kong	-1,117	-37	-67	-611	-402
<b>US, EU and Japan</b>					
Malaysia	17,402	419	1,727	9,748	5,508
Singapore	14,752	-185	64	11,504	3,370
Taiwan	-8,698	-473	-445	-7,445	-335
Korea	-10,206	447	-901	-4,236	-5,516
Hong Kong	-13,250	-207	-445	-9,572	-3,027

## 5 EXPORT COMPETITION IN MACHINERY AND TRANSPORT EQUIPMENT

5.1 Given the importance of machinery & transport equipment (SITC 7) in Singapore's total exports, this section examines in detail Singapore's export competitiveness in this product category vis-à-vis the other ANIEs. Chart 5.1 shows that Singapore performed better than average in all three major markets of the US, EU and Japan, as reflected by the positive net shifts. Singapore's SITC 7 exports experienced the largest positive net shifts in the US, followed by EU and Japan.

**Chart 5.1**  
**Net Shifts in SITC 7 Exports to US, EU and Japan, 1991-96**

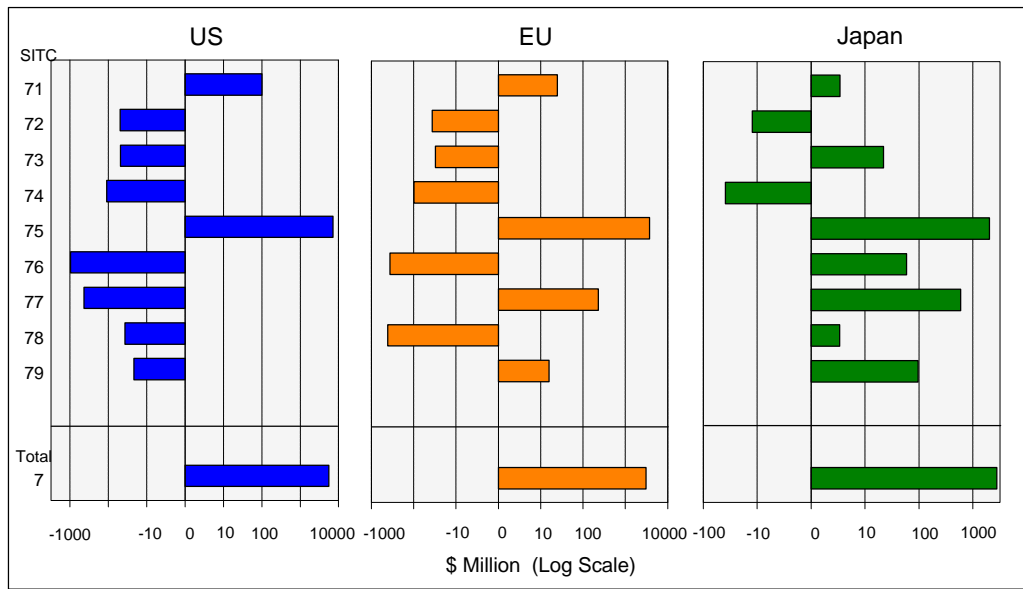


5.2 Besides Singapore, Malaysia is the only other economy with positive net shifts in SITC 7 exports in all three markets. In contrast, Korea experienced a loss in market shares in its exports to both the US and Japan, but a gain in market share in the EU. Taiwan and Hong Kong performed worse than average in all three markets.

5.3 Analysis at the level of 2- and 3-digit SITC products shows that Singapore's strong export performance in all three markets was invariably dominated by office & data machines (SITC 75) comprising primarily disk drives (SITC 752). (See Chart 5.2.) Its exports of electrical machinery

(SITC 77), comprising largely semiconductors (SITC 776), also performed comparatively well, particular in the EU and Japanese markets.

**Chart 5.2**  
**Decomposition of Singapore's Net Shifts by 2-Digit SITC 7 Categories**



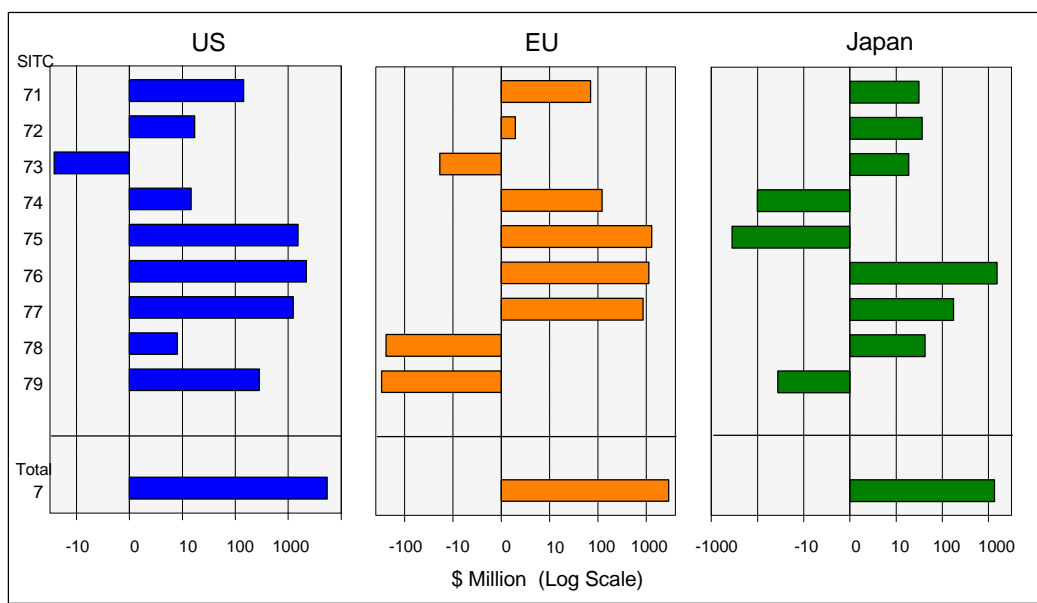
5.4 On the other hand, Singapore's exports of general industrial machinery (SITC 74), telecommunications equipment (SITC 76) performed poorly, recording significant negative net shifts in the three markets. This reflects the loss of competitiveness in Singapore's exports of low-value-added manufactures such as pumps (SITC 743) and radio broadcast receivers (SITC 762).

5.5 Malaysia similarly performed strongly in its exports of office and data machines (SITC 75) to the US and EU markets, and of electrical machinery (SITC 77) and telecommunications apparatus (SITC 76) to all three markets. (See Chart 5.3.) These trends reflect Malaysia's increasing importance as a direct competitor to Singapore in electronics exports. However, the fact that Malaysia has also become a more important export market<sup>4</sup> to Singapore in these same commodities over the period (MAS [1998a]) suggests some degree of complementarity between the two

<sup>4</sup> The share of our exports of machinery & transport equipment to Malaysia rose from 8% in 1991 to 12% in 1996.

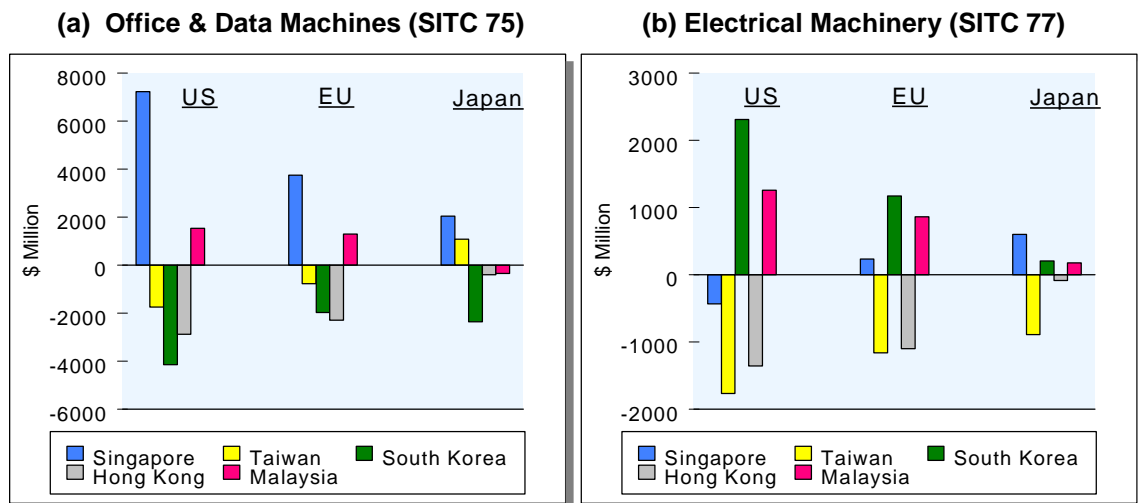
economies. Indeed, intra-industry trade accounted for 65% of Singapore's total trade with Malaysia in 1996, up from 50% in 1992. (See MAS [1998b].) The rapid expansion of the electronics industry in Malaysia over the last few years, reflecting the trend towards a regional production network of facilities by multi-national corporations to harness locational comparative advantages, has led to increased sourcing of electronic parts and components from Singapore.

**Chart 5.3**  
**Decomposition of Malaysia's Net Shifts by 2-Digit SITC 7 Categories**



5.6 The positive net shift in exports of office & data machines (SITC 75) and electrical machinery (SITC 77) enjoyed by Singapore and Malaysia was largely at the expense of Hong Kong and Taiwan. (See Chart 5.4.) While South Korea fared worse than the average ANIE in the former product in all three markets, it performed better in the latter, reflecting its status as a semiconductor powerhouse.

**Chart 5.4**  
**Comparative Net Shifts in Singapore's Key Exports**



5.7 The sources of divergence in SITC 7 export performance among the ANIEs could be attributed to the **industry mix effect** (IME), the **competitive effect** (CE) and the **interaction effect** (IE), thus:

*Net Shifts in Exports =*

*Industry Mix Effect + Competitive Effect + Interaction Effect*

5.8 Table 5.1 summarises the sources of net shifts in SITC 7 exports for the five competing economies. Several key observations can be made. First, Singapore's favourable export performance in machinery & transport equipment (SITC 7) could be largely attributed to its favourable export mix, i.e. positive industry mix effect. In other words, the share of these high-growth commodities, particularly office & data machines (SITC 75) and electrical machinery (SITC 77), in Singapore's total exports is higher than that of the ANIEs as a whole. While such a structural advantage is usually a natural outcome of an economy's endowments, it can also be a consequence of government policy aimed at promoting the industries.

5.9 Second, Singapore's exports of office & data machines (SITC 75) to the US and EU grew faster than for the ANIEs as a whole. The same is true of Singapore's exports of electrical machinery (SITC 77) to Japan and the EU. These exports are said to enjoy a competitive advantage, which



reflects the effects of both micro- and macro economic factors such as favourable overall business cost environment, and a productive and efficient labour force, as well as the effect of late-comer's advantage.

**Table 5.1**  
**Sources of Export Divergence in SITC 7 Exports, 1991-96**

(S\$ mil)

Exporters	Machinery & Transport (SITC 7)				Office & Data Machines (SITC 75)				Electrical Machinery (SITC 77)			
	Net Shifts	IME	CE	IE	Net Shifts	IME	CE	IE	Net Shifts	IME	CE	IE
<b>US Market</b>												
Singapore	5,657	5,903	1,915	-2,070	7,227	5,610	754	864	-437	267	-684	-20
Malaysia	5,462	1,020	36,928	-32,429	1,539	-1,065	24,284	-21,680	1,257	2,094	160	-997
Taiwan	-3,591	-2,489	1,301	-2,399	-1,741	-746	-1,146	151	-1,770	-2,128	2,273	-1,915
Korea	-3,034	-2,350	-2,069	1,384	-4,149	-2,681	-3,668	2,199	2,309	697	1,658	-46
Hong Kong	-4,494	-1,968	-3,494	930	-2,876	-1,118	-3,852	2,094	-1,359	-931	1,334	-1,763
<b>EU Market</b>												
Singapore	3,076	1,837	1,870	-206	3,749	1,877	1,418	453	230	140	125	-36
Malaysia	2,927	-591	110,994	-107,478	1,304	-1,175	87,085	-84,607	859	907	-5	-42
Taiwan	-3,523	981	-5,085	581	-771	1,639	-1,628	-782	-1,162	-226	-1,072	135
Korea	1,987	274	2,304	-591	-1,980	-1,275	-1,685	980	1,172	-303	1,945	-470
Hong Kong	-4,467	-1,631	-4,421	2,031	-2,301	-1,066	-3,058	1,823	-1,099	-518	-408	-173
<b>Japan Market</b>												
Singapore	2,770	3,044	1,946	-2,220	2,038	3,000	-127	-834	599	68	537	-6
Malaysia	1,360	-369	91,626	-89,894	-354	-838	88,527	-88,043	176	539	-71	-292
Taiwan	-331	-967	1,514	-878	1,083	-546	2,637	-1,008	-892	-325	-691	123
Korea	-3,189	-1,583	-2,394	789	-2,363	-1,755	-1,918	1,310	204	-103	287	20
Hong Kong	-611	-119	271	-760	-404	140	-285	-259	-86	-179	622	-529

5.10 Third, the structural and competitive advantages of Singapore's exports to the US and EU also combined to give rise to a positive interaction effect. In this regard, Singapore is said to enjoy a revealed comparative advantage vis-à-vis the other ANIEs in SITC 75 exports in the US and EU

markets. In other words, the positive net shifts in Singapore's SITC 75 exports are reflected in all three sources of export divergence.<sup>5</sup>

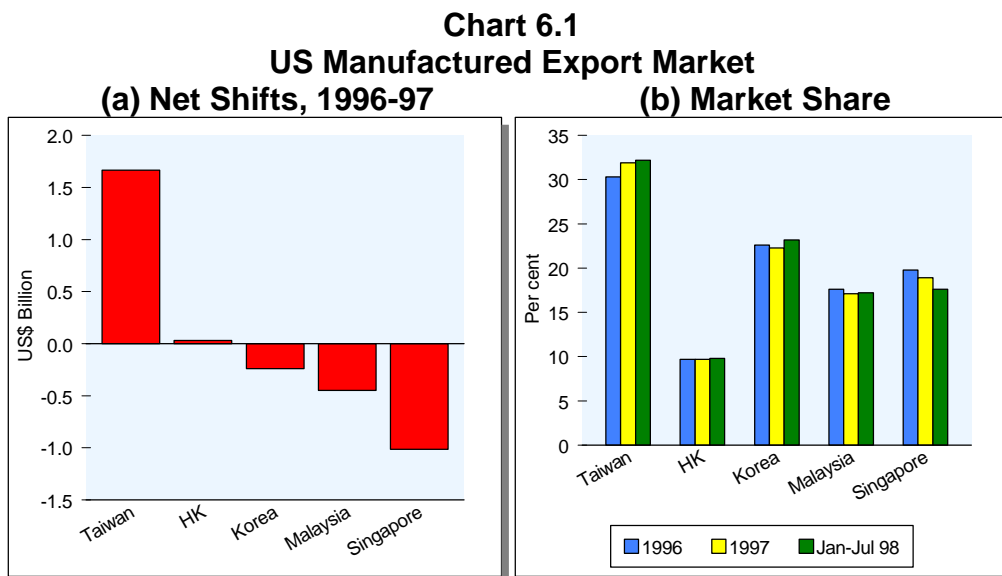
5.11 By comparison, Malaysia's positive net shifts in SITC 7 exports, the next largest after Singapore's, were largely derived from its faster than average growth or competitive advantage. However, combined with an unfavourable export mix or negative industry effect generally, Malaysia's SITC 7 exports also showed a substantial negative interaction effect or revealed comparative disadvantage. These results suggest that Malaysia began in 1991 with a relatively smaller share of SITC 7 in its manufactured exports. But in the course of the following years, active promotion of the industry by policy makers has led to such exports growing faster than the reference economies. In due course, it is likely that Malaysia will also gain a major foothold in this industry, and hence compete with Singapore head on.

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<sup>5</sup> The seemingly anomalous results in Table 5.1 which show, for some cases, positive IME and CE but negative IE are due to the fact that they were summed from the results at the level of 3-digit SITC at which the analysis was performed.

## 6 REGIONAL ECONOMIC CRISIS AND EXPORT COMPETITION

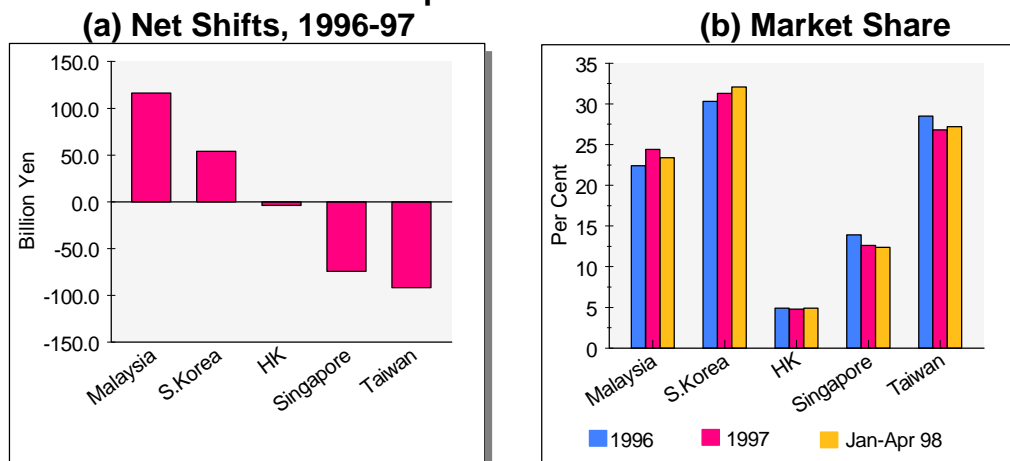
6.1 This section updates the analysis on export performance of the ANIEs in light of the Asian financial crisis. As up-to-date national statistics on exports are yet unavailable for Malaysia, South Korea and Taiwan, statistics of two key markets – the US and Japan – on manufactured imports from the ANIEs are used instead. As Chart 6.1 shows, Taiwan was the only economy among the ANIEs experiencing significant positive net shifts in manufactured exports (SITC 5-8) to the US between 1996 and 1997. Hong Kong's export position was relatively unchanged. Korea, Malaysia and Singapore, on the hand, registered negative net shifts as their manufactured exports to the US grew at a relatively slower rate or even contracted. For example, based on US import statistics, Singapore's manufactured exports to the US contracted by 2.1% in 1997, compared to the 3.1% expansion by the reference competing economies.



6.2 As such, in 1997, Taiwan gained market share in the US vis-à-vis the other ANIEs. This gain was extended to Jan-Jul 98. In contrast, Singapore's share of the ANIEs' manufactured to the US declined throughout the recent period.

6.3 Similarly, Japanese import statistics show that Singapore's exports to Japan did not perform well, recording a negative net shift between 1996 and 1997. This has led to the contraction in its share of ANIEs' manufactured exports to Japan from 13.9% to 12.6%, reflecting the decline in its share of SITC 7 exports from 22.2% to 20.1%. In contrast, Malaysia and South Korea enjoyed positive export net shifts in 1997, which raised their relative market shares to 23.4% and 32.1% respectively. However, in the first half of 1998, there has been a deterioration in Malaysia's competitiveness as evident in its loss of market share to South Korea and Taiwan, while Singapore's share has also declined somewhat. (See Chart 6.2.).

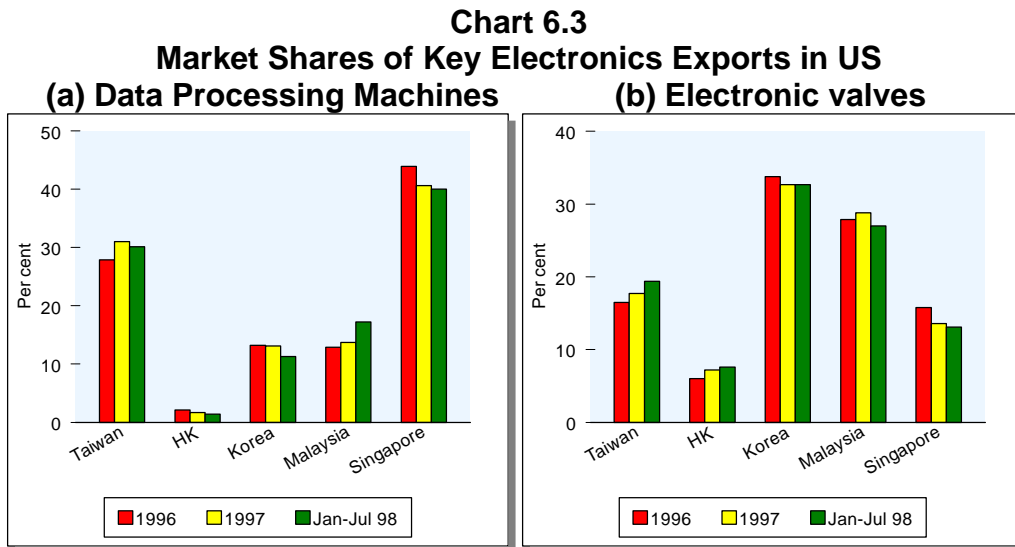
**Chart 6.2**  
**Japanese Market**



6.4 The relatively poor performance of Singapore's manufactured exports in the US reflects its loss of competitiveness in the two key electronics exports, namely, data processing machines and semiconductors.<sup>6</sup> Apart from the competitiveness issue, Singapore's exports of disk drives was also affected by the problem of over-supply in the industry. The impact on Singapore was the most severe as it exports much more data processing machines than the other ANIEs. Similarly, the problem of overcapacity in the semiconductor industry and the subsequent

<sup>6</sup> A detailed breakdown by commodity of ANIEs exports to Japan for Jan-Apr 98 is not available. But the recent loss in Singapore's share of the Japanese market was likely to be accounted for by the same exports.

decline in chip prices were partly responsible for the lacklustre performance of Singapore's exports of electronics valves. Both the shares of Singapore's exports of data-processing machines and electronics valves fell to 40% and 13% in Jan-Jul 98, from 44% and 16% in 1996 respectively. (See Chart 6.3.)



## 7 CONCLUSIONS AND IMPLICATIONS

7.1 This study has shown that, between 1991 and 1996, Singapore and Malaysia outperformed the other ANIEs in manufactured exports to all three major markets – the US, EU and Japan. The Northeast Asian NIEs, on the other hand, recorded negative net shifts across all markets except South Korea which posted a small positive net shift only in the EU.

7.2 The divergence in export performance among the ANIEs was clearer upon examination of the net shifts for each of the one-digit SITC commodity section. Singapore registered the largest positive net shifts for machinery and transport equipment (SITC 7) in all three markets, followed by Malaysia. The favourable performance of Singapore's SITC 7 exports was attributable to the fact that its export structure was skewed towards high-growth exports, namely data processing machines (SITC 75) and electronics valves (SITC 776) in each of the markets. Together these products accounted for 39% of Singapore's total manufactured exports to the major markets in 1996. This is a significantly larger proportion than that of Malaysia (14%), Taiwan (27%), South Korea (16%) and Hong Kong (9%).

7.3 Singapore, however, has done less well in the exports of telecommunications equipment and consumer electronics than Malaysia and Hong Kong, which experienced large increases in market shares in all the three markets. On other major manufactured exports such as chemicals and chemical-related products, Singapore's performance was also not impressive, recording an overall negative net shift in the three markets combined.

7.4 Notwithstanding Singapore's impressive export performance in 1991-96, the regional economic crisis, which began in Jul 97, appeared to have had an adverse impact on Singapore's competitiveness, at least in the US and Japanese markets. The loss in market shares reflects the intense competition posed by producers from crisis-hit economies following the

substantial depreciation of their currencies, although this is offset somewhat by the credit crunch<sup>7</sup> faced by manufacturers in these economies.

7.5 In the face of rising competition from the ANIEs as well as emerging economies, Singapore manufacturers would have to sharpen their competitive edge to maintain their market share. First, they would have to boost their competitiveness by raising labour productivity through greater emphasis on skills development and training. A more productive and efficient workforce would help reduce unit labour costs and moderate the upward cost pressures precipitated by Singapore's shortage of land and labour. Moreover, given the critical role played by skilled labour in the electronics industry, efforts to recruit foreign talents to supplement the local labour force would have to be stepped up.

7.6 Second, Singapore's manufacturers must continue to move up the value-added chain and be ahead of competitors in exporting new and high-tech products. This calls for the rapid development of Singapore's hi-tech industry in order to help make up for the export losses due to the traditional industries' moving offshore, and also to improve Singapore's overall export competitiveness. Equally important is the need for Singapore to innovate and identify export niches faster than its competitors. According to a study by Rose (1997), who defines competitiveness as the speed at which a country exports its goods relative to others, Taiwan and Hong Kong received higher rankings than the other ANIEs.<sup>8</sup> Singapore, while having experienced rising level of competitiveness, was not in the league of top 20 most competitive economies.

7.7 Finally, Singapore should further diversify its export destinations and explore new markets to gain the "first-mover advantage".

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<sup>7</sup> In particular, Korean integrated circuit producers currently have limited access to the cash required to purchase the next generation of equipment and materials.

<sup>8</sup> For example, having realised that the memory business will not provide adequate returns, a number of Taiwanese firms are quick to diversify into the logic side and become semiconductor foundries.

With increasing intensity of export competition in the industrial markets, Singapore's exporters must have a keener eye for opportunities available in fast-growing, albeit less developed economies. Recent news of Singapore's success in breaking new grounds in non-traditional markets was encouraging.<sup>9</sup> The double-digit growth of more than 20% for exports to China, India, Mexico and the Middle East in the first half of this year shows the great potential of these economies in boosting Singapore's external demand. TDB's plan to launch 22 missions this year to non-traditional destinations and the Productivity and Standards Board's joint-assistance to organize business-matching missions to markets in Latin America and South Africa will help further diversify Singapore's export markets.

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<sup>9</sup> *The Straits Times*, July 27 98.



## Appendix 1

### Decomposition of Net Shift in Export Market

This appendix provides a mathematical exposition of the shift-share technique in analysing export market competition. Consider a home country's export of commodity  $i$  to market  $j$  at time  $t$ ,  $X_t^{ij}$ , and the reference competing economies' like exports with the  $\hat{\ }^j$  sign, viz.  $\hat{X}_t^{ij}$ . We can express the change in the home country's exports between two periods  $t$  and  $(t-1)$  as:

$$\begin{aligned}
 X_t^{ij} - X_{t-1}^{ij} = & \\
 & X_{t-1}^j \cdot \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \left( \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} - 1 \right) \\
 & + X_{t-1}^j \cdot \left\{ \left( \frac{X_{t-1}^{ij}}{X_{t-1}^j} \right) - \left( \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \right) \right\} \left\{ \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} - 1 \right\} \\
 & + X_{t-1}^j \cdot \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \cdot \left\{ \left( \frac{X_t^{ij}}{X_{t-1}^{ij}} \right) - \left( \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} \right) \right\} \\
 & + X_{t-1}^j \cdot \left\{ \left( \frac{X_{t-1}^{ij}}{X_{t-1}^j} \right) - \left( \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \right) \right\} \cdot \left\{ \left( \frac{X_t^{ij}}{X_{t-1}^{ij}} \right) - \left( \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} \right) \right\}
 \end{aligned}$$

Summing across all commodities, the growth or change in size of export market  $j$ ,

$$\begin{aligned}
 [X_t^j - X_{t-1}^j] - X_{t-1}^j \cdot \sum_i \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \left( \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} - 1 \right) = & \\
 X_{t-1}^j \cdot \sum_i \left\{ \left( \frac{X_{t-1}^{ij}}{X_{t-1}^j} \right) - \left( \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \right) \right\} \cdot \left\{ \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} - 1 \right\} & \Rightarrow \text{Industry mix effect} \\
 + X_{t-1}^j \cdot \sum_i \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \cdot \left\{ \left( \frac{X_t^{ij}}{X_{t-1}^{ij}} \right) - \left( \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} \right) \right\} & \Rightarrow \text{Competitive effect} \\
 + X_{t-1}^j \cdot \sum_i \left\{ \left( \frac{X_{t-1}^{ij}}{X_{t-1}^j} \right) - \left( \frac{\hat{X}_{t-1}^{ij}}{\hat{X}_{t-1}^j} \right) \right\} \cdot \left\{ \left( \frac{X_t^{ij}}{X_{t-1}^{ij}} \right) - \left( \frac{\hat{X}_t^{ij}}{\hat{X}_{t-1}^{ij}} \right) \right\} & \Rightarrow \text{Interaction effect}
 \end{aligned}$$

## REFERENCES

- Fothergill, Stephen and Graham Gudgin. 1979. "In defence of Shift-Share" *Urban Studies*, 16:309-319.
- Hayward, J. David. 1995. *International Trade and Regional Economies: The Impacts of European Integration on the United States*. Colorado: WestView Press.
- Herschede, Fred. 1991. "Competition among ASEAN, China, and the East Asian NICs: A Shift-Share Analysis" *ASEAN Economic Bulletin*, 7:3:290-306.
- Hong Kong Census and Statistics Department. Various issues. *Hong Kong Trade Statistics*.
- Khalifah, N. Aini. 1996. "Identifying Malaysia's Export Market Growth: A Shift-Share Analysis" *Asia-Pacific Development Journal*, 3:1:72-92.
- Leamer, E.F. and R.M. Stern. 1969. *Quantitative International Economics*. New York: John Wiley and Sons.
- Ledebur, L.C. and R.L.Moomaw. 1983. "A Shift-Share Analysis of Regional Labor Productivity in Manufacturing" *Growth and Change*, Jan:2-9.
- Malaysia Department of Statistics. Various issues. *Malaysia External Trade Statistics*.
- Monetary Authority of Singapore (1998a) "Singapore's Export Market Growth, 1991-96: A shift-Share Analysis" *MAS Occasional Paper No. 4*.
- Monetary Authority of Singapore (1998b) "Singapore's Trade Linkages, 1991-96: Trends and Implications" *MAS Occasional Paper No. 7*.
- Poa T. S. and Leu G.J. (1998) "NIEs and ASEAN: Trade Competitors?" in John D. Kendall, Park Donghyun and Randolph Tan (ed.) *East Asian Economic Issues*, Vol 3.
- Republic of Korea National Statistical Office. Various issues. *Korea Statistical Yearbook of Foreign Trade*.
- Rose, Andrew. 1997 "Dynamic Measures of Competitiveness: Are the Geese Still Flying in Formation?" *Federal Reserve Bank of San Francisco Economic Letter*.
- Singapore Trade Development Board. Various issues. *Singapore Trade Statistics: Imports and Exports*.

Taiwan Directorate General of Customs. Various issues. *Monthly Statistics of Exports: The Republic of China Taiwan District*.

Voon Jan P. 1998 "Export Competitiveness of China and ASEAN in the US Market" *ASEAN Economic Bulletin* 14:3:273-291.

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