

**Singapore's Trade Linkages,
1992-96: Trends and
Implications**

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**SINGAPORE'S TRADE LINKAGES, 1992-96:
TRENDS AND IMPLICATIONS**

BY

**DOMESTIC ECONOMY DIVISION*
ECONOMICS DEPARTMENT
MONETARY AUTHORITY OF SINGAPORE**

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EXECUTIVE SUMMARY

1 Singapore's international trade has experienced rapid growth over the last three decades, averaging 14% p.a. during 1965-1997. Despite the vital role played by external trade in Singapore's economic development, there has been relatively little analysis on the dynamics of its trade linkages with major trading partners. Using the technique of trade intensity analysis, this paper examines Singapore's trade linkages with its main trading partners and identifies its key driving forces over the period 1992-96.

2 Export and import linkages are defined in this paper as the shares of the trading partners in Singapore's total exports and imports respectively. Shifts in trade linkages can be attributed to (1) the changing importance of the various countries or regions in world trade, and (2) changes in trade intensity between Singapore and its trading partners. An increase in a country's or region's share of world trade, *ceteris paribus*, will lead to an expansion of its share of Singapore's trade. Trade intensity, on the other hand, measures the importance of a country or region to Singapore's trade *relative* to its importance to the rest of the world (ROW). This can be quantified by the export (or import) trade intensity index, which is defined as the country's or region's share of Singapore's exports (or imports) relative to its share of imports from (or exports to) the ROW.

3 To gain further insights into bilateral trading relationships, the trade intensity index can in turn be decomposed into an index that accounts for the commodity composition of the countries' trade, and another that reflects the intensity of trade in various commodities. The first is the complementarity index, which measures the extent to which Singapore's commodity export pattern matches the trading partner's import pattern relative to the commodity pattern of imports from the ROW. The second index is the special country bias index, which measures the degree of resistance in the trading partner's imports from Singapore relative to its average degree of resistance to imports from the ROW. This index is largely determined by factors such as relative geographical proximity, import

preference granted to specific countries, associated flows of investment, technology and development aid. In summary, Singapore's trade linkages with a region can be expressed as:

Trade Linkages =

Region's Share of World Trade x Complementarity Index x Special Country Bias Index

Recent Trends in Singapore's Trade Linkages

4 Of the major geographical regions, Singapore's trade linkages with ASEAN-3 have strengthened the most in recent years. Between 1992 and 1996, the region recorded the largest increase in share of both Singapore's total exports and imports. Over the same period, Northeast Asia also became a more important export market, although its share of Singapore's imports declined. The strengthening of Singapore's trade linkages with ASEAN-3 and Northeast Asia mirrors a slackening of its linkages with both the EU and North America. While the shares of both the EU and North America in Singapore's total exports declined, they remained as Singapore's major sources of imports.

Singapore's Export Intensity

5 An analysis of trade intensity reveals that Singapore's trade relations with ASEAN-3 were much stronger than implied by their bilateral export and import shares. The high trade intensity index of Singapore's exports to ASEAN-3 implies that Singapore's exports to the region were more than could be accounted for by the region's share of world trade. Among the ASEAN-3 economies, Singapore's export trade linkages with Malaysia were by far the strongest and, moreover, improved the most during 1992-96.

6 The expansion of ASEAN-3's share in Singapore's total exports over 1992-96 reflects the growing importance of the region as a world importer. A decomposition of the export intensity of Singapore's trade with ASEAN-3 shows that its decline reflects primarily the fall in the special country bias, which was, however, still considerably higher than the

complementarity index. This implies that Singapore's exports to ASEAN-3 were based less on the degree of complementarity in commodity composition of traded goods than the fact that Singapore's exports encountered significantly lower resistance, compared to those from the ROW.

7 Singapore's strong and improving trade linkages with Northeast Asia, on the other hand, were predominantly due to the region's growing importance in world trade. The intensity of Singapore's exports to the region, however, was not particularly high and has in fact declined over the period. China is the only Northeast Asian economy that saw an improvement, albeit marginal, in the export intensity of Singapore's trade.

8 The diminution in Singapore's export linkages with North America owed much to the decline in its intensity of trade with North America, particularly its special country bias, even though the region's share of world imports has increased. This reflected a shift in bias of North American imports from Singapore to other countries, with Mexico being a particularly prominent beneficiary.

9 On the other hand, the decline in Singapore's export linkages with the EU was entirely due to the latter's decline in importance in world imports. The export intensity of Singapore's trade with the EU was unchanged over the 1992-96 period and has remained the lowest among the various trade regions. Indeed, Singapore's exports to the EU exhibited a special country bias index that was substantially lower than the complementarity index, implying a high degree of trade resistance between Singapore and the EU.

Singapore's Import Intensity

10 As in the case of exports, the intensity of Singapore's import trade with ASEAN-3 was the strongest among the various regions. It has, however, declined in recent years, reflecting a reduction in the special country bias factor. The rise in ASEAN-3's share of Singapore's total

imports was thus attributable to the increased weight of the region as a world exporter.

11 Of the ASEAN-3 economies, the intensity of Singapore's import trade with Malaysia remained the highest, although it fell substantially. This was attributable to a drastic decline in special country bias as each country developed and extended its trade linkages further ashore. In contrast, the intensity of Singapore's import trade with both Thailand and the Philippines saw an increase, reflecting the growing importance of Singapore as an export market to these countries. The increase in import intensity was supported by a rise in complementarity of Singapore's import trade with the two countries. The special country bias factor also increased in respect of trade with Thailand, although that with the Philippines declined.

12 While Singapore's export linkages with Northeast Asia increased in recent years, its import linkages with the region declined somewhat. This was despite the region's increased importance in world exports over the same period. The decline was due to the fall in intensity, or more specifically the special country bias, of Singapore's import trade with Northeast Asia. This reflects the somewhat more diversified export markets of Northeast Asia, unlike in ASEAN-3 whose export markets were concentrated within the same region. The decline in Singapore's import linkages with Northeast Asia was attributable mainly to Japan where the special country bias index of Singapore's imports has fallen.

13 Turning to the Western economies, Singapore's import linkages with North America declined marginally but those with the EU improved. The decline in import linkages with North America was due to a fall in intensity of trade even though the region's share of world exports has increased. The improvement in import linkages with the EU, on the other hand, was due entirely to an increase in EU's share of world exports.

Intra-Industry Trade

14 Intra-industry trade has in recent years made up an increasing share of Singapore's total trade with all the major regions. Trade with ASEAN-3 registered the highest proportion of intra-industry trade. Among the ASEAN-3 economies, the degree of intra-industry trade linkages with Malaysia was the strongest, followed by Thailand and the Philippines. Intra-industry trade with Northeast Asia was also significant while the bulk of Singapore's trade with North America and the EU was made up of *inter-industry* trade.

15 There are a number of possible explanations for the marked increase in intra-industry trade between Singapore and ASEAN-3, and Northeast Asia in recent years. First, the level of trade resistance among ASEAN economies was reduced, following a number of initiatives taken towards trade liberalisation within the region. Second, the rapid growth of intra-industry trade reflects ASEAN-3's increasing demand for capital goods and the capacity to produce them as a result of rapid industrialisation in recent years. Finally, the increased significance of intra-industry trade could also be ascribed to the trend in internationalisation of production in which multi-national corporations (MNCs) employ manufacturing facilities in several countries for production in order to harness locational comparative advantages.

Trade Linkages and their Implications

16 From the foregoing analysis, several implications for Singapore's external trade can be drawn, especially in light of the current regional economic downturn. First, given Singapore's strong export linkages with the ASEAN-3 and Northeast Asian economies, the regional slowdown is expected to have an adverse impact on Singapore's export growth.

17 Second, the predisposition toward special country bias, rather than complementarity, in Singapore's exports to ASEAN-3 has highlighted the importance of such factors as geographical proximity, historical ties, and investment flows between Singapore and the regional economies. Just as

these factors have buoyed Singapore's export growth during the boom export years of the ASEAN-3 economies in 1993-95, they are likely to pose a drag on Singapore's exports in the event of a protracted regional slowdown over the next few years.

18 Third, the adverse impact of a regional economic slowdown on Singapore may be mitigated somewhat by the significant share of its intra-industry trade or trade in intermediate goods with ASEAN-3, especially if the demand for final goods bound for the US and Europe remains healthy. However, high interest rates and cautious bank lending in the region have led to a credit squeeze on manufacturers which could sever key nodes in the regional production network.

19 Fourth, the slowdown in Singapore's export growth to Asian economies has accentuated the importance of the US and EU as its key export markets, notwithstanding their decline in recent years. Singapore's heavy reliance on ASEAN-3, economic uncertainty in the region and rising protectionist pressures from crisis-hit economies have underscored the need for Singapore to diversify its export base by reaching out to new growth areas outside the region.

20 Finally, the vulnerability of the Singapore economy to external shocks like the regional economic crisis has highlighted the importance for a more diversified economy. Singapore's economic base would have to be broadened to include the higher value-added services sectors, particularly financial and information technology.

1 INTRODUCTION

1.1 Singapore's international trade has experienced rapid growth over the last three decades, averaging 14% p.a. during 1965-1997. This reflects the outward orientation of an economy heavily dependent on external trade, and the robust growth in world trade of about 12% p.a. With total trade amounting to about three times its nominal GDP, Singapore is the world's 12th largest exporting nation in merchandise trade in 1997, up from 20th position in 1986. Singapore's share of world merchandise exports has more than doubled over the same period, from 1.1% to 2.2%. Despite the vital role played by external trade in Singapore's economic development, there has been relatively little analysis on the dynamics of its trade linkages with major trading partners. Recent studies include Tongzon (1996), who examined Singapore's bilateral trade relations with Australia during 1980-89, and Rajan (1996), who focussed on Singapore's trade linkages with Japan and the US over the period 1976-91.

1.2 Using the technique of trade intensity analysis, this paper updates and expands the scope of these studies to examine Singapore's trade linkages with its main trading partners and identifies its key driving forces over the period 1992-96. Export and import data at the 3-digit Standard Industrial Trade Classification (SITC) for Singapore are from *Singapore Trade Statistics: Imports and Exports* compiled by the Singapore Trade Development Board (TDB [various issues]), which do not include Singapore's trade with Indonesia. For other countries, the data are from the International Trade Centre UNCTAD/WTO (ITC), which do not cover Taiwan. Section 2 of the paper first provides an exposition of the decomposition of trade linkages and the methodology of trade intensity analysis. This is followed in Section 3 by a brief overview of recent trends in Singapore's bilateral trade relations. Singapore's major export and import linkages, and their underlying factors, are discussed in Sections 4 and 5 respectively. In Section 6, the paper examines further the characteristics of these trade linkages by focussing on the significance of intra-industry trade. Finally,

Section 7 concludes with some implications for Singapore's external trade in light of the current regional economic crisis.

2 DECOMPOSITION OF TRADE LINKAGES AND TRADE INTENSITY ANALYSIS

2.1 One approach to analyse bilateral and multilateral trade linkages is the use of interdependency measures. Petri (1993) identifies three commonly used ratios of interdependency. The first is an **absolute** measure of trading intensity, in which a particular bilateral or regional trade flow is normalized using overall world trade. The second is a **relative** measure, which deflates the absolute intensity with either the global share of the exporting country, or the global share of the importing country. It is the familiar bilateral trade share. However, looking at either the absolute measure or relative measure of trade flows alone may not be adequate as these measures may mask significant and special relationships underlying these flows. For example, the US is Singapore's largest trading partner largely by virtue of the fact that it is the world's largest economy and commands a substantial portion of world trade. For this reason, the third measure of trading intensity, known as the **double-relative** measure, deflates the absolute trade intensity with both the global shares of the exporting and importing countries. The double-deflation procedure effectively removes the "large-country" effect. Double-relative measures are also known as "gravity coefficients". (See, for example, Linnemann [1966], and Leontief and Strout [1963].) This paper employs largely the double-relative measure of trade intensity, which was first pioneered by Brown (1949) and subsequently developed by Kojima (1964) and Drysdale (1969).¹ Appendix 1 provides a more technical exposition of these measures of trade intensity analysis.

2.2 In this paper, Singapore's trade linkages with its trading partners refer to their importance in Singapore's total trade. Thus, export and import linkages are defined as the shares of the trading partners in Singapore's total exports and imports respectively. Shifts in trade linkages can be attributed to (1) the changing importance of the various countries or

¹ See Drysdale and Garnaut (1982) for a comprehensive discussion on the use of trade intensity analysis for analysing trade linkages.

regions in world trade, and (2) changes in trade intensity between Singapore and its trading partners. An increase in a country's or region's share of world trade, *ceteris paribus*, will lead to an expansion of its share of Singapore's trade. Trade intensity, on the other hand, measures the importance of a country or region to Singapore's trade *relative* to its importance to the rest of the world (ROW). This can be quantified by the export (or import) trade intensity index, which is defined as the country's or region's share of Singapore's exports (or imports) relative to its share of imports from (or exports to) the ROW. An export trade intensity of more (or less) than 1.0 indicates that Singapore is exporting more (or less) to the country or region than might be expected from the country's or region's share in world trade, and analogously for import trade intensity. Singapore's trade linkages with a region can thus be expressed as:

$$\text{Trade Linkages} = \text{Region's Share of World Trade} \times \text{Trade Intensity Index}$$

2.3 To gain further insights into bilateral trading relationships, the trade intensity index can in turn be decomposed into an index that accounts for the commodity composition of the countries' trade, and another that reflects the intensity of trade in various commodities. The first is the **complementarity index**, which measures the extent to which Singapore's commodity export pattern matches the trading partner's import pattern relative to the commodity pattern of imports from the ROW.² It is calculated as the weighted sum of the product of each commodity's share in Singapore's exports and in the trading partner's imports, with the weights being the inverse of the commodities' shares in world trade. A value of the index close to or greater than one implies a close match between Singapore's exports and the trading partner's imports. An analogous index can be defined for Singapore's imports and the trading partner's exports.

² Complementarity here refers to the degree of similarity between Singapore's exports and the trading partner's imports.

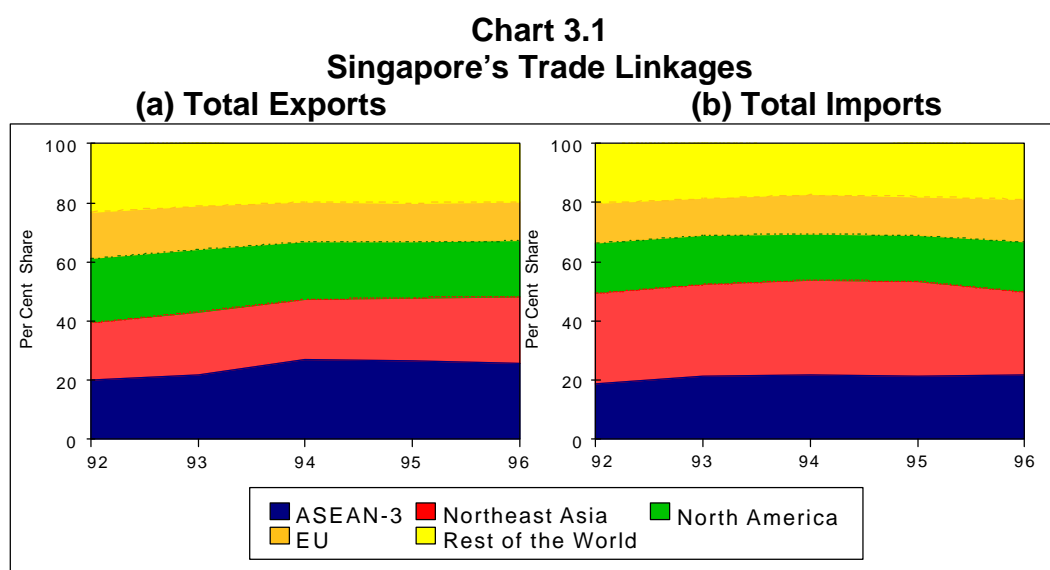
2.4 The second index is the **special country bias index**, which measures the degree of resistance in the trading partner's imports from Singapore relative to its average degree of resistance to imports from the ROW. Singapore's exports to the trading partner are said to enjoy a favorable country bias if the special country bias index is greater than one. Such bias may arise from relative geographical proximity, import preference granted to specific countries, associated flows of investment, technology and development aid. A special country bias index for Singapore's imports and the trading partner's exports can similarly be computed.

2.5 In summary, Singapore's trade linkages with a region can be attributed to: (1) the region's share of world trade; (2) the degree of complementarity in trade between the region and Singapore; and (3) the resistance (or bias) to Singapore's trade with the region relative to other trading partners, thus:

$$\text{Trade Linkages} = \text{Region's Share of World Trade} \times \text{Complementarity Index} \\ \times \text{Special Country Bias Index}$$

3 RECENT TRENDS IN SINGAPORE'S TRADE LINKAGES

3.1 Of the major geographical regions, Singapore's trade linkages with ASEAN-3³ strengthened the most in recent years. Between 1992 and 1996, ASEAN-3 recorded the largest increase in share of both Singapore's total exports and imports. The region's share of Singapore's total exports rose from 20.0% in 1992 to 25.5% in 1996, while its share of Singapore's total imports expanded from 18.8% to 21.6%. Over the same period, Northeast Asia⁴ also became a more important export market, with its share of Singapore's exports growing from 19.4% in 1992 to 22.8% in 1996. Its share of Singapore's imports, however, declined from 30.6% in 1992 to 28.2% in 1996. (See Chart 3.1.)



3.2 The strengthening of Singapore's trade linkages with ASEAN-3 and Northeast Asia mirrors a slackening of its linkages with both the EU⁵ and North America. The share of EU in Singapore's total exports declined from 15.8% in 1992 to 13.0% in 1996, whilst the North American share fell from 21.8% to 18.8%. Both regions, however, remained as Singapore's major

³ ASEAN-3 refers to Malaysia, Thailand and the Philippines.

⁴ Northeast Asia here includes Japan, China, South Korea and Hong Kong.

⁵ EU refers to EU-13, which includes the UK, Germany, Austria, Denmark, France, Italy, Finland, Switzerland, Sweden, Spain, Ireland, Belgium and Luxembourg.

sources of imports, accounting for a significant 14.5% and 16.9% of total imports in 1996 respectively.

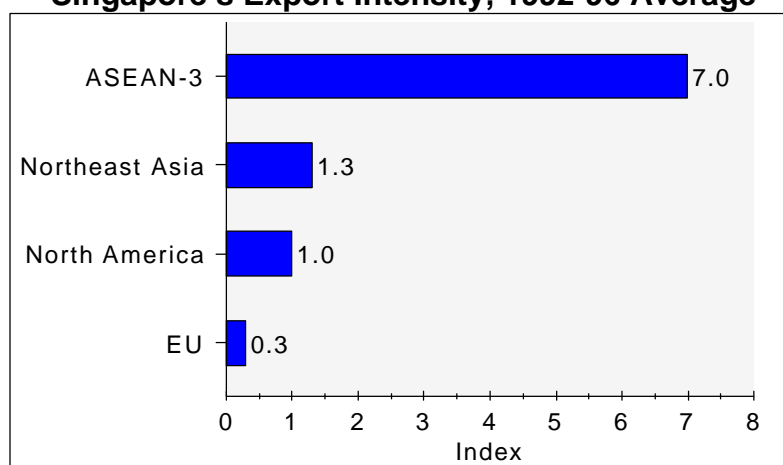
3.3 Singapore's growing export linkages with ASEAN-3 and Northeast Asia reflects its strong export growth to these markets during the period. An earlier study (MAS [1998a]) on Singapore's export market growth using the technique of shift-share analysis showed that the largest gain in exports was recorded in the ASEAN market, followed by Northeast Asia. Singapore's strong export performance was underpinned mainly by the rapid growth in exports of machinery & transport equipment (SITC 7), comprising largely electronics. The robust growth in electronics exports, in particular, office & data machines and electronic valves to these markets reflects Singapore's favourable industrial structure that was skewed towards an industry experiencing rapid expansion during 1993-95.

4 SINGAPORE'S EXPORT INTENSITY BY REGION

ASEAN-3

4.1 An analysis of trade intensity reveals that Singapore's trade relations with ASEAN-3 were much stronger than implied by their bilateral export and import shares. The trade intensity index of Singapore's exports to ASEAN-3 averaged 7.0 in 1992-96, much higher than 1.3 for Northeast Asia, 1.0 for North America and 0.3 for the EU. (See Chart 4.1.) An export intensity index of 7.0 means that the share of Singapore's exports to ASEAN-3 was 7 times the region's share of imports from the rest of the world, suggesting an over-representation of the region as an export market to Singapore. In other words, Singapore exported much more to ASEAN-3 than might be expected from the region's share in world imports. This could be attributable to Singapore's substantial re-export trade with the region, given its role as a regional hub for port services. In 1996, re-exports accounted for 57% of Singapore's total exports to ASEAN-3, compared with 38% to Northeast Asia and 21% to North America. Nonetheless, even on the basis of domestic exports alone, Singapore's intensity of trade with ASEAN-3 still averaged a significant 4.4 in 1996.

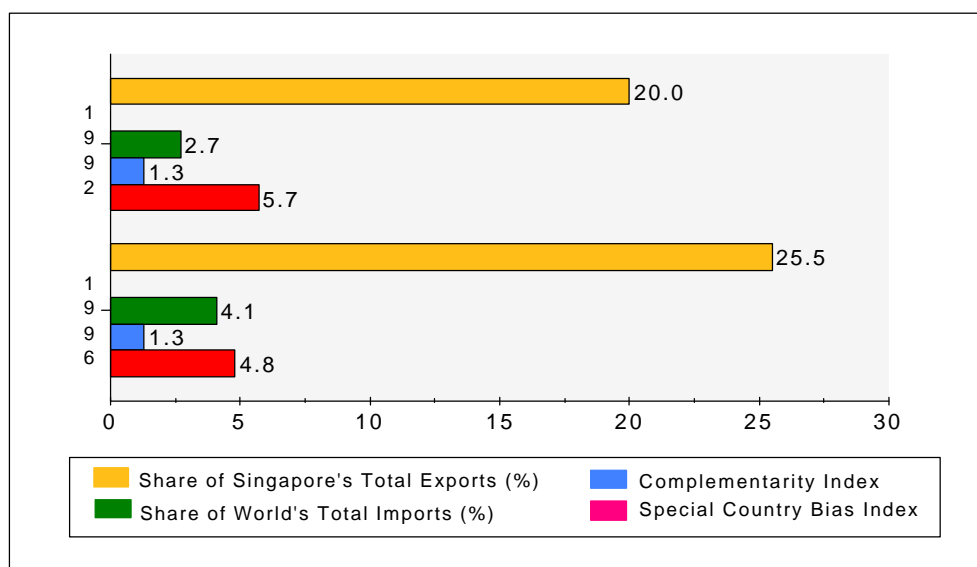
Chart 4.1
Singapore's Export Intensity, 1992-96 Average



4.2 Notwithstanding the strong trade linkages, the intensity of Singapore's total export trade with ASEAN-3 declined during the period, from 7.4 in 1992 to 6.2 in 1996. Thus, the expansion of ASEAN-3's share in

Singapore's total exports over 1992-96, discussed in the last section, reflected the growing importance of the region as a world importer. As shown in Chart 4.2, ASEAN-3's share of world imports rose from 2.7% in 1992 to 4.1% in 1996. A decomposition of the export intensity of Singapore's trade with ASEAN-3 shows that its decline reflects primarily the fall in the special country bias although, at 4.8 in 1996, the special country bias index was still considerably higher than the complementarity index of 1.3. Thus, Singapore's exports to ASEAN-3 were based less on the degree of complementarity in commodity composition of traded goods than the fact that Singapore's exports encountered significantly lower resistance, compared to those from the ROW. The significant special country bias reflects the importance of factors such as geographic proximity, strong bilateral ties, investment linkages and trade agreements, such as the ASEAN Preferential Trading Arrangement, in facilitating Singapore's trade with ASEAN-3.

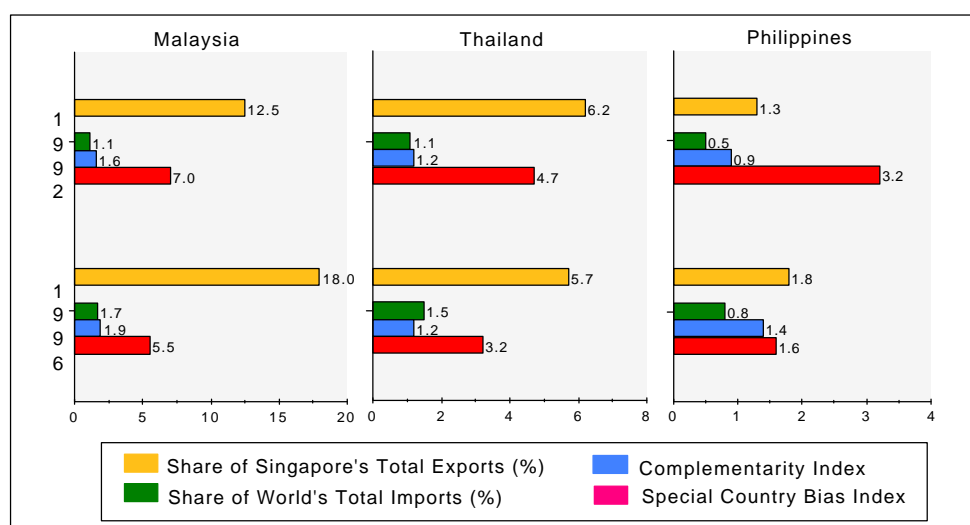
Chart 4.2
Decomposition of Singapore's Export Trade Linkage with ASEAN-3



4.3 Among the ASEAN-3 economies, Singapore's export trade linkages with Malaysia were by far the strongest and, moreover, improved the most during 1992-96. Malaysia was Singapore's largest export market in ASEAN in 1996, accounting for 18.0% of total exports, up from 12.5% in

1992. The orientation of Singapore's exports towards Malaysia reflects, primarily, the growing importance of latter as a world importer and, secondarily, the increase in complementarity of its trade with Singapore. Malaysia's share of world imports increased from 1.1% in 1992 to 1.5% in 1996, while the index of complementarity of Singapore's exports with Malaysia's imports rose from 1.6 to 1.8. (See Chart 4.3.) The latter could have been facilitated by the promotion of growth triangle, which enables companies to relocate their production facilities to harness the comparative advantages of the partner countries. Together, the two factors more than offset the significant decline in the special country bias in Singapore's export trade with Malaysia, which remained high for reasons of geographical proximity and historical ties.

Chart 4.3
Decomposition of Export Linkages with Individual ASEAN-3 Economies



4.4 Singapore's export trade linkages with the Philippines also improved, reflecting both increases in the Philippines' share of world imports and the complementarity of its trade with Singapore. However, the special country bias in Singapore's exports to the Philippines saw a sharp decline from 3.2 in 1992 to 1.6 in 1996. This was the lowest special country bias index recorded among the ASEAN-3 countries, indicating a bilateral trading

relationship that was the least intense.⁶ Nonetheless, the substantial 70% p.a. growth in Singapore's investments in the Philippines over 1992-95, would augur well for even greater trade linkages between the two countries.

4.5 In contrast to Malaysia and the Philippines, Singapore's export linkages with Thailand weakened. This was reflected in the decline in Thailand's share of Singapore's total exports, from 6.2% in 1992 to 5.7% in 1996. The orientation of Singapore's exports away from Thailand was attributable mainly to a decline in special country bias, which fell from 4.7 to 3.2. Moreover, given Thailand's increased significance as a world importer during the period, the deterioration in export linkages suggests that Singapore has not been as successful as the ROW in penetrating the Thai market.

Northeast Asia

4.6 By contrast, Singapore's strong and improving trade linkages with Northeast Asia were predominantly due to the region's growing importance in world trade. Between 1992 and 1996, Northeast Asia's share of Singapore's exports rose from 19.4% to 22.8% as its share of world imports increased from 14.9% to 18.9%. The intensity of Singapore's exports to the region, however, was not particularly high, averaging 1.3 during 1992-96, and has in fact declined over the period. (See Chart 4.4.)

4.7 Indeed, except for Hong Kong, the intensity indices of Singapore's exports to the individual economies of Northeast Asia were at about 1.0 or less in 1996. This implies that these economies' trade relations with Singapore were less than with the rest of the world. China is the only Northeast Asian economy that saw an improvement, albeit marginal, in the export intensity with Singapore's trade. The improvement was mainly accounted for by the rise in the special country bias index, reflecting China's

⁶ The decline in special country bias index reflects to some extent the deterioration in political ties between Singapore and the Philippines over the controversy surrounding the hanging of a Filipino maid in 1995. The strained bilateral relationship could have led to greater resistance in the Philippines towards Singapore's exports.

greater openness to Singapore's exports. (See Chart 4.5.) The orientation towards Singapore's exports could be due to growing investment links between Singapore and China in recent years, particularly following the launch of the Singapore-Suzhou Industrial Park. For example, between 1992-1995, Singapore's investments in China expanded by a significant 62% p.a.

Chart 4.4
Decomposition of Singapore's Export Linkage with Northeast Asia

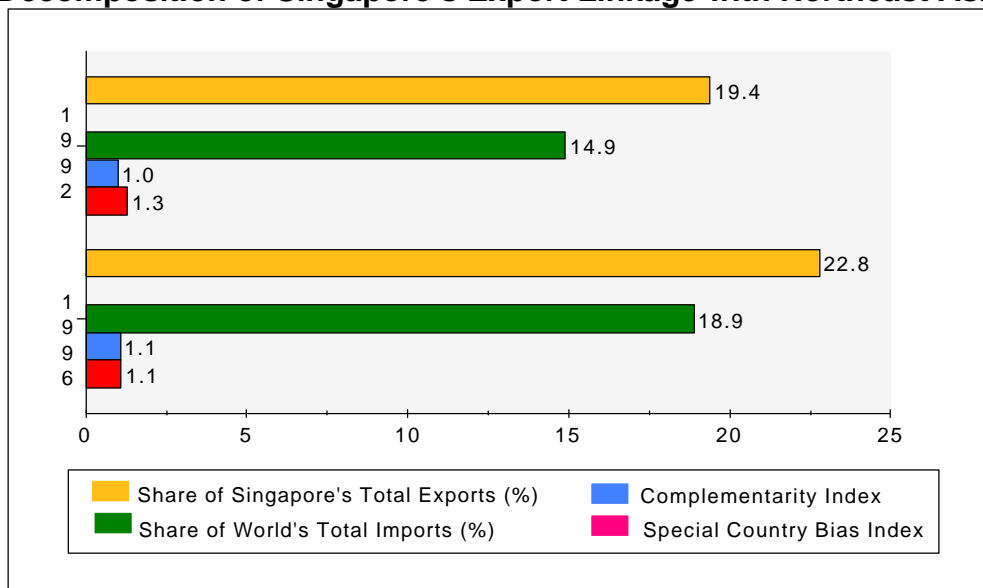
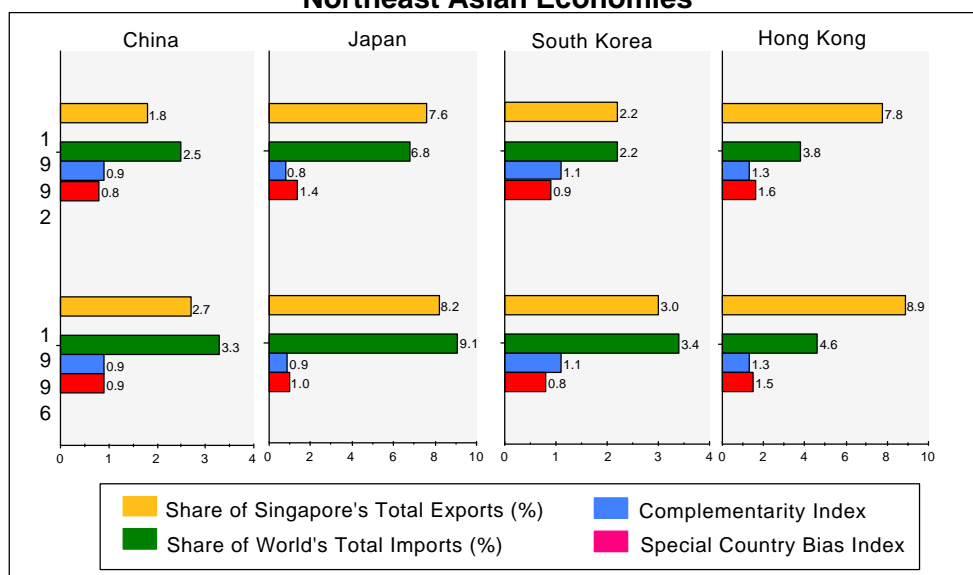


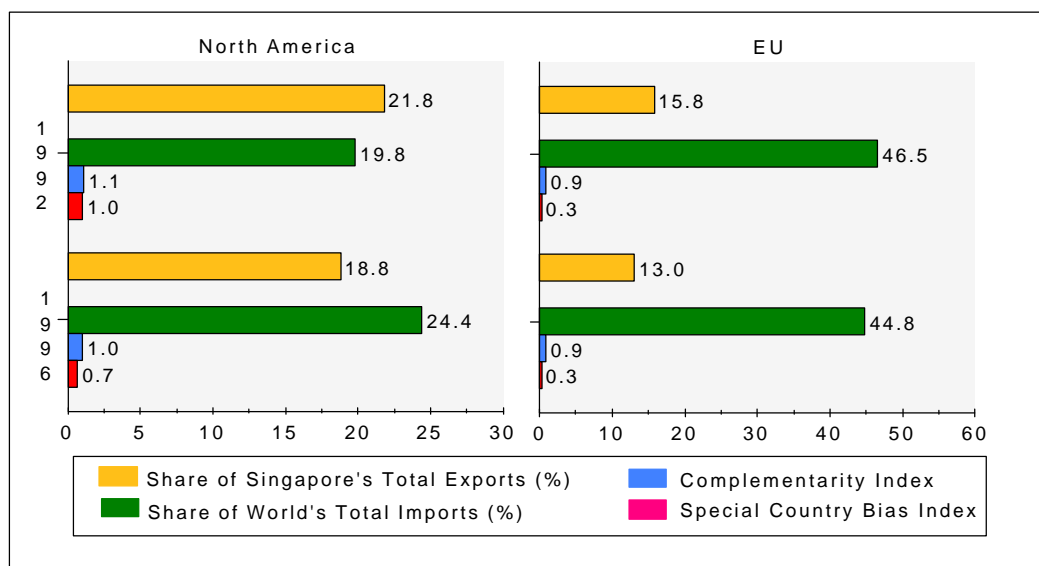
Chart 4.5
Decomposition of Singapore's Export Linkages with Northeast Asian Economies



North America and EU

4.8 The strengthening of Singapore's export linkages with ASEAN-3 and Northeast Asia was at the expense of the North American and EU markets. Between 1992 and 1996, North America's share of Singapore's total exports fell from 21.8% to 18.8%, while that of EU declined from 15.8% to 13.0%. (See Chart 4.6.) The diminution in Singapore's export linkages with North America owed much to the decline in its intensity of trade with North America, particularly its special country bias, even though the region's share of world imports has increased. This reflected a shift in bias of North American imports from Singapore to other countries, with Mexico being a particularly prominent beneficiary. Indeed, given its geographical proximity, substantial US direct investments and the host of maquiladoras⁷ at its border with the US, Mexico's share of US imports of machinery and transport equipment (SITC 7) - Singapore's key exports - rose from 7.7% in 1992 to 11.2% in 1996.

Chart 4.6
Decomposition of Singapore's Export linkages with North America and EU



⁷

Maquiladoras are non-Mexican-owned production plants that complete processing or secondary assembly of imported components for exports. These plants are exempted from Mexican tariffs on imports of parts and material. Also, US firms that use maquiladoras are exempted from US tariffs on the US components of maquiladora-made goods when these goods are exported back to the US. As a result, US firms have increasingly turned to outsourcing to the maquiladoras a large fraction of manufactured goods, particularly in electric/electronics, transport equipment and textiles. See, for example, Hummels, Rapoport and Yi (1998).

4.9 On the other hand, the decline in Singapore's export linkages with the EU was entirely due to the latter's decline in importance in world imports. The export intensity of Singapore's trade with the EU was unchanged over the 1992-96 period although, at 0.3, it was the lowest among the various trade regions. Indeed, Singapore's exports to the EU exhibited a special country bias index that was substantially lower than the complementarity index. This implies a high degree of trade resistance between Singapore and the EU, caused perhaps by factors such as geographical distances, cultural differences and the domination of intra-regional trade within a single common market.⁸

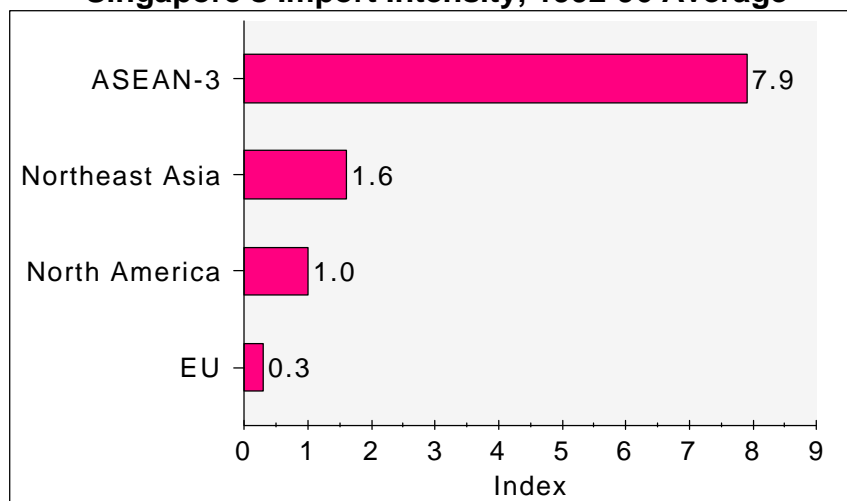
⁸ According to Frankel (1997), intra-regional trade in the EU has been on the rise since the 1960s.

5 SINGAPORE'S IMPORT INTENSITY BY REGION

ASEAN-3

5.1 As in the case of exports, the intensity of Singapore's import trade with ASEAN-3 was the strongest among the various regions, with the import intensity index registering an average 7.9 in 1992-96. Thus, the share of ASEAN-3 in Singapore's imports was 7.9 times its share of world exports. By comparison, Singapore's import intensity indices with the other regions were 1.6 for Northeast Asia, 1.0 for North America and 0.3 for the EU. (See Chart 5.1.)

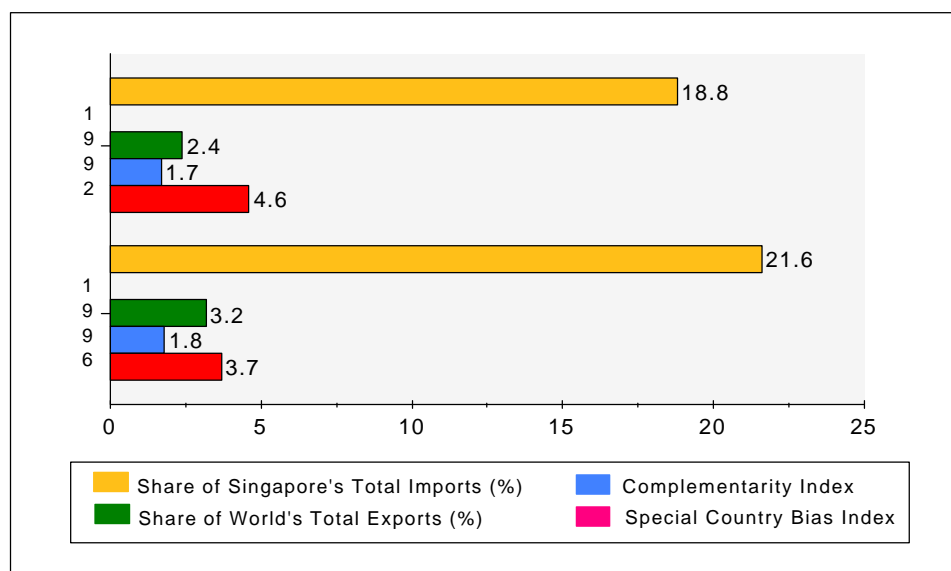
Chart 5.1
Singapore's Import Intensity, 1992-96 Average



5.2 The rise in ASEAN-3's share of Singapore's total imports, from 18.8% in 1992 to 21.6% in 1996, was attributable to the increased weight of the region as a world exporter, even though the intensity of Singapore's imports from the region has declined. (See Chart 5.2.) The ASEAN-3's share of world exports expanded from 2.2% to 2.9% during the period. This reflected an acceleration in the export-oriented industrialisation strategy of the regional economies in recent years. Indeed, manufactured exports accounted for 79% of total exports of the ASEAN-3 economies in 1996, compared with 63% in 1992. The decline in intensity of Singapore's imports from the region from 7.8 in 1992 to 6.7 in 1996, on the other hand, was

caused by a reduction in the special country bias factor, even though their complementarity in trade has increased.

Chart 5.2
Decomposition of Singapore's Import Trade Linkage with ASEAN-3



5.3 Of the ASEAN-3 economies, the intensity of Singapore's import trade with Malaysia remained the highest, although it declined substantially, from 12.4 in 1992 to 8.3 in 1996. The decline in trade intensity was attributable to a drastic fall in special country bias, reflecting a natural development in diversification as each country developed and extended its trade linkages further ashore. (See Chart 5.3.) Also, Malaysia's efforts at developing and promoting local ports via administrative measures, such as levy on goods vehicles using Singapore's port, appeared to have had some success in diverting its domestic exports from Singapore to Port Kelang. (See, for example, Chart 5.4.)

5.4 In contrast, the intensity of Singapore's import trade with both Thailand and the Philippines saw an increase, reflecting the growing importance of Singapore as an export market for these countries. The increase in import intensity was supported by a rise in complementarity of Singapore's import trade with the two countries. The special country bias factor also increased in respect of trade with Thailand, although that with the Philippines declined for possibly the same reason as that cited earlier, viz. a

temporary tiff in diplomatic relations following the controversy surrounding the hanging of a Filipino maid convicted of murder in 1995. Along with growth in their shares of world exports, Singapore's import linkages with Thailand and the Philippines thus strengthened over the period, from 3.7% and 0.4% in 1992 to 5.5% and 1.1% in 1996 respectively.

Chart 5.3
Decomposition of Singapore's Import Trade Linkage with ASEAN-3 Economies

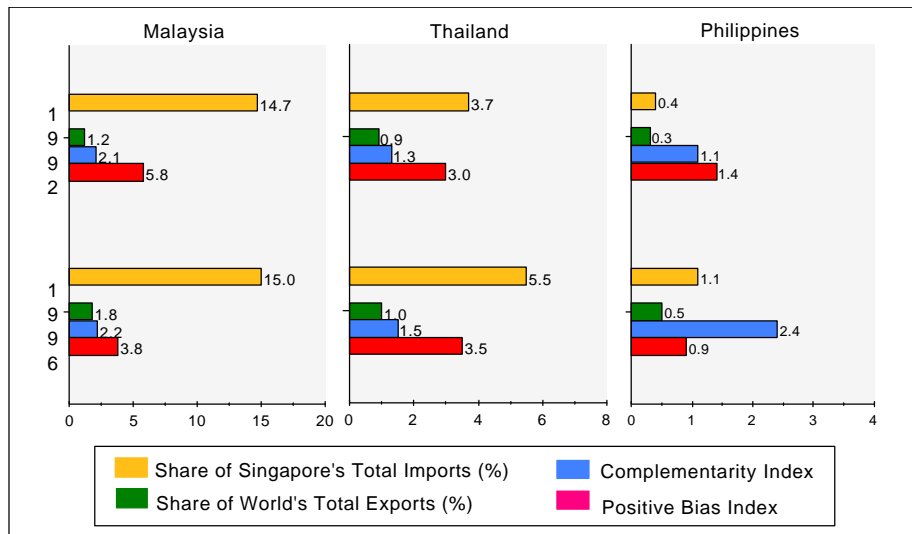
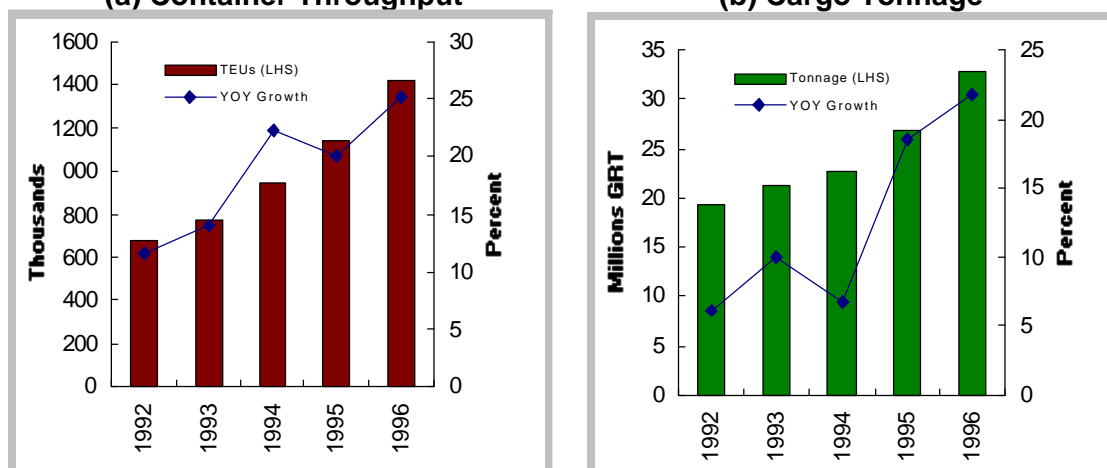


Chart 5.4
Malaysia's Exports Through Port Kelang
(a) Container Throughput **(b) Cargo Tonnage**

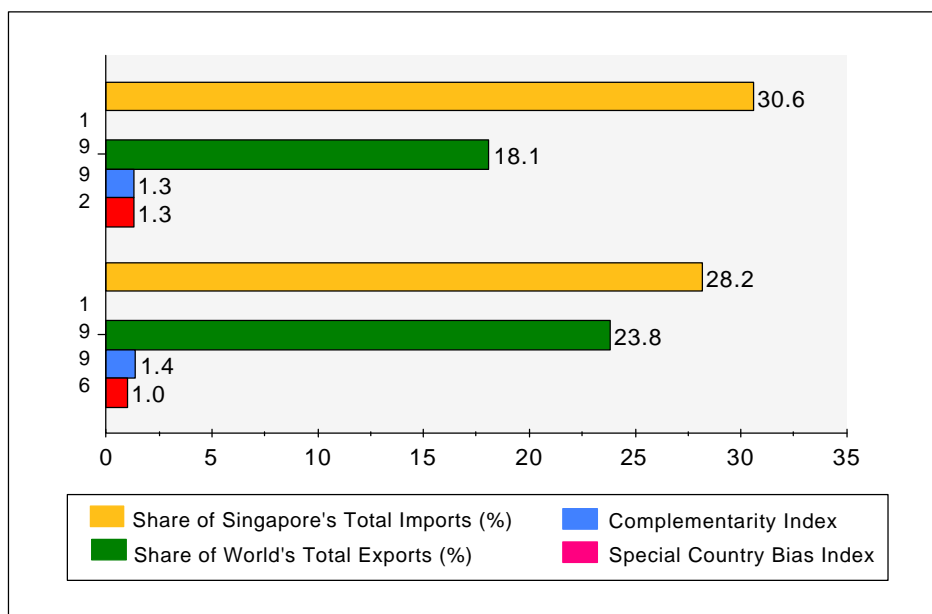


Source: Malaysia Yearbook of Statistics (various issues)

Northeast Asia

5.5 While Singapore's export linkages with Northeast Asia has increased in recent years, its import linkages with the region declined somewhat. Northeast Asia accounted for 28.2% of Singapore's total imports in 1996, down from 30.6% in 1992. (See Chart 5.5.) This is despite the region's increased importance in world exports over the same period. The decline was due to the fall in intensity, or more specifically the special country bias, of Singapore's import trade with Northeast Asia. This reflected the increasingly more diversified export markets of Northeast Asia, unlike in ASEAN-3 whose export markets are concentrated within the same region.

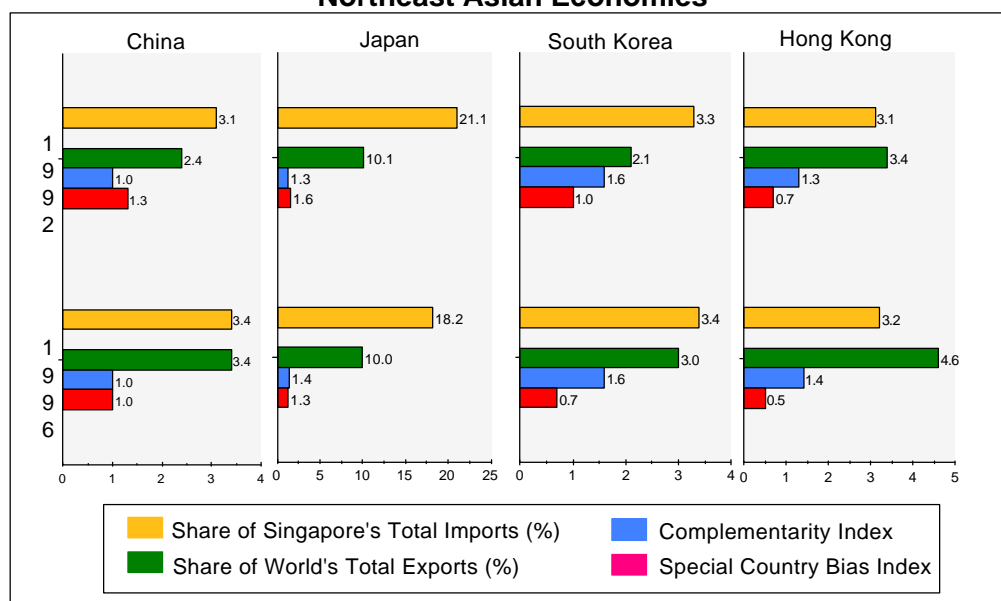
Chart 5.5
Decomposition of Singapore's Import Trade Linkage with Northeast Asia



5.6 The decline in Singapore's import linkages with Northeast Asia was attributable in particular to Japan, whose share of Singapore's total imports fell from 21.1% in 1992 to 18.2% in 1996. (See Chart 5.6.) The special country bias index of Singapore's imports from Japan declined from 1.6 to 1.3, while the complementarity index improved slightly from 1.3 to 1.4. Although the special country bias indices of Singapore's imports from the other Northeast Asian economies also declined, it was more than offset by their increased share of world exports on the back of their strong export growth. For example, China's exports expanded by a significant 12.2% p.a.

in 1992-96 as its economic reforms expanded and accelerated, lifting its share of world exports from 2.4% in 1992 to 3.4% in 1996. Concomitantly, Singapore's import linkages with China, Hong Kong and South Korea strengthened over the period.

Chart 5.6
Decomposition of Singapore's Import Trade Linkage with Northeast Asian Economies



North America and EU

5.7 Turning to the Western economies, Singapore's import linkages with North America declined marginally but those with the EU improved. The decline in import linkages with North America was due to a fall in intensity of trade even though the region's share of world exports increased. The improvement in import linkages with the EU, on the other hand, was due entirely to the increase in EU's share of world exports. As in the case of exports to the region, the special country bias index of Singapore's imports from the EU was very low. (See Chart 5.7.)

5.8 Table 5.1 summarises the dynamics of Singapore's trade linkages with its major trading partners between 1992 and 1996. Export linkages with all Asian economies, except Thailand, strengthened. This was attributable largely to the increase in share of world imports by these economies as well as the rise in complementarity between their imports and

Singapore's exports. Singapore's exports were generally marked by a decline in special country bias, reflecting increasing openness of these markets to other trading partners. Singapore's import trade linkages displayed somewhat similar characteristics, with the rise in world export share of its trading partners and complementarity indices as the main contributing factors.

Chart 5.7
Decomposition of Singapore's Import Trade Linkage with EU & North America

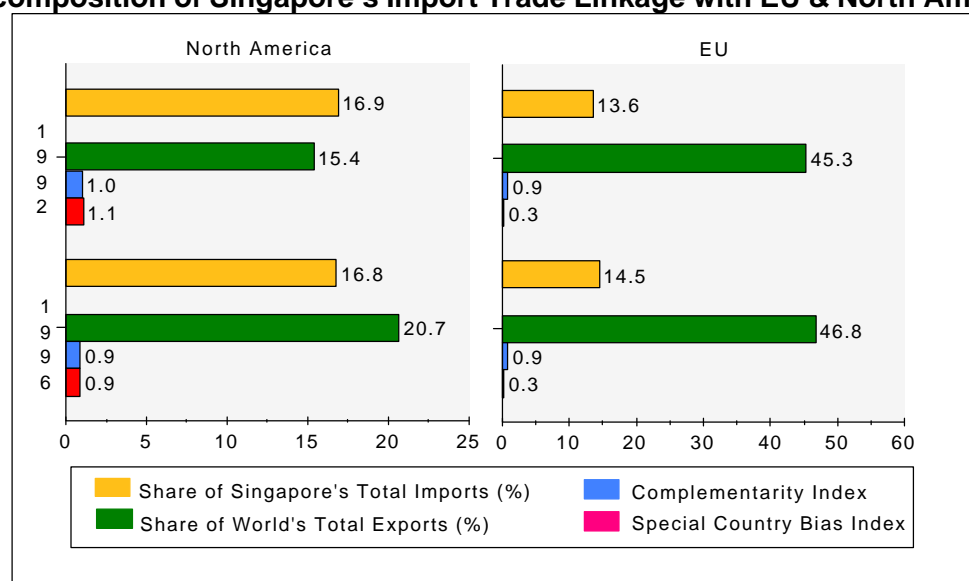


Table 5.1
Singapore's Trade Linkages between 1992-96

Trading Partner	Exports				Imports			
	Trade Linkages	Partner's Share of World Imports	C.I.	S.C.I.	Trade Linkages	Partner's Share of World Exports	C.I.	S.C.I.
Asean-3	+	+	0	--	+	+	+	--
Malaysia	+	+	+	--	+	+	+	--
Thailand	--	+	0	--	+	+	+	+
Philippines	+	+	+	--	+	+	+	--
Northeast Asia	+	+	+	--	--	+	+	--
China	+	+	0	+	+	+	0	--
Japan	+	+	+	--	--	--	+	--
S. Korea	+	+	0	--	+	+	0	--
Hong Kong	+	+	0	--	+	+	+	--
EU	--	--	0	0	+	--	0	0
North America	--	+	--	--	--	+	--	--

KEY:

C.I. Complementarity Index
+ Increase

S.C.I. Special Country Bias Index
-- Decrease

o Unchanged

6 INTRA-INDUSTRY TRADE

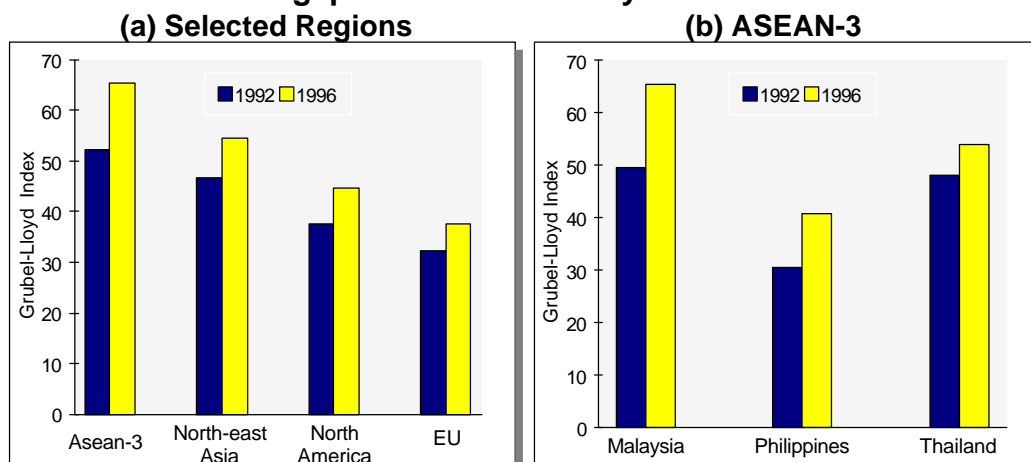
6.1 A major factor contributing to the trends in Singapore's trade linkages with its major trading partners has been their changing patterns of trade. For example, much of the increase in bilateral trade linkages in recent years could be ascribed to a significant increase in overlap in the composition of goods traded, as evident in the rise of complementarity index in Singapore's trade with a number of its trading partners. To gain further insights into the issue, this section examines the significance of intra-industry trade between Singapore and its major trading partners.

6.2 Intra-industry trade refers to the simultaneous import and export of products within the same industry and can either involve trade in differentiated products (horizontal specialisation) or trade in intermediate goods (vertical specialisation). The most commonly used indicator of intra-industry trade is the Grubel-Lloyd (G-L) index, which measures the share of intra-industry trade in total trade. (See Appendix 2 for a technical exposition of the G-L index.)

6.3 As Chart 6.1 shows, an increasing proportion of Singapore's total trade with all the major regions was characterised by intra-industry trade. The G-L indices for ASEAN-3, Northeast Asia, North America and the EU all trended upwards between 1992 and 1996. Trade with ASEAN-3 registered the highest G-L index of 65 in 1996. In other words, intra-industry trade accounted for 65% of Singapore's total trade with the region, a marked increase from 52% in 1992. Over this period, intra-industry trade contributed up to 77% of the growth in total trade between Singapore and ASEAN-3.

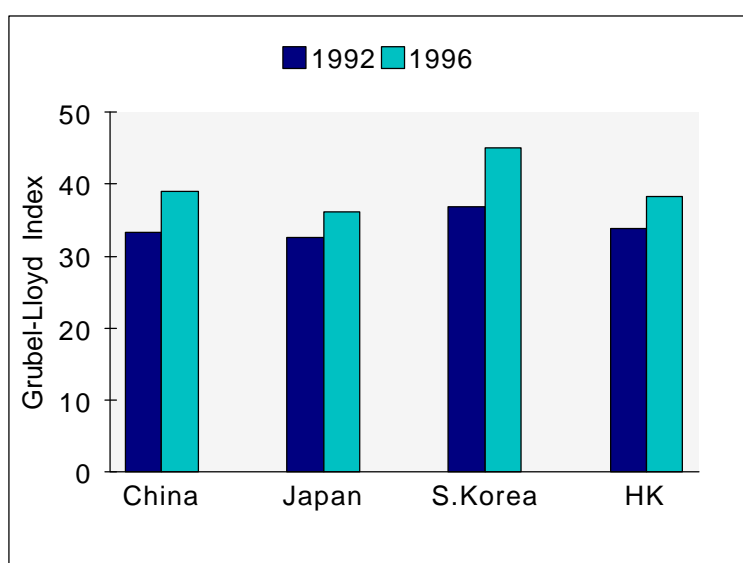
6.4 Among the ASEAN-3 economies, the degree of intra-industry trade linkage with Malaysia was the strongest, with the G-L index at 65 in 1996, up from 50 in 1992. This was followed by Thailand and the Philippines, with G-L indices of 54 and 41 in 1996 respectively.

Chart 6.1
Singapore's Intra-Industry Trade With



6.5 Intra-industry trade with Northeast Asia was also significant, accounting for 55% of total trade in 1996, up from 47% in 1992. During this period, some 67% of the growth in Singapore's total trade with the region was contributed by intra-industry trade. Among the Northeast Asian economies, Singapore's trade with South Korea has the highest proportion of intra-industry trade, with a G-L index at 45 in 1996, up from 37 in 1992. (See Chart 6.2.) On the other hand, intra-industry trade with Japan, China and Hong Kong remained relatively low, recording G-L indices of about 38.

Chart 6.2
Singapore's Intra-Industry Trade with Northeast Asian Economies



6.6 In contrast to Asian trading partners, the bulk of Singapore's trade with North America and the EU was made up of *inter-industry* trade, although the intra-industry trade had also risen somewhat over the years. With North America, intra-industry trade constituted 45% of Singapore's total trade in 1996, up from 38% in 1992, and accounted for 58% of the growth in total trade over the period. With the EU, the proportion of intra-industry trade was lower at 38% in 1996, albeit higher than 32% in 1992. Intra-industry trade accounted for 47% of the growth in Singapore's total trade with the EU during 1992-96.

6.7 There are a number of possible explanations for the marked increase in intra-industry trade between Singapore and ASEAN-3, and Northeast Asia in recent years. First, the level of trade resistance among ASEAN economies was reduced, following a number of initiatives taken towards trade liberalisation within the region. In particular, the levels of trade protection in Malaysia and Thailand came down considerably over the past few years. The removal of tariffs could have allowed resources to be re-allocated from import-competing to export-promoting sectors. This is usually associated with a diversification in export patterns through the process of horizontal specialisation, thereby raising the share of intra-industry trade. Conversely, the establishment of the North American Free Trade Area (NAFTA) in 1992 and the Single European Market in 1993 could have hampered the growth of intra-industry trade between Singapore and these regions.

6.8 Second, the rapid growth of intra-industry trade reflected the industrial development of ASEAN-3 in recent years. With the rapid industrialisation of these economies, their demand for capital goods and the capacity to produce them increasingly resembled those of Singapore. Moreover, the growth of intra-industry trade was also boosted by the rising share of manufactured goods in the trade structures of the ASEAN economies. Manufactured goods typically exhibited greater product differentiation and scale economies in their production, all of which are major determinants of intra-industry trade.

6.9 Finally, the increased significance of intra-industry trade could also be ascribed to the trend in internationalisation of production. Rather than concentrate production in a single country, multi-national corporations (MNCs) used production plants - operated either as subsidiaries or through sub-contracting firms - in several countries. This allowed the MNCs to harness powerful locational comparative advantages, such as proximity to markets and access to low-cost labour. This is the principle espoused in the Singapore-Johor-Riau Growth Triangle.

6.10 However, as Hummels, Rapoport and Yi (1998) noted, increased international production does not always lead to increased international trade. For example, if MNCs serve their overseas markets through production facilities in each market, rather than through exports from the home or third country, trade may actually decline with international production. International production will be associated with increased trade when these transnational facilities are vertically linked, i.e. when countries specialise in particular stages of the production process. Indeed, the international vertical integration in manufacturing production by MNCs has led to the establishment of a network of production facilities in the region, particularly for electronic goods. Given the small size of the ASEAN market, however, the bulk of final production is intended for eventual export to the US and the EU. These regional production facilities contributed to the increase in intra-industry trade through trade in intermediate goods such as parts and components. For example, estimates by the Trade Development Board showed that about 80% of Singapore's non-oil domestic exports to the ASEAN region comprised intermediate goods.⁹

⁹ See *The Straits Times*, 21 Jan 1998.

7 TRADE LINKAGES AND THEIR IMPLICATIONS

7.1 From our analysis of Singapore's trade linkages, several implications for Singapore's external trade can be drawn, especially in light of the current regional economic downturn. First, given Singapore's strong export linkages with the ASEAN-3 economies, the regional slowdown is expected to have an adverse impact on Singapore's export performance. In addition, Singapore has strong export linkages with the Northeast Asian economies, and recessions in Japan, Hong Kong and South Korea would further dampen the demand for Singapore's exports.

7.2 Second, the predisposition toward special country bias, rather than complementarity, in Singapore's exports to ASEAN-3 has highlighted the importance of such factors as geographical proximity, historical ties, and investment flows between Singapore and the regional economies. Just as these factors had buoyed Singapore's export growth during the boom years of the ASEAN-3 economies in 1993-95, they are likely to pose a drag on Singapore's exports in the event of a protracted regional slowdown over the next few years. Growth of intra-regional investments, for example, is expected to decline and adversely affect intra-regional export performance.

7.3 Third, the adverse impact of a regional economic slowdown on Singapore may be mitigated somewhat by the significant share of its intra-industry trade or trade in intermediate goods with ASEAN-3, especially if the demand for final goods bound for the US and Europe remains healthy. However, high interest rates and cautious bank lending in the region have led to a credit squeeze on manufacturers which could sever key nodes in the regional production network. Moreover, foreign direct investments in the region are expected to slow, given the current economic environment and depressed investor confidence, thereby putting a cap on MNC activities in the regional economies.

7.4 Fourth, the recent slowdown in Singapore's export growth to Asian economies has accentuated the importance of the US and EU as its

key export markets, notwithstanding their decline in recent years. Given their favourable economic outlook, trade linkages with these regions are likely to strengthen in the coming years as Singapore's exporters divert their attention from the regional economies to faster growth areas like the industrial economies. Singapore's heavy reliance on ASEAN-3 and economic uncertainty in the region have underscored the need for Singapore to diversify its export base by reaching out to new growth areas outside the region. Moreover, the high special country bias of Singapore's trade with ASEAN-3 would imply greater vulnerability of Singapore exporters to rising protectionist pressures under the current economic conditions.¹⁰ While Singapore has made some headway in penetrating into non-traditional markets, such as Ireland (as shown in MAS [1998a]), its trading relations with countries in the Middle East, South Asia, Latin America and Eastern Europe remain superficial.

7.5 Finally, the susceptibility of the Singapore economy to external shocks like the current regional economic crisis has highlighted the need for a more diversified economy. For long-term sustainable growth, it is critical that the engines of growth for the economy not be limited to just a few industries. Notwithstanding its resource constraints, Singapore's economic base would have to be broadened, involving the higher value-added services sectors such as financial and information technology services. Indeed, consistent with trends in the OECD countries, the employment share of services in the Singapore economy has increased over the years (MAS [1998b]). Economic growth and improvement to standards of living in the future will also increasingly depend on productivity improvement in the services sectors.

¹⁰ See Political & Economic Risk Consultancy, *Asian Intelligence*, 22 Jul 98.

Appendix 1: A Technical Note on the Measures of Trade Intensity

1 The absolute measures (A_{ij}) of trade intensity in exports of country i to country j is defined as the share of country i 's exports to country j as a proportion of world trade, thus:

$$A_{ij} = \frac{X_{ij}}{X_w} \quad (1)$$

where X_{ij} = exports of country i to trading partner j

X_w = total world exports

2 The relative measure (R_{ij}) of trade intensity deflates the absolute intensity with either the worldwide export share of the exporting country i , or the worldwide import share of the importing country j :

$$R_{ij} = \frac{A_{ij}}{X_i/X_w} = \frac{X_{ij}}{X_i} \quad (2)$$

$$\text{or } R'_{ij} = \frac{X_{ij}}{M_j} \quad (3)$$

where X_i = total exports of country i

M_j = total imports of country j

3 The double-relative measure (DR_{ij}) of trade intensity deflates absolute intensity with both the worldwide export share of the exporting country i and the worldwide import share of the importing country:

$$DR_{ij} = \frac{A_{ij}}{(X_i/X_w)(M_j/X_w)} = \frac{X_{ij}X_w}{X_iM_j} = \frac{X_{ij}}{X_i} \bigg/ \frac{M_j}{X_w} \quad (4)$$

4 The double-relative measure of trade intensity can be modified by using overall world trade reduced by country i's exports and country j's imports as deflator. This adjustment is necessary as country i cannot export to itself and country j cannot import from itself. The index of trade intensity (IX_{ij}) can thus be defined as the share of country i's export trade with country j relative to country j's share in imports from the rest of the world (ROW),

$$IX_{ij} = \left\{ \frac{X_{ij}}{X_i} \right\} / \left\{ \frac{M_j}{M_w - M_i} \right\} \quad (5)$$

where M_w = total world imports

thus:

5 The index of trade intensity in exports of country i to country j can be expressed as the product of a **complementarity index** CX_{ij} and an index of **special country bias** BX_{ij} , thus;

$$IX_{ij} = CX_{ij} \cdot BX_{ij}$$

6 The complementarity index for country i's exports to country j is defined as:

$$\begin{aligned} CX_{ij} &= \sum_k \left\{ \frac{X_i^k}{X_i} \cdot \frac{M_j^k}{M_j} \cdot \frac{M_w - M_i}{M_w - M_i^k} \right\} \\ &= \sum_k \left(\frac{1}{\left(\frac{M_w - M_i^k}{M_w - M_i} \right)} \right) \left[\frac{X_i^k}{X_i} \cdot \frac{M_j^k}{M_j} \right] \end{aligned} \quad (6)$$

where X_i^k = country i's exports of commodity k

M_j^k = country j's imports of commodity k

M_i^k = country i's imports of commodity k

M_w^k = world imports of commodity k

7 The complementarity index, CX_{ij} , is the weighted sum of the products of each commodity's share in country i's exports and in country j's imports, with commodities weighted by the inverse of their shares in world trade. It measures the extent to which the commodity composition of country i's

exports matches that of country j's imports relative to the commodity composition of world trade. A value greater than 1.0 for the index implies that the commodity composition of country i's exports matches country j's imports better than imports by the rest of the world.

8 The special country bias index, BX_{ij}^k , in exports of each commodity k is defined as:

$$BX_{ij}^k = \left\{ \frac{X_{ij}^k}{X_i^k} \right\} / \left\{ \frac{M_j^k}{M_w^k - M_i^k} \right\} \quad (7)$$

where X_{ij}^k = country i's exports of commodity k to country j

9 The index measures the importance of country j as a market for country i's exports of k relative to its importance as a world importer of k. If the index is greater than unity, it implies that country i's trade in commodity k is biased towards country j as the latter is a more important market than the ROW to country i in the exports of k. It can also be interpreted as the resistance of country j to country i's exports of k being less than its resistance to exports from rest of the world of the same commodity.

10 Given the different composition by commodity of country i's exports to country j, a composite bias index of country i's total export trade with country j can be obtained by combining the various commodity bias indices with some appropriate weights. These weights are derived assuming that country i's trade with country j is neutral (without bias). The composite index of special country bias is defined as:

$$BX_{ij} = \sum_k \left(BX_{ij}^k \cdot \frac{\bar{X}_{ij}^k}{\bar{X}_{ij}} \right) \quad (8)$$

where \bar{X}_{ij}^k is the hypothetical value of X_{ij}^k when BX_{ij}^k equals unity, and \bar{X}_{ij} is the hypothetical value of X_{ij} when all BX_{ij}^k equal unity.

11 When $BX_{ij}^k = 1.0$, we can deduce from (7) that,

$$\bar{X}_{ij}^k = \frac{X_i^k \cdot M_j^k}{M_w^k - M_i^k} \quad (9)$$

By substituting (2) into (1), we obtain:

$$\begin{aligned} BX_{ij} &= \frac{1}{\bar{X}_{ij}} \sum_k BX_{ij}^k \cdot \frac{X_i^k \cdot M_j^k}{M_w^k - M_i^k} \\ &= \frac{1}{\bar{X}_{ij}} \sum_k \left\{ \left(\frac{X_{ij}^k}{X_i^k} \right) / \left(\frac{M_j^k}{M_w^k - M_i^k} \right) \right\} \cdot \frac{X_i^k \cdot M_j^k}{M_w^k - M_i^k} \\ &= \frac{1}{\bar{X}_{ij}} \sum_k X_{ij}^k \end{aligned} \quad (10)$$

As \bar{X}_{ij} and X_{ij} represent country i 's unbiased and actual exports to j respectively, country i is said to enjoy a special country bias if BX_{ij} is greater than 1.0.

12 With both the complementarity and special country bias indices, the growth in country j 's share of country i 's exports can be disaggregated into three components: (1) that due to the growth in country j 's share of world trade; (2) that due to increasing complementarity between country j 's trade and country i 's; and (3) that due to reduced resistance (or increased bias) to country i 's trade with country j relative to other countries. The share of country j in country i 's exports can be defined as:

$$SX_{ij} = S_j \cdot CX_{ij} \cdot BX_{ij} \quad (11)$$

$$\text{where } SX_{ij} = \frac{X_{ij}}{X_i} \text{ and } S_j = \frac{M_j}{M_w - M_i}$$

Appendix 2: A Technical Note on the Grubel-Lloyd Index

1 Intra-industry trade refers to the cross-hauling of similar products between trading partners or the simultaneous import and export of products within the same industry. It can be statistically defined as the value of exports of an industry in one country which is exactly matched by imports of the same industry from another country.

2 In a given trade flow, inter-industry trade, or trade in different products is shown as the absolute value of the difference between exports (X) in a product category (i) and imports (M) in the same category, that is:

$$\text{Inter-industry trade} = |X_i - M_i| \quad (1)$$

3 It then follows that trade in similar products is given by the residual of trade upon subtraction of inter-industry trade:

$$\text{Intra-industry trade} = (X_i + M_i) - |X_i - M_i| \quad (2)$$

4 Intra-industry trade can be expressed as a percentage of total trade of an industry, yielding the Grubel-Lloyd (GL) Index:

$$GL_i = \frac{(X_i + M_i) - (|X_i - M_i|)}{(X_i + M_i)} \quad (3)$$

The GL index ranges from 0 to 100. If either X_i or M_i equals zero, the index will be zero, implying no intra-industry trade. The closer the index is to 100, the greater the degree of intra-industry trade in that industry. The aggregate GL index can be computed as weighted average of intra-industry trade indices in the country's total trade. The formula is as follows:

$$GL = \sum_i^n \frac{GL_i (X_i + M_i)}{(X + M)} \quad (4)$$

$$\text{where } X = \sum_i^n X_i \text{ and } M = \sum_i^n M_{ii}$$

5 A main problem with the use of GL index, as in other intra-industry trade measures, is that it is dependent on the level of aggregation of products examined. For example, a GL index based on 2-digit SITC commodities would naturally be higher than that of 3-digit SITC. Nevertheless, Grubel and Lloyd (1975) have concluded that the 3-digit SITC classification is the most appropriate for empirical work.

6 Another limitation of the GL index has to do with the system of commodity classification. The SITC system, though based on similarity of the product, does not take into account the factor input which is required to produce the commodities. Therefore, a category of commodities might serve the same consumption purpose but use completely different inputs. For instance, SITC 744 refers to mechanical handling equipment and parts. It can be expected that the input requirements are essentially different.

REFERENCES

Anderson K. and Garnaut, R (1983) 'Australia's Trade Growth with Developing Countries' Australia-Japan Research Centre, Research Paper No. 102.

Anderson k. (1983) ' Intensity of Trade between Pacific Basin Countries' Australia-Japan Research Centre, Research Paper No. 102.

Brown, A.J. 1949. *Applied Economics, Aspects of the World Economy in War and Peace*, London: George Allen and Unwin.

Drysdale P. (1969) 'Japan, Australia, New Zealand: The Prospect for Western Pacific Economic Integration', *Economic Record* 45(111):321-42

Drysdale, P. and Ross Garnaut. 1982. "Trade Intensities and the Analysis of bilateral Trade Flows in a Many-Country World: A Survey", *Hitotsubashi Journal of Economics*, 22(2):62-84.

Frankel, J.A. 1997. *Regional Trading Blocs In the World Economic System*. Washington D.C.: Institute for International Economics.

Grubel, H.G. and P.J. Lloyd. 1975. *Intra-Industry Trade: The Theory and Measurement of International Trade in Differentiated products*. London: John Wiley and Sons.

Hummels, D., D. Rapoport and Kei-Mu Yi. 1998. "Vertical Specialization and the Changing Nature of World Trade", Federal Reserve Bank of New York *Economic Policy Review*, 4(2): 79-99.

International Trade Centre, *Trade Statistics*, UNCTAD/WTO, Various Issues.

Kojima, K. 1964. "The Pattern of International Trade Among Advanced Countries", *Hitotsubashi Journal of Economics*, 5(1):16-36.

Leontief, W. and Alan Strout. 1963. "Multiregional Input-Output Analysis" in *Structural Interdependence and Economic Development*, ed. by T. Barna. London: Macmillan.

Linnemann, Hans. 1966. *An Econometric Study of International Trade Flows*. Amsterdam; North-Holland.

Malaysia Department of Statistics, *Malaysia Yearbook of Statistics*, various issues.

Monetary Authority of Singapore (MAS), 1998a. *Growth in Singapore's Export Markets, 1991-96: A Shift-Share Analysis*, MAS Occasional Paper No. 4, February.

Monetary Authority of Singapore (MAS), 1998b. *Singapore's Services Sector in Perspective: Trends and Outlook*, MAS Occasional Paper No. 5, February.

Petri, Peter 1993. "The East Asian Trading Bloc: An Analytical History" in *Regionalism and Rivalry: Japan and the US in Pacific Asia*, ed. by Jeffrey Frankel and Miles Kahler. Chicago: University of Chicago Press.

Political & Economic Risk Consultancy, *Asian Intelligence*, 22 Jul 98.

Rajan, R. 1996. "Singapore's Bilateral Merchandise Trade Linkages with Japan and the United States: Trends, Patterns and Comparisons", *Asian Economic Journal*, 10(2): 133-164.

Singapore Trade Development Board, *Singapore Trade Statistics*, Various Issues.

Tongzon, J. L. 1996. "Singapore-Australia Trade Relations: Present and Future" in *Development, Trade and the Asia-Pacific* ed. by Basant Kapur, Euston T.E. Quah and Hoon Hian Teck.

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