Intra-Industry Trade and the ASEAN Free Trade Area

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CONTENTS

List of tables and figures ................................................................. vi

Introduction ......................................................................................... 1

The CEPT scheme: an overview ......................................................... 3

Method ................................................................................................. 5

Data issues ........................................................................................... 6

Results ................................................................................................. 8

Concluding remarks .......................................................................... 14

Notes ..................................................................................................... 16

References .......................................................................................... 18
Tables

Table 1  Intra-ASEAN CEPT exports, 1990 ................................................. 4

Table 2  Contribution measures and GL indexes for intra and extra-ASEAN trade, 1981 to 1986 .................................................. 9

Table 3  Contribution measures and GL indexes for intra and extra-ASEAN trade, 1986 to 1991 .................................................. 9

Table 4  Intra-firm trade between US majority-owned foreign affiliates (MOFAs) in ASEAN and the United States, 1989 to 1992 ................................................................. 11

Table 5  Intended Use of intra-firm imports of US majority-owned foreign affiliates (MOFAs) in ASEAN from the United States, 1989 ................................................................. 12

Figures

Figure 1  The ASEAN automobile factory: the Toyota example ............... 13
ABSTRACT

The decision to establish the ASEAN Free Trade Area (AFTA) by the year 2005 has resulted in producers in all ASEAN countries except Singapore raising concerns relating to potential loss of market share and adjustment pressures. Underlying these concerns is the view that the expected growth in intra-ASEAN trade will be dominated by inter-industry or net trade rather than intra-industry trade. If most of the expected growth in trade is intra-industry, however, then the short-run resource re-allocation costs are likely to be low. This study employs a new methodology to analyse the dynamics of intra-industry trade in ASEAN. Problems associated with using movements in the value of the Grubel–Lloyd (GL) index are overcome by deriving a formula that decomposes the growth in trade into the contributions of growth in intra-industry and net trade. The results suggest that the role of intra-industry trade in trade growth has been increasing in importance, and thus much of the recent concern that threatens the viability of AFTA may be misplaced.
INTRA-INDUSTRY TRADE AND THE ASEAN FREE TRADE AREA

Introduction

The establishment of an ASEAN Free Trade Area (AFTA) was agreed to at the Fourth ASEAN Summit Meeting held in Singapore in January 1992. The deadline for its completion has recently been moved forward to the year 2005. The backbone of AFTA is the Common Effective Preferential Tariff (CEPT) scheme, which aims to reduce tariffs to 0–5 per cent for 15 product groups (fast track) within five to seven years, and the remainder (normal track) within 10 to 15 years (see Section 2). Although much has been said about ‘open regionalism’, an important objective of AFTA is to promote intra-regional trade. The importance of intra-ASEAN trade has been heightened following the establishment of the North American Free Trade Area (NAFTA) in 1993, and increasing fears that a ‘fortress Europe’ is emerging. With markets external to the region becoming more trade-restricting, and given East Asia’s preoccupation with its accessibility to the North American market, the region will have to increase intra-ASEAN trade if it is to offset some of these losses (Kumar 1992, p. 74). In light of these developments, it is not surprising that the initial response to the creation of AFTA was nothing short of euphoric.

The initial enthusiasm has begun to wane in recent months, however. Fearing a flood of imports, producers in Thailand and, more recently, in Malaysia have called for greater protection, at least in the short term (Kumar 1992, p. 72). This response is of particular concern since these two countries have been promoted ‘to play a leading role in ensuring relatively exclusion-free implementation of AFTA’ (Chirathivat 1993, p. 8). Concerns have also been raised by the two most protected countries in ASEAN, Indonesia and the Philippines, who fear that their firms will not be able to compete with the more efficient producers in other ASEAN states (DeRosa 1995).

Underlying these concerns is a view about the pattern of trade that is likely to evolve following the liberalisation of intra-ASEAN trade. Implicit is the view that the expected growth in intra-ASEAN trade is likely to be more of a competitive nature rather than a complimentary one, or, in other words, that inter-industry or net trade is likely to dominate intra-industry trade. If most of the expected growth in trade is intra-industry, however, then the short-run resource
re-allocation costs (that underlie much of the recent concerns) are likely to be low. To the extent that there is some degree of industry-specificity in the employment of factors, their re-allocation between activities (or product lines) within industries is likely to incur lower costs than their re-allocation between industries. In other words, both labour and capital are likely to adapt more easily to a new environment where the change is a result of increased intra-industry rather than inter-industry specialisation. Adjustment costs may also be lower because it is possible for all factors to gain from trade in an intra-industry setting (Krugman 1981). The political pressure faced in individual countries to intervene and constrain the impact of AFTA on particular industries will also depend on the extent of net versus intra-industry trade.

Recognising the importance of this issue, a number of studies have examined the changing pattern of intra-industry trade in the region. Examples include Imada (1990), Ariff (1991), and Kwan (1994). The approach taken in these studies, as well as in those conducted for other countries, has been based on the Grubel and Lloyd (GL) index of intra-industry trade (see Grubel and Lloyd 1975). The method employed has been to compare the value of the GL index at different points in time, and to infer some pattern of the changing importance of intra-industry trade from movements in the value of the index. The GL index measures the share of intra-industry trade in total trade and can provide a relatively reliable measure of the importance of intra-industry trade at any point in time. There are a number of problems associated with using movements in its value to infer the changing importance of intra-industry trade over time, however. First, it does not even address the relevant issue. The relevant issue in analysing adjustment costs in the context of formation of a free trade area is the contribution of intra-industry trade growth to the growth in trade over time. That is, we need to know how much of the growth in trade is intra-industry, as opposed to net trade. Movements in the value of the GL index over time cannot provide this information.

Second, movements in the GL index may not even be indicative of the contribution of intra-industry trade to the growth in total trade. In other words, it can be misleading. The GL index can record an increase (decrease) despite intra-industry trade contributing less (more) than net trade to the growth in trade. An increase (decrease) in the GL index over time is compatible with a decrease (increase) in the absolute amount of intra-industry trade.

This study overcomes these problems by employing a new methodology to analyse the dynamics of intra-industry trade. It derives formulas for decomposing the growth in total trade into the contributions of intra-industry trade and net trade. With these contributions measures, it is possible to provide explicit answers to questions such as ‘How much of the growth in trade
was a result of intra-industry (or net) trade growth?’, or ‘If not for the contribution of intra-
industry (or net) trade growth, what would trade have grown by?’.

All the contributions measures are computed using data for manufacturing industries
defined at the 3-digit level of the Standard International Trade Classification (SITC). The
definition of manufacturing in this study covers about 130 industries belonging to SITC 5–8 less
67–68 (metals). The country sample consists of the original five ASEAN members: Singapore,
Thailand, Malaysia, Indonesia and the Philippines. The study examines intra and extra-ASEAN

The paper is organised in six sections. To provide the background for the ensuing
empirical analysis, the next section provides an overview of the CEPT. The third section
presents the methodology to measure the contributions of growth in intra-industry and net trade
to the growth in total trade. Here it is shown how using movements in the GL index to infer
changes in the importance of intra-industry trade can lead to error. The data used in this study
are discussed in the fourth section while the results of the analysis are presented in the fifth
section. A final section summarises the major findings.

The CEPT scheme: an overview

The main mechanism for the actualisation of AFTA is the CEPT scheme. It is through this
scheme that ASEAN will move towards the goal of free trade within the region by the year 2008.
The design of the CEPT scheme is basically sectoral, and thus provides a more comprehensive
product coverage than previous attempts at liberalisation that have employed the item-by-item
approach (Ariff 1994a, p. 15). The CEPT Products List released by the ASEAN Secretariat in
November 1993 covers about 41,000 tariff lines, which account for about 88 per cent of the tariff
lines in ASEAN. It is also worth noting that the CEPT scheme, once successfully implemented,
will equalise tariff rates across ASEAN countries.

There are two main tariff reduction programs under the CEPT scheme: fast track and
normal track. The fast track will apply in the first instance to the fifteen product groups agreed
to at the Fourth ASEAN Summit for accelerated tariff reductions. These fifteen product
categories are listed in Table 1, and together accounted for 37 per cent (US $9.3 billion) of intra-
ASEAN trade in 1990 (Kumar 1992). For CEPT products with tariff rates of 20 per cent or
below, the fast track program will reduce them to 0–5 per cent by 1 January 2000 (seven years
from the decision to establish the AFTA). Tariffs on CEPT products that were above 20 per cent
in 1993 will be reduced to 0–5 per cent by 1 January 2003. Tariffs on products that are not
included in the CEPT scheme will be dealt with under the normal track program. For products
with tariff rates of 20 per cent or below, the normal track program will reduce them to 0–5 per
cent by 1 January 2003. Tariffs on non-CEPT products that are above 20 per cent will be reduced
in two stages: to 20 per cent within five to eight years (between 1998 and 2001) and,
subsequently, to 0–5 per cent in five years according to an agreed schedule ending 31 December
2005.3

The granting of tariffs and other preferences is governed by specific ‘rules of origin’ aimed
at preventing third-country exporters from using a lower-tariff country as a back-door through
which to enter the high tariff country. This discourages the deflection of third-country trade from
high-tariff to low-tariff member countries. These tariff reduction programs also include
provisions for the removal of quantitative restrictions such as prohibitions, quotas and
restrictive licensing, once the CEPT concessions for the product set in, and the elimination of
other non-tariff barriers (NTBs) gradually within five years from commencement of CEPT
concessions (Lee 1994). There are also rules of origin in place to deter ‘trade deflection’, with
a minimum 40 per cent local content required to gain preferential access to ASEAN markets.
Furthermore, ‘AFTA-plus’ has been mooted to increase trade and regional integration. The

Table 1  Intra-ASEAN CEPT exports, 1990 (million US dollars)

<table>
<thead>
<tr>
<th></th>
<th>Indonesia</th>
<th>Malaysia</th>
<th>Philippines</th>
<th>Singapore</th>
<th>Thailand</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp</td>
<td>12.3</td>
<td>2.7</td>
<td>0.0</td>
<td>8.2</td>
<td>0.9</td>
<td>24.1</td>
</tr>
<tr>
<td>Textiles</td>
<td>396.4</td>
<td>2,008.4</td>
<td>4.6</td>
<td>95.2</td>
<td>59.4</td>
<td>2,564.0</td>
</tr>
<tr>
<td>Vegetable oils</td>
<td>17.7</td>
<td>359.9</td>
<td>7.4</td>
<td>30.9</td>
<td>1.7</td>
<td>417.5</td>
</tr>
<tr>
<td>Chemicals</td>
<td>31.1</td>
<td>61.7</td>
<td>37.2</td>
<td>197.8</td>
<td>27.3</td>
<td>355.2</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>4.2</td>
<td>20.5</td>
<td>4.6</td>
<td>20.5</td>
<td>8.6</td>
<td>58.3</td>
</tr>
<tr>
<td>Fertilisers</td>
<td>94.2</td>
<td>38.4</td>
<td>49.7</td>
<td>9.8</td>
<td>2.7</td>
<td>194.9</td>
</tr>
<tr>
<td>Plastics</td>
<td>37.1</td>
<td>43.5</td>
<td>2.5</td>
<td>349.6</td>
<td>25.3</td>
<td>458.0</td>
</tr>
<tr>
<td>Leather</td>
<td>2.1</td>
<td>3.1</td>
<td>0.2</td>
<td>2.8</td>
<td>7.4</td>
<td>15.7</td>
</tr>
<tr>
<td>Rubber</td>
<td>11.5</td>
<td>34.1</td>
<td>2.2</td>
<td>20.8</td>
<td>25.6</td>
<td>94.3</td>
</tr>
<tr>
<td>Cement</td>
<td>35.6</td>
<td>41.6</td>
<td>0.0</td>
<td>12.8</td>
<td>0.7</td>
<td>90.7</td>
</tr>
<tr>
<td>Glass, ceramics</td>
<td>20.5</td>
<td>44.4</td>
<td>5.0</td>
<td>19.2</td>
<td>13.3</td>
<td>102.4</td>
</tr>
<tr>
<td>Gems, jewellery</td>
<td>15.5</td>
<td>0.2</td>
<td>0.4</td>
<td>9.2</td>
<td>10.9</td>
<td>36.2</td>
</tr>
<tr>
<td>Electronics</td>
<td>39.0</td>
<td>2,872.0</td>
<td>149.8</td>
<td>878.9</td>
<td>874.1</td>
<td>4,814.3</td>
</tr>
<tr>
<td>Furniture</td>
<td>11.1</td>
<td>53.1</td>
<td>0.9</td>
<td>1.5</td>
<td>7.8</td>
<td>74.5</td>
</tr>
</tbody>
</table>

measures contained within AFTA-plus include the harmonisation of standards, reciprocal recognition of tests and certification of products, harmonisation of customs procedures, removal of barriers to foreign investment, macroeconomic consultations, rules of fair competition and promotion of venture capital. It is also expected that AFTA-plus will deal with issues such as trade-related investment policies (TRIMs) and trade-related intellectual property rights (TRIPs), as well as the protection of copyrights, patents, and trademarks (Naya and Imada 1992). The Framework Agreement on Enhancing ASEAN Economic Cooperation concluded at the Fourth ASEAN Summit contains provision to increase cooperation in banking, finance, transport and communications. It is unlikely, however, that free movement of labour within ASEAN will ever be part of AFTA (see Panagariya 1994).

Method

To derive our growth contribution measures, we begin by defining total trade \((TT)\) for commodity \(i\) in any year as the sum of net trade \((NT)\) and intra-industry trade \((IIT)\):

\[
TT_i = NT_i + IIT_i, \quad (1)
\]

where \(TT_i = X_i + M_i\), \(NT_i = |X_i - M_i|\), and \(IIT_i = (X_i + M_i) - |X_i - M_i|\). \(X_i\) and \(M_i\) are exports and imports of commodity \(i\) valued in base period f.o.b. prices.

We denote the percentage growth in variables over a period of time in lower-case letters (for example, \(n_i = ((DTT_i / TT_i) \cdot 100)\)). The percentage growth in total trade of commodity \(i\) \((r_i)\) over any period is given by:

\[
r_i = Cnt_i + Cii_i, \quad (5)
\]

where \(Cnt_i = (1 - GL_i) n_t\), \(Cii_i = GL_i ii_t\), \(GL_i = IIT_i / TT_i\) \((6)\) and \(nt_i\) and \(iit_i\) are the percentage changes over the period in \(NT_i\) and \(IIT_i\). Note that \(GL_i = 1 - \{|X_i - M_i| / (X_i + M_i)\}\), which is the Grubel–Lloyd index of intra-industry trade at the beginning of the period.

In our study of ASEAN trade reported in the fifth section, we find that growth rates in net trade are largely uncorrelated with growth rates in intra-industry trade. Under the assumption that \(nt_i\) is determined independently of \(iit_i\), \(Cnt_i\) is the contribution to growth in total trade of
growth in net trade, while $C_{iit_i}$ is the contribution of growth in intra-industry trade. With these contributions measures, we are able to provide explicit answers to questions such as ‘How much of the growth in trade was a result of intra-industry (or net) trade?’, or ‘If not for the contribution of intra-industry (or net) trade, what would trade have grown by?’.$^5$

A common practice is to use movements over a period in GL indexes as indicators of the importance of growth in intra-industry trade. Examples in the ASEAN context include Imada (1990), Ariff (1991), and Kwan (1994). From equation (8), we can see that $GL_i$ will increase over a period whenever $iit_i > nt_i$. However, even under this condition, growth in $iit_i$ may make a relatively minor contribution to growth in total trade of product $i$. Consequently, in this study we prefer to use our contribution measures ($Cnt_i$ and $C_{iit_i}$). These take account not only of growth rates in intra-industry and net trade but also of their shares in total trade. More formally:

$$iit_i > nt_i \text{ implies } GL_i \text{ is increasing,}$$

$$\text{but if } GL_i < nt_i / (nt_i + iit_i) \text{ , (9)}$$

$$\text{and } nt_i + iit_i > 0 \text{ , (10)}$$

$$\text{then } C_{iit_i} < Cnt_i. \text{ }^6$$

Similarly, $nt_i > iit_i$ implies that $GL_i$ is decreasing,

$$\text{but if } GL_i > nt_i / (nt_i + iit_i) \text{ (9a)}$$

$$\text{and } nt_i + iit_i > 0 \text{ , (10a)}$$

$$\text{then } Cnt_i < C_{iit_i}. \text{ }^7$$

These propositions show that movements in the GL index might prove misleading when used to infer the importance of growth in intra-industry trade. The GL index can record an increase (decrease) despite intra-industry trade contributing less (more) than net trade to the growth in trade.

**Data issues**

The definition of ‘industry’ employed in compiling the data base is potentially important to the measurement of the contributions of growth in net and intra-industry trade to the growth in total trade. Sceptics such as Finger (1975), Lipsey (1976) and Pomfret (1985) have argued that almost all measured intra-industry trade is a statistical artefact brought about by trade data having been grouped in heterogeneous categories.\textsuperscript{8} In a sense they are right. At an extremely fine level of disaggregation, there will be no intra-industry trade. That is, if one were to keep
disaggregating the data *ad infinitum*, then any measured intra-industry trade would eventually disappear. The problem, however, is that this level of disaggregation may exceed the bounds placed on any reasonable notion of an industry. The issue boils down to one regarding the motivation behind analysing intra-industry trade.

The concerns of these ‘sceptics’ were motivated by the validity of competing theoretical explanations of the determinants of trade flows and patterns. That is, they were concerned with the challenge to traditional theories of trade based on the Heckscher–Ohlin hypothesis posed by the ‘new’ trade theories which emphasise imperfect competition, production differentiation and scale economies (see Helpman and Krugman, 1985).

As explained in the introduction to this study, our motivation for studying intra-industry trade is quite different. Our interest in the measurement of the contributions of growth in intra-industry and net trade to total trade growth reflects concern with adjustment problems associated with trade growth and liberalisation. To look at adjustment problems, we need industry categories within which a high degree of factor mobility is possible. That is, the industry classification should incorporate a range of production activities that are similar in their requirements of both the type and proportions of factor inputs. With very fine categories, there will be many possible inter-industry factor movements which are barely more difficult or costly than intra-industry movements. However, the industry classifications should not be too broad either. Very broad industry categories will include production activities which employ factor inputs that vary significantly in type and proportions. With such categories, intra-industry movements may be just as costly as inter-industry movements. This will run counter to our arguments based on different degrees of adjustment costs associated with intra-industry versus net trade.

To meet these criteria, we judged that disaggregation at the 3-digit SITC level is appropriate. At this level, we have industries such as inorganic acids (SITC 523), paints (SITC 533), paper and paperboard (SITC 641), glass (SITC 664), glassware (SITC 665), tractors (SITC 722), television receivers (SITC 761), and furniture (SITC 821). Activities within such industries tend to have similar capital and skill requirements. Furthermore, it is often true that each firm within such industries produces the full range of the industry’s products. For example, chemical firms usually produce most types of inorganic acids. Thus it is reasonable to assume that factor re-allocations within 3-digit industries are relatively costless. On the other hand, movements of factors between such industries as inorganic acids and paints, are likely to be relatively difficult.
Consequently, we worked with data at this level covering all manufacturing industries belonging to SITC 5–8 less 67–68 (metals). This definition of manufacturing contains about 130 industries. We focus on manufactures only because the CEPT covers mainly manufactures and excludes agricultural raw materials, food commodities and trade in services. Furthermore, intra-industry trade is unlikely to play an important role in the trade of these non-manufactured goods.

We consider two time periods, namely 1981 to 1986 and 1986 to 1991. We chose these sub-periods for a number of reasons. First, despite the adoption of the Preferential Trading Agreement (PTA) in 1977, the concessions did not really make a difference until the revamping of the system in the early 1980s. Second, the period 1986 to 1991 witnessed a more than doubling of ASEAN exports, from US$716 billion to US$162 billion. The full sample period of our study from 1981 to 1991 also captures the transformation of most ASEAN countries from mainly commodity-based or primary-goods exporting nations to exporters of manufactured goods.

The data relate to the calendar years 1981, 1986 and 1991, and all come from the United Nations COMTRADE database. The data for all years have been re-classified to be consistent with Revision 2 of the SITC. Our country sample consists of the original five ASEAN members: Singapore, Thailand, Malaysia, Indonesia and the Philippines. Due to its very small share of manufactures in total trade, Brunei is excluded from our analysis. We consider both intra and extra-ASEAN trade.

Results

In Tables 2 and 3 we have aggregated our results for the 130 or so manufacturing industries. The aggregation formulas are in the notes at the end of the tables. We consider two periods: 1981 to 1986 (Table 2) and 1986 to 1991 (Table 3). These tables contain our contributions measures and GL indexes (reported as percentages) for intra and extra-ASEAN trade for each of the five ASEAN countries.

We begin by considering intra-ASEAN trade between 1981 and 1986. Intra-industry trade growth contributes more to the growth in total trade than net trade in Singapore, Thailand and Malaysia. In Indonesia and the Philippines, all the growth in total trade during this period is a result of net trade growth; the contribution of intra-industry trade growth is negative. The results for extra-ASEAN trade are quite similar, except that it did not generally grow as fast
### Table 2  Contribution measures and GL indexes for intra and extra-ASEAN trade, 1981 to 1986

<table>
<thead>
<tr>
<th>Trade flow</th>
<th>Intra-ASEAN</th>
<th>Extra-ASEAN</th>
<th>GL(31)</th>
<th>GL(86)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>82.10</td>
<td>22.01</td>
<td>60.09</td>
<td>53.90</td>
</tr>
<tr>
<td>Thailand</td>
<td>67.33</td>
<td>39.51</td>
<td>47.83</td>
<td>48.38</td>
</tr>
<tr>
<td>Malaysia</td>
<td>106.40</td>
<td>39.44</td>
<td>66.96</td>
<td>71.56</td>
</tr>
<tr>
<td>Indonesia</td>
<td>40.75</td>
<td>41.58</td>
<td>-0.84</td>
<td>31.87</td>
</tr>
<tr>
<td>Philippines</td>
<td>85.99</td>
<td>87.15</td>
<td>-1.16</td>
<td>38.08</td>
</tr>
</tbody>
</table>

Note: See Table 3.

### Table 3  Contribution measures and GL indexes for intra and extra-ASEAN trade, 1986 to 1991

<table>
<thead>
<tr>
<th>Trade flow</th>
<th>Intra-ASEAN</th>
<th>Extra-ASEAN</th>
<th>GL(86)</th>
<th>GL(91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>337.02</td>
<td>129.62</td>
<td>207.40</td>
<td>62.60</td>
</tr>
<tr>
<td>Thailand</td>
<td>356.44</td>
<td>87.97</td>
<td>268.47</td>
<td>51.36</td>
</tr>
<tr>
<td>Malaysia</td>
<td>395.73</td>
<td>139.29</td>
<td>256.45</td>
<td>67.11</td>
</tr>
<tr>
<td>Indonesia</td>
<td>166.25</td>
<td>85.31</td>
<td>80.94</td>
<td>16.51</td>
</tr>
<tr>
<td>Philippines</td>
<td>177.60</td>
<td>127.71</td>
<td>49.89</td>
<td>26.46</td>
</tr>
</tbody>
</table>

Notes: The s(j)’s are the set of (about 130) products that make up total manufacturing. To obtain these aggregates, we begin by defining the following:

\[
TT(j) = \sum_{i} s(j) TT_i \quad (1)
\]

\[
NT(j) = \sum_{i} s(j) NT_i \quad (2)
\]

\[
IIT(j) = \sum_{i} s(j) IIT_i \quad (3)
\]

\[
GL(j) = \sum_{i} s(j) GL_i (TT_i / (TT(j)) \times 100 \quad (4)
\]

Using equations (1) to (4) above, we obtain:

\[
tt(j) = \sum_{i} s(j) tt_i (TT_i / (TT(j)) \quad (5)
\]

\[
nt(j) = \sum_{i} s(j) nt_i (NT_i / (NT(j)) \quad (6)
\]

\[
iit(j) = \sum_{i} s(j) iit_i (IIT_i / (IIT(j)) \quad (7)
\]

\[
Cnt(j) = (1 - (GL(j) / 100)) nt(j) \quad (8)
\]

\[
Ciit(j) = (GL(j) / 100) iit(j) \quad (9)
\]
as intra-ASEAN trade. For Indonesia for instance, extra-ASEAN trade declined by 30 per cent over the period.

Both intra and extra-ASEAN trade grew very sharply for all countries between 1986 and 1991. The contribution of growth in intra-industry trade to the growth in intra-ASEAN trade is triple that of net trade growth in Thailand, and almost double in Singapore and Malaysia. Unlike the first period, the contributions of intra-industry and net trade growth to the growth in total trade are now almost equal for the Philippines. While net trade growth is still the dominant contributor to total trade growth in Indonesia, intra-industry trade growth now contributes 50 per cent of the 177 per cent growth in total trade. The contribution of growth in intra-industry trade to total trade growth is more significant in intra compared to extra-ASEAN trade for all ASEAN countries during this period. For instance, while the contribution of intra-industry trade growth to the growth in Thailand’s intra-ASEAN trade is highest among the ASEAN countries, the contribution of intra-industry trade growth to its growth in extra-ASEAN trade is significantly lower than the contribution of net trade growth.

Various comparative studies have shown that the intra-industry trade phenomenon is generally confined to trade among the industrialised countries, and more recently, the newly industrialising economies (NIEs) (see Havrylyshyn and Civan 1983; Tharakan 1984; Kwan 1994). The results from this study suggest that not only is intra-industry trade increasing rapidly among the developing countries of ASEAN, but that intra-industry trade has recently become more significant in trade among these countries than it is in trade with the industrialised countries (which makes up most of extra-ASEAN trade).

There are a number of factors that underlie our findings of the increasing importance of intra-industry trade growth in total trade growth, particularly for intra-ASEAN trade. First, converging incomes and hence taste patterns have led to an increase in the importance of intra-industry trade over time (as predicted by the ‘Linder hypothesis’). Second, the experience over the last decade has evinced an increase in the importance of manufactured goods in the trade structures of all the ASEAN countries. Manufactured goods typically exhibit greater product differentiation, and scale economies and technological factors in their production, all of which are major determinants of intra-industry trade. Third, the period under study is characterised by a process of the dismantling of protection regimes in the ASEAN countries. One of the consequences of a protected regime is the creation of a range of non-traded products, or varieties of product, which become tradeable when protection is reduced or removed (see, for instance, Falvey, 1981). Reducing protection leads to a re-allocation of resources from import-competing
to export sectors, and is usually associated with diversification in export patterns through the process of horizontal specialisation. This would tend to increase the importance of intra-industry trade in the total multilateral trade of the liberalising countries.

The final, and perhaps most important, reason for the increase in the importance of intra-industry trade relates to the globalisation of production processes. This involves the relocation of production activities of multinational corporations in third countries as part of the process of international vertical integration. The extent of intra-ASEAN division of labour within vertically integrated industries is reflected in the magnitude of intra-firm trade. Almost all intra-firm trade shows up as intra-industry trade. Table 4 presents data on intra-firm trade of US majority-owned foreign affiliates (MOFAs) in ASEAN for the period 1989 to 1992. In all countries except the Philippines, the value of intra-firm exports of US MOFAs has been increasing over the period (Menon 1996). As a share of trade, intra-firm imports and exports are quite significant in Singapore, Thailand and Malaysia. Table 5 presents shares of intra-firm imports of US MOFAs by intended use for 1989. In all countries except Indonesia, the majority of imports are for further manufacture. This type of intra-firm trade is almost certainly intra-

### Table 4  Intra-firm trade between US majority-owned foreign affiliates (MOFAs) in ASEAN and the United States, 1989 to 1992 (as a percentage of trade)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>Imports</td>
<td>35.23</td>
<td>62.30</td>
<td>36.26</td>
<td>36.76</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>60.41</td>
<td>67.81</td>
<td>na</td>
<td>59.89</td>
</tr>
<tr>
<td>Thailand</td>
<td>Imports</td>
<td>24.19</td>
<td>29.02</td>
<td>30.08</td>
<td>26.07</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>22.65</td>
<td>20.76</td>
<td>22.16</td>
<td>13.36</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Imports</td>
<td>39.47</td>
<td>32.80</td>
<td>20.42</td>
<td>18.59</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>32.14</td>
<td>31.96</td>
<td>31.77</td>
<td>39.13</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Imports</td>
<td>14.78</td>
<td>15.62</td>
<td>12.73</td>
<td>9.17</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>15.89</td>
<td>13.28</td>
<td>10.58</td>
<td>9.45</td>
</tr>
<tr>
<td>Philippines</td>
<td>Imports</td>
<td>17.56</td>
<td>9.74</td>
<td>9.91</td>
<td>4.52</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>44.43</td>
<td>39.89</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

**Notes:** A US majority-owned foreign affiliate (MOFA) is one in which the combined ownership of all US parents is greater than 50 per cent. Since the majority, if not all, intra-firm trade involves manufacturing, the percentages reported in this table are shares in total manufacturing (defined as SITC 5–8) imports or exports. na — not available (that is, suppressed to avoid disclosure of data of individual companies).

**Sources:** Bureau of Economic Analysis, *Survey of Current Business*, various issues; OECD, *Foreign Trade in Commodities*, various issues.
industry trade as well. More information on the extent of intra-firm intra-industry trade is presented in a survey conducted by the Bureau of Economic Analysis in 1991 on US manufacturing MOFAs in fourteen so-called ‘low-wage’ host countries (Bureau of Economic Analysis 1993). This survey reported results on sales by US MOFAs back to the United States as a share of their total sales. Singapore and Malaysia topped the list of fourteen countries with shares of 53 and 51 per cent, respectively.13

While a considerable amount of vertically integrated trade is between the ASEAN countries and the United States and East Asian NIEs, there are signs that this type of trade has been increasing within ASEAN, particularly between Singapore, Thailand and Malaysia. For instance, the Mitsubishi Corporation has launched a brand-to-brand car parts complementation scheme which involves a regional division of labour between Malaysia, Thailand and the Philippines. In this scheme, Malaysia concentrates on the production of door panels and other stamped parts; Thailand specialises in the manufacture of fuel tanks, consoles, bumpers and windshields; while the Philippines focuses on the production of transmission parts (Ariff 1994b; UNCTAD 1994).

All major Japanese automobile producers including Honda, Toyota, Nissan, Isuzu and Mazda have also undertaken similar initiatives to form affiliates and subsidiaries which span not only ASEAN but also the East Asian NIEs. Honda has recently begun participating in Mitsubishi’s complementation scheme, while Nissan has set up its own regional complementation program that involves the export of Thai-made Nissan engines to Taiwan in exchange for

Table 5  Intended Use of intra-firm imports of US majority-owned foreign affiliates (MOFAs) in ASEAN from the United States, 1989 (percentages)

<table>
<thead>
<tr>
<th>Country</th>
<th>Capital equipment</th>
<th>Trans-shipment</th>
<th>Further manufacture</th>
<th>Total (US$ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>2.23</td>
<td>27.82</td>
<td>55.44</td>
<td>2067</td>
</tr>
<tr>
<td>Thailand</td>
<td>8.35</td>
<td>20.99</td>
<td>70.65</td>
<td>443</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.30</td>
<td>14.67</td>
<td>85.03</td>
<td>668</td>
</tr>
<tr>
<td>Indonesia</td>
<td>56.84</td>
<td>28.42</td>
<td>14.74</td>
<td>239</td>
</tr>
<tr>
<td>Philippines</td>
<td>2.09</td>
<td>13.39</td>
<td>84.52</td>
<td>95</td>
</tr>
</tbody>
</table>

Notes: 'Trans-shipment' involves goods imported from the US parent for re-sale without further manufacture.

Taiwanese-made auto bodies (Doner 1993). Toyota, traditionally the most Japan-bound producer, has a complex production network involving all ASEAN countries in an attempt to build a ‘regional automobile’. This production network is summarised in Figure 1, with components being produced in different ASEAN countries depending on the advantages of the location in terms of supplier infrastructure and local resources (Petri 1993). Motorola has restructured the production activities of its Singapore subsidiary by shifting labour-intensive processes to its Malaysian subsidiaries and more recently from Malaysia to the Philippines (Crosby and Nakamori 1991). The Sharp plant in Malaysia produces some of the parts that its
subsidiaries elsewhere in the region require, and sources most of the components from Sharp affiliates in the region.

The emergence of ‘growth triangles’ in the region is also an important factor underlying the increase in vertically integrated trade within ASEAN. These triangles bring together the comparative advantages of different countries in a complementary manner rather than a competitive one, and directly encourage vertically integrated investment and trade, an example being the Singapore–Johor–Riau (SIJORI) triangle, which has been operating since 1989, or the more recent Northern Growth Triangle, which links the three most northern states of Malaysia with Northern Sumatra and Southern Thailand.

In the third section we showed, as a theoretical possibility, that the GL index could be misleading when used to infer the contribution of intra-industry trade growth to the growth in total trade. In particular, we showed that the GL index could increase (decrease) despite growth in intra-industry trade contributing less (more) to total trade growth than growth in net trade. In Table 2, we find that the GL index falls despite growth in intra-industry trade contributing more to the growth in total trade than net trade for Malaysia’s intra-ASEAN trade, while it rises despite net trade growth contributing more to the growth in total trade than intra-industry trade for the Philippines’ extra-ASEAN trade. In Table 3, we find that the GL index is misleading as an indicator of growth contributions in all cases except for Thailand. As with the first period, the GL index falls despite intra-industry trade growth contributing more to the growth in total trade growth than net trade for Malaysia’s intra-ASEAN trade, while in all other cases, the GL index rises despite net trade growth contributing more to the growth in total trade than intra-industry trade.

Concluding remarks

In this study, we have employed a new methodology to analyse the dynamics of intra-industry trade in ASEAN which overcomes the problems associated with using movements over time in the value of the GL index. Our results suggest that the importance of intra-industry trade growth in intra-ASEAN trade growth has increased significantly in all ASEAN countries between 1981 and 1991. More than 75 per cent of the growth in Thailand’s intra-ASEAN trade between 1986 and 1991 is a result of intra-industry trade growth, while in Malaysia and Singapore the figure is above 60 per cent. While all the growth in Indonesia’s and the Philippines’ intra-ASEAN trade was due to growth in net trade between 1981 and 1986, over the period 1986 and 1991
intra-industry trade growth contributed almost half the growth in intra-ASEAN trade in the Philippines, and almost one-third of the growth in trade in Indonesia. While intra-industry trade has previously been considered to be prevalent only in the trade of the developed world, our results suggest that not only is intra-industry trade increasing rapidly in trade among the developing countries of ASEAN, but that intra-industry trade has recently become more significant in trade among these countries than it is in trade with the industrialised countries. Based on this experience, it is reasonable to expect that intra-industry trade will continue to grow in importance as these countries continue to industrialise, and as they pursue more liberal trading regimes. In light of this, it would appear that the various concerns expressed by producers in relation to perceived adjustment pressures resulting from liberalisation under AFTA may be misplaced, or at least overstated. After all, lobby groups are not only proficient in overstating their claims but often feel it necessary to do so.
Notes

* This paper reports some of the results from a study on ASEAN trade undertaken at the Institute of Southeast Asian Studies (ISEAS) in Singapore (see Menon 1996). I am grateful to ISEAS for awarding me a Research Fellowship to undertake that study. I thank Peter Dixon, Joseph Tan, Pearl Imada, Sree Kumar, Toh Mun Heng and Lam San Ling for sparing the time to assist me with my work. I also received very useful comments from two anonymous referees of this series. The usual disclaimer applies.

1 As recently as April 1994 for instance, Malaysia implemented the Approved Permit System (APS) which places new import restrictions on petrochemical products. The APS requires Malaysian companies to obtain a government permit before they can import certain resins used in plastics production, even though importers are already paying a 30 per cent tariff. The severity of the conflict has resulted in Singapore seeking redress through the World Trade Organisation (WTO), claiming that the protection afforded to the petrochemicals industry is not GATT-consistent.

2 This contrasts with the results of conventional trade models which explain inter-industry trade, where, as implied by the Stolper–Samuelson theorem, the relative price changes that accompany trade expansion must make some factor worse off (see Jones and Schienkman 1977).

3 The acceleration in the pace of tariff reductions was agreed to at the 1994 ASEAN Heads of State meeting in Chiang Mai, Thailand. Both Thailand and Malaysia also agreed to additional concessions at this meeting; the former dropped its threat to include its key petrochemicals industry on the exclusion list, while the latter agreed to remove hardwood and tobacco from its exclusion list.

4 The correlation coefficients between \( nt_i \) and \( iit_i \) for all types of trade flows relating to our ASEAN countries range between -0.20 and 0.35 for both periods. The low correlations supports our assumption of independent determination of \( nt_i \) and \( iit_i \). (These results are available on request.) This finding is consistent with theory, since the factors that determine NT are different from those that drive IIT (see, for instance, Helpman and Krugman 1985).

5 Formulas that measure the contributions of growth in imports and exports to the growth in total, net and intra-industry trade are presented in Menon and Dixon (1994).

6 From (9) and (10), and given that \( iit_i > nt_i \), we can see that \( GL_i < 1/2 \) in this instance.

7 From (9a) and (10a), and given that \( iit_i < nt_i \), we can see that \( GL_i > 1/2 \) in this instance.

8 This is commonly referred to in the literature as ‘categorical aggregation’. For a discussion on how categorical aggregation can affect the measurement of intra-industry trade, see Greenaway and Milner (1983) and Menon (1994).
The detailed results are available on request. The results for aggregations to 1-digit SITC sectors and for bilateral trade flows between ASEAN countries are presented in Menon (1996).

According to Havrylyshyn and Civan (1983), for instance, the average GL index for total manufacturing is 59 per cent for the industrialised countries, 42 per cent for the NIEs, but only 15 per cent for the developing countries.

For discussion on the changing comparative advantage in ASEAN countries, see Hughes (1995).

For a discussion of how AFTA could affect foreign investment flows in the region, see Athukorala and Menon (1996).

Even these figures may underestimate the importance of intra-firm trade, however, as they ignore possible exports of US MOFAs in these countries to their affiliates located outside the United States.

The Malaysian state of Johor has an abundance of land, skilled and semi-skilled labour, as well as good physical infrastructure; Singapore has high quality human capital, sophisticated financial, marketing and service industries, and excellent supporting infrastructure; the Riau islands (particularly Batam) of Indonesia have low-cost land and low-skilled cheap labour. For useful discussions of the SIJORI growth triangle, see Kumar (1994).

At the 3-digit SITC level, the extent to which the GL index presents a misleading picture of our growth contribution varies from 4 per cent (Philippines’ intra-ASEAN trade) to 43 per cent (Indonesia’s extra-ASEAN trade) of all industries. (These results are available on request.)
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