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# The Extent of Intra Industry Trade Between Thailand and ASEAN Economic Community (AEC)

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Additional information is available at the end of the chapter

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## 1. Introduction

At present, the Asian region has an increasingly important role in the global economy. Economic indicators show that region's GDP proportion (not including Japan) has increased from 9.7 per cent of world GDP in 1998 to 16.3 per cent in 2009. Therefore, the Asian region can be seen as the new engine to drive the new global economy. Many countries pay attention to increase investment and trading with Asian countries. Even though the ASEAN Economic Community (AEC) derived from the ASEAN leaders, the vision will still focus on transforming ASEAN into a single market and production base that is highly competitive and fully integrated into the global community by 2015. The economic integration goals will include, among others, the elimination of tariffs, free movement of professionals, freer movement of capital, and a streamlined customs clearance procedure [1]. The proportion of international trade between Thailand and the AEC shows that Thailand increased her exports to AEC countries from 19.34 percent in 2001 to 22.70 per cent in 2010. Imports from AEC to Thailand increased from 17.84 percent to 17.88 percent in the same period [2].

Intra-industry trade (IIT) involves the import and export of similar goods. While taking account of measurement limitations, it would appear that the IIT share of manufacture trade has increased significantly since the late 1980s across many AEC countries. This follows trend increases in IIT for all the major AEC countries between 1993 and 2010. Although various origins can be traced, the phenomenon of IIT as such first received attention in the 1960s in studies by Verdoon, P.J., [3] and Balassa, B., [4];[5];[6], on the increased trade flows among European countries. Grubel and Lloyd [7] provided the definitive empirical study on the importance of IIT and how to measure it. Concrete theoretical foundations for explaining IIT came later in the 1980s and 1990s with the new trade literature to a large extent based on a monopolistic competition framework.

Since that time numerous theoretical and empirical studies e.g. Globerman, S. and Dean, J. W. [8]; Duc, N. H. [9]; Glejser, H. [10]; Guell, R. C. and Richards, D. G. [11], have been conducted to measure the size and importance of IIT, and also to explore its determinants. In addition to the desirable welfare effects mentioned before, trade analysts also noted another positive aspect of IIT from the investigation of the ASEAN experience after the formation of the ASEAN, namely, the adjustment costs of economic integration.

It was shown from the actual experience of ASEAN in the late 1970s that IIT reduced the adjustment costs of an economy opening up to foreign trade as domestic industries could remain intact while moving to specialize only in a limited range of products. Intra-Industry Trade (IIT) is now widely accepted. The proposition of increasing IIT in developed nation's economies has found general support. Accordingly, the mass of empirical studies have focus on IIT of developed countries e.g. in Australia [12];[13]; in EEC [14]; in UK [15]; in EU [16] in Switzerland [17], etc. However, an increasing number of studies have also been done on developing countries e.g. in Turkey [18]; in Korea [19]; in APEC [20]; in ASEAN [21]; [22]; [23]; etc. Some of the studies in attempting to identify the determinants of IIT have focused on country-specific determinants while others have concentrated on industry-specific ones. However, there are some studies which focus on both types of determinants. IIT studies in recent times have also estimated the extent of horizontal and vertical IIT and identified their determinants.

Only a few studies have focused on Thailand's intra-industry trade, and on Thailand and the AEC in particular. This study tries to make a modest contribution to the relatively small stock of research on Thailand's IIT. Given that nearly half of Thailand's foreign trade is with the AEC and that a FTA between these two sides was introduced in 1993, this study pays particular attention to estimate the extent of Thailand's IIT, to identify the determinant's of its intra- industry pattern and test a number of country specific hypotheses concerning the determinants of intra industry trade between Thailand and the AEC.

The rest of the paper is organized as follows: Section II presents a brief discussion of the general performance of Thailand's foreign trade over the past three decades. Measurement alternatives of IIT are discussed in section III. The extent of intra-industry trade in Thailand's foreign trade is provided in section IV, and section V stresses the extent of intra-industry trade between Thailand and the AEC. The main findings are summarized in section VI.

## **2. General performance of international trade in Thailand**

Thailand had trade deficits between 1970 and -1997 due to a dependency on raw material such as crude oil, machinery, raw material etc. Table 1 indicated that Thailand's total foreign merchandise trade (exports + imports) increased significantly from 0.40 billion baht in 1970 to 3.4 billion baht in 2000 and 5.5 billion in 2010, an increase of nearly 200 percent during this period. Owing to the far greater external orientation of the economy since the beginning of the 1980s, when Thailand embarked on a trade liberalization program, foreign trade has represented a much higher proportion of the national income in comparison to the pre-1980s period. As a percentage of GDP, total trade increased from 27.50 percent in 1970 to

121.55 percent in 2010. The increase in this ratio resulted from the increase in both export and import shares: the exports/GDP share rose from 9.62 percent in 1970 to 68.98 percent in 2010 while the corresponding imports/GDP share increased from 17.88 percent to 52.57 percent, respectively (Figure 1 and Table 1).

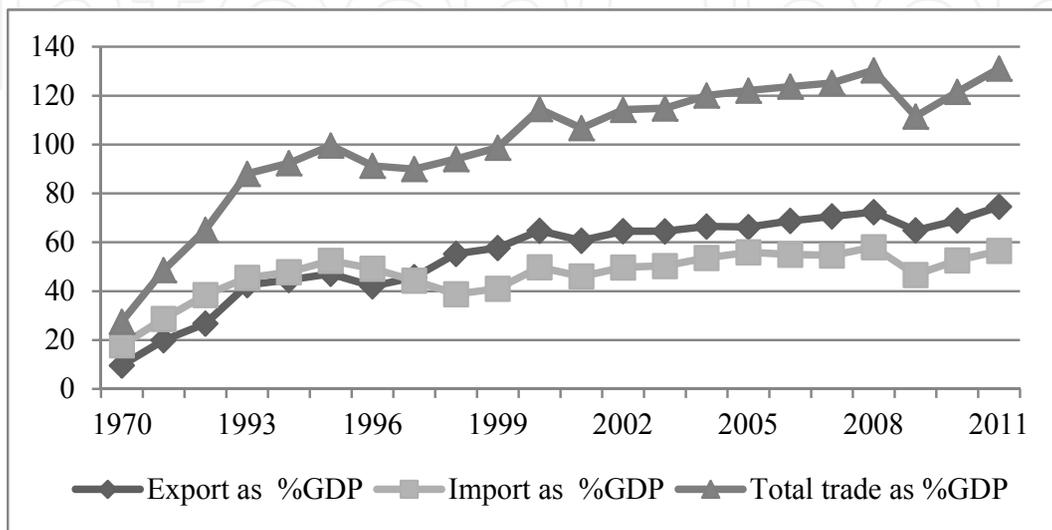
Year	Total trade (X+M) as Million of Baht	Exports (X) as % of GDP	Imports (M) as % of GDP	Total trade (X+M) as % of GDP
1970	40,784	9.62	17.88	27.50
1980	322,065	19.93	28.68	48.62
1990	1,421,548	26.71	38.39	65.10
1993	2,175,131	42.52	45.51	88.03
1994	2,487,346	44.59	47.78	92.36
1995	2,929,711	47.12	52.47	99.59
1996	2,843,789	42.03	49.25	91.28
1997	2,765,176	45.70	44.29	89.99
1998	2,586,313	55.28	38.78	94.06
1999	2,835,428	57.70	41.02	98.73
2000	3,444,753	64.72	49.78	114.50
2001	3,280,438	60.68	46.05	106.73
2002	3,698,033	64.53	49.71	114.24
2003	3,981,010	64.49	50.30	114.79
2004	4,429,093	66.46	53.63	120.09
2005	4,710,362	66.21	55.88	122.09
2006	5,015,762	68.76	54.94	123.71
2007	5,332,698	70.58	54.63	125.21
2008	5,692,016	72.38	58.03	130.41
2009	4,752,805	64.84	46.65	111.49
2010	5,586,669	68.98	52.57	121.55

Source: For 1970 -1990- data, S. Chemsripong (2004), pp. 210-211; For 1993 data, Bank of Thailand

**Table 1.** Thailand's External Trade, 1970-2010

Thailand's foreign trade gained momentum in the 1990s: in particular, since Thailand joined ASEAN to collaborate in trade integration. The key trade enhancing agreements, the ASEAN Trade in Goods Agreement (ATIGA) has been signed to consolidate and synergies various provisions on trade in goods into a single reference document. The ATIGA will supersede the 1993 Agreement on the Common Effective Preferential Tariff Scheme for the ASEAN Free Trade Area (CEPTAFTA). In 2010, nine ASEAN Member States (Brunei

Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore and Viet Nam) have ratified the ATIGA. ASEAN continues to implement various trade facilitating measures such as the ASEAN Customs Declaration Document and the ASEAN Cargo Processing Model that relates to air freight services. Efforts are underway to activate the ASEAN Customs Transit System. Therefore, Thailand's exports increased from \$56.72 billion in 1995 to \$110.93 in 2005 and \$195.31 billion in 2010. Imports rose from \$70.71 billion in 1995 to \$118.17 billion in 2005 and \$182.41 billion in 2010, respectively.



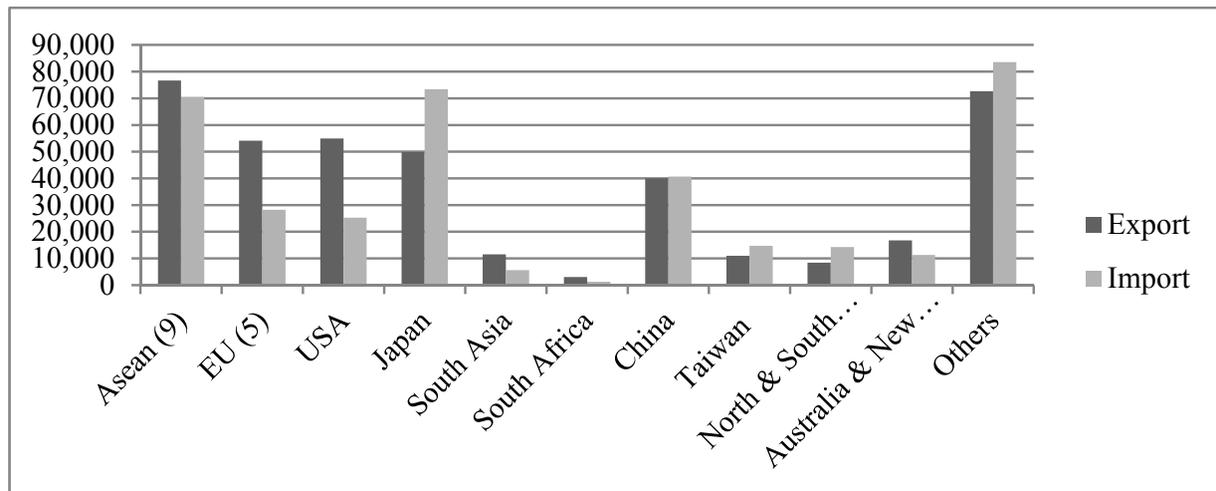
Source: data from Table A1

**Figure 1.** Thailand's External Trade, 1970-2010

Thailand showed great performances in exports in the year 2000, 2003, 2004 and 2010. Thailand's exports grew by 19.27, 17.43, 20.56, and 28.14 percent respectively. Although slowing down in relation to the previous years, export growth kept on rising, to 28.14 per cent in 2010. Imports in this period decreased first by 24.56 percent in 2000 due to the great contraction in the economy. However, when the economy recovered and grew again in the years between 2005 and 2010, imports also improved considerably, increasing 24.5 per cent in 2000, 25.67 per cent in 2005, 36.47 per cent in 2010. However, there has been a minor change in import structure in the last decade. Basically, the impact of intermediate goods has constituted an important part of total imports, with its share of 72.4 per cent in 1990 and 81.3 per cent in 2005. The other major components of imports showed slight changes: investment goods were 18.1 per cent in 1990 and 20.2 percent in 2005 while consumption goods were 9.5 per cent and 13.9 per cent during the same period.

Table 2 indicates that Thailand's international trade has been dominated by the United States and Japan for many decades. However trade with these countries has fallen from nearly 34.6 per cent of Thailand's trade in 1995 to 10 per cent in 2010. The trade with ASEAN countries has been relatively stable, increasing from 21.73 per cent in 1995 and 22.7 per cent in 2010. Trade within the AEC has constituted nearly 22 percent of both Thailand exports and imports. Among the country groups, therefore, the AEC with its geographical proximity and the level of economic development has been the most important group.

The share of Thailand's exports and imports with other groups namely EU (27 countries), NAFTA and the Middle East countries have been decreasing over time. As well, Thailand's share of exports and imports with countries such as the USA and Japan have been important, although they have diminished since 1995. However, the share of Thailand imports with the ASEAN has been striking over the last a couple of years.



**Figure 2.** The share of Thailand's Export and Import in 2010

Region/countries	1995	2000	2005	2006	2007	2008	2009	2010
NAFTA	19.01	22.98	16.68	16.44	14.06	12.71	12.23	11.57
EU (27)	16.51	16.31	13.61	13.88	14.10	13.16	11.91	11.17
ASEAN	21.73	19.34	21.99	20.83	21.31	22.59	21.32	22.70
Middle East	4.50	3.03	4.03	4.41	4.86	5.34	5.74	4.93
USA	17.83	21.31	15.32	14.99	12.62	11.40	10.93	10.34
Japan	16.79	14.74	13.60	12.63	11.78	11.30	10.32	10.45
Hong Kong	5.18	5.04	5.56	5.52	5.65	5.65	6.22	6.72
China	2.91	4.07	8.26	9.04	9.65	9.11	10.58	10.99
Taiwan	2.40	3.50	2.45	2.59	2.16	1.52	1.48	1.65
South Korea	1.42	1.83	2.04	2.06	1.94	2.06	1.85	1.85
others	5.45	3.96	5.13	5.38	6.06	6.67	6.47	6.63
Total Export	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Bank of Thailand

**Table 2.** Thailand's Trade by Selected Export Destinations: (FoB : % Total Export)

Table 3 shows that Thailand's imports with NAFTA and EU decreased, while Thailand's trade with ASEAN and Middle East countries has increased. However, Thailand's import

from individual countries decreased over time, as was the case with the USA and Japan, but the share of imports from China increased from 2.96 per cent to 13.29 per cent.

Region/countries	1995	2000	2005	2006	2007	2008	2009	2010
NAFTA	12.95	12.52	7.96	8.02	7.44	7.08	6.93	6.57
EU (27)	16.43	10.49	9.14	8.73	8.54	8.00	9.01	7.61
ASEAN 3/	13.32	16.64	18.30	18.33	17.91	16.82	18.48	16.63
Middle East	3.79	10.21	12.90	14.09	13.18	15.66	12.37	11.39
USA	12.01	11.77	7.35	7.45	6.78	6.37	6.26	5.85
Japan	30.55	24.73	22.03	19.93	20.28	18.71	18.72	20.75
China	2.96	5.45	9.44	10.56	11.59	11.25	12.74	13.29
Hong Kong	1.05	1.43	1.27	1.20	1.03	1.09	1.29	1.00
Taiwan	4.83	4.68	3.81	3.96	4.10	3.47	3.59	3.74
South Korea	3.50	3.50	3.29	3.98	3.78	3.83	4.06	4.42
Others	4.11	4.89	4.95	4.73	5.09	5.15	4.97	4.94
Total Imports	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Bank of Thailand

**Table 3.** Thailand's Trade by Selected Import Destinations: (CIF: % Total Import)

Thailand's total international trade (exports + imports) with ASEAN countries increased from 13 per cent (\$8,578 million US) in 1991 to 20 per cent in 2009. Trade with non-ASEAN countries accounted to 87 per cent (\$57,455 million US). The share of International Trade between Thailand and the AEC countries members indicated that Thailand's merchandise exports increased from 19.34 per cent in 2001 to 22.70 per cent in 2010, while Thailand's merchandise imports from the AEC countries remained unchanged (17.84 per cent in 2001 and 17.88 per cent in 2010) (see Table 5).

Year	Thailand Exports to AEC	%	Thailand Imports from AEC	%	Total Trade	%
1991	3,540.8	12.4	5,038.0	13.4	8,578.8	13.0
1992	4,490.2	13.8	5,541.4	13.6	10,031.5	13.7
1993	6,584.8	17.6	5,939.9	12.9	12,524.7	15.0
1994	9,058.4	19.9	7,450.4	13.7	16,508.9	16.5
1995	12,325.3	21.7	9,422.5	13.3	21,747.8	17.1
1996	12,113.4	21.7	9,639.6	13.3	21,753.0	17.0

Year	Thailand Exports to AEC	%	Thailand Imports from AEC	%	Total Trade	%
1997	12,734.2	21.8	8,127.6	12.9	20,861.8	17.2
1998	9,895.9	18.2	6,401.1	15.1	16,296.9	16.8
1999	10,871.6	18.6	7,906.4	15.8	18,778.0	17.3
2000	13,482.2	19.4	10,346.1	16.6	23,828.4	18.1
2001	12,599.1	19.3	10,012.7	16.2	22,611.8	17.8
2002	13,568.9	19.9	10,815.9	16.8	24,384.8	18.4
2003	16,486.0	20.6	12,489.2	16.6	28,975.2	18.7
2004	21,241.0	22.0	15,835.4	16.8	37,076.4	19.5
2005	23,892.0	21.7	21,608.7	18.5	45,500.6	20.1
2006	27,209.7	20.8	23,716.6	18.6	50,926.3	19.8
2007	32,488.6	19.9	25,066.9	16.7	57,555.5	18.4
2008	38,070.4	21.4	32,531.3	18.0	70,601.7	19.7
2009	32,491.1	21.3	24,699.9	18.5	57,191.0	20.0
2010	44,333,936	22.7	32,607,572	17.88	76,941,508	

*Source:* Information and Communication Technology Center, Office of the Permanent Secretary Ministry of Commerce with the Co-Operation of the Customs Department,

**Table 4.** Thailand Trade with AEC and its share in Thailand Trade (Million US Dollar)

YEAR	AEC	Non-AEC
1991	0.83	0.87
1993	0.95	0.87
1995	0.87	0.84
1997	0.78	0.91
1999	0.84	0.94
2001	0.94	0.98
2003	0.91	0.97
2005	0.98	0.96
2007	0.90	0.93
2009	0.90	0.99
2010	0.85	0.98

*Note:* Denote average for the period

*Source:* Calculated by author from the United Nations, COMTRADE database

**Table 5.** The IIT indexes for Thailand trading with AEC and Non-AEC member nations, 2000-2010

After becoming an AEC member, Thailand's exports increased with all member countries except Singapore. Table 6 shows that Malaysia Singapore and Indonesia are the top ranked countries for Thailand's exports and Brunei Darussalam takes the lowest rank. Malaysia, Singapore and Indonesia are the AEC member countries that comprise Thailand's highest import shares.

Countries	Before AFTA 1992		After AFTA 2003*		2009	
	Export	Import	Export	Import	Export	Import
<b>World</b>	<b>32,609.08</b>	<b>40,615.76</b>	<b>80,039.98</b>	<b>75,033.98</b>	<b>152,052.36</b>	<b>133,795.97</b>
Japan	5,710.43	11,885.22	11,356.20	18,074.36	15,732.00	25,024.00
USA	7,316.47	4,767.10	13,596.16	7,092.61	16,662.00	8,373.00
China	387.56	1,217.09	5,688.92	6,002.32	16,123.88	17,028.95
Others	8,401.05	11,982.98	26,853.87	29,874.12	103,984.48	83,370.02
Singapore	2,834.51	2,964.64	5,850.25	3,235.04	7,574.22	5,724.01
Malaysia	845.08	1,592.10	3,872.01	4,493.61	7,663.69	8,575.57
Indonesia	283.98	290.44	2,265.65	1,752.31	4,667.33	3,800.47
Vietnam	77.05	80.17	1,262.09	333.36	4,678.46	1,385.42
Philippines	155.35	121.07	1,616.26	1,337.75	3,022.05	1,783.17
Cambodia	66.13	92.99	685.35	12.25	1,580.61	77.73
Mynma	80.92	140.50	437.90	901.37	1,544.70	2,781.58
Lao	121.54	40.99	454.54	102.68	1,642.63	462.71
Brunai	25.59	218.47	41.98	320.83	117.39	109.19
<b>ASEAN</b>	<b>4,490.15</b>	<b>5,541.37</b>	<b>16,486.03</b>	<b>12,489.20</b>	<b>32,491.08</b>	<b>24,699.85</b>

Note: \* 60% of inclusion list tax reduction = 0

Source: 1. Information and Communication Technology Center, Office of the Permanent Secretary Ministry of Commerce with the Co-Operation of the Customs Department,  
2. Bank of Thailand

**Table 6.** Thailand export to ASEAN and import from ASEAN

### 3. Measurement of Intra-Industry Trade

Intra-industry trade (IIT) flows are conventionally defined as the two-way exchange of goods within standard industrial classifications. The extent of intra-industry trade is commonly measured by Grubel-Lloyd (G-L) indexes based on commodity group transactions. Thus, for any particular product class  $i$ , an index of the extent of intra-industry trade in the product class  $i$  between countries A and B is given by the following ratio:

$$IIT_{i,AB} = \left[ \frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} \right] * 100 \quad (1)$$

This index takes the minimum value of zero when there are no products in the same class that are both imported (represent by  $M_i$ ) and exported (represent by  $X_i$ ), and the maximum value of 100 when all trade is intra-industry (in this case  $X_i$  is equal to  $M_i$ ). The indices reported in this section have been computed according to [1] for each pair of trading partners and for each two digit SITC revision 3 product class. Bilateral indices of intra-industry trade in the product class  $i$  between country A and all its trading partners are obtained as a weighted average of the bilateral indices [1] for each partner country B, using as weights the share of total trade of A accounted for by trade with B. Bilateral indices of intra industry trade between country A and country B for total manufacturing are the weighted average of the indexes in [1] for all product classes  $i$ , with weights given by the share of total trade of  $i$  over total manufacturing trade:

$$IIT_{AB} = \sum_i \left[ \frac{(X_i + M_i) - [X_i - M_i]}{(X_i + M_i)} \right] * \left[ \frac{(X_i + M_i)}{\sum_i (X_i + M_i)} \right] * 100 \quad (2)$$

A degree of caution must be used when comparing and interpreting intra-industry indices because their measurement crucially depends on the level of disaggregation chosen for the analysis. In the current context of assessing the importance of the division of the production process across countries, it should be recognized that, as well as measuring trade in intermediate goods at various stages of production, much intra-industry trade is trade in similar, but often highly differentiated, finished products.

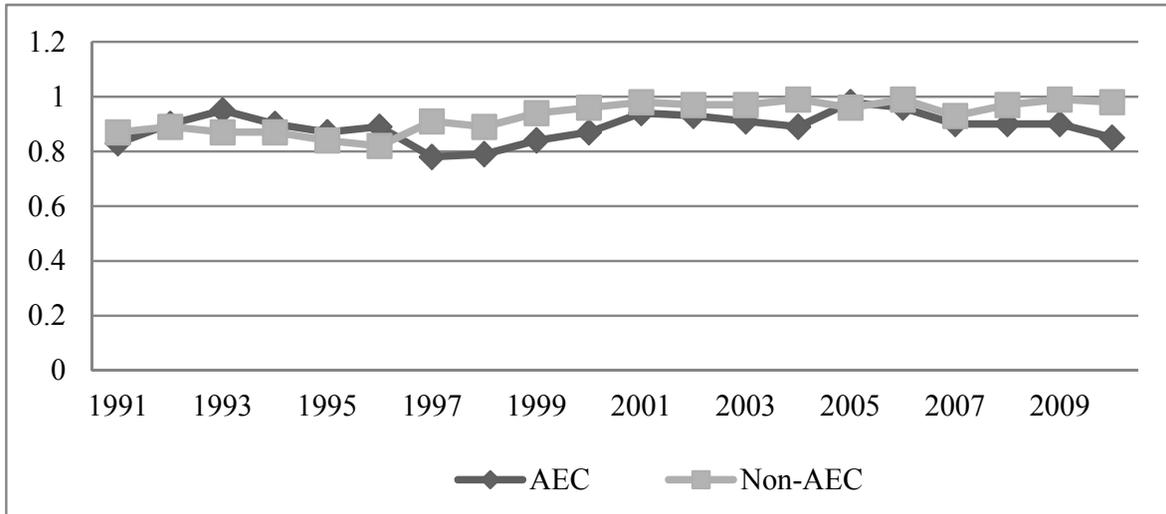
#### 4. The extent of Intra-Industry Trade in Thailand's foreign trade

As pointed out in section 3, this study centers on the G-L index measured by the ratio of difference between total trade and net trade expressed in terms of percentages. The estimated G-L indexes, IIT, are reported in Table 7. The G-L indexes, IIT, are calculated by aggregation across all products for Thailand with all AEC member nations and for Thailand with the rest of the world, hereafter referred to as non-AEC member nations. The estimation time span is 1991-2010.

About one-fourth of world trade consists of IIT, that is, two-way exchange of goods within standard industrial trade classification (SITC). For advanced industrial nations, IIT plays a large role in trade in manufactured goods which accounts for most of world trade. Industrial countries have become increasingly similar in their levels of technology and in the availability of capital and skilled labor. Since the major trading nations have become similar in technology and resources, there is often no clear comparative advantage within an industry, and much of international trade therefore takes the form of two-way exchanges within industries, probably driven by comparative advantage.

Apart from the quantitative increase in foreign trade, the most striking change that has occurred is in the sector share of Thailand exports since 1980. There has been a shift towards industrial goods, in contrast to the situation before 1980 when Thailand's agricultural

exports typically accounted for about two-thirds of total exports. The share of manufactured products in total exports rose from 31.0 percent 1982 to 44.9 percent in 1986, while the share of exports of agricultural products fell from 70.3 percent in 1970 to 43.6 percent in 1985.



Source: data from Table A4

**Figure 3.** The IIT indexes for Thailand trading with AEC and Non-AEC member nations, 2000-2010

## 5. Industry composition for Thailand with individual AEC countries

### 5.1. Country analysis

In this section we turn our attention to the decomposition of bilateral trade by products. For each significant AEC nation with which Thailand has a trading relationship, the top ten products (ranked according to average IIT) are discussed. Table 7 points out that the top three products namely manmade filaments (54), articles of iron or steel (73), organic chemicals (29) have a highest level of IIT. Five from ten products are in SITC 5-9 and transform from low-technology products to high-technology industries.

The results of the highest average values of the IIT index during 2000-2010 show that within manufactures, certain resource-based labor intensive manufacturers and low technology manufactures occupy large shares of total trade. Common to both periods are the resource-based labor intensive manufactures. Post-AEC, the medium and high skill/technology intensive manufactures are footwear, gaiters and the like, parts thereof (64), soaps, lubricants, waxes, candles, and the low skill/technology manufactures of articles of iron or steel (73), aluminum and articles thereof (76), electrical, electronic equipment (85), plastics and articles thereof (39), aluminum and articles thereof (76). The trade environment for at least some of these products is changing. The quantitative restrictions in export markets and the reduction in domestic protection offered to the Thai textile and clothing industries have already been noted (BOT [24]).

ASEAN countries with high values of IIT, above 80 per cent are Malaysia, Singapore and Indonesia.

Rank	Code	Description	IIT (%)
1	54	Manmade filaments	90.75
2	73	Articles of iron or steel	90.26
3	29	Organic chemicals	87.87
4	85	Electrical, electronic equipment	86.76
5	36	Explosives, pyrotechnics, matches, pyrophorics, etc	86.59
6	64	Footwear, gaiters and the like, parts thereof	84.78
7	28	Inorganic chemicals, precious metal compound, isotopes	84.09
8	39	Plastics and articles thereof	82.11
9	76	Aluminums and articles thereof	82.84
10	48	Paper & paperboard, articles of pulp, paper and board	81.93

Source: Calculated by author from the United Nations, COMTRADE database

**Table 7.** Top 10 products ranked according to average IIT between Thailand and AEC, 2000-2010

The IIT index between Thailand and Malaysia, Singapore, Cambodia, Lao, Myanmar and Brunei Darussalam increased over time. The IIT indexes of Malaysia, Singapore, Myanmar are high and increasing IIT which means Thailand international trade structure with those countries are complementary rather than competitive. The IIT indexes of Indonesia and Philippines are high and decreasing IIT. In contrast the Lao People's Democratic Republic and Brunei Darussalam have low and increasing IIT. Viet Nam is low and decreasing IIT (see Table 8).

Countries	1995-1997	1998-2000	2001-2003	2004-2006	2007-2010	Change
ASEAN	0.84	0.83	0.88	0.91	0.85	0.01
Malaysia	0.76	0.91	0.92	0.90	0.97	0.21
Singapore	0.69	0.71	0.70	0.79	0.82	0.13
Indonesia	0.91	0.95	0.94	0.90	0.90	-0.01
Viet Nam	0.29	0.56	0.47	0.46	0.44	0.15
Philippines	0.89	0.94	0.93	0.92	0.75	-0.13
Cambodia	0.43	0.09	0.04	0.06	0.10	-0.32
Lao PDR	0.30	0.24	0.37	0.48	0.50	0.20
Myanmar	0.57	0.47	0.60	0.56	0.68	0.11
Brunei Darussalam	0.59	0.40	0.19	0.51	0.89	0.30

Note: 1. Countries are classified as having 'high' or 'low' level of intra-industry trade according to whether intra-industry trade is above or below 50 percent of total manufacturing trade on average over all periods shown and 'increasing' or 'stable' according to whether intra-industry trade increases by more than 5 percentage points between the first and last periods, as shown in the final column.

2. PDR denote People's Democratic Republic

Source: author calculations, based on International Trade Statistics.

**Table 8.** Determinant of IIT between Thailand and AEC, 1995-2010 (Million US)

Of particular interest when considering intra-industry trade and the internationalization of production are those countries where exports and imports account for a very high percentage of GDP. There are currently ten AEC economies (Thailand; Malaysia; Singapore; Indonesia; Viet Nam; Philippines; Cambodia; Lao People's Democratic Republic; Myanmar; Brunei Darussalam) where both imports and exports account for more than half of GDP. Although there is far from a perfect correspondence, these countries all tend to have relatively high intra-industry trade (Malaysia; Singapore; Myanmar); all but two (Vietnam and Cambodia) having measures of intra-industry trade that are below the average across all AEC countries and five of them (Malaysia, Singapore, Indonesia, Philippines and Brunei Darussalam) being in the top ten countries for the period 2007-2010.

Table 9 shows that Thailand's IIT with Indonesia increases from 1995 through to 2009. The basket of products in the top ten completely changes with no products in common in the top ten pre- and post- AEC. Despite this dramatic change, the overall industrial composition does not shift markedly with roughly 50 percent of products pre-and post-AEC being in the resource based labor intensive and low skill/technology manufactures (Table 9).

Rank	Code	Description	IIT
1	85	Electrical, electronic equipment	92.45
2	76	Aluminum and articles thereof	91.94
3	52	Cotton	90.84
4	61	Articles of apparel, accessories, knit or crochet	85.47
5	70	Glass and glassware	84.50
6	48	Paper & paperboard, articles of pulp, paper and board	80.20
7	34	Soaps, lubricants, waxes, candles, modeling pastes	79.82
8	57	Carpets and other textile floor coverings	79.61
9	29	Organic chemicals	76.22
10	68	Stone, plaster, cement, asbestos, mica, etc articles	75.77

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 9.** Top 10 products ranked according to average IIT between Thailand and Indonesia, 2000-10

Malaysia and Thailand have enjoyed a strong trade relationship with an increasing proportion of IIT. Of all the countries under review, Malaysia has the largest number of products common to both periods. Three of the four existing products from the top ten were drawn from the medium to high skill/technology manufactures, being Articles of iron or steel (73), stone, plaster, cement, asbestos, mica, etc articles (68), other made textile articles, sets, worn clothing, etc (63), machinery, nuclear reactors, boilers, etc (84). Thus, the striking feature of the industrial composition of the Malaysian basket is the relatively high proportion that falls into the medium to high skill products in both periods (five of the top ten in both time frames) (see Table 10).

Rank	Code	Description	IIT
1	96	Miscellaneous manufactured articles	93.83
2	39	Plastics and articles thereof	91.40
3	41	Raw hides and skins (other than fur skins) and leather	87.58
4	68	Stone, plaster, cement, asbestos, mica, etc articles	86.25
5	84	Machinery, nuclear reactors, boilers, etc	86.19
6	63	Other made textile articles, sets, worn clothing etc	82.44
7	29	Organic chemicals	82.10
8	15	Animal, vegetable fats and oils, cleavage products, etc	81.76
9	73	Articles of iron or steel	79.81
10	19	Cereal, flour, starch, milk preparations and products	78.53

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 10.** Top 10 products ranked according to average IIT between Thailand and Malaysia, 2000-2010

The pattern of IIT in manufactures between Thailand and the Philippines displays sizable variability over the period. Only four products are common and of these are in the medium skill/technology area. Four of the existing products come from the medium to high skill end of the spectrum, being electrical, electronic equipment (85), miscellaneous articles of base metal (83), machinery, nuclear reactors, boilers, etc (84), vehicles other than railway, tramway (87) and iron and steel (72). Similar to Malaysia, the overall Philippines industrial composition has a relatively high proportion that falls into the medium to high skill products in both periods (six and eight of the top ten pre- and post-AEC, respectively (Table 11)).

Rank	Code	Description	IIT
1	85	Electrical, electronic equipment	91.48
2	83	Miscellaneous articles of base metal	86.64
3	19	Cereal, flour, starch, milk preparations and products	80.49
4	12	Oil seed, oleaginous fruits, grain, seed, fruit, etc, nes	79.50
5	82	Tools, implements, cutlery, etc of base metal	75.80
6	84	Machinery, nuclear reactors, boilers, etc	74.47
7	90	Optical, photo, technical, medical, etc apparatus	70.64
8	87	Vehicles other than railway, tramway	70.60
9	08	Edible fruit, nuts, peel of citrus fruit, melons	62.76
10	72	Iron and steel	61.56

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 11.** Top 10 products ranked according to average IIT between Thailand and the Philippines, 2000-2010

Singapore, like Malaysia, has a high level of IIT with Thailand, though there is an indication of moderate decline in the late 1990s. Two products, both are at the medium skill/technology level, persist from the 1980s to the 1990s (85 and 96). Four of the products that are no longer in the top ten after 1990 are from the low skill/technology manufactures—A Ceramic products (69), manmade filaments (54), residues, wastes of food industry, animal fodder (23), come from the resources based labor intensive sector. However, four of new products on the list in the 1990s are also from these sectors- electrical, electronic equipment (85), optical, photo, technical, medical, etc apparatus (90), articles of iron or steel (73) and pharmaceutical products (30). Overall, one cannot deduce a shift in the industrial composition of IIT between Thailand and Singapore (Table 12).

Rank	Code	Description	IIT
1	85	Electrical, electronic equipment	93.26
2	96	Miscellaneous manufactured articles	88.27
3	21	Miscellaneous edible preparations	86.43
4	90	Optical, photo, technical, medical, etc apparatus	86.24
5	83	Miscellaneous articles of base metal	84.01
6	35	Albuminoidal, modified starches, glues, enzymes	82.97
7	59	Impregnated, coated or laminated textile fabric	81.94
8	69	Ceramic products	81.80
9	73	Articles of iron or steel	80.39
10	30	Pharmaceutical products	78.69

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 12.** Top 10 products ranked according to average IIT between Thailand and Singapore, 2000-2010

Myanmar has a low level of IIT with Thailand (below 50). Only two products, furniture, lighting, signs, prefabricated buildings (94) and manufactures of plaiting material, basketwork, etc. (46) have a high level. Many products still come from resources based labor intensive sector (see Table 13).

Rank	Code	Description	IIT
1	94	Furniture, lighting, signs, prefabricated buildings	73.22
2	46	Manufactures of plaiting material, basketwork, etc.	57.99
3	12	Oil seed, elegiac fruits, grain, seed, fruit, etc, nes	47.31
4	71	Pearls, precious stones, metals, coins, etc	46.47
5	23	Residues, wastes of food industry, animal fodder	37.23
6	09	Coffee, tea, mate and spices	35.38
7	08	Edible fruit, nuts, peel of citrus fruit, melons	34.31

Rank	Code	Description	IIT
8	41	Raw hides and skins (other than fur skin) and leather	30.85
9	92	Musical instruments, parts and accessories	28.36
10	24	Tobacco and manufactured tobacco substitutes	27.42

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 13.** Top 10 products ranked according to average IIT between Thailand and Myanmar, 2000-2010

Vietnam, like Myanmar has a low level of IIT with Thailand. All of the top ten products are above 50 percent of IIT level. A high proportion fell into the medium skill/technology area (see Table 14).

Rank	Code	Description	IIT
1	71	Pearls, precious stones, metals, coins, etc	85.16
2	62	Articles of apparel, accessories, not knit or crochet	75.07
3	85	Electrical, electronic equipment	70.66
4	61	Articles of apparel, accessories, knit or crochet	67.36
5	65	Headgear and parts thereof	66.61
6	54	Manmade filaments	64.87
7	12	Oil seed, oleaginous fruits, grain, seed, fruit, etc, nes	59.90
8	69	Ceramic products	57.70
9	27	Mineral fuels, oils, distillation products, etc	56.79
10	07	Edible vegetables and certain roots and tubers	56.17

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 14.** Top 10 products ranked according to average IIT between Thailand and Vietnam, 2000-2010

Lao PDR, like Vietnam has a low level of IIT with Thailand. Five of the products are above 50 percent of IIT level. A high proportion fell into the resource based or low skill/technology area (see Table 15).

Rank	Code	Description	IIT
1	10	Cereals	61.35
2	62	Articles of apparel, accessories, not knit or crochet	58.71
3	09	Coffee, tea, mate and spices	57.89
4	41	Raw hides and skins (other than fur skins) and leather	56.60
5	36	Explosives, pyrotechnics, matches, pyrophorics, etc	50.76
6	49	Printed books, newspapers, pictures etc	48.44

Rank	Code	Description	IIT
7	42	Articles of leather, animal gut, harness, travel goods	38.15
8	50	Silk	37.06
9	27	Mineral fuels, oils, distillation products, etc	36.92
10	01	Live animals	33.72

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 15.** Top 10 products ranked according to average IIT between Thailand and Lao People's Democratic Republic, 2000- 2010

Brunei Darussalam is the only AEC member country that has a low level of IIT (below 50) for all products which means Thailand has no longer trade in terms of Intra-industry trade but Thailand will trade in term of international trade with other countries.

Rank	Code	Description	IIT
1	76	Aluminum and articles thereof	45.85
2	90	Optical, photo, technical, medical, etc apparatus	28.20
3	49	Printed books, newspapers, pictures etc	26.99
4	82	Tools, implements, cutlery, etc of base metal	26.44
5	83	Miscellaneous articles of base metal	19.40
6	74	Copper and articles thereof	15.80
7	44	Wood and articles of wood, wood charcoal	13.98
8	41	Raw hides and skins (other than fur skins) and leather	12.21
9	32	Tanning, dyeing extracts, tannins, derives, pigments etc	09.42
10	96	Miscellaneous manufactured articles	08.86

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 16.** Top 10 products ranked according to average IIT between Thailand and Brunei Darussalam, 2000-2010

Cambodia, like Lao PDR has a low level of IIT with Thailand. Only three of the products are above 50 percents of IIT level. A high proportion fell into the resource based or low skill/technology area (see Table 17).

Rank	Code	Description	IIT
1	44	Wood and articles of wood, wood charcoal	63.86
2	09	Coffee, tea, mate and spices	56.17
3	03	Fish, crustaceans, mollusks, aquatic invertebrates, nes.	55.46
4	62	Articles of apparel, accessories, not knit or crochet	47.76

Rank	Code	Description	IIT
5	72	Iron and steel	46.90
6	76	Aluminum and articles thereof	45.21
7	10	Cereals	44.54
8	41	Raw hides and skins (other than fur skins) and leather	31.84
9	63	Other made textile articles, sets, worn clothing etc	31.06
10	61	Articles of apparel, accessories, knit or crochet	29.57

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 17.** Top 10 products ranked according to average IIT between Thailand and Cambodia, 2000-2010

## 5.2. Industry analysis

International trade can be investigated in terms of bilateral trade relationships between countries, in terms of product composition or in terms of bilateral trade decomposed by products. This section is concentrates on analysis by product composition.

Table 18 calculates the average annual IIT for all commodities within each specific product group and thus summarizes significant detail in its construction. The G-L indexes are calculated by aggregation a cross all classifications (SITC) at 1-digit level for Thailand with AEC member nations during 2001-2010. The results in Table 19 show that the share of IIT in SITC 3 is the highest IIT index while the share of IIT at SITC 5 and 6 have been increasing 2 times from 2001 to 2010. The share of IIT of SITC 3-9 is higher than 50 and SITC 0-2 is below 50.

SITC	2001	2003	2005	2007	2009	2010
0	40.74	42.14	43.54	40.69	37.52	44.71
1	34.60	30.81	35.93	37.80	40.92	41.69
2	40.94	41.03	39.19	43.88	42.98	49.40
3	61.02	67.03	67.56	72.69	68.03	66.41
4	59.38	55.66	50.09	56.85	59.45	53.93
5	31.81	43.81	48.94	41.99	53.26	53.66
6	35.96	48.05	53.98	54.11	56.47	56.15
7	59.90	54.21	65.98	57.05	62.89	56.02
8	51.76	57.97	57.82	63.34	54.23	52.78
9	50.79	61.76	45.75	45.79	42.06	56.70

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 18.** Average IIT according to SITC 0-9, 2001-2010

Table 19 indicates that from 2001 to 2010, the proportion of commodities with an IIT index of less than 30 fell from 36.45 to 24.98 percent, while the proportion with and IIT index greater than 50 percent rose from 42.70 to 57.10 percent.

SITC	2001	2003	2005	2007	2009	2010
0 and below 30 (%)	35 (36.45)	29 (27.84)	22 (22.90)	26 (27.08)	29 (30.19)	24 (24.98)
30 and below 50 (%)	20 (20.82)	20 (19.20)	24 (24.99)	25 (26.03)	20 (20.82)	17 (17.7)
50 and below 100 (%)	41 (42.7)	51 (48.96)	50 (52.08)	49 (51.04)	51 (53.12)	55 (57.28)
total sample (%)	96 (100.00)	96 (100.00)	96 (100.00)	96 (100.00)	96 (100.00)	96 (100.00)
Average IIT	46.69	50.25	50.88	51.42	51.78	53.15
all product	93.66	90.63	97.92	90.30	90.33	84.76

Source: Calculated by author from the United Nations, COMTRADE database

Note: a weighted by the trade share.

**Table 19.** Frequency distribution of IIT index at 3 digits SITC 0-9, 2001-2010

IIT for Thailand's trade with AEC countries changed from agricultural products (SITC 0-4) in 2001 to manufactured products (SITC 5-8) in 2010 for example soaps, lubricants, waxes, candles, modeling pastes (34), glass and glassware (70), coffee, tea, mate and spices (09), optical, photo, technical, medical, etc apparatus (90), organic chemicals (29) in 2001 to ceramic products (69), mineral fuels, oils, distillation products, etc. (27), (explosives, pyrotechnics, matches, pyrophorics, etc.(36), organic chemicals (29), works of art, collectors pieces and antiques (97).

At 3 digits SITC-0, the highest of IIT levels (above 80 percent) are coffee, tea, mate and spices (09), fish, crustaceans, mollusks, aquatic invertebrates, nes (03). In contrast, the lowest level IIT index are meat and edible meat offal (02), products of animal origin, nes (05), edible fruit, nuts, peel of citrus fruit, melons (08). Increasing IIT are dairy products, eggs, honey, edible animal product, nes (04), products of animal origin, nes (05), edible vegetables and certain roots and tubers (07), edible fruit, nuts, peel of citrus fruit, melons (08) (see Table 20).

Code	Description	2001	2003	2005	2007	2009	2010
TOL		93.66	90.63	97.92	90.30	90.33	84.76
01	Live animals	48.33	88.00	38.32	81.02	5.22	12.43
02	Meat and edible meat offal	4.22	2.57	60.08	6.14	1.32	0.50
03	Fish, crustaceans, molluscs, aquatic invertebrates nes	80.24	58.02	45.49	53.10	49.62	58.79
04	Dairy products, eggs, honey, edible animal product nes	28.46	33.68	35.46	46.88	63.61	67.53
05	Products of animal origin, nes	5.58	85.27	64.71	32.88	37.71	76.16
06	Live trees, plants, bulbs, roots, cut flowers etc	53.10	32.89	30.25	33.17	23.08	32.17

Code	Description	2001	2003	2005	2007	2009	2010
07	Edible vegetables and certain roots and tubers	45.63	59.90	78.25	52.28	77.91	91.88
08	Edible fruit, nuts, peel of citrus fruit, melons	3.07	7.54	29.33	39.71	35.44	48.05
09	Coffee, tea, mate and spices	98.03	11.40	10.00	21.08	43.74	14.87

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 20.** Distribution of IIT index at 3 digit SITC 0, 2001-2010

Analysis at 3 digits SITC-1, indicated that the IIT index increased in cereals (10), oil seed, oleagiac fruits, grain, seed, fruit, etc, nes (12), animal, vegetable fats and oils, cleavage products, etc (15), meat, fish and seafood food preparations, nes (16), sugars and sugar confectionery (17), cocoa and cocoa preparations (18), cereal, flour, starch, milk preparations and products (19). In contrast IIT decreased in milling products, malt, starches, insulin, wheat gluten (11), lac, gums, resins, vegetable saps and extracts, nes (13), vegetable plaiting materials, vegetable products, nes (14). The lowest IIT index at 3 digits SITC-1 is sugars and sugar confectionery (17). The highest IIT index at 3 digit SITC 1 are oil seed, oleagiac fruits, grain, seed, fruit, etc, nes (12) and cereal, flour, starch, milk preparations and products (19) (see Table 21).

code	Description	2001	2003	2005	2007	2009	2010
TOL		93.66	90.63	97.92	90.30	90.33	84.76
10	Cereals	0.41	0.98	5.18	5.06	13.84	11.99
11	Milling products, malt, starches, insulin, wheat gluten	20.78	11.78	25.47	21.23	13.73	14.96
12	Oil seed, oleagiac fruits, grain, seed, fruit, etc, nes	62.87	76.64	54.77	88.83	70.16	68.29
13	Lac, gums, resins, vegetable saps and extracts nes	48.80	24.65	36.99	24.79	32.71	45.82
14	Vegetable plaiting materials, vegetable products nes	24.18	11.87	10.61	4.97	0.61	0.72
15	Animal, vegetable fats and oils, cleavage products, etc	49.67	54.57	57.85	42.48	65.38	76.12
16	Meat, fish and seafood food preparations nes	12.84	12.48	29.75	27.39	54.02	48.06
17	Sugars and sugar confectionery	5.02	5.58	4.84	4.67	7.97	6.38
18	Cocoa and cocoa preparations	18.69	32.55	37.96	49.98	44.52	39.56
19	Cereal, flour, starch, milk preparations and products	68.55	47.17	65.16	75.83	79.14	75.33

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 21.** Distribution of IIT index at 3 digits SITC 1, 2001-2010

At 3 digits SITC-2, the analysis indicated that the IIT index increased in vegetable, fruit, nut, etc food preparations (20), beverages, spirits and vinegar (22), residues, wastes of food industry, animal fodder (23), tobacco and manufactured tobacco substitutes (24), salt, sulphur, earth, stone, plaster, lime and cement (25), ores, slag and ash (26), mineral fuels, oils, distillation products, etc (27), organic chemicals (29). In contrast, IIT decreased in miscellaneous edible preparations (21), Inorganic chemicals, precious metal compound, isotopes (28). The highest IIT are mineral fuels, oils, distillation products, etc (27), inorganic chemicals, precious metal compound, isotopes (28), organic chemicals (29) (see Table 22).

code	Description	2001	2003	2005	2007	2009	2010
TOL		93.66	90.63	97.92	90.30	90.33	84.76
20	Vegetable, fruit, nut, etc food preparations	14.32	17.14	22.87	36.47	29.66	28.39
21	Miscellaneous edible preparations	43.70	41.69	37.59	38.83	29.59	29.86
22	Beverages, spirits and vinegar	8.69	37.63	33.52	23.34	12.87	11.24
23	Residues, wastes of food industry, animal fodder	20.88	15.13	20.70	21.10	22.03	28.06
24	Tobacco and manufactured tobacco substitutes	49.90	38.51	39.64	56.03	62.70	61.48
25	Salt, sulphur, earth, stone, plaster, lime and cement	9.79	11.44	9.96	10.85	7.73	11.50
26	Ores, slag and ash	4.19	6.47	1.54	22.41	4.46	50.56
27	Mineral fuels, oils, distillation products, etc	71.10	69.97	66.59	75.61	77.31	96.19
28	Inorganic chemicals, precious metal compound, isotopes	91.83	80.45	70.90	85.50	85.15	81.63
29	Organic chemicals	94.97	91.88	88.55	68.69	98.32	95.14

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 22.** Distribution of IIT index at 3 digits SITC 2, 2001-2010

At 3 digits SITC-3, we found that the IIT level increased in fertilizers (31), tanning, dyeing extracts, tannins, derives, pigments etc (32), essential oils, perfumes, cosmetics, toiletries (33), explosives, pyrotechnics, matches, pyrophorics, etc (36), photographic or cinematographic goods (37), miscellaneous chemical products (38). IIT decreased in soaps, lubricants, waxes, candles, modeling pastes (34), albuminoids, modified starches, glues, enzymes (35). The highest IIT level are for explosives, pyrotechnics, matches, pyrophorics, etc (36). The lowest IIT levels are for albuminoids, modified starches, glues, enzymes (35) (see Table 23).

	Description	2001	2003	2005	2007	2009	2010
30	Pharmaceutical products	41.73	51.88	42.69	52.69	48.72	42.66
31	Fertilizers	30.08	40.10	57.63	56.17	61.57	53.18
32	Tanning, dyeing extracts, tannins, derivs, pigments etc	43.97	55.83	88.59	81.57	94.89	88.43
33	Essential oils, perfumes, cosmetics, toileteries	55.13	59.34	57.23	63.47	62.78	65.68
34	Soaps, lubricants, waxes, candles, modelling pastes	98.78	88.84	82.25	86.09	67.04	60.76
35	Albuminoids, modified starches, glues, enzymes	34.48	44.15	37.32	33.16	25.33	22.21
36	Explosives, pyrotechnics, matches, pyrophorics, etc	81.52	96.06	78.27	98.70	78.01	95.54
37	Photographic or cinematographic goods	61.20	74.07	85.63	97.74	81.14	70.73
38	Miscellaneous chemical products	74.16	71.31	66.96	79.14	86.14	87.29
39	Plastics and articles thereof	89.16	88.74	79.01	78.14	74.68	77.63

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 23.** Distribution of IIT index at 3 digits SITC 3, 2001-2010

At 3 digits SITC-4, IIT increased in articles of leather, animal gut, harness, travel goods (42), wood and articles of wood, wood charcoal (44), cork and articles of cork (45), paper & paperboard, articles of pulp, paper and board (48). IIT decreased for rubber and articles thereof (40), raw hides and skins (other than fur skins) and leather (41), fur skins and artificial fur, manufactures thereof (43), manufactures of plaiting material, basketwork, etc. (46), pulp of wood, fibrous cellulosic material, waste etc (47), printed books, newspapers, pictures etc (49). The highest IIT index was for paper & paperboard, articles of pulp, paper and board (48), while the lowest IIT was for fur skins and artificial fur, manufactures thereof (43) (see Table 24).

	Description	2001	2003	2005	2007	2009	2010
40	Rubber and articles thereof	25.98	21.62	22.02	22.13	16.71	16.85
41	Raw hides and skins (other than furskins) and leather	94.97	71.51	42.21	43.73	45.95	37.71
42	Articles of leather, animal gut, harness, travel goods	65.46	51.37	64.76	63.64	76.04	75.13
43	Furskins and artificial fur, manufactures thereof	55.17	10.30	28.13	50.00	18.10	14.29
44	Wood and articles of wood, wood charcoal	15.52	23.45	32.44	71.01	77.25	81.90

	Description	2001	2003	2005	2007	2009	2010
45	Cork and articles of cork	11.32	50.00	9.22	16.35	91.20	54.96
46	Manufactures of plaiting material, basketwork, etc.	76.26	72.09	91.31	72.66	45.65	44.44
47	Pulp of wood, fibrous cellulosic material, waste etc	74.65	73.12	60.60	61.97	75.06	69.49
48	Paper & paperboard, articles of pulp, paper and board	81.58	88.17	90.33	76.12	75.24	83.23
49	Printed books, newspapers, pictures etc	92.86	94.97	59.92	90.84	73.26	61.30

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 24.** Distribution of IIT index at 3 digits SITC 4, 2001-2010

At 3 digits SITC-5, IIT is increasing in silk (50), wool, animal hair, horsehair yarn and fabric thereof (51), vegetable textile fibres nes, paper yarn, woven fabric (53), wadding, felt, nonwovens, yarns, twine, cordage, etc (56), carpets and other textile floor coverings (57), special woven or tufted fabric, lace, tapestry etc (58), impregnated, coated or laminated textile fabric (59). IIT decreased in cotton (52), manmade filaments (54), manmade staple fibres (55). The highest IIT is for manmade filaments (54). The lowest IIT is for manmade staple fibres (55) (Table 25).

	Description	2001	2003	2005	2007	2009	2010
50	Silk	31.41	84.07	96.41	40.11	68.33	86.32
51	Wool, animal hair, horsehair yarn and fabric thereof	18.94	27.63	30.14	62.69	77.45	67.58
52	Cotton	35.86	33.97	30.02	15.30	15.99	29.62
53	Vegetable textile fibres nes, paper yarn, woven fabric	25.97	50.76	86.04	41.08	96.56	72.69
54	Manmade filaments	93.17	87.64	90.54	91.22	88.82	89.82
55	Manmade staple fibres	38.41	40.06	26.34	19.74	21.04	21.74
56	Wadding, felt, nonwovens, yarns, twine, cordage, etc	14.37	19.76	19.06	25.59	25.81	23.72
57	Carpets and other textile floor coverings	10.76	19.02	23.35	19.12	27.19	25.02
58	Special woven or tufted fabric, lace, tapestry etc	23.54	35.13	41.07	51.87	61.96	72.80
59	Impregnated, coated or laminated textile fabric	25.65	40.09	46.39	53.20	49.48	47.26

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 25.** Distribution of IIT index at 3 digits SITC 5, 2001-2010

At 3 digits SITC-6, the analysis found that IIT increased in articles of apparel, accessories, knit or crochet (61), Articles of apparel, accessories, not knit or crochet (62), Other made textile articles, sets, worn clothing etc (63), footwear, gaiters and the like, parts thereof (64), headgear and parts thereof (65), umbrellas, walking-sticks, seat-sticks, whips, etc (66), ceramic products (69). IIT decreased in knitted or crocheted fabric (60), bird skin, feathers, artificial flowers, human hair (67), stone, plaster, cement, asbestos, mica, etc articles (68). The highest IIT is ceramic products (69), while the lowest IIT is stone, plaster, cement, asbestos, mica, etc articles (68) (Table 26).

	Description	2001	2003	2005	2007	2009	2010
60	Knitted or crocheted fabric	27.21	17.14	14.16	21.08	19.29	23.66
61	Articles of apparel, accessories, knit or crochet	13.95	24.66	34.04	51.34	46.62	49.65
62	Articles of apparel, accessories, not knit or crochet	26.46	22.90	31.80	52.96	57.69	51.40
63	Other made textile articles, sets, worn clothing etc	59.43	83.08	70.22	76.54	87.95	88.24
64	Footwear, gaiters and the like, parts thereof	52.98	85.64	74.76	88.51	96.34	93.13
65	Headgear and parts thereof	19.83	13.83	45.63	23.56	36.80	44.53
66	Umbrellas, walking-sticks, seat-sticks, whips, etc	16.62	37.80	40.63	22.75	17.90	34.29
67	Bird skin, feathers, artificial flowers, human hair	65.10	89.05	97.19	80.55	94.49	59.30
68	Stone, plaster, cement, asbestos, mica, etc articles	38.93	44.88	50.45	34.30	22.51	19.51
69	Ceramic products	39.10	61.56	80.91	89.47	85.05	97.80

Source: Calculated by author from the United Nations, COMTRADE database, UN (2010)

**Table 26.** Distribution of IIT index at 3 digits SITC 6, 2001-2010

At 3 digits SITC-7, we found that IIT increased in pearls, precious stones, metals, coins, etc (71), iron and steel (72), articles of iron or steel (73), aluminum and articles thereof (76), lead and articles thereof (78), IIT decreased in glass and glassware (70), copper and articles thereof (74), nickel and articles thereof (75), zinc and articles thereof (79). The highest IIT is lead and articles thereof (78), and the lowest IIT is pearls, precious stones, metals, coins, etc (27) (Table 27).

	Description	2001	2003	2005	2007	2009	2010
70	Glass and glassware	98.23	83.90	92.98	61.60	51.35	53.78
71	Pearls, precious stones, metals, coins, etc	11.86	30.87	62.01	47.03	20.31	27.01

	Description	2001	2003	2005	2007	2009	2010
72	Iron and steel	30.91	40.83	62.08	43.99	58.53	55.46
73	Articles of iron or steel	89.18	77.68	97.51	87.05	98.32	91.09
74	Copper and articles thereof	36.51	33.16	47.43	48.76	30.80	33.17
75	Nickel and articles thereof	84.98	24.73	22.48	10.30	87.25	35.33
76	Aluminium and articles thereof	62.55	75.99	72.15	94.92	98.53	84.25
78	Lead and articles thereof	68.97	95.28	99.08	71.79	86.15	91.34
79	Zinc and articles thereof	55.91	25.47	38.06	48.00	34.74	32.78

Source: Calculated by author from the United Nations, *COMTRADE database*, UN (2010)

**Table 27.** Distribution of IIT index at 3 digits SITC 7, 2001-2010

At 3 digits SITC-8, IIT increased in tools, implements, cutlery, etc, of base metal (82), ships, boats and other floating structures (89). IIT decreased in miscellaneous articles of base metal (83), machinery, nuclear reactors, boilers, etc (84), electrical, electronic equipment (85), railway, tramway locomotives, rolling stock, equipment (86), vehicles other than railway, tramway (87), aircraft, spacecraft, and parts thereof (88). IIT was stable in tin and articles thereof (80), other base metals, cermets, articles thereof (81). IIT was highest for tools, implements, cutlery, etc of base metal (82), and lowest for aircraft, spacecraft, and parts thereof (88) (Table 28).

	Description	2001	2003	2005	2007	2009	2010
80	Tin and articles thereof	24.08	41.16	10.50	70.08	73.67	23.76
81	Other base metals, cermets, articles thereof	34.84	59.80	82.63	84.70	52.96	35.44
82	Tools, implements, cutlery, etc of base metal	62.45	72.63	68.01	97.65	91.97	91.31
83	Miscellaneous articles of base metal	65.14	64.24	68.69	52.91	61.49	51.68
84	Machinery, nuclear reactors, boilers, etc	81.45	82.85	87.72	81.15	83.48	72.17
85	Electrical, electronic equipment	89.37	92.95	82.48	85.97	80.56	82.78
86	Railway, tramway locomotives, rolling stock, equipment	73.31	70.09	75.62	83.20	35.27	54.38
87	Vehicles other than railway, tramway	70.45	67.39	42.43	34.71	34.31	40.73
88	Aircraft, spacecraft, and parts thereof	13.94	5.10	1.09	1.75	7.03	3.18
89	Ships, boats and other floating structures	2.56	23.52	59.03	41.30	21.55	72.41

Source: Calculated by author from the United Nations, *COMTRADE database*,

**Table 28.** Distribution of IIT index at 3 digits SITC 8, 2001-2010

At 3 digits SITC-9, IIT increased in clocks and watches and parts thereof (91), arms and ammunition, parts and accessories thereof (93), furniture, lighting, signs, prefabricated buildings (94), miscellaneous manufactured articles (96), works of art, collectors pieces and antiques (97). IIT decreased in optical, photo, technical, medical, etc apparatus (90), musical instruments, parts and accessories (92), toys, games, sports requisites (95), commodities not elsewhere specified (99). The highest IIT is for works of art, collectors pieces and antiques (97), while the lowest IIT is for commodities not elsewhere specified (99) (Table 29).

code	Description	2001	2003	2005	2007	2009	2010
TOL		93.66	90.63	97.92	90.30	90.33	84.76
90	Optical, photo, technical, medical, etc apparatus	96.48	80.59	59.61	73.08	83.11	77.43
91	Clocks and watches and parts thereof	46.84	42.77	26.14	33.13	75.40	59.00
92	Musical instruments, parts and accessories	23.46	24.77	8.82	13.44	12.42	19.58
93	Arms and ammunition, parts and accessories thereof	4.07	18.17	6.79	56.84	49.65	55.30
94	Furniture, lighting, signs, prefabricated buildings	50.59	65.84	52.78	43.36	48.58	88.07
95	Toys, games, sports requisites	84.08	65.71	48.42	41.40	31.68	39.32
96	Miscellaneous manufactured articles	55.35	68.06	64.53	67.32	67.60	78.62
97	Works of art, collectors pieces and antiques	32.35	93.75	83.76	39.12	10.13	93.03
99	Commodities not elsewhere specified	63.87	96.15	60.89	44.40	0	0.00

Source: Calculated by author from the United Nations, *COMTRADE database*

**Table 29.** Distribution of IIT index at 3 digits SITC 9, 2001-2010

## 6. Conclusion

Since Verdoon, P.J., [25], Grubel and Lloyd [26] many studies stressed that there is strong empirical support for the hypothesis that countries that have common borders and have eliminated or lowered barriers on trade with each other will have relatively high levels of intra-industry trade. Moreover, the extent of intra-industry trade will be positively correlated with trade intensity. That is, as the trade volume with trade partners increases, there will be more opportunity for more differentiated products to be traded.

The results show that, Thailand's external trade with the AEC is significantly composed of the intra-industry type trading, especially so after the significant of the AFTA (ASEAN Free Trade Area) agreement with the ASEAN in 1993. The level of intra-industry trade is higher between Malaysia, Singapore and Indonesia compared to these countries and the rest of the

world. However, the average level of intra-industry trade for AEC decreased from 93 percent in 2001 to 84 percent in 2010 as opposed to OECD countries over the same period: 36 percent and 48 percent, respectively. This result is, at the same time, parallel to Thailand's trade with the rest of the world. On the other hand, even though the AEC is Thailand's main trading partner, Thailand's share of IIT in total trade is lower with the AEC than with the rest of the world for the entire period. However, economic integration (AEC) with ASEAN countries has changed the production structure of Thailand toward the ASEAN industrial base. As stated by Lohrmann, A-M. [27], the production structure adjustment is an outcome of free trade. That is, the free trade between Thailand and the AEC led to adjustment of the production structure in the Thailand's economy. As a result of this, Thailand's IIT is increasingly changing from low-technology product to high-technology industries.

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