INTRA-INDUSTRY TRADE BETWEEN TAIWAN AND ASEAN-5 IN THE AGRO-FOOD SECTOR: PATTERNS AND DETERMINANTS

by

Ching-Cheng Chang
Research Fellow, Institute of Economics, Academia Sinica, Taipei, Taiwan

Tuan-Chen Ou Yang
Valuation and Actuarial Service, Pricewaterhouse Coopers, Taipei, Taiwan

Deng-Shing Huang
Research Fellow, Institute of Economics, Academia Sinica, Taipei, Taiwan

Corresponding author:

Dr. Ching-Cheng Chang
Institute of Economics, Academia Sinica, No 128, Yen-Chiou Yuan Rd., Sec. 2, Taipei 115, TAIWAN, ROC
TEL: (886) 2-2782 2792 ext 201 FAX: (886) 2- 2785 3946
Email: emily@ieas.econ.sinica.edu.tw

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Abstract

This paper attempts to identify the patterns and determinants of the levels of IIT between Taiwan and ASEAN-5 during the past three decades. Our empirical results confirm the belief that IIT between Taiwan and ASEAN-5 in the agro-food sector has been growing over time. Although industry-specific factors like market size and product differentiation have desirable impacts on IIT, taste overlaps do not. No deterministic conclusion can be drawn from the effect of trade liberalization as implied by removing trade barriers when shaping the future development of IIT. However, the indirect effect arising from income and consumer preferences' convergence may be the main determinant in promoting intra-industry agro-food trade among the Asian countries.

Intra-Industry Trade between Taiwan and ASEAN-5 in the Agro-Food Sector: Patterns and Determinants

I. Introduction

This paper examines the patterns and determinant of intra-industry trade (IIT) in the agro-food sector between Taiwan and the ASEAN-5 (Indonesia, Malaysia, the Philippines, Thailand, and Singapore). The motivation for this paper stems from the recent development in export industrialization and the rapid expansion of processed food exports in many Southeast Asian economies. We focus on the agriculture and food sector not only because this is an important sector within the region, but also because it is one of the most critical sectors for the success of future world trade reform (Anderson, et al, 1997).

In recent literature the growing importance of the ASEAN Free Trade Area (AFTA) and its implications on the major trading partners have attracted a lot of attentions. Many Southeast Asian economies have emerged as central players in the recomposition of agro-food production in the wake of adopting the Uruguay Round Agreement on Agriculture under the auspices of General Agreements on Tariffs and Trade (GATT) (Thompson and Cowan, 2000). The historical trend of IIT is particularly relevant when discussing future bilateral agreements or global trade liberalization where trade partners expect major trade adjustments to take place within industries, rather than across industries (Globerman and Dean, 1990). Most empirical work on IIT has focused on manufacturing goods. It is expected that IIT will be important in the agro-food sector in this region as these industries have become more concentrated and significant structural change has been observed in their export/import markets.

Many empirical studies have found evidence that the adjustment faced by firms and industries under liberalized trade is likely to decrease in a differentiated product industry and that trade liberalization is likely to benefit in the presence of imperfect competition (Richardson, 1989). To the extent that IIT can be taken as an indicator of imperfect competition, trade liberalization in industries with high potentials in IIT should be especially

rewarding (Hart and McDonald, 1992).

This paper compiles the bilateral IIT indices between Taiwan and the ASEAN-5 over the period 1970-95 and analyzes the determinants of IIT variations over time and across industries.[1] In particular, we attempt to separate country characteristics from industry characteristics as determinants of IIT. The approach of this paper is as follows. The second section examines the relative importance of agro-food in total trade and their composition and characteristics. The third section describes data compilation and the methodologies used in calculating the IIT indices. The fourth section attempts to analyze the determinants of IIT with emphasis on the relative importance of policy regime, resource endowments and the level of development in explaining the inter-country and inter-industry differences. The final section summarizes the findings along with deriving policy inferences and suggestions for future research.

II. The Role of Agro-food Trade

Table 1 illustrates the development of bilateral trade between Taiwan and the ASEAN-5 during the past two decades. Overall speaking, the development has been very slow and no significant progress was made until the 1990s. It is also very obvious that Taiwan's previous main trade partner, Indonesia, has gradually been replaced by Singapore and Malaysia.

The share of agro-food exports in total value of Taiwan's exports has declined during the past two decades as shown in Table 2. The figure was above 10 per cent for exports to Indonesia and Malaysia during the 1970s, but descended to 1 to 2 per cent in the 1990s, while exports to Thailand showed a very slow increasing trend in the 1990s. This is an indication of the rapid industrial development in the ASEAN countries and manufacturing has substituted the agro-food sector as the region's leading sector.

On the import side, Taiwan's agro-food imports from ASEAN-5 are mostly concentrated in crop and processed food items, except from Malaysia where forestry

products account for more than 60 per cent in agro-food imports. The imports of primary agro-food products have been decreasing, substituted by increases in processed products.

The agro-food trade between Taiwan and ASEAN-5 during the past two decades can be described as follows:

(1) Due to lack of natural resources and high labor costs, Taiwan's agro-food imports from ASEAN-5 have gradually increased over time, but at a slower speed than the increase in manufacturing imports. Therefore, the share of agro-food products imported from ASEAN-5 in Taiwan's total imports have been decreasing over time. There are not many changes on the export side in either relative or absolute terms.

(2) An itemized comparison shows that most of the agro-food trade between Taiwan and ASEAN-5 belongs to the processed food group. Specifically, processed agro-food products account for 70 per cent of Taiwan's agro-food that is imported from and exported to these countries.

III. Data Compilation and Measurement

The measurement of IIT has been dominated by the indices suggested by Balassa (1966) and Grubel and Lloyd (1975). In this paper Grubel and Lloyd's index is calculated at the 4-digit level of disaggregation.[2] The main data source is the World Database CD-ROM from the International Trade Division of Statistics Canada. The commodities in this database are classified by the Standard International Trade Classification (SITC) of the United Nations. The data are drawn at the 4-digit level for 173 agro-food commodities over the period 1970-1995. Appendix A provides a detailed list of these commodities and their corresponding SITC 4-digit codes.

During our sample period the United Nations revised SITC twice, once in 1963 and once in 1975. Therefore, our data contains both SITC Revisions 1 and 2. A conversion thus has to be made to maintain consistency in the commodity coverage. Although different countries might classify the same commodity with the use of a different SITC code, given 26 years of data the time series of indices should be able to reflect the bilateral IIT

patterns accurately.

To aggregate the indices to a higher level of aggregation, Grubel and Lloyd use the relative size of exports plus each industry's imports in the total value of exports plus imports as weights, that is, $\frac{(X_i + M_i)}{\sum_{i=1}^{n}(X_i + M_i)}$. The aggregated Grubel-Lloyd index ($\overline{GL}$) is shown in equation (1):

$$\overline{GL}_{jk} = \left[1 - \frac{\sum_{i=1}^{n}\left|X_{ijk} - M_{ijk}\right|}{\sum_{i=1}^{n}\left(X_{ijk} + M_{ijk}\right)}\right] * 100, \qquad (1)$$

where X and M stand for the value of exports and imports, i refers to the 4-digit product categories that make up each 2-digit industry j, and k identifies the countries. The value of $\overline{GL}$ varies between 0 and 100. When the exports exactly match the imports of the same industry, $\overline{GL}$ is 100. Therefore, the higher the IIT is, the closer $\overline{GL}$ is to 100, and vice versa.

Equation (1) is a downward-biased measure of IIT if the country's exports are not equal to imports. With an imbalance between exports and imports, $\overline{GL}$ must be less than 100 no matter what the pattern of exports and imports is, because exports cannot match imports in every industry. Therefore, $\overline{GL}$ has to be adjusted to remove the trade imbalance effect from the IIT. As suggested by Aquino(1978), these biases exist in all levels of aggregation and therefore should be adjusted as such. The adjustment method proposed by Aquino is summarized as follows.

First, before the calculation of IIT the values of exports and imports are adjusted separately by the following two ratios:

$$X_{ijk}^{q} = X_{ijk} * a, \qquad \text{where} \quad a = \frac{\sum_i (X_{ijk} + M_{ijk})}{2\sum_i X_{ijk}} \qquad (2)$$

$$M^{q}_{ijk} = M_{ijk} * b, \qquad \text{where} \quad b = \frac{\sum_{i}(X_{ijk} + M_{ijk})}{2\sum_{i} M_{ijk}} \quad . \tag{3}$$

According to equation (2) and (3), when imports and exports are balanced in an industry, *a=b=1*. Otherwise, if $\sum_{i=1}^{n} X_i > \sum_{i=1}^{n} M_i$ (i.e., exports exceed imports), then *a<1* and *b>1*. The adjustment simply downsizes the exports by multiplying the exports with a less-than-one factor, while the imports will be enlarged by a greater-than-one factor. If trade deficits prevail (i.e., $\sum_{i=1}^{n} X_i < \sum_{i=1}^{n} M_i$), then *a>1* and *b<1*. The export and import adjustments are then reversed.

The weights used to aggregate the indices should also be modified to remove the bias. The new weights now become $\frac{(aX_{ijk} + bM_{ijk})}{\sum_{i=1}^{n}(aX_{ijk} + bM_{ijk})}$, which gives the following adjusted aggregate measure ($\overline{AQ}$):

$$\overline{AQ}_{jk} = \left[1 - \frac{\sum_{i=1}^{n}\left|aX_{ijk} - bM_{ijk}\right|}{\sum_{i=1}^{n}(aX_{ijk} + bM_{ijk})}\right] * 100 \tag{4}$$

$$= \left[1 - \frac{\sum_{i=1}^{n}\left|X^{q}_{ijk} - M^{q}_{ijk}\right|}{\sum_{i=1}^{n}(X^{q}_{ijk} + M^{q}_{ijk})}\right] * 100 \tag{5}$$

Both the $\overline{GL}$ and $\overline{AQ}$ indices are used in our empirical study. This allows us to gain knowledge about the sensitivity of the IIT measure to alternative aggregation methods of the trade data. The nature of IIT with the ASEAN-5 for Taiwan was calculated over the period 1970~95.

IV. Patterns

Figure 1 compares the trends in bilateral IIT for Taiwan and each ASEAN-5 member. The historical patterns indicate that the bilateral trade between Taiwan and the ASEAN-5 was basically inter-industry in nature over the 1970s and 1980s. However, the trend toward increased IIT started up during the late 1980s. These increasing trends seem particular relevant in view of future trade agreements with ASEAN in the agro-food sector where trade adjustments are expected to take place within industries rather than across industries.

Among the five trading partners, we also find that the bilateral IIT index with Singapore has generally been significantly higher than that of the other four ASEAN members. Therefore, IIT tends to be higher for the more economically-developed countries in the group. This coincides with Balassa and Bauwens' finding that IIT is positively correlated with per capita income.

The results indicate that IIT for agro-food products is lower than that for manufacturing as reported in other literature. For example, in the UK in 1977, Greenaway and Milner (1986) reported values of 0.35 for agriculture and 0.69 for manufacturing goods. The largest number reported in Table 4 is 0.31 for IIT between Taiwan and Singapore in 1995.[3] Compared to manufacturing goods, agro-food products have some intrinsic characteristics that contribute to the smaller degree of intra-industry specialization. Lack of competition and product differentiation, non-increasing returns to scale, insufficient R&D investment, along with too much government intervention are among these characteristics. Nevertheless, similar to the findings in recent empirical works by Christodoulou (1992) for the EEC meat market and Hirschberg, Sheldon and Dayton (1994) for food processing sector in a sample of 30 countries, bilateral IIT between Taiwan and ASEAN-5 does exist in the agro-food sector and the level has been growing over time.

Inter-industry comparisons are made in Table 4 for a total of 26 2-digit-level industries within the agro-food sector. The titles of classifications and SITC codes are reported in Appendix B. The comparisons over time are broken into 5 periods using their corresponding arithmetic means.

As shown in Table 4, the level of IIT in the meat (01), fish (03), beverages (11), oilseeds (22), crude materials (29), and chemical elements and compounds (51) industries is much greater than that in other industries. Most of these industries are also the ones with higher trade deficits against Taiwan. On the other hand, live animals (00), dairy products and eggs (02), tobacco (12), and textile fibers (26) industries show very little specialization in IIT, and no sign of increasing over time.

Great instabilities over time are observed in Table 4. We can also see that the two indices ($\overline{GL}$ and $\overline{AQ}$) differ the most where trade imbalances prevail. For example, the differences between two indices for the sugar and honey (06) industry widened substantially after 1980. In the empirical work by Aquino (1978) on the manufacturing sector over the period 1951-74, the difference in one case turned out to be as high as 94%. If we examine the trade statistics on an annual basis, these striking differences are mainly caused by the simultaneous import and export from/to the Philippines starting in year 1982 along with the imbalances between exports and imports leading to the downward-biased measure of IIT. Therefore, the recommendations given by Greenaway and Milner (1981) to exclude transitory influences and to avoid periods of obvious trade imbalances are taken into consideration in our regression analysis in the following section.

V. Determinants

Many attempts have been made to establish a theoretical foundation in explaining the occurrence of IIT. Christodoulou (1992) provides a review of several popular approaches, e.g., the H-O-S approach by Falvey (1981), the neo-Chamberlinian models of monopolistic competition by Krugman (1979), and the neo-Hotelling models of monopolistic competition based on Lancastrian consumer preference analysis by Lancaster (1980) and Helpman (1981). However, as mentioned in Christodoulou,

"c*onstruction of a generalized theory that would be applicable to a wide variety of circumstances is quite impossible. ... Most of the empirical investigations,…, have put on test*

a set of hypotheses on causal relationships rather than a specific theoretical model."

Therefore, our investigation is largely based on the previous empirical literature.

Many empirical studies have examined the determinants of the degree of IIT between pairs of countries for a particular industry. Generally speaking, these studies have found systematic relationships between the share of IIT and the average levels of and inequalities between their gross domestic products (GDPs), scale economies, market size, market structure, government policies, and preferences for diversified products (e.g., Balassa and Bauwens, 1987; Bergstrand, 1990). In such a context, we draw the hypothesis that country-specific characteristics and inter-country differences are influenced by the markets' demand and supply conditions, government policies, along with resource endowments in the economies, while industry-specific characteristics and inter-industry differences are explained by product differentiation and government policies.

Two types of regressions are estimated, one using the IIT by country as the dependent variable while the other using the IIT by industry. We hope to identify the sources of inter-country and inter-industry differences given by the historical IIT patterns in section IV.

1. Regressions of country-specific IIT

The model specification of country-specific IIT regressions (with predicted signs) is as follows:

$$IIT_{ij} = f(\underset{+}{SIZE_j}, \underset{+}{DEMDIFF_j}, \underset{+}{OPEN_j}, \underset{-}{DGDP_{ij}}, \underset{?}{DPCGDP_{ij}}, \mu), \qquad (6)$$

where IIT_{ij} denotes the IIT between countries i (Taiwan) and trading partner j (member of ASEAN-5) and $SIZE_j$ refers to the market size of j. It is approximated by the gross domestic product (GDP) of country j. According to Helpman (1987), IIT is expected to be higher the larger the market size. Term $DEMDIFF_j$ is used to account for the influence of economic development on consumers' demand for differentiated products. It is approximated by the GDP per capita of country j following Linder (1961)'s assertion that taste overlap is systematically related to level of development.

Term $OPEN_j$ represents the degree of openness. The inclusion of this variable captures the influence of policy interventions in agro-food trade. The level of IIT should positively correlate with lower trade barriers as demonstrated in Falvey (1981). This variable is approximated by a trade orientation measure, which is the residual from a regression of per capita trade on per capita income and population as suggested in Stone and Lee (1995). Per capita trade is the sum of total agro-food exports and imports divided by population.

The inequalities of the economic size and resource endowment (or consumers' preferences) of the two trading partners are denoted by $DGDP_{ij}$ and $DPCGDP_{ij}$, respectively. They are approximated by either their absolute differences, i.e.,

$$\mid GDP_i - GDP_j \mid \text{ and } \mid PCGDP_i - PCGDP_j \mid$$

or, alternatively, by the index proposed by Balassa and Bauwens (1987) as follows:

$$1 + \frac{[w \ln w + (1-w)\ln(1-w)]}{\ln 2},$$

where $w = \dfrac{GDP_i}{(GDP_i + GDP_j)}$ for $DGDP_{ij}$ or

$$w = \frac{PCGDP_i}{(PCGDP_i + PCGDP_j)} \text{ for } DPCGDP_{ij}.$$

Both inequality measures are used in our regressions. Model A uses the absolute differences and Model B uses the alternative proxies by Balassa and Bauwens. The "+", "-" and "?" signs below the regression model represent, respectively, the expected positive, negative and uncertain relationships of the explanatory variables with the level of IIT. Term μ is our residual.

The GDP and per capita GDP data on ASEAN-5 members come from Key Indicators of Developing Asian and Pacific Countries published by the Asian Development Bank. Data on Taiwan are obtained from Social Indicators of the Republic of China published by Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. The

ordinary least squares method is used in our country–wise regressions. The results are listed in Table 5. With the $\overline{R}^2$ ranging from 0.70 to 0.90, the overall explanatory power of the model is considered to be fairly high. The best overall fit in terms of $\overline{R}^2$ is present in the IIT with Indonesia and Malaysia. In general, the regressions behave better for model A than formodel B. Therefore, in our study the absolute difference of GDP is a better proxy for country size inequality than the proxy proposed by Balassa and Bauwens (1987).

The market size (*SIZE*) has, as expected, positive and significant influences on IIT for all bilateral trade between Taiwan and the five members in ASEAN. By contrast, the variable representing level of development and taste overlaps (*DEMDIFF*) exerts negative influences on IIT in almost all cases. This unexpected result perhaps can be attributed to the fact that consumers' taste overlaps in agro-food products are not in line with the region's progress of economic development. Differences in culture and religion are considered to be the main deterrent.

The influences of degree of openness (*OPEN*) are positive in IIT with Malaysia and Singapore as expected, but negative in IIT with Indonesia, the Philippines, and Thailand. This seems to indicate that the positive relationship between IIT and openness only exists when both countries are at the similar level of economic development. In order to test this hypothesis, we add the interactions of per capita GDP and openness (i.e., *PCGDP*OPEN*) into Model A on the IIT with Singapore. The estimation results are shown in the extra columns on Model C in Table 5. The overall fit in terms of $\overline{R}^2$ improves and the two estimates of the added interaction term are positive and statistically significant, while the estimates for *OPEN* become negative and insignificant. Therefore, our result suggests that the direct effect of openness on IIT may be undetermined, but its indirect effect through the development in consumers' well-being and taste overlaps is positive and significant. This result has great implications for public policy decisions. The level of IIT cannot be promoted by removing government's restrictions on agro-food trade alone, while policy measures on income enhancement and demand promotions have to be taken into

considerations as well.

The inequalities in market size (*DGDP*) and taste overlaps (*DPCGDP*) are negatively related to the level of IIT as expected in most cases, but most of the estimates are statistically insignificant. We try to adopt two alternative measures for this inequality index in our regressions as shown in Model A and Model B respectively, but the results are not very different. Therefore, although our results do not refute the hypothesis proposed by Helpman and Krugman (1985) model, market inequalities do appear to exert little influence on IIT between Taiwan and the ASEAN-5.

2. Regressions of industry-specific IIT

Due to difficulty in finding the appropriate proxies, there are only 5 sets of explanatory variables in our industry-specific regressions. The difficulty in collecting time-series data also shortens our study period to 1989~1995. A total of 17 industries' data is pooled over the period 1989~95.[4] Therefore, six time dummies and sixteen industry dummies are added (with predicted signs) into our industry-specific regression as follows:

$$IIT_k = f(DEXP_k, DIMP_k, TAR_K, D1 \sim D6, DU1 \sim DU16, \mu), \qquad (7)$$
$$\qquad\qquad +\quad +\quad -\quad ?\quad ?$$

where $DEXP_k$ represents the degree of product differentiation of the export commodity in the k^{th} industry and $DIMP_k$ measures the degree of product differentiation of the import commodity.

These two variables are approximated by their export/import unit values and the following two indices as proposed by Hufbauer (1970):

$$DEXP = \frac{XS_K}{XM_K}. \qquad (8)$$

XS_K denotes the standard deviation of export unit values for the different 4-digit product categories included in the 2-digit IIT index of the k^{th} industry, while XM_K denotes the mean of these export unit values. Similar definitions apply to $DIMP_k$ where

$$DIMP = \frac{IS_K}{IM_K}. \qquad (9)$$

The higher the product differentiation is, the higher the proportion of IIT that is expected to be. These two variables also capture the influences of government policies since they take into account the unit trade prices and the product composition in the agro-food sector (Christodoulou). The major data sources include the unit prices of imports and exports reported in the web site of the Council of Agriculture (http://www.coa.gov.tw/agr_sed/ts/ts000000.htm).

Term TAR_K represents the tariff level of the k^{th} industry. It is expected to move in the opposite direction with the level of IIT. Tariff data come from the Custom Import Tariff of the Republic of China published by the Directorate General of Customs, Ministry of Finance. Because the data is compiled according to the Chinese Commodity Classification (CCC) code, a conversion has to be made to cross-reference the SITC 4-digit commodity listing to the CCC 4-digit listing. This is a very time-consuming task. Due to the time constraint, we can only identify the tariff rates for 173 4-digit level commodities in years 1989 and 1992 between Taiwan and each ASEAN-5 member. Under the assumption that tariffs do not change on an annual basis, the 1989 data are used to represent the tariff level over the period 1989~91, with the 1992 data covering the period 1992~95. These 4-digit level tariffs are then aggregated into a 2-digit level by using the weighted averages with weights given by each 4-digit commodity's share in their 2-digit level total imports.

The fixed-effect method is used to obtain efficient estimates. The results are reported in Table 6.[5] First, product differentiation of export commodities (*DEXP*) are negatively related to IIT and the coefficients are statistically significant. This is inconsistent with our expectations. In contrast, product differentiation of import commodities (*DIMP*) is positively related to IIT, but unfortunately the coefficients are insignificant. Despite the weaknesses and criticisms of using the Hufbauer index as a proxy for product differentiation, our results suggest that the level of IIT in the agro-food sector will be higher as more

differentiated products are imported. However, when the export products are highly differentiated, the IIT will decrease, because the exporters will lose economies of scale in producing these products and their comparative advantages in the destination market. Therefore, from the exporter's point of view product specialization or standardization may be more beneficial to promote IIT.

The negative signs of the coefficients of import tariff (*TAR*) are consistent with expectations, but they are not statistically significant One possible reason is due to the fact that non-tariff barriers are more than often employed in this region for agro-food trade. Nevertheless, this result conforms relatively well with our country-specific regression result on the degree of openness (*OPEN*). Once again, we cannot conclude that removing trade barriers will increase IIT. Therefore, we argue that although trade liberalization in the agro-food sector has increased bilateral IIT between Taiwan and ASEAN, caution should be raised as to whether this increasing trend will continue into the future when more liberalization efforts are made for the next round of WTO negotiation.

All the coefficients for time dummies are also insignificant, which indicate no significant changes over the period 1989-95. As for the industry dummies, all the positive coefficients are statistically significant, such as the dummies for SITC 03 (fish), 04 (cereals), 05 (fruits and vegetables), 06 (sugar and honey), 07 (coffee and tea), 11 (beverages), 29 (crude animal and vegetable materials), 41 (animal oils and fats), and 51 (chemical elements and compounds). Factors like market concentration, economies of scale, product innovation and technological progressiveness could be the main causes for the higher IIT specialization in these nine particular industries.

VI. Concluding Remarks

This paper attempts to identify the patterns and determinants of the levels of IIT between Taiwan and ASEAN-5 during the past three decades. Our empirical results confirm the general belief that bilateral IIT between Taiwan and ASEAN-5 in the agro-food sector has been growing over time. The greatest IIT is found in trade between Taiwan and Singapore. This is quite consistent with the argument by Helpman and Krugman (1985) as

well as the empirical studies dealing with IIT among developing and newly-industrialized countries (e.g., Hellvin, 1994).

For the issues concerning the determinants of IIT, our major conclusion is that some of the industry-specific factors (market size, economies of scale, product differentiation) have significant impacts on bilateral agro-food IIT. However, some demand factors like taste overlaps do not have desirable influences as expected. This suggests areas for further research on the overall Asian agro-food market with a special focus on the prospects of consumer preferences.

Next, the degree of openness would not appear to contribute much to the level of IIT. Accordingly, no deterministic conclusion can be drawn for the effect of trade liberalization as implied by removing trade barriers in shaping the future development of IIT. However, the positive relationship between IIT and openness does exist in the bilateral IIT between Taiwan and Singapore. This implies that the indirect effect of trade liberalization on income and consumer preferences' convergence will play a role in promoting IIT among the developing countries. These conclusions are, of course, tentative in light of the very small progresses in IIT during the sample period which temper the robustness of our regression results. We do believe that if a mutual free trade agreement like the one in the EU agro-food market is made between Taiwan and ASEAN, then more intra-industry specialization will be fostered.

Footnotes

1. Given the nature of the resource endowment, the agro-food product was not an export option for Singapore. However, a significant amount of processed food from her neighboring countries is routed through her harbor as part of entrepôt trade. Singapore also undertakes some final stage processing of these products and therefore is not excluded from our study.
2. The index suggested by Balassa is the analog of the one suggested by Grubel and Lloyd, with focuses on the overlaps in trade flows. The only difference is that Balassa's index is not subtracted from one.
3. All indices reported in Table 4 and 5 have been multiplied by 100. Thus, they range from zero to 100 rather than zero to one.
4. The commodities classified in SITC 2-digit codes 09, 42, 61, and 63 are excluded, because there is no simultaneous export and import during the period 1989-95. In addition, those in SITC 21, 24, 25, 26, and 65 are also excluded due to lack of data while quantifying the explanatory variables. Therefore, our industry-specific regressions consist of 17 2-digit level industries.
5. One outlier for products in SITC00 (live animal) in year 1995 is detected in our estimation and thus deleted from the sample.

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Table 1. The development of bilateral trade between Taiwan and the ASEAN-5, 1976-95.

Unit: million U.S. dollars

	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN-5	World Total
1976-80	127,270 (2.71%)	63,929 (1.36%)	38,169 (0.81%)	83,092 (1.77%)	41,256 (0.88%)	353,716 (7.54%)	4,690,872 (100%)
1981-85	148,458 (1.63%)	136,998 (1.50%)	66,572 (0.73%)	183,120 (2.01%)	67,988 (0.74%)	603,136 (6.61%)	9,128,471 (100%)
1986-90	197,897 (1.34%)	198,915 (1.34%)	118,127 (0.80%)	349,509 (2.36%)	157,794 (1.07%)	1,022,242 (6.90%)	14,808,567 (100%)
1991-95	410,521 (1.84%)	533,885 (2.40%)	203,972 (0.92%)	682,123 (3.06%)	413,831 (1.86%)	2,244,332 (10.07%)	22,280,450 (100%)

Source: Ministry of Finance, Monthly Statistics of Exports and Imports, Taiwan Area, R.O.C.

Note: Numbers in parentheses are the percentage of bilateral trade between Taiwan and the ASEAN-5 in world total.

Table 2. The role of agro-food exports in total exports from Taiwan to ASEAN-5, 1976-95.

Unit: million U.S. dollars

Destiny	Period	Primary agro-food products				Processed agro-food products	Non-agro-food products	Total
		Crops	Forestry	Fishery	Animal			
Indonesia	1976-1980	27 (1.41%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	386 (20.09%)	1508 (78.50%)	1921 (100.00%)
	1981-1985	31 (1.69%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	228 (12.44%)	1574 (85.87%)	1833 (100.00%)
	1986-1990	16 (0.39%)	0 (0.00%)	3 (0.07%)	1 (0.02%)	188 (4.56%)	3915 (94.96%)	4123 (100.00%)
	1991-1995	40 (0.62%)	0 (0.00%)	4 (0.06%)	3 (0.05%)	107 (1.66%)	6295 (97.61%)	6449 (100.00%)
Malaysia	1976-1980	32 (4.28%)	0 (0.00%)	3 (0.40%)	0 (0.00%)	62 (8.29%)	651 (87.03%)	748 (100.00%)
	1981-1985	102 (6.95%)	0 (0.00%)	2 (0.14%)	0 (0.00%)	99 (6.75%)	1264 (86.16%)	1467 (100.00%)
	1986-1990	78 (1.90%)	0 (0.00%)	14 (0.34%)	2 (0.05%)	72 (1.76%)	3929 (95.95%)	4095 (100.00%)
	1991-1995	31 (0.25%)	0 (0.00%)	44 (0.35%)	3 (0.02%)	107 (0.86%)	12237 (98.51%)	12422 (100.00%)
Philippines	1976-1980	8 (1.05%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	13 (1.70%)	743 (97.25%)	764 (100.00%)
	1981-1985	18 (2.39%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	18 (2.39%)	716 (95.21%)	752 (100.00%)
	1986-1990	23 (0.80%)	0 (0.00%)	0 (0.00%)	5 (0.17%)	58 (2.01%)	2794 (97.01%)	2880 (100.00%)
	1991-1995	22 (0.50%)	0 (0.00%)	0 (0.00%)	1 (0.02%)	59 (1.35%)	4287 (98.12%)	4369 (100.00%)
Singapore	1976-1980	61 (3.23%)	0 (0.00%)	0 (0.00%)	10 (0.53%)	124 (6.57%)	1693 (89.67%)	1888 (100.00%)
	1981-1985	108 (3.30%)	0 (0.00%)	0 (0.00%)	25 (0.76%)	165 (5.04%)	2975 (90.90%)	3273 (100.00%)
	1986-1990	436 (4.52%)	1 (0.01%)	4 (0.04%)	31 (0.32%)	264 (2.74%)	8900 (92.36%)	9636 (100.00%)
	1991-1995	272 (1.56%)	0 (0.00%)	5 (0.03%)	20 (0.12%)	561 (3.23%)	16523 (95.06%)	17381 (100.00%)
Thailand	1976-1980	7 (0.83%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	16 (1.91%)	816 (97.26%)	839 (100.00%)
	1981-1985	6 (0.54%)	0 (0.00%)	0 (0.00%)	2 (0.18%)	13 (1.18%)	1081 (98.09%)	1102 (100.00%)
	1986-1990	11 (0.24%)	0 (0.00%)	1 (0.02%)	6 (0.13%)	251 (5.56%)	4247 (94.04%)	4516 (100.00%)
	1991-1995	51 (0.44%)	0 (0.00%)	2 (0.02%)	4 (0.03%)	752 (6.53%)	10706 (92.97%)	11515 (100.00%)

Source: Calculated from GTAP Database Version4 (McDougall, Elbehri, and Truong, 1998).

Note: Numbers in parentheses are percentages of each product group in total.

Table 3. The role of agro-food imports in total imports from ASEAN-5, 1976-95.

Unit: million U.S. dollars

Source	Period	Primary agro-food products				Processed agro-food products	Non-agro-food products	Total
		Crops	Forestry	Fishery	Animal			
Indonesia	1976-1980	115 (4.89%)	1714 (72.94%)	0 (0.00%)	1 (0.04%)	15 (0.64%)	505 (21.49%)	2350 (100.00%)
	1981-1985	146 (11.71%)	151 (12.11%)	0 (0.00%)	0 (0.00%)	35 (2.81%)	915 (73.38%)	1247 (100.00%)
	1986-1990	262 (9.40%)	41 (1.47%)	1 (0.04%)	5 (0.18%)	114 (4.09%)	2363 (84.82%)	2786 (100.00%)
	1991-1995	169 (2.35%)	22 (0.31%)	5 (0.07%)	0 (0.00%)	185 (2.57%)	6812 (94.70%)	7193 (100.00%)
Malaysia	1976-1980	172 (14.10%)	791 (64.84%)	0 (0.00%)	4 (0.33%)	5 (0.41%)	248 (20.33%)	1220 (100.00%)
	1981-1985	137 (8.68%)	822 (52.06%)	1 (0.06%)	0 (0.00%)	16 (1.01%)	603 (38.19%)	1579 (100.00%)
	1986-1990	339 (9.61%)	1481 (41.99%)	4 (0.11%)	0 (0.00%)	127 (3.60%)	1576 (44.68%)	3527 (100.00%)
	1991-1995	136 (1.76%)	838 (10.82%)	18 (0.23%)	4 (0.05%)	400 (5.17%)	6347 (81.97%)	7743 (100.00%)
Philippines	1976-1980	20 (5.71%)	88 (25.14%)	0 (0.00%)	0 (0.00%)	22 (6.29%)	220 (62.86%)	350 (100.00%)
	1981-1985	31 (9.48%)	50 (15.29%)	0 (0.00%)	0 (0.00%)	45 (13.76%)	201 (61.47%)	327 (100.00%)
	1986-1990	64 (6.72%)	38 (3.99%)	3 (0.31%)	0 (0.00%)	60 (6.30%)	788 (82.69%)	953 (100.00%)
	1991-1995	33 (2.66%)	1 (0.08%)	8 (0.65%)	0 (0.00%)	86 (6.94%)	1112 (89.68%)	1240 (100.00%)
Singapore	1976-1980	207 (20.72%)	20 (2.00%)	0 (0.00%)	7 (0.70%)	42 (4.20%)	723 (72.37%)	999 (100.00%)
	1981-1985	236 (16.71%)	20 (1.42%)	0 (0.00%)	9 (0.64%)	44 (3.12%)	1103 (78.12%)	1412 (100.00%)
	1986-1990	243 (3.31%)	11 (0.15%)	5 (0.07%)	13 (0.18%)	406 (5.53%)	6668 (90.77%)	7346 (100.00%)
	1991-1995	216 (1.25%)	26 (0.15%)	12 (0.07%)	8 (0.05%)	674 (3.90%)	16354 (94.59%)	17290 (100.00%)
Thailand	1976-1980	283 (54.74%)	3 (0.58%)	0 (0.00%)	7 (1.35%)	191 (36.94%)	33 (6.38%)	517 (100.00%)
	1981-1985	180 (42.76%)	0 (0.00%)	0 (0.00%)	3 (0.71%)	160 (38.00%)	78 (18.53%)	421 (100.00%)
	1986-1990	329 (21.56%)	47 (3.08%)	0 (0.00%)	20 (1.31%)	336 (22.02%)	794 (52.03%)	1526 (100.00%)
	1991-1995	415 (9.91%)	0 (0.00%)	6 (0.14%)	13 (0.31%)	794 (18.95%)	2961 (70.69%)	4189 (100.00%)

Source: Calculated from GTAP Database Version4 (McDougall, Elbehri, and Truong, 1998).

Note: Numbers in parentheses are percentages of each product group in total.

Table 4. Industry-wise IIT indices

SITC 2-digit code	By index	1970-1975	1976-1980	1981-1985	1986-1990	1991-1995	1970-1995	
		mean	mean	mean	mean	mean	mean	Standard deviation
00	GL	0.943	0.000	1.628	0.395	0.369	0.677	1.499
	AQ	1.703	0.000	9.618	0.207	16.721	5.498	18.079
01	GL	10.354	2.475	0.000	2.471	9.825	5.563	13.483
	AQ	10.862	11.337	0.000	14.379	10.133	9.712	18.626
02	GL	8.792	1.313	0.000	0.611	1.586	2.704	6.453
	AQ	7.891	1.701	0.000	1.072	8.525	3.994	6.675
03	GL	6.778	25.394	3.751	16.689	12.333	12.750	12.551
	AQ	17.639	34.384	21.724	26.017	30.768	25.781	13.850
04	GL	0.104	0.031	0.311	8.995	19.283	5.528	8.383
	AQ	0.306	0.099	0.431	10.639	21.571	6.367	9.305
05	GL	10.685	3.210	2.308	7.642	16.742	8.216	6.619
	AQ	9.693	4.685	3.393	10.677	16.835	9.081	6.240
06	GL	1.119	0.274	0.608	1.715	1.834	1.110	1.501
	AQ	10.777	0.423	28.007	30.954	25.032	18.721	20.837
07	GL	5.872	4.391	7.459	13.678	14.315	9.017	6.338
	AQ	5.377	4.695	8.518	14.352	25.128	11.374	10.822
08	GL	2.309	1.372	5.243	8.003	8.898	5.055	3.590
	AQ	2.532	4.751	7.142	14.734	11.226	7.864	6.179
09	GL	18.246	14.203	N.A.	N.A.	N.A.	16.629	16.461
	AQ	26.101	37.555	N.A.	N.A.	N.A.	30.682	24.660
11	GL	17.126	14.541	6.245	15.126	28.824	16.401	15.086
	AQ	34.999	28.084	8.315	20.833	32.029	25.242	19.660
12	GL	3.244	0.210	0.000	0.116	1.272	1.056	2.645
	AQ	10.213	0.243	0.000	1.079	3.445	3.273	8.190
21	GL	1.600	3.171	1.844	6.960	36.147	9.623	15.825
	AQ	10.309	20.911	52.008	23.219	35.140	27.625	25.778
22	GL	2.736	1.112	0.000	10.825	7.826	4.432	8.732
	AQ	12.008	5.394	0.000	11.090	10.842	8.026	13.438
24	GL	0.038	0.035	0.182	1.416	2.787	0.859	1.451
	AQ	0.463	0.473	1.126	27.406	37.832	12.960	17.812
25	GL	N.A.	0.000	21.568	0.281	0.422	6.960	15.104
	AQ	N.A.	0.000	32.108	8.094	3.024	13.508	19.846
26	GL	4.526	2.183	2.909	0.892	1.671	2.516	3.441
	AQ	3.720	3.330	2.182	4.874	10.034	4.785	8.133
29	GL	21.870	11.874	7.114	29.822	27.419	19.707	13.296
	AQ	25.703	23.134	18.646	37.714	35.198	27.988	9.848
41	GL	0.000	0.000	8.595	14.988	3.382	6.311	11.918
	AQ	0.000	0.000	25.397	30.632	8.302	14.813	23.447
42	GL	0.808	0.818	N.A.	N.A.	N.A.	0.812	0.678
	AQ	13.968	3.742	N.A.	N.A.	N.A.	9.878	12.896
43	GL	3.441	10.390	3.071	6.563	11.022	6.897	4.931
	AQ	7.109	34.864	32.532	42.550	24.804	28.372	22.444
51	GL	N.A.	30.069	36.569	18.099	35.560	30.076	13.020
	AQ	N.A.	38.719	41.116	42.384	40.165	41.065	9.288
59	GL	N.A.	7.620	5.716	0.955	0.704	2.781	3.166
	AQ	N.A.	61.864	25.130	13.596	12.223	19.788	14.578
61	GL	2.218	1.052	N.A.	N.A.	N.A.	1.751	1.482
	AQ	3.146	6.771	N.A.	N.A.	N.A.	4.596	4.535
63	GL	3.952	17.265	N.A.	N.A.	N.A.	9.277	8.622
	AQ	14.656	24.021	N.A.	N.A.	N.A.	18.402	9.742
65	GL	N.A.	5.192	9.755	14.569	28.454	16.818	10.586
	AQ	N.A.	36.494	32.858	49.266	48.195	43.005	10.133

Note: N.A. represents no trade values.

Table 5. Coefficient estimates of determinants of IIT

Independent variables	Model A		Model B	
	GL	AQ	GL	AQ
Taiwan and Indonesia				
Constant	0.82	1.26	3.49	4.28
	(0.71)	(0.98)	(1.08)	(1.23)
SIZE	0.0002	0.0003	0.0003	0.0004
	(2.34)**	(2.54)**	(4.45)***	(4.52)***
DEMDIFF	-0.037	-0.0465	-0.054	-0.059
	(-1.86)*	(-2.10)**	(-3.73)***	(-3.83)***
OPEN	-0.011	-0.015	-0.024	-0.029
	(-0.52)	(-0.66)	(-1.11)	(-1.25)
DGDP	-0.0001	-0.0001	-14.88	-14.47
	(-2.48)**	(-2.07)*	(-0.66)	(-0.60)
DPCGDP	0.0003	0.0003	-3.397	-4.844
	(0.61)	(0.61)	(-0.54)	(-0.72)
$\overline{R}^2$	0.90	0.89	0.87	0.86
Taiwan and Malaysia				
Constant	-0.386	-3.709	-0.714	-2.210
	(-0.16)	(-1.49)	(-0.23)	(-0.67)
SIZE	0.001	0.0007	0.0005	0.0004
	(4.55)***	(2.81)**	(1.27)	(0.83)
DEMDIFF	-0.011	-0.0026	-0.005	-0.0007
	(-2.04)*	(-0.44)	(-0.54)	(-0.08)
OPEN	0.002	0.0037	0.0012	0.0017
	(1.17)	(2.23)**	(0.59)	(0.81)
DGDP	-5.9E-05	-0.0004	3.03	2.31
	(-0.16)	(-1.26)	(0.06)	(0.04)
DPCGDP	-0.001	0.006	-32.27	-37.25
	(-0.17)	(0.91)	(-0.55)	(-0.61)
$\overline{R}^2$	0.89	0.90	0.87	0.85
Taiwan and the Philippines				
Constant	0.92	1.18	5.402	5.513
	(0.25)	(0.33)	(1.06)	(1.13)
SIZE	0.0003	0.0006	0.0008	0.0009
	(0.59)	(1.19)	(1.66)	(2.10)**
DEMDIFF	0.004	-0.012	-0.039	-0.048
	(0.11)	(-0.35)	(-1.34)	(-1.71)
OPEN	-0.038	-0.027	-0.027	-0.023
	(-1.55)	(-1.12)	(-0.86)	(-0.77)
DGDP	0.0006	0.0005	30.73	12.57
	(1.41)	(1.28)	(0.99)	(0.42)
DPCGDP	-0.011	-0.011	-17.28	-13.45
	(-1.28)	(-1.24)	(-0.80)	(-0.65)
$\overline{R}^2$	0.76	0.76	0.73	0.74

Table 5. (Continued)

Independent variables	Model A		Model B	
	GL	AQ	GL	AQ
Taiwan and Thailand				
Constant	9.68	11.06	3.17	13.59
	(4.39)***	(3.73)***	(1.22)	(4.47)***
SIZE	0.0012	0.0010	0.0011	0.0009
	(4.26)***	(2.68)**	(3.04)***	(2.26)**
DEMDIFF	-0.110	-0.042	-0.063	-0.053
	(-3.67)**	(-1.03)	(-2.78)**	(-1.99)*
OPEN	-0.082	-0.059	-0.071	-0.060
	(-7.56)***	(-4.04)***	(-6.33)***	(-4.57)***
DGDP	-0.001	0.0005	-78.34	13.02
	(-2.78)**	(0.77)	(-1.33)	(0.18)
DPCGDP	0.025	-0.010	36.70	-17.83
	(2.75)**	(-0.81)	(1.50)	(-0.62)
$\overline{R}^2$	0.89	0.76	0.86	0.77

Taiwan and Singapore						
	Model A		*Model B*		*Model C*	
	GL	AQ	GL	AQ	GL	AQ
Constant	14.78	12.95	-19.63	-9.97	13.147	11.13
	(4.11)***	(3.35)***	(-0.46)	(-0.23)	(4.07)***	(3.34)***
SIZE	0.002	0.0029	0.003	0.003	0.002	0.002
	(3.15)***	(3.61)***	(2.60)**	(2.60)**	(2.76)**	(3.27)***
DEMDIFF	-0.017	-0.004	-0.0096	-0.0097	-0.017	-0.0035
	(-0.97)	(-0.21)	(-2.45)**	(-2.44)**	(-1.07)	(-0.21)
OPEN	0.0012	0.001	0. 0007	0.0008	-0.00037	-0.0007
	(2.45)**	(2.04)*	(1.60)	(1.88)*	(-0.50)	(0.83)
DGDP	0.0007	-0.0002	108.11	82.90	0.0007	-7.62E-05
	(0.64)	(-0.14)	(0.87)	(0.66)	(0.80)	(-0.08)
DPCGDP	0.011	-0.006	98.66	63.71	0.012	-0.0044
	(0.51)	(-0.25)	(0.58)	(0.37)	(0.64)	(-0.22)
PCGDP*OPEN	N.A.	N.A.	N.A.	N.A.	1.70E-07	1.88E-07
					(2.60)**	(2.70)**
$\overline{R}^2$	0.76	0.75	0.70	0.72	0.81	0.81

Notes: Numbers in parenthesis are t-values.

* significant at 10% level;

** significant at 5% level;

*** significant at 1% level.

Table 6. Coefficient estimates of industry-specific determinants of bilateral IIT between Taiwan and ASEAN-5

Independent variables	Dependent variables			
	GL index		AQ index	
	Coefficient	t-value	Coefficient	t-value
Constant	17.319	1.567	13.191	0.836
DEXP	-7.347	-2.436**	-7.481	-1.764*
DIMP	4.014	1.272	5.407	1.203
TAR	-64.015	-1.455	-16.079	-0.254
D1	0.863	0.249	3.403	0.680
D2	1.795	0.516	4.283	0.859
D3	1.256	0.362	2.831	0.567
D4	-1.649	-0.522	-2.805	-0.625
D5	1.336	0.425	1.374	0.307
D6	-0.650	-0.207	-1.052	-0.234
DU1	-12.575	-1.158	-11.286	-0.711
DU2	7.405	1.390	-1.719	-0.226
DU3	-0.697	-0.135	-5.400	-0.732
DU4	16.950	2.691***	21.265	2.358**
DU5	17.236	3.218***	13.185	1.720*
DU6	23.952	3.253***	10.364	0.981
DU7	4.121	0.615	16.318	1.697*
DU8	10.929	1.873*	13.576	1.622
DU9	-7.706	-0.738	-0.887	-0.059
DU10	31.309	3.802***	22.314	1.905*
DU11	15.466	1.296	-2.424	-0.141
DU12	6.358	1.174	1.653	0.214
DU13	21.081	2.363**	25.418	1.941*
DU14	6.426	1.007	15.447	1.689*
DU15	-1.953	-0.196	13.484	0.942
DU16	19.155	2.021**	33.349	2.443**
$\overline{R}^2$	0.513		0.403	

Notes: Same as Table 5.

Appendix A. List of 173 agro-food commodities and their SITC 4-digit codes

SICT code	Code descriptions
0011	Animals of the bovine species, incl. buffaloes, live
0013	Swine, live
0014	Poultry, live (i.e., fowls, ducks, geese, etc.)
0015	Horses, asses, mules and hinnies, live
0019	Live animals of a kind mainly used for human food
01XX	Meat and meat preparations
011X	Meat, edible meat offals, fresh, chilled or frozen
0111	Meat of bovine animals, fresh, chilled or frozen
0112	Meat of sheep and goats, fresh, chilled or frozen
0114	Poultry, dead & edible offals ex. liver, fresh/frozen
0118	Other fresh, chilled, frozen meat or edible offals
0121	Bacon, ham & other dried, salted, smoked meat of swine
0129	Meat & edib.offals, n.e.s. salt. in brine dried/smok.
014X	Meat & edib. offals, prep/pres., fish extracts
0142	Sausages & the like, of meat, meat offal or blood
0149	Other prepared or preserved meat or meat offals
0223	Milk & cream, fresh, dried or otherwise preserved
0224	Milk & cream, preserved, concentrated or sweetened
0230	Butter
0240	Cheese and curd
0251	Eggs in shell
0252	Eggs not in shell
03XX	Fish, crustaceans, mollusks, preparation thereof
0341	Fish, fresh (live/dead) or chilled, excl. fillets
0342	Fish, frozen (excluding fillets)
0343	Fish fillets, fresh or chilled
0344	Fish fillets, frozen
0350	Fish, dried, salted or in brine; smoked fish
0360	Crustaceans and mollusks, fresh, chilled, frozen, etc.
0371	Fish, prepared or preserved, n.e.s. including caviar
0372	Crustaceans and mollusks, prepared or preserved
0411	Durum wheat, unmilled
0412	Other wheat (including spelt) and meslin, unmilled
0421	Rice in the husk or husked, but not further prepar.
0422	Rice semi-milled or wholly milled, broken rice
0430	Barley, unmilled
0440	Maize (corn), unmilled
0451	Rye, unmilled
0452	Oats, unmilled
0459	Buckwheat, millet, canary seed, grain sorghum, etc.
0460	Meal and flour of wheat and flour of meslin
0470	Other cereal meals and flours
048X	Cereal prepar. & preps. of flour of fruits or veg.
0481	Cereal grains, worked/prepared, (breakfast foods)
0483	Macaroni, spaghetti and similar products

0484	Bakery products (e.g., bread , biscuits, cake), etc.
0488	Malt extract; prep. of flour etc., for infant food
0541	Potatoes, fresh or chilled, excl. sweet potatoes
0542	Beans, peas, lentils & other leguminous vegetables
0544	Tomatoes, fresh or chilled
0545	Other fresh or chilled vegetables
0546	Vegetables, frozen or in temporary preservative
0561	Vegetables, dried, dehydrated or evaporated
0565	Vegetables, prepared or preserved, n.e.s.
0571	Oranges, mandarins, clementines and other citrus
0572	Other citrus fruit, fresh or dried
0574	Apples, fresk
0575	Grapes, fresh or dried
0577	Edible nuts (excl. nuts used for the extract of oil)
0579	Fruit, fresh or dried, n.e.s.
0583	Jams, fruit jellies, marmalades, fruit puree, cooked.
0585	Juices, fruit & veget.(incl. grape must) unfermented.
0586	Fruit, temporarily preserved.
0589	Fruit otherwise prepared or preserved, n.e.s.
0611	Sugars, beet and cane, raw, solid.
0612	Refined sugars and other prod. of ref.beet/cane.
0616	Natural honey
0619	Other sugars, sugar syrups, artificial honey, caramel.
0620	Sugar confectionery and other sugar preparations.
07XX	Coffee, tea, cocoa, spices, manufactures thereof.
0711	Coffee, whether or not roasted or free of caffeine.
0712	Extracts essences/concent. of coffee & chicory.
0730	Chocolate & other food preparations containing cocoa
0741	Tea.
075X	Spices.
0752	Spices (except pepper and pimento).
081X	Feed, stuff for animals (not incl. unmilled cereals).
0811	Hay and fodder, green or dry.
0812	Bran, sharps & other residues derived from sifting.
0813	Oil-cake & other residues (except dregs).
0814	Flours & meals of meat/fish unfit for human food.
0819	Food wastes and prepared animal feeds, n.e.s.
091X	Margarine and shortening.
0910	Margarine and shortening.
0980	Edible products and preparations n.e.s.
1110	Non alcoholic beverages, n.e.s.
1121	Wine of fresh grapes (including grapes must).
1123	Beer made from malt (including ale, stout and porter)
1124	Spirits, liqueurs, other spirituous beverages, n.e.s.
1211	Tobacco not stripped
1212	Tobacco wholly or partly stripped
1213	Tobacco refuse
1222	Cigarettes

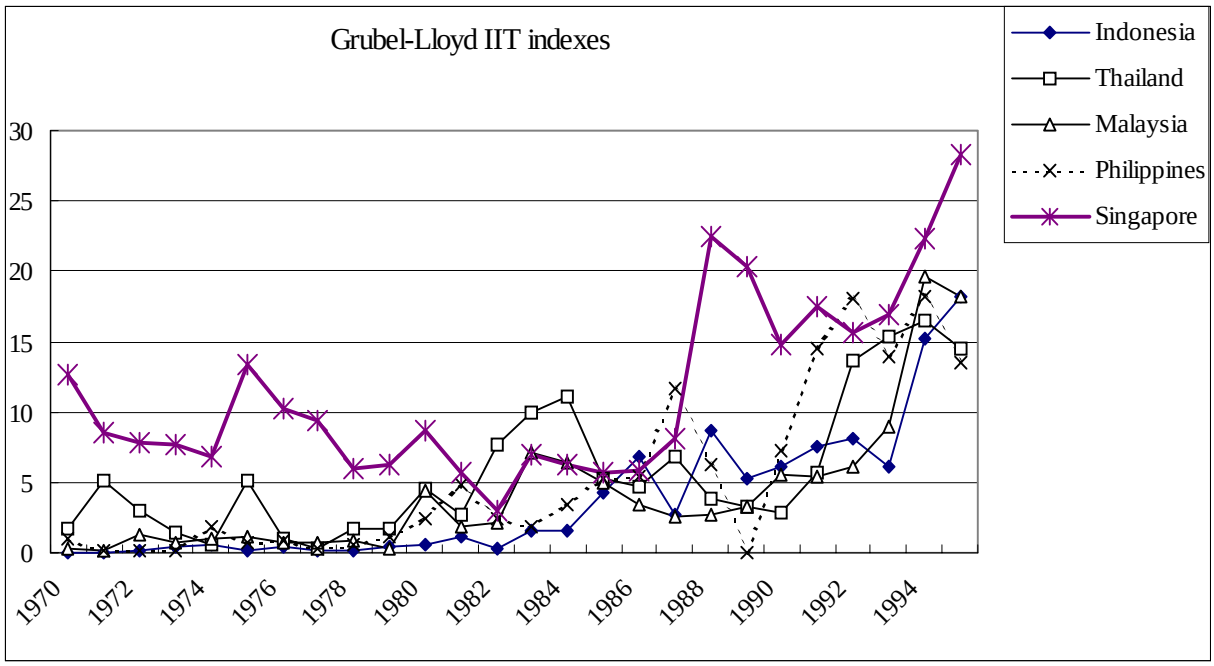
1223	Tobacco manufactured (inc. smoking, chewing tobacco)
2111	Bovine & equine hides (other than calf), raw.
2112	Calf skin, raw (fresh, salted, dried, pickled/limed)
2117	Sheep & lamb skins without the wool, raw (fresh etc.)
2119	Hides and skins, n.e.s. waste and used leather
2120	Fur skins, raw (include astrakhan, caracul, etc.)
222X	Oil seeds and oleaginous fruit, whole or broken
2222	Soya beans
2223	Cotton seeds
2224	Sunflower seeds
2225	Sesame (sesamum) seeds
2226	Rape and colza seeds
2232	Palm nuts and palm kernels
2234	Linseed
2235	Castor oil seeds
2238	Oil seeds and oleaginous fruit n.e.s
24XX	Cork and wood
2440	Cork, natural, raw & waste (include in blocks/sheets)
2450	Fuel wood (excluding wood waste) and wood charcoal
2460	Pulpwood (including chips and wood waste)
247X	Other wood in the roughly squared
2471	Sawlogs and veneer logs of coniferous species
2472	Sawlogs and veneer logs of non coniferous species
2479	Pitprops, poles, piling, posts & other wood in rough
248X	Wood simply worked and railway sleepers of wood
2481	Railway or tramway sleepers (ties) of wood
2482	Wood of coniferous species, sawn, planed, tongued, etc.
2483	Wood of non-coniferous species, sawn, planed, planed, tongue
2512	Mechanical wood pulp
2516	Chemical wood pulp, dissolving grades
2613	Raw silk (not thrown)
2614	Silk worm cocoons suitable for reeling & silk waste
263X	Cotton
2630	Cotton
2640	Jute & other textile bast fibres, n.e.s., raw/processed.
265X	Vegetable textile fibres and waste of such fibres
2681	Sheep’s or lambs’ wool, greasy or fleece-washed
2682	Sheep’s or lambs’ wool, degreased in the mass
2683	Fine animal hair, not carded or combed
2685	Horsehair & other coarse animal hair (excl. wool)
2686	Waste of sheep’s/lamb’s wool or other animal hair
29XX	Crude animal and vegetable material, n.e.s.
291X	Crude animal materials, n.e.s.
2911	Bones, horns, ivory, hooves, claws, coral, shells, etc.
2919	Other materials of animal origin, n.e.s.
2922	Shellac, seed lac, stick lac, resins, gum-resins, etc.
2924	Plants, seed, fruit used in perfumery, pharmacy
2925	Seeds, fruit & spores, n.e.s. of a kind used for sowing

2926	Bulbs, tubers & rhizomes of flowering or of foliage
2927	Cut flowers and foliage
2929	Other materials of vegetable origin, n.e.s.
4111	Fats and oils of fish and marine mammals
4113	Animal oils, fats and greases, n,e,s.
4232	Soya bean oil
4239	Other soft fixed vegetable oils
4241	Linseed oil
4243	Coconut (copra) oil
4249	Fixed vegetable oil n.e.s.
4313	Fatty acids, acid oils, and residues
4314	Waxes of animal or vegetable origin
5121	Acyclic alcohols & their halogenated derivatives
5921	Starches, inulin and wheat gluten
611X	Leather
6113	Calf leather
6114	Leather of other bovine cattle and equine leather
612X	Manufactures of leather/of composition leather n.e.s.
6130	Fur skins, tanned/dressed, pieces/cuttings of furskin
63XX	Cork and wood manufactures (excl. furniture)
6341	Wood sawn lengthwise, sliced/peeled, but not prepared
6342	Plywood consisting of sheets of wood
6343	Improved wood and reconstituted wood
635X	Wood manufactures, n.e.s.
6351	Wooden packing cases, boxes, crates, drums, etc.
6353	Builders’ carpentry and joinery
6359	Manufactured articles of wood n.e.s.
6512	Yarn of wool or animal hair including wool tops)
6519	Yarn of text fibers, n.e.s., incl. yarn of glass fibers
6522	Cotton fabrics, woven, bleach, merceriz dyed, printed
6542	Fabrics, woven contain 85% of wool/fine animal hair
6549	Fabrics, woven, n.e.s.

Appendix B. Industry specifications by SITC 2-digit codes

SITC codes	Code descriptions
SITC00	Live animals
SITC01	Meat and meat preparations
SITC02	Dairy products and eggs
SITC03	Fish and fish preparations
SITC04	Cereal and cereal preparations
SITC05	Fruits and vegetables
SITC06	Sugar, sugar preparations and honey
SITC07	Coffee, tea, spices and manufactures thereof
SITC08	Feeding stuff for animals (not including unmilled cereals)
SITC09	Miscellaneous food preparations
SITC11	Beverages
SITC12	Tobacco and tobacco manufactures
SITC21	Hides, skins, and fur skins, undressed
SITC22	Oilseeds, oil nuts and oil kernels
SITC24	Wood, lumber and cork
SITC25	Pulp and paper
SITC26	Textile fibers (not manufactured into yearn, thread or fabrics) and their waste
SITC29	Crude animal and vegetable materials, n.e.s.
SITC41	Animal oils and fats
SITC42	Fixed vegetable oils and fats
SITC43	Animal and vegetable oils and fats, processed, and waxes of animal or vegetable origin
SITC51	Chemical elements and compounds
SITC59	Chemical materials and products, n.e.s.
SITC61	Leather, leather manufactures, n.e.s. and dressed fur skins
SITC63	Wood and cork manufactured (excluding furniture)
SITC65	Textile yarn, fabrics, made-up articles and related products.

Source: United Nations, SITC Revison 1.



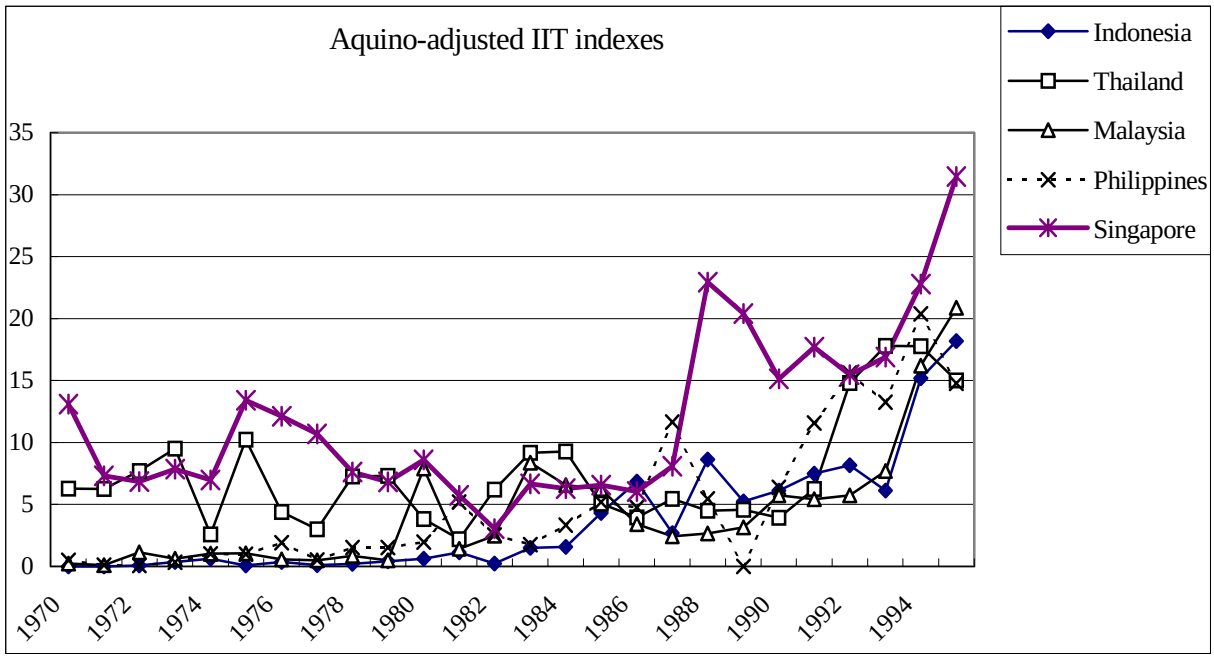


Figure 1. Country-wise comparison of Taiwan's IIT with ASEAN-5, 1970-1995