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SINGAPORE AND ASEAN:

A Study on Intra-Industry Trade

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Abstract

Southeast Asia, with Singapore in the lead, has seen the importance of integration, both regionally and with the rest of the world. The region has had high growth rates during the past years and it has benefited from trade creation through its free trade agreements, both multilateral and bilateral. Due to its successful FTAs, Singapore has been able to specialize in trade and has become an important trade harbor in the region. This study examines the form of specialization between Singapore and ASEAN and Singapore and the rest of the world. The theory of FTAs, intra-industry trade and North-South trade are described and studied in the context of Singapore's situation. The conclusion is made that if there is IIT in North-South trade it is most likely to be of a vertical nature. If IIT occurs in North-South trade the formation of production networks is likely to take place. Furthermore, the level of Singapore's intra-industry trade with the ASEAN countries is measured with the Grubel-Lloyd index and compared to the level of intra-industry trade Singapore has with the rest of the world. Singapore's IIT is found to be high and is analyzed with the help of economic theory. The most important partners for Singaporean trade all are in a free trade agreement with the city-state. Singapore's FTAs have been important for its IIT and the importance of ASEAN in Singaporean trade has been growing for the past fifteen years. Singapore and ASEAN are put in the North-South trade model and are examined to see if differences in GDP per capita and differences in economic size are negatively correlated with IIT and if the sharing of a border and little distance between countries are positively correlated with IIT.

Key words: Singapore, ASEAN, AFTA, Economic Integration, Intra-Industry Trade

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List of Abbreviations

AFTA	ASEAN Free Trade Area
ASEAN	Association of South East Asian Nations
ASEAN+3	ASEAN and Japan, China and South Korea
ASEAN-4	Indonesia, Malaysia, the Philippines and Thailand
ASEAN-5	Indonesia, Malaysia, the Philippines, Singapore and Thailand
ASEAN-6	Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand
EU	European Union
FTA	Free Trade Area
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IIT	Intra-industry trade
NAFTA	North American Free Trade Area
PTA	Preferential Trade Arrangement
RTA	Regional Trade Agreement
ROO	Rules of Origin
SAPTA	South Asian Preferential Trade Agreement

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1. Introduction

Globalizing forces are at work in the world today and yet we still live in an international arena where nations are important. Internationalization processes are extending economic activities across national borders, leading to more extensive geographical patterns. Yet globalizing processes are also at work, extending the process into more functional integration of international activities. The amounts of trading agreements and integration processes in the world have accelerated the past decades and in particular since the early 1990s. About 400 Regional Trade Agreements (RTAs) are scheduled to be implemented by 2010 and about 90 percent of these are free trade agreements (WTO, Regional Trade Agreements Gateway 2008-06-19).

Singapore is a fast-growing city-state economy in Southeast Asia and has since its independence in 1965 moved from being a developing country to an industrialized market economy. Trade has, throughout Singapore's history, been important for development. On 8 August 1967, Singapore, together with Indonesia, Malaysia, Philippines and Thailand established The Association of Southeast Asian Nations (ASEAN). ASEAN was created to accelerate economic, social and cultural development in the region, as well as to promote regional peace and stability. In 1992 ASEAN Free Trade Area (AFTA) was formed as a step towards deeper economic integration in the region. As a part of ASEAN, Singapore has extended its free trade agreements and has been able to become a leading part of the production networks of the region (ASEAN Secretariat, 2008-08-04).

1.1 Aim

The aim of this study is to examine the integration process between Singapore and ASEAN. Singapore's spatial trade and specialization patterns will be studied with a focus on intra-industry trade. Furthermore, the extent and development of IIT between Singapore and ASEAN compared to the IIT between Singapore and the rest of the world will be studied.

What is the level of Singapore's intra-industry trade with the ASEAN countries compared to the level of intra-industry trade with the rest of the world? How has ASEAN affected Singapore's intra-industry trade? And has Singapore's intra-industry trade been affected by its free trade agreements?

1.2 Method

This study has a theoretical foundation and the measurement and analysis of intra-industry trade will be based upon theories of economic integration and intra-industry trade. Trade statistics from the past decades will be used to measure the intra-industry trade for Singapore in relation to the ASEAN countries and the rest of the world. These measurements will be used to analyze the importance of the free trade areas and the level of intra-industry trade. To measure the level of IIT the Grubel-Lloyd index will be used. This index will be further described in the paper.

The statistics used for the measurements in this study mainly come from the UN COMTRADE database. Statistics have also been collected from World Bank's World Development Indicators. The rest of the material used comes from articles published in international academic journals, reports from international organizations and associations, as well as from other academic literature.

1.3 Disposition

I will begin with a historical review of ASEAN and the trade policies of the association. A short description of the theories of free trade agreements, intra-industry trade and north-south trade will follow. Thereafter I will describe the dynamics of Singaporean trade, through a description of trade volumes and trade partners. The focus will then be on Singapore's intra-industry trade, first with an account of the data and measurements I have used in this paper, and second, Singapore's intra-industry trade will be analyzed with the help of the Grubel-Lloyd index. The results of the measurement will be discussed with the help of economic theory and by then I will answer my opening questions and conclude the paper.

2. ASEAN: Overview of the Integration Process

ASEAN was launched in 1967 for political and security reasons. However, in 1976 ASEAN began its economic cooperation, and a year after the ASEAN preferential trade area was installed. The PTA adopted a product-by-product approach, which laid focus on the number of products negotiated instead of the amount of trade liberalized. These policies led to long exclusion lists, with many products significant to the intra-ASEAN trade potential. Under the ASEAN PTA the rules of origin became a restraining factor since products had to have at least 50 percent ASEAN content to be allowed preferences (Yue 1998:215).

Yet in 1992 ASEAN shifted from preferential trade and formed AFTA, the ASEAN Free Trade Area. The decision to form AFTA can be seen as a response to domestic and external changes of both political and economic character. The end of the Cold War and the Indochina conflicts made it easier for the countries in ASEAN to act more politically and strategically independent. ASEAN was no longer important to geopolitical interests and the grouping had to find another raison d'être. Additionally, the countries of Indonesia, Malaysia, the Philippines and Thailand (ASEAN-4), which had been characterized by a more protectionist nature had during the 1980's undergone far-reaching economic reforms. The ASEAN-4 also improved their industrial sector and export competitiveness, which facilitated the integration process. As well as this, the global economy seemed to emphasize the importance of export manufacturing and FDI. The ASEAN countries found the need to improve their attractiveness to be able to compete with trading blocs such as NAFTA and the EU. The formation of AFTA would enable each country to improve its growth and productivity. This would be done through resource pooling and a greater market (Yue 1998:218).

The aim of the free trade area is to promote trade and growth. When abolishing tariffs and non-tariff barriers, the countries in AFTA are expected to become more economically efficient, productive as well as competitive (ASEAN Secretariat 2008-08-04). By 2002 ASEAN was presented as the most successful FTA among developing countries (Low,

2004:7). Almost 99 percent of all the tariffs of the products in the Inclusion List of the ASEAN-6 (Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand) have been reduced to no more than 5 percent as of 1st January 2005 and more than 60 percent of the products are now exempted from tariffs. The newer member countries, Cambodia, Lao PDR, Myanmar and Viet Nam, have brought down the tariffs to within 0-5 percent on about 81 percent of the products in their Inclusion List (ASEAN Secretariat 2008-08-04). Although AFTA has not applied free trade fully yet, the result should be seen as good with consideration to the political and economic tensions that have existed between the ASEAN-members since the association was established. Furthermore, one should take into account the economic differences between the countries. According to Blomqvist (2006:21), the stale bureaucracy that follows with the implementation of trade preferences and rules of origin, have in many ways prevented AFTA to realize its full potential.

ASEAN's member states are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. These countries have relied on their national growth and trade strategies rather than a regional-wide effort. Yet the member countries have shared the shift from state-driven, import-substitution policies to export-oriented policies for industrialization (Low 2004:7). Asia has not always had good prerequisites for regional agreements because of the great heterogeneity in the area. Influential trade partners are located outside of the region and the lack of sound economic leadership as well as historical disputes, are all reasons for difficulties in the integration process. However, the region has greater motivation today to take advantage of the benefits of regional integration (Blomqvist 2006:20). Low (2004:7), on the other hand, ASEAN's role in making the region socio-politically stable through dialogue and cooperation is highlighted. Some of the member countries, mainly Indonesia, Malaysia and Singapore, have balanced the deep-rooted industrial policies and authoritarian political regimes with well-working production networks of foreign direct investments and multinational corporations. These production networks have put in force competition and discipline in the market. The region is characterized by a number of sectors which function in integrated, cross-border, fragmented chains of production.

2.1 Further Integration

ASEAN+3, where the +3 stands for the three Northeast Asian economies, China, Japan and Korea, has been growing in attention the past few years. It is not yet an organized association, but more of a process towards an East Asian Community (EAC), which would include a free trade agreement, the East Asia Free Trade Area (EAFTA), with all countries involved (Blomqvist 2006:22).

ASEAN has become an attractive trade partner, much more so compared to SAPTA or the Bangkok Agreement. As the member countries of ASEAN have become more industrialized and liberalized, their economies have changed and become more diversified. In addition to production changes, Asian trade with both the United States and the European Union has decreased in relative terms, which leaves a great potential for an ASEAN+3 trade agreement (Low, 2004:7). Bilateral trade arrangements between ASEAN and China as well as ASEAN and Japan have been established and an arrangement between ASEAN and Korea is on its way. These bilateral and regional trade agreements are seen as credible building blocks for further economic integration.

Bilateral trade agreements in individual member countries have been growing in amount recently and Singapore is the country leading in the development of these kinds of agreements. These bilateral agreements are quicker and more efficient than those on a multilateral and regional level. Singapore benefits greatly from bilateral agreements, since trade relations with important partners are secured (e.g. the FTA with Japan or the United States). A bilateral agreement also protects from future protectionism and can stretch beyond trade relations (Blomqvist 2006:26).

It is questionable, however, whether ASEAN is mature enough to benefit from an ASEAN+3 trade arrangement. Asia is still a region characterized by strong states and national leadership, and may not be ready for a deep economic integration or political convergence. It would be difficult for Asia to follow in the path of EU: s vastly integrated model or NAFTA: s national economic strategy model. On the other hand, ASEAN+3 could benefit from scale economies and trade complementariness. Through the Northeast

Asian Three, ASEAN+3 would have the size and political commitment to grow rapidly (Low 2004:7ff). A united Asian regionalism would be able to counterbalance the EU and NAFTA. The discussion on deeper integration will be continued in the last chapter of this paper. There I will focus on the affect of further integration on the intra-industry trade of Singapore and ASEAN.

Table 2.1 – Singapore's Free Trade Agreements

FTA	Launched	Member Countries
AFTA	1992	Brunei, Indonesia, Malaysia, the Philippines, Singapore, Thailand
ACFTA	2001 (Negotiations for 2010)	ASEAN – China
AKFTA	2004 (Negotiations for 2010)	ASEAN – Korea
SAFTA	2003	Singapore – Austrailia
SJFTA	2005	Singapore – Hashemite Kingdom of Jordan
CECA	2005	India – Singapore Comprehensive Economic Cooperation Agreement
JSEPA	2002	Japan – Singapore
KSFTA	2005	Korea – Singapore
ANZSCEP	2000	New Zealand – Singapore
PSFTA	2006	Panama – Singapore
ESFTA	2002	Switzerland, Lichtenstein, Norway and Iceland – Singapore
Trans-Pacific SEP	2005	Brunei, New Zealand, Chile and Singapore
USSFTA	2004	United States – Singapore

Source: International Enterprise Singapore 2008-08-04

3. Theory of Economic Integration

One can define economic integration as the elimination of barriers to the movement of products and factors of production between countries as well as the introduction of common policies at the regional level. Economic integration can be divided into negative integration – the removal of barriers to trade – and positive integration – the introduction of common policies and the creation of common institutions (Senior Nello 2005:3).

There are different forms of integration, such as free trade area, custom union, common market, monetary and economic union and political union. In this theoretical specification I will focus on the theory of free trade areas, because that is the integration form of AFTA and Singapore's free trade agreements. Thereafter I will specify the theory of intra-industry trade and a short part on North-South trade.

3.1 Free Trade Areas

In a free trade area (FTA), tariffs are abolished between the countries in the agreement, yet each country still has its own trade policies. The countries use rules of origin (ROO), which define what products qualify for free trade, usually through requirements for the minimum extent of local inputs and local value-added transformations to the finished goods. Rules of origin are often formulated as the percent of the product's value that originates from a country in the free trade area. Why are free trade agreements the most popular form of economic integration today? Below I will present the main background to FTA: s through economic theory.

The *Hecksher-Ohlin* model is based on the theory of international comparative advantage. This model shows that a country exports the commodity that, in production, uses its relatively abundant factor intensely, and the country imports the commodity that, in production, uses its relatively scarce factor intensely. Countries should therefore specialize in what they are comparatively more efficient in producing and import what they are relatively less efficient in producing. Furthermore, increasing international specialization should make production more efficient and contribute to higher growth

rates. FTA is a possibility for countries to open up towards each other and allocate production resources in an efficient way. This makes it possible for an area to compete on the global market with a greater influence.

How an FTA is created and applied, can lead to different effects for the member countries as well as effects towards third countries. An FTA can lead to *trade creation*, in other words, import increases from member countries and replaces domestic production and meets a greater domestic demand. *Trade diversion* can also be an effect of forming an FTA. Trade diversion is when the increased import from member countries replaces imports from more efficient producers in third countries. Because of the reduction of tariffs on intra-regional trade at the formation of an FTA, a regional producer is able to continue its high-cost production, and therefore harms the much more efficient producers outside the trade agreement to compete in the member countries (Dicken 2003:145). Integration can also lead to an increase in investments. Through a greater market size and decreased tariffs and non-tariff barriers, investments will be made where they are most profitable.

Free trade areas have, on the other hand, dynamic effects. As mentioned above, integration may lead to specialization and may lead to better localization of production within the region. Integration may also lead to increased competition when trade barriers are abolished, costs and prices are reduced and the market size increases. In many ways an FTA leads to a greater power of negotiation on an international level, through the cooperation of nations. Another effect of an FTA may be economies of scale, since companies now work in a greater market and the intra-industry trade (which is linked to the above mentioned increased specialization) between members, increases when trade barriers are reduced (Senior Nello 2005:103f). The effects of specialization and efficient production localization may lead to agglomeration effects of an FTA. Multinational corporations build networks with local companies in the regions attractive locations, which leads to important spill-over effects and the distribution of new technology in the region. These dynamic effects should in many ways contribute to a more rapid growth.

3.2 Intra-industry trade

Intra-industry trade is trade between countries in goods from the same industry. Intra-industry trade differs from inter-industry trade since it is not directly based on comparative advantages. Instead intra-industry trade takes place when products are differentiated and the production of a commodity requires fixed costs. Alternative economic theory (not based on comparative advantage) states that economies of scale and monopolistic competition supports intra-industry trade because of additional incentives for specialization (Bernatonytė, Normantienė 2007:25). Intra-industry trade produces extra gains from trade since countries can benefit from a larger market. A country can reduce the number of products produced and increase the variety of products available on the home market. Therefore a country can produce with higher productivity and lower costs (Krugman, Obstfeld 2003:140). This kind of specialization, within an industrial category, stimulates innovation through diversification. International trade should, in other words, be more beneficial than the standard trade theory suggests. Endogenous growth models would say that since intra-industry trade stimulates innovation, and innovation stimulates more innovation, the growth rate can be impacted by intra-industry trade (Ruffin 1999:7).

There is a link between regional integration and intra-industry trade. Regional integration is a way to decrease transaction costs between countries. Therefore an RTA leads to benefits for trade and the possibility for member countries to produce where it is least costly. RTAs make it possible for cross-border production networks to function properly and more efficiently. It is through economies of scale (and the dynamic effects of a free trade area mentioned above), which arise through integration, that lead to regionally integrated production networks, which has been the case in Southeast Asia.

There are two types of intra-industry trade: horizontal and vertical. Horizontal intra-industry trade is the export and import of goods from the same industrial sector and at the same stage of processing, in other words products with the same qualitative characteristics. This is the diversification of two similar products, e.g. two televisions of different models or brands. Vertical intra-industry trade is, on the other hand, the export

and import of goods from the same industrial sector with different qualitative characteristics (Bernatonytė, Normantienė 2007:27). It is vertical intra-industry trade that leads to production fragmentation and the building of international production networks.

3.3 North-South Trade

There are rich nations (the North) which are relatively abundant in capital, entrepreneurial ability and skilled labor. These countries specialize in sectors, which use these resources intensively. On the other hand, there are poor, developing-world countries (the South), characterized by the abundance of unskilled labor and a specialization in products using unskilled labor. These countries often meet a low world demand and continue to stagnate through the unfavorable terms of trade and their comparative advantage in unskilled production. This led to negative spiral of development for these countries (Todaro, Smith 2006:596).

The North-South trade models focus on trade relations between rich and poor countries. These models focus on the process of factor accumulation and uneven development. For example, it is argued that initial higher endowments of capital in the North generate external economies in manufacturing output and higher profit rates. Through further capital accumulation and the rise in monopoly power, the North meets higher growth rates. As a result, the North develops a cumulative competitive advantage over the South (Todaro, Smith 2006:596). International trade usually has a strong effect on income distribution since trade changes relative prices, and changes in relative prices of goods have very strong effects on the relative earnings of production factors. Those who own abundant factors of production gain from trade, but those who own scarce factors lose (Krugman, Obstfeld 2003:86).

Ruffin (1999:7) argues that if international trade was mostly intra-industry trade, internal income distribution should be minor. Since intra-industry trade is not based on comparative advantage, it does not result in a reduced demand for scarce production factors and an increased demand for abundant factors; so that trade expansion should not have a large effect on the distribution of income.

The question remains whether North-South intra-industry trade has the same effect as North-South trade based on standard trade theory. Is it possible for countries at different economic levels to have high amounts of intra-industry trade and benefit from the gains of this kind of trade? There are different theories on how intra-industry trade is affected by the difference in economic level and size.

According to the Helpman and Krugman model (1985) intra-industry trade is more likely to exist in countries with similar levels of per capita income, since the differences in per capita income are interpreted as differences in capital-labor endowments. The model also shows that a high per capita income indicates a high capital-labor ratio, which should lead to a greater production of capital intensive goods, since the differentiated good should be capital intensive in production. Another aspect is that a greater inequality in per capita income leads to a decreased potential for intra-industry trade since the demand structures are different in the two countries. Demand for variety is assumed to increase as income increases. In other words, the higher the average per capita income, the higher the intra-industry trade (Nilsson, 1997:136f). The prevalence of intra-industry trade depends on the level of economic development. Countries at a similar level tend to have more intra-industry trade than countries at different levels. The gains of intra-industry trade tend to be larger when economies of scale are important and the products are highly differentiated. Usually intra-industry trade takes place in more sophisticated manufacturing sectors, than between goods in traditional sectors or raw materials.

Economic theory also makes the connection between intra-industry trade and economic size. There should be a negative correlation between the extent of intra-industry trade and differences in country size, because of difficulties in their ability to produce differentiated products. It can also be stated that formulated that intra-industry trade is positively correlated with average country size because of the greater possibilities to produce a large number of differentiated goods under economies of scale (Balassa, Bauwens 1987:927).

Intra-industry trade is more prevalent among countries sharing a border (Balassa, Bauwens 1987:938). Additionally intra-industry trade tends to decrease the further the distance between the trading countries, because of the increasing transportation costs between the countries (Krugman, 1980:957). Balassa and Bauwens (1987:938) also find that intra-industry trade is positively correlated with the participation in an economic integrated area.

North-South trade, as described above, is the trade between a developed partner and a less developed partner. The trade between these two parts is therefore on different quality levels, because of differences in capital and human capital supplies. The conclusion can be made that if there is intra-industry trade in North-South trade it is most likely to be of a vertical nature. If IIT occurs in North-South trade the formation of production networks is likely to take place. The North would import products of low quality from the South and export products to the South of a higher quality.

4. Spatial and Product Patterns of Singaporean Trade

Singapore is one of the foremost countries in ASEAN which have taken advantage and benefited from intra-industry trade. The country is characterized by its high growth, yet its lack of natural resources. Over the past 30 years the nation has had a savings ratio as high as between 30 and 50 percent of GDP (World Development Indicators), which has made it possible for the government to invest further in growing sectors of the economy. The Human Development Report of 2007/2008 ranks Singapore 25th out of 177 countries with data, with the Human Development Index, and in GDP Singapore ranks number 19, between France and Germany (Human Development Report, 2008-04-12).

One should not forget that Singapore has had authoritarian political governance as many other East Asian nations. Most major companies have been primarily state-owned and the industrialization schemes have been precisely planned by the government. However, Singapore is one of the countries in the region that has been able to balance its authoritarian political regime with a market economy, influenced by foreign direct investors and multinational corporations that have found interest in the city-state. Singapore's modern day state capitalism can be seen as being successful in industrializing the nation. Additionally, foreign pressure and continued domestic economic development has led to greater transparency in both government and state-owned companies (Rodan 2004:52f). Singapore can definitely be classified as the most trade-oriented country in ASEAN (See Appendix A1). Singapore is also the most integrated country with the region and accounts for the largest share of intra-ASEAN trade (Yue 1998:217).

Asia is a great example of a region where borderless networks have become incredibly important for trade the past ten years. This is one factor in the demand for intra-regional trade barrier reductions, which points out the importance of regional liberalization (Blomqvist 2006:21). My hypothesis for this study, from the above theories, is that Singapore's free trade agreements have benefited the country's intra-industry trade and the specialization of differentiated products.

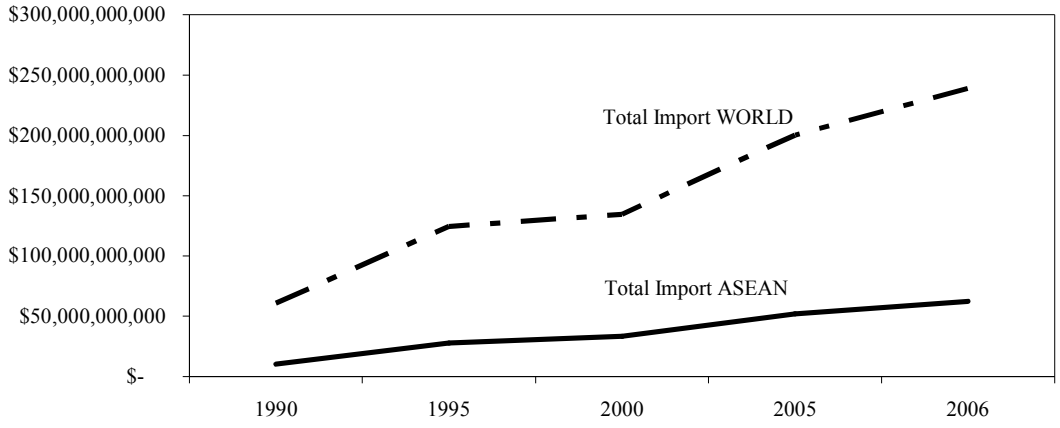
The aim of this paper is to examine the intra-industry trade between Singapore and ASEAN compared to the intra-industry trade between Singapore and the rest of the world. Now that the theories of intra-industry trade have been explained I will continue with an assessment to try to analyze the Singaporean trade patterns.

4.1 Development of Trade Volumes

As described above, Singapore has become a major harbor for trade as well as for the export and import of intra-industry trade. Through production networks and product differentiation, Singapore has become one of the leading countries in Southeast Asia. Singapore's engines of growth are manufacturing and services.

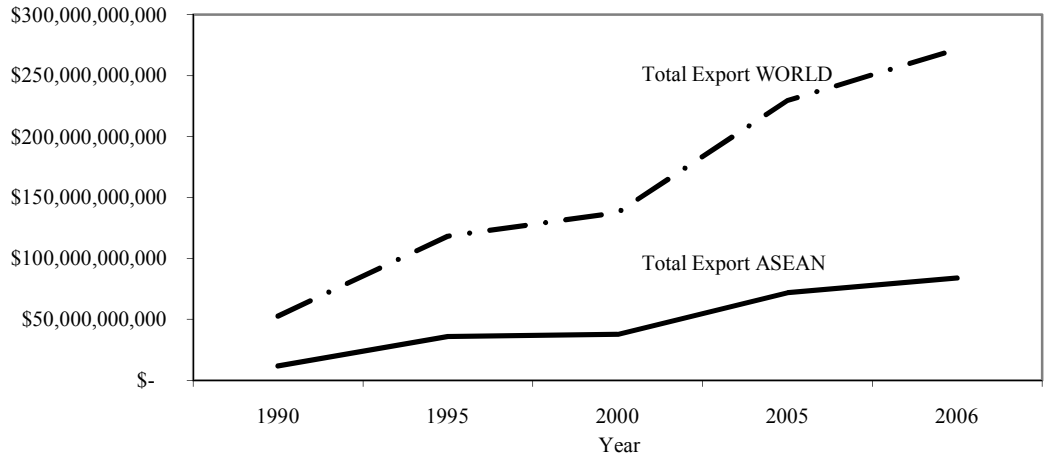
When examining Singapore's trade patterns it is interesting to see the actual value of trade and the importance of the ASEAN countries in Singapore's total trade. When looking at the figures below one can clearly see growth in both total trade and ASEAN trade. The amount of ASEAN trade in total trade has been increasing during the years, going, in imports, from approximately 17 percent in the year 1990 to about 26 percent in 2006 and, in exports, from approximately 23 percent in 1990 to 31 percent in 2006.

Figure 4.1 – Total Import Singapore 1990-2006



Source: UN Comtrade

Figure 4.2 – Total Export Singapore 1990-2006



Source: UN Comtrade

Between the years 1995 and 2000 there was a decrease in the growth rate both in export and imports of total trade and ASEAN trade. This can be explained by the 1997 Asian financial crisis, but Singapore managed to recover quickly and return to high growth rates in trade. Overall the growth in Singaporean trade has been positive during the past fifteen years. AFTA was launched in 1992, which could be an explanation for ASEAN's increased importance in Singaporean trade. Most of Singapore's FTAs were launched after the year 2000 (See figure 2.1).

4.2 Trade Partners

When looking at the top export and import countries within ASEAN (see the tables below), one can see that Malaysia has been the most important trading country for Singapore during the past fifteen years. Malaysia is one of the only countries sharing a border with Singapore, which could explain the natural trade between the countries. The countries' importance have somewhat evened out during the past years, probably explained by the growing trade within the region.

By looking at table 4.1, Malaysia followed by Indonesia, Thailand and the Philippines are today Singapore's most important import partners within ASEAN. Indonesia jumped into importance between the years 2000 and 2005. The explanation for this jump could be

Indonesia's strong economic recovery from the 1997 financial crisis, with expanded trade regimes and a stronger home market.

Table 4.1 – Singapore's Top Import Partners in ASEAN (Percent of Total Import from ASEAN)

ASEAN Countries	1990	1995	2000	2005	2006
Malaysia	79.4	69.5	68.7	52.4	50.0
Indonesia				20.0	23.7
Thailand	15.8	23.2	17.4	14.4	14.0
Philippines	3.0	4.0	10.1	8.9	9.1
Brunei Darussalam	1.2	0.8	0.8	0.3	0.4
Viet Nam		1.6	2.5	3.5	2.6
Myanmar	0.6	0.8	0.3		
Other partners (inside selection)	0.0	0.20	0.20	0.40	0.30

Note: There is no information where there is a blank.
Source: UN Comtrade

Table 4.2 – Singapore's Top Export Partners in ASEAN (Percent of Total Export to ASEAN)

ASEAN Countries	1990	1995	2000	2005	2006
Malaysia	58.3	63.2	66.3	42.2	42.3
Indonesia				30.7	29.7
Thailand	29.6	19.0	15.5	13.1	13.5
Philippines	5.7	5.4	9.0	5.8	6.1
Brunei Darussalam	4.6	4.1	1.3		0.7
Viet Nam		5.0	5.5	6.1	6.5
Myanmar	1.9	1.8	1.2	0.8	
Other partners (inside selection)	0.0	1.50	1.20	1.20	1.30

Note: There is no information where there is a blank.
Source: UN Comtrade

If we look at the top trading partners in the world during the same years, we could get a view of how important the ASEAN countries really are for Singaporean trade. Malaysia stands as one of the top trading countries even here and can be seen as one of the top trade partners throughout the studied period. When looking at other partners, their importance in Singaporean trade has varied and changed during the examined period, e.g. Japan. Today most of the top trade partners are Asian countries, yet the USA stands high in ranking as well.

Table 4.3 – Singapore's Top Import Partners World (Percent of Total Imports)

Countries	1990	1995	2000	2005	2006
Japan	20.2	21.1	17.2	9.6	8.3
USA	16.0	15.1	15.1	11.7	12.7
Malaysia	13.6	15.5	17.0	13.7	13.1
China			5.3	10.3	11.4
Thailand		5.2			
Rep. Of Korea		4.3			
Saudi Arabia	5.3				
Other Asia, nes	4.8		4.4	6.7	6.7
Other partners	40.1	38.8	41.0	48.1	47.8

Note: Only the top five partners per year have their percentages listed.
Source: UN Comtrade

Table 4.4 – Singapore's Top Export Partners World (Percent of Total Exports)

Top Export Partners in the selection	1990	1995	2000	2005	2006
Japan	8.7	21.1	7.5		
USA	21.3	15.1	17.3	10.4	10.2
Malaysia	13.1	15.5	18.2	13.2	13.1
Indonesia				9.6	9.2
Thailand	6.6	5.2			
Rep. Of Korea		4.3			
China				8.6	9.7
China, Hong Kong SAR	6.5		7.9	9.4	10.0
Other Asia, nes			6.0		
Other partners	43.8	38.8	43.1	48.8	47.8

Note: Only the top five partners per year have their percentages listed.
Source: UN Comtrade

4.3 Product Specialization

The top trade sectors that I will be using in my measurements of intra-industry trade are classified at the 2-digit level of the Harmonized Commodity Description and Coding System (HS). This is an internationally standardized system classifying products in trade, which is important for e.g. customs tariffs, rules of origin and the collection of trade statistics. The industries in the measurements account for more than fifty percent of Singaporean trade, and are the following:

85 Electrical, electronic equipment;

84 Nuclear reactors, boilers, machinery, etc; and

27 Mineral fuels, oils, distillation products, etc.

Below are tables of the amount of trade in the main trading industries in total trade. When comparing imports and exports, the industries are similar in rank and in percentage of total imports and total exports. The Singapore-ASEAN trade is characterized by high levels of both imports and exports of electrical, electronic equipment, yet the imports exceed the exports slightly. The imports in electrical, electronic equipment have risen somewhat since 1990, yet the exports in this industry have definitely increased. The increase in the industry group 27, between 2000 and 2005 in the ASEAN-Singapore trade, could be because of Indonesia's increased importance which was mentioned above.

Table 4.5 – Top Import Industries from ASEAN (Percent of Total Imports ASEAN-Singapore)

	Industries	1990	1995	2000	2005	2006
85	Electrical, electronic equipment	33.4	44.5	47.1	42.3	39.9
84	Nuclear reactors, boilers, machinery, etc	12.2	22	24.4	19.6	16
27	Mineral fuels, oils, distillation products, etc	12.8	4.9	6.4	14	16.6

Source: UN Comtrade

Table 4.6 – Top Export Industries to ASEAN (Percent of Total Exports ASEAN-Singapore)

	Industries	1990	1995	2000	2005	2006
85	Electrical, electronic equipment	21.2	38.3	46.2	35.8	35.7
84	Nuclear reactors, boilers, machinery, etc	15.9	17.1	17.4	18.9	17.7
27	Mineral fuels, oils, distillation products, etc	24.5	8.3	10.2	16.2	17.6

Source: UN Comtrade

Singapore's trade with the rest of the world is also dominated by the trade in electrical, electronic equipment (See tables 4.7 and 4.8). There has been a steady rise in both imports and exports in this industry. The imports in industry 84 had its peak in the year 2000 and have since then decreased to a percentage less than in 1990. Exports in the same industry have also been decreasing since the first year of the study. Today it is the third largest industry for imports and the second largest for exports between Singapore and the World. Yet industry 85 stands alone as the most important industry in both import and export in Singapore-world trade, as well as in Singapore-ASEAN trade. The

Industries 84 and 27 share a more equal place as second and third most important industries. This too characterizes both Singapore's trade with the world and with ASEAN.

Table 4.7 – Top Import Industries from WORLD (Percent of Total Imports)

	Industries	1990	1995	2000	2005	2006
85	Electrical, electronic equipment	22.7	34.6	37.1	37.5	34.1
84	Nuclear reactors, boilers, machinery, etc	17.1	19.4	20.9	20.0	16.3
27	Mineral fuels, oils, distillation products, etc	15.8	8.1	12.1	12.2	18.8

Source: UN Comtrade

Table 4.8 – Top Export Industries from WORLD (Percent of Total Imports)

	Industries	1990	1995	2000	2005	2006
85	Electrical, electronic equipment	24.4	34.1	39.7	37.5	38.6
84	Nuclear reactors, boilers, machinery, etc	23.4	30.0	27.5	20.0	17.9
27	Mineral fuels, oils, distillation products, etc	18.2	6.8	7.4	12.2	13.1

Source: UN Comtrade

5. Singapore's Intra-Industry Trade

5.1 Data and Measures

Throughout this study I will be using national statistics for the ASEAN-countries. Most of my data is from the UN COMTRADE database of trade statistics. Furthermore, I will use the World Development Indicators to find relevant data for my measurements.

5.1.1 The Grubel-Lloyd index

The Grubel-Lloyd index is an indicator of the level of intra-industry trade and was introduced by Herbert Grubel and Peter Lloyd in 1975. It ranges from 0 to 1, where 0 indicates no intra-industry trade but perfect inter-industry trade, and 1 indicates perfect intra-industry trade and the lack of inter-industry trade (Senior Nello 2005:67).

(1) $GLi = 1 - | Xi - Mi | / (Xi + Mi)$,

Where GLi = index of intra-industry trade for industry i;

Xi = value of export in industry i;

Mi = value of import in industry i;

Xi + Mi = total value of trade;

| Xi – Mi | = trade balance industry i.

(2) $GL = 1 - \sum | Xi - Mi | / \sum (Xi + Mi)$

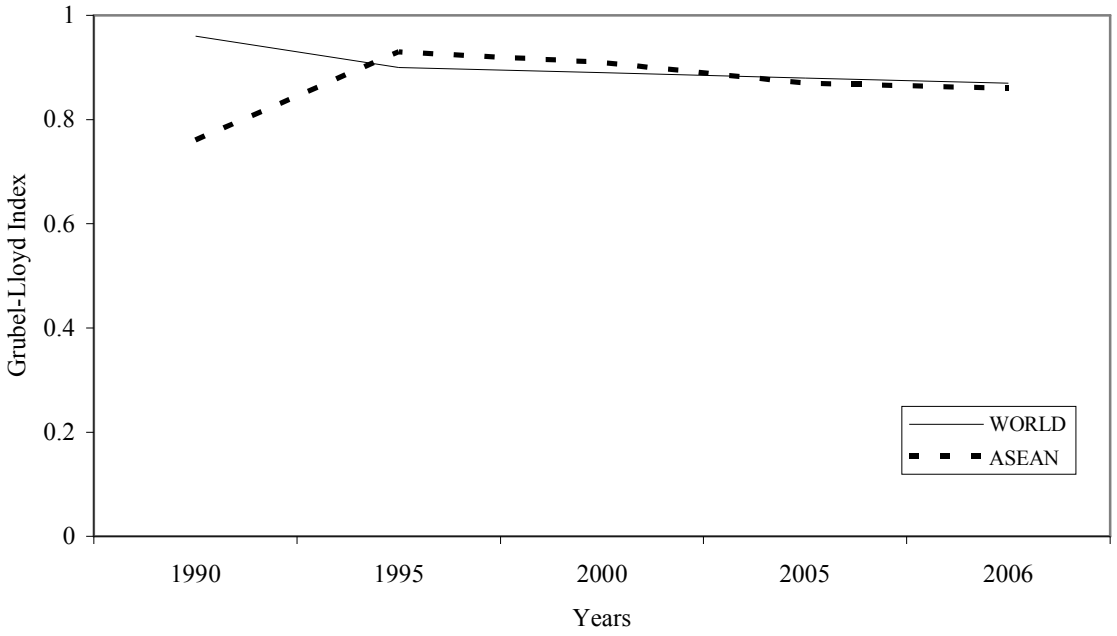
Where GL = the weighted Grubel-Lloyd index at the aggregate level.

When using the Grubel-Lloyd index my measures will be carried out at the industry level (the 2-digit level of the Harmonized System of merchandise trade). This will give a better picture of the level of IIT than at the 1-digit level, which is at the sector level, and not as detailed as at the product level, 3- or 4-digit level. An assumption made for the measurements is that the intra-industry trade of Singapore is mainly vertical, which makes the 2-digit level the most appropriate for measuring the intra-industry trade of the country.

5.2 Intra-Industry Trade

I will now use the Grubel-Lloyd index to measure the level of intra-industry trade in Singapore for the three main industries of trade between 1990 and 2006. With the help of trade values of the above industries, the Grubel-Lloyd index can be calculated to measure the intra-industry trade between Singapore and ASEAN and Singapore and the rest of the world. In Figure 5.1 the Weighted Grubel-Lloyd index is calculated for the top three industries in Singaporean trade (those mentioned above). These industries account for more than fifty percent of Singapore's total trade. This is why only these three industries are used in the measurements.

Figure 5.1 – Weighted Grubel-Lloyd Index: Singapore-ASEAN vs. Singapore-WORLD



Note: The Weighted Grubel-Lloyd index of the top three industries (HS1992 2-digit: 85, 84, and 27).
Source: Own calculations, UN Comtrade

When looking at Singapore-ASEAN intra-industry trade in the top three industries, there was a large increase in the GL-index between 1990 and 1995. During the same period the GL-index for Singapore and the World decreased slightly. The amount of Singapore's intra-industry trade in the top three industries has also seen a small steady decrease

between 1995 and 2006. However the IIT between Singapore-ASEAN and Singapore-World are very high at an aggregated level for the top three industries of trade.

5.3 Analysis and Evaluation

The aim of this study was to find the level of Singapore's intra-industry trade with the ASEAN countries compared to the level of intra-industry trade with the rest of the world. Now that the above has been documented, the following questions need to be answered:

> *How has ASEAN affected Singapore's intra-industry trade with ASEAN? And has Singapore's intra-industry trade been affected by its free trade agreements?*

When studying the compilation of the statistics of Singaporean trade, an amount of results are found. Firstly, the absolute value of Singaporean trade has increased drastically during the time period studied, both with ASEAN and with the rest of the world. Secondly, the amount of trade with ASEAN countries has increased relatively to trade with the rest of the world. Thirdly, the levels of intra-industry trade in the top three industries are very high, both with ASEAN and with the rest of the world. Below I will analyze these results with consideration to economic theory and answer the above stated questions. I will also discuss why the levels of intra-industry trade where found to be so high.

5.3.1 Trade Partners and Theory

Free Trade Agreements

Singapore's top trading partners all have a free trade agreement with Singapore, either through ASEAN or through a bilateral agreement. As mentioned in the theory section of this paper, free trade areas can lead to trade creation, and for Singapore this seems to be the case. Therefore one can conclude that Singapore's intra-industry trade has been affected by its free trade agreements, which have in many ways facilitated trade for the city-state.

So how has ASEAN affected Singapore's intra-industry trade with the ASEAN members? Singapore would probably not have such high levels of intra-industry trade with the ASEAN countries (foremost Malaysia and Indonesia) if they did not have the ASEAN integration. ASEAN is also a forum for new bilateral relations, e.g. China, which is an advantage for Singapore. The role of ASEAN in Singaporean trade is, relative the World, of increased importance today than fifteen years ago (see figures 4.1 and 4.2). Therefore one must conclude that ASEAN and furthermore AFTA has had a positive impact on Singapore's trade relations with the other member states. When looking at the most important trade relations today, they are mostly Asian countries, which all have bilateral agreements with Singapore. Moreover, the growth of ASEAN and the development of the association could lead to an even greater importance in Singaporean trade. A possible further integration through ASEAN+3 could also lead to a more important role in Singaporean trade.

North-South Trade

The analysis of the results of the measurements of Singaporean IIT can be put in a north-south perspective. Using economic theory presented earlier in this paper, the spatial patterns of Singaporean trade can be further analyzed. The theories of how IIT is affected by differences in GDP per capita, differences in economic size, the sharing of a border and distance will be discussed in the Singaporean context.

Singapore and ASEAN can be put into the example of north-south trade. Singapore has a much higher GDP per capita than the other member states. Economic theory on north-south trade suggests that *differences in GDP per capita* between trade partners are negatively correlated with intra-industry trade. The tables 5.1 and 5.2 show the GDP per capita for Singapore's trade partners.

As of 2006, Malaysia is one of Singapore's top trade partners, yet when looking at table 5.1 and 5.2 Malaysia's GDP per capita is a lot less. According to economic theory, ceteris paribus, these countries should not show high levels of IIT because of the negative

correlation between differences in GDP per capita and high levels of IIT. However, these two countries do show high levels of IIT in the top three sectors of Singaporean trade.

Table 5.1 – GDP per capita ASEAN Countries (constant 2000 US$)

Countries	1990	1995	2000	2005	2006
Singapore	14658	19359	23019	25968	27125
Brunei Darussalam	18713	19043	17996	17787	18304
Malaysia	2511	3471	3881	4360	4535
Thailand	1462	2086	2023	2494	2601
Philippines	918	913	996	1117	1154
Indonesia	612	827	800	942	983
Vietnam	227	305	402	539	576
Cambodia		225	286	408	445
Lao PDR	231	274	332	415	439

Source: World Development Indicators

Table 5.2 – GDP per capita Top Trading Partners (constant 2000 US$)

Countries	1990	1995	2000	2005	2006
Japan	33369	35439	36789	38962	39824
USA	28263	29942	34600	37084	37791
Hong Kong	19048	23152	25375	30405	32250
Singapore	14658	19359	23019	25968	27125
Malaysia	2511	3471	3881	4360	4535
China	392	658	949	1451	1598
Indonesia	612	827	800	942	983

Source: World Development Indicators

Indonesia also shows high levels of IIT with Singapore yet has one of the lowest levels of GDP per capita in ASEAN and Singapore one of the highest. The country in ASEAN which has the closest GDP per capita to Singapore is Brunei Darussalam, yet these two countries do not meet high levels of intra-industry trade. However, when looking at the rest of the ASEAN countries, the theory of negative correlation between high levels of IIT and differences in GDP per capita may be an explanation to why there are such small levels of IIT with Singapore. Singapore is a much more diversified economy and therefore the levels of intra-industry trade are small with the rest of the ASEAN countries. Singapore does have high levels of intra-industry trade with Japan, USA and Hong Kong, which all are somewhat close to Singapore in GDP per capita. These countries support the theory of negative correlation between differences in GDP per capita and high levels

of intra-industry trade. China, on the other hand, has a small level of GDP per capita. So are Singapore's top trading partners in ASEAN, foremost Malaysia and Indonesia, as well as China exceptions to the above mentioned theory or are there other factors which play a role in the high levels of IIT?

Differences in economic size are, according to economic theory on north-south trade, negatively correlated with intra-industry trade. When looking at the economic size of the ASEAN countries (Table 5.3), the importance of Malaysia and Indonesia as trade partners may be explained. Malaysia and Singapore are close in total GDP and Indonesia may have a greater total GDP than Singapore, but is still close in ranking.

Table 5.3 GDP ASEAN Countries (constant 2000 US$)

Countries	1990	1995	2000	2005	2006
Indonesia	109150240768	159382274048	165020532736	207872147456	219270938624
Thailand	79359844352	120005697536	122725244928	157110403072	164996743168
Singapore	44662452224	68229554176	92716859392	112746815488	121626705920
Malaysia	45459496960	71474831360	90319740928	111837904896	118436339712
Philippines	56229863424	62591328256	75912536064	94445633536	99590340608
Vietnam	15017998336	22276483072	31172517888	44769046528	48425918464
Brunei Darussalam	4809302016	5617229312	6001169408	6649483264	6991387136
Cambodia		2567835392	3654221312	5697206272	6314452480
Lao PDR	943209920	1286713344	1735377024	2350634496	2528467968

Source: World Development Indicators

Singapore and Malaysia are very similar in economic size which makes the chance of large amounts of intra-industry trade greater. Indonesia is largest in ASEAN, and Singapore is ranked third, which makes the reality of high levels of intra-industry trade more understandable. Thailand is also one of Singapore's top trading partners in ASEAN (see tables 5.1 and 5.2) and has the second largest GDP in ASEAN. The most important partners in ASEAN also have the greatest GDP in the association, which proves the theory of negative correlation between differences in GDP and intra-industry trade.

Table 5.4 shows the GDP for Singapore's top trading partners. Malaysia does stand at the top of importance and is the country which is the closest to Singapore in economic size. However, the USA, with the absolute largest GDP, is also an important partner for

Singaporean intra-industry trade. In the case of USA, the similarity in economic size does not seem to be the most important factor for high levels of IIT. The countries are, on the other hand, a little bit closer in GDP per capita (See table 5.2), which may be a reason for increased IIT.

Table 5.4 GDP Top Trading Partners (constant 2000 US$)

Countries	1990	1995	2000	2005	2006
USA	7055000207360	7972799905792	9764800036864	10995799949312	11314678202368
Japan	4122341277696	4445371367424	4667448229888	4978244059136	5087765200896
China	444600549376	792789254144	1198480293888	1893359943680	2095949545472
Hong Kong	108658262016	142523056128	169121136640	207152775168	221139353600
Indonesia	109150240768	159382274048	165020532736	207872147456	219270938624
Singapore	44662452224	68229554176	92716859392	112746815488	121626705920
Malaysia	45459496960	71474831360	90319740928	111837904896	118436339712

Source: World Development Indicators

The *sharing of a border*, as well as *little distance* between countries is positively correlated with intra-industry trade according to the presented theory. Therefore the countries in ASEAN should have a high level of IIT with Singapore because of the closeness of the countries. Malaysia's and Indonesia's high levels of intra-industry trade with Singapore supports this theory. Other countries, like the USA and Japan, are important for Singaporean IIT yet are located at a far distance from the nation. How large are the transaction costs which make this factor so influential for the level of IIT? Is it a different kind of IIT where distance is less significant? Distance may be important for vertical IIT which leads to production networks, whereas horizontal IIT might not be as dependent on distance. However, today Singapore has a lot of trade relations in Asia and sees growing intra-industry trade as intra-Asian trade. Therefore one may draw the conclusion that Singaporean IIT has benefited from the trade with countries located nearby.

For further analysis of the above mentioned theories an econometric study must be made under the ceteris paribus assumption.

5.2.2 High Levels of Intra-Industry Trade

Singapore's levels of intra-industry trade, in the top three trading industries, were found very high. Below I will discuss why the results were found to be so high.

When looking at the mere measurement of the level of IIT in this study there are a few comments to be made about the high results. The level of intra-industry trade was measured only in the top three industries of Singaporean trade. All of Singapore's industries have not been included in the measurements, but it can be guessed that at an aggregated level Singaporean IIT would not have reached as high levels. Another factor which could play a part in the high results is transit trade and re-exports. In the measurements, total exports and total imports where used as data, without taking transit trade and re-export into consideration. This could be a factor that increases the high levels in the measurements of intra-industry trade. A third aspect of the measurement analysis is whether the 2-digit level is appropriate for measuring the intra-industry trade of Singapore. The assumption made, that most of the intra-industry trade is vertical, may make the use of the 2-digit level misleading. The assumption that most IIT with ASEAN is of a vertical nature may be true, but the IIT with the rest of the world may not show the same characteristics. The 2-digit level may be too aggregate to be able to analyze which products are traded in IIT if it is found that a lot of IIT is of a horizontal nature.

The high levels of IIT between Singapore and ASEAN could be guessed to be of a vertical nature because of the great amount of production networks in the region and also because of the different nature of the countries' economies. Put in a north-south context the countries would most likely import and export products of different qualities. Therefore when comparing the IIT between Singapore-ASEAN and Singapore-World one must be aware that these may show different characteristics.

6. Conclusions

Singapore has high levels of intra-industry trade with both ASEAN countries and the rest of the world. Between 1990 and 1995 the ASEAN countries met a slight increase in the level of intra-industry trade with Singapore, while the rest of the world met a slight decrease. Between 1995 and 2006 the intra-industry trade of Singapore-ASEAN and of Singapore-World has been at a similar level.

The importance of ASEAN in Singaporean trade compared to the rest of the world has seen an increase during the time period studied. This may be because of the economic growth of the ASEAN region and the increased stability since the economic crisis 1997. Singapore's intra-industry trade has definitely been affected by its free trade agreements. Its top trading partners are all in an agreement with Singapore and one must come to the conclusion that these agreements have led to trade creation and benefited intra-industry trade. However, in ASEAN there are mainly two top trade partners, Malaysia and Indonesia. The rest of the ASEAN nations are somewhat lagging behind and not contributing as much to the intra-industry trade of the region.

North-south trade theories do, in one way or another, support the results of the measurements made in this paper. However, it would be interesting to study the relationship between the nature of IIT and the following factors: differences in GDP per capita, differences in economic size, the sharing of a border and distance. Is vertical IIT more occurring between countries located at a close distance of each other, and is horizontal IIT less dependent of distance? Are differences in economic size not as important for countries with vertical IIT? Many questions can be asked in the future study of the relationship between the nature of intra-industry trade and the north-south trade theories.

Today the most important trade partners, in relative terms, are other Asian countries. The growth of ASEAN will influence Singaporean trade and may become a more important factor in intra-industry trade for Singapore. This could be seen in the growth of

production networks and the fragmentation of production in the ASEAN countries. An ASEAN+3-integration would affect Singaporean trade. Yet the dilemma of bilateral versus multilateral agreements would arise. Is ASEAN efficient enough to be able to handle Singaporean intra-industry trade? Although Singapore might still use bilateral agreements to stabilize trade relations, the growth of ASEAN and deeper integration should lead to more trade creation. If the ASEAN development continues in this positive direction, ASEAN could have an even greater part in Singaporean trade. The influence of Japan, China and South Korea in ASEAN could have a positive effect on Singapore's relations to ASEAN because of the influence of higher GDP per capita, greater economic size, larger markets and lowered transaction costs. However, today an ASEAN+3-agreement may not have as great impact on the developing member states. The association would no longer be an antithesis to the greater Asian economies. Nevertheless, in the future a greater economic association in Asia might just be what the region needs for further development and growth.

For future studies it would be interesting to examine the role of ASEAN in Singaporean trade during a longer time period. Another aspect in the analysis of the ASEAN countries trade with Singapore is economic and political stability. Since the 1997 crisis in Asia, some countries have had a slow recovery, whilst other members of the association have recovered and been able to build up well-functioning economic institutions. Further studies could include a more detailed view of the economies of the important member countries for Singaporean trade. Furthermore, an examination of how an ASEAN+3-agreement really would affect Singapore's intra-industry trade would be relevant in this context.

It would also be interesting to find what characterizes the intra-industry trade between Singapore and ASEAN as well as Singapore and the world. Is, what could be hypothesized, Singapore-ASEAN intra-industry trade of a vertical nature? Does Singapore have more vertical IIT with ASEAN and more horizontal IIT with the rest of the world? The examination of ASEAN's production fragmentation and cross-border networks is also highly relevant in future studies.

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Appendix

Appendix A1

Table 17

Total ASEAN Trade, 2005-2006

as of 15 August 2007

ASEAN Statistics

value in US$ million; change in percent

Country	2005			2006			Year-on-year change		
	Exports	Imports	Total trade	Exports	Imports	Total trade	Exports	Imports	Total trade
Brunei Darussalam	6,369.3	1,503.1	7,872.4	7,619.4	1,488.9	9,108.3	19.6	(0.9)	15.7
Cambodia	3,091.5	2,824.8	5,916.2	3,514.4	2,923.0	6,437.4	13.7	3.5	8.8
Indonesia	85,660.0	57,700.9	143,360.8	100,798.6	61,065.5	161,864.1	17.7	5.8	12.9
Lao, PDR	174.1	701.9	875.9	402.7	587.5	990.2	131.3	(16.3)	13.0
Malaysia	140,470.5	114,213.1	254,683.6	157,226.9	128,316.1	285,543.0	11.9	12.3	12.1
Myanmar	3,123.8	1,632.9	4,756.7	3,514.8	2,115.5	5,630.2	12.5	29.6	18.4
The Philippines	41,254.7	47,418.2	88,672.9	47,410.1	51,773.7	99,183.8	14.9	9.2	11.9
Singapore	229,804.1	200,162.8	429,966.9	271,607.9	238,482.0	510,089.9	18.2	19.1	18.6
Thailand	109,622.6	117,990.9	227,613.5	121,579.5	127,108.8	248,688.3	10.9	7.7	9.3
Viet Nam	28,576.5	32,593.9	61,170.4	37,033.7	40,236.8	77,270.5	29.6	23.4	26.3
ASEAN	648,147.0	576,742.4	1,224,889.4	750,707.8	654,097.8	1,404,805.7	15.8	13.4	14.7

Source: ASEAN Trade Database (compiled from data submission and/or websites of ASEAN Member Countries' national statistical offices and other relevant government agencies)

Symbols used

- not available as of publication time
- x not available/not compiled

Notes : -