

Chapter 7

ASEAN+1 FTAs and Global Value Chains in East Asia: The Case of the Electronics Industry in Malaysia

Rasyad A. Parinduri

Nottingham University Business School, University of Nottingham, Malaysia Campus

Shandre M. Thangavelu

Department of Economics, National University of Singapore

November 2011

This chapter should be cited as

Parinduri, R. A. and S. M. Thangavelu (2011), 'ASEAN+1 FTAs and Global Value Chains in East Asia: The Case of the Electronics Industry in Malaysia', in Findlay, C. (ed.), *ASEAN+1 FTAs and Global Value Chains in East Asia*. ERIA Research Project Report 2010-29, Jakarta: ERIA. pp.185-231.

CHAPTER 7

ASEAN+1 FTAs and Global Value Chains in East Asia: The Case of the Electronics Industry in Malaysia

RASYAD A. PARINDURI

Nottingham University Business School, University of Nottingham, Malaysia Campus

SHANDRE M. THANGAVELU

Department of Economics, National University of Singapore

We examine the development of the electronics industry in Malaysia and the challenges and impediments that firms in the industry are facing along the supply chain. We approach these questions as an analysis of trade data and case studies. We find that the industry has grown fast in the past few decades, and driven by large intra-industry trade in electronic components. The trends of the Malaysian electronics industry production and trade are correlated with the trends of the world economy. However, the stagnant productivity of workers since the early 2000s, and the declining revealed comparative advantage in producing electronic products for Malaysia are key concerns for sustainable growth. Given the current drive towards regional free trade agreements and with the increase in the fragmentation of the electronics industry, we offer some policy recommendations that could help firms in the industry to keep their global competitiveness.

1. Introduction

How has the electronics industry in Malaysia developed since the Asian financial crisis? What are the effects of Malaysia's trade policies and free trade agreements (FTAs) on the map of the regional and global supply chain of the industry? What are the challenges and the constraints faced by firms in the industry along the supply chain?

The answers to these questions are important to understand the effects of FTAs, in particular those of the Association of Southeast Asian Nations (ASEAN) +1 FTAs on the supply chain map.¹ They are also important to inform policy-makers on how to help firms in the industry to overcome impediments to trade.

We approach these questions by undertaking an analysis of trade data and a case study. First, we look at the data from Malaysia's Department of Statistics for production, trade, value added, and employment of Malaysia's electronics industry. We also compile the industry's trade statistics from the Comtrade database. Then we interview several managers of firms in the industry to understand what they think about the FTAs and to make sense of the challenges that they are facing along the supply chain.

The electronics industry in Malaysia has developed rapidly because of the export-oriented trade policies adopted by the Government of Malaysia since its independence. Production of the electronics industry has grown fast, but it has followed closely the boom and bust of external demand, with similar consequences for the industry's value added, employment and productivity.

The key product categories of the electronics industry are electronic components and computers.² However, the industry does not seem to have revealed comparative advantage (RCA) in producing components. As a result, the electronics industry as a whole does not have large RCA. At the product level, Malaysia has high RCA in radio and communications as well as in computers and consumer electronics.

¹ The focus of the paper will be on the following ASEAN+1 FTAs: ASEAN--Australia--New Zealand, ASEAN--China, ASEAN--Japan, ASEAN--Korea, and ASEAN--India.

² See Appendix 1 for the definition of the electronics industry, and Appendix 2 for the definition of the electronic products.

The industry's production, exports and imports of electronic products follow closely the cycle of external demand. Most of the electronics industry's exports are components and computers, while most of the imports are components. In the 1990s, a large proportion of trade in components used to be inter-industry trade and horizontal intra-industry trade (HIIT). But, the proportion of vertical intra-industry trade (VIIT) has been increasing so that in 2009 about 80 per cent of trades in components were VIIT.

We also find that the heavy reliance of the electronics industry on imports of components makes exports and imports tend to move in tandem. Despite the co-movement, net exports of electronic products have been increasing since the 1990s.

On the subject of Malaysia's trades in electronic products, we find that Malaysia's major trading partners are China, the United States (US), Singapore, Hong Kong and Japan. The last four countries have been Malaysia's major trading partners since the 1990s. Not only are they major trading partners for the industry as a whole, but these five countries are also major trading partners for each of the six electronic products analysed in this paper. Besides Singapore, ASEAN member countries that are major trading partners of Malaysia are Thailand and the Philippines.

There are also some indications that Malaysia's FTAs and ASEAN+1 FTAs affect the production network of the electronics industry in the region, though the FTAs are not perhaps the most important factors. Given the low or zero import duties on electronic final goods and components, some firms may have relocated their factories to other ASEAN member countries or ASEAN's FTA partners to take advantage of cheaper labor costs or larger market demand.

Trade facilitation in Malaysia provided by Dagang Net, a government-linked trade facilitation and e-commerce service provider, seems to be quite good. We also find that many firms are likely to be aware of the FTAs and do actually use the FTA provisions, in particular for imports and exports of final goods. There are a few other regulatory issues and non-trade barriers that may also affect the firms' use of FTAs; these factors are, among others, the Strategic Trade Act (STA) 2010 and excise duties on automotive electronics. The Government of Malaysia and federations of manufacturers in Malaysia do promote FTAs, though perhaps small and medium enterprises (SMEs) are the firms

that gain the most from this promotion and training programmes, not large multinational corporations (MNCs) like the ones whose managers we interviewed.

We offer several policy recommendations. One, the government needs to continue promoting the FTAs to firms in the electronics industry, in particular to SMEs. Two, the government should disseminate more information on the ASEAN--Australia--New Zealand, ASEAN--Korea, and ASEAN--India FTAs, which seem to be used less frequently compared to other ASEAN+1 FTAs. Three, the government should streamline the procedures of applications for certificates of origin and the STA permits. Four, the government should remove some of the non-tariff barriers such as the excise taxes currently imposed on automotive electronics. Five, it may be difficult to increase linkages between large firms and SMEs, but the government could push some of the SMEs development programmes further to help the SMEs to grow so that they have the technological capabilities required by large firms in the industry. Six, to graduate into the designing and development stage of production in the electronics industry, Malaysia would need to make its economy more attractive to foreign investors and skilled labor.

The paper proceeds as follows: section 2 describes the electronics industry in Malaysia. Section 3 analyses the map of the supply chain. In section 4, we discuss the challenges and the impediments to trade faced by firms in the industry along the supply chain. Section 5 concludes with a discussion of policy implications.

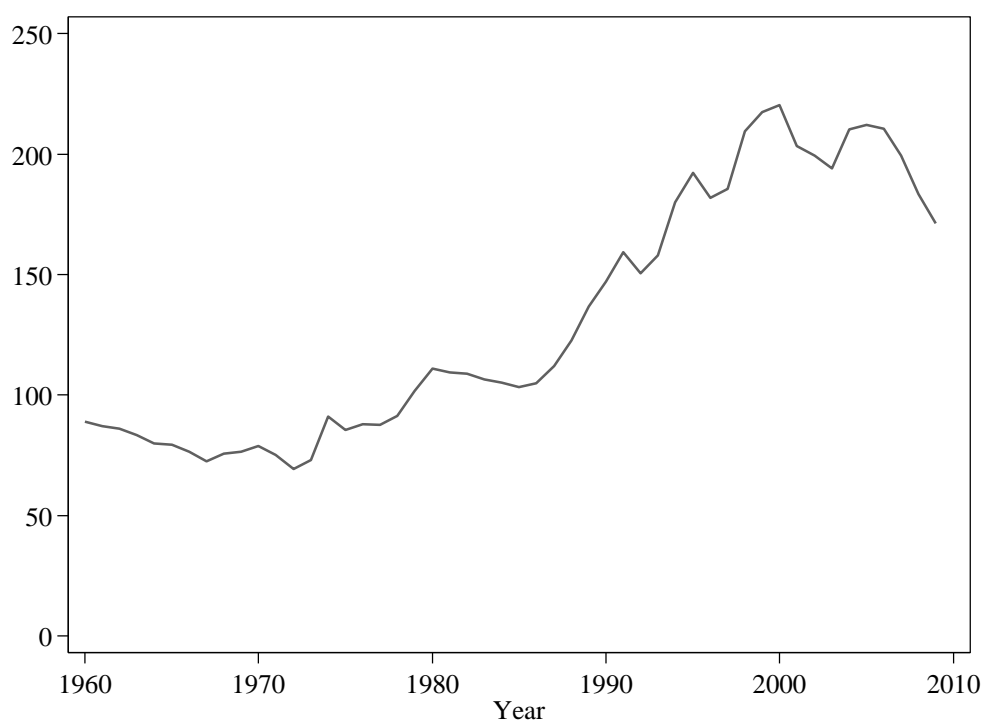
2. The Electronics Industry in Malaysia

First, we briefly describe trade policies and the stages of industrialization in Malaysia. Then, we discuss the trends of production in the electronics industry, the composition of output, the productivity of workers, and the industry's trade competitiveness. We conclude this section with an examination of the value added and employment of the industry.

2.1. Trade Policies and Industrialization in Malaysia

Except for the two stints of industrialization in the 1960s and early 1980s when the government implemented import substitution policies, in general, Malaysia's trade policy since its independence in 1957 has been quite liberal.³ Malaysia's ratio of trade to gross domestic product (GDP), for example, in terms of trade openness, has been always high. In the 1960s and 1970s, Malaysia's trade had been equivalent to about 70-90 per cent of its GDP (see Figure 1). In the 1980s, Malaysia's trade to GDP ratio was rising until it reached about 200 per cent in the early 2000s.

Figure 1. Trade as a Percentage of GDP



Source: World Development Indicators

Note: Trade is defined as the sum of exports and imports.

³ See, for example, Tham (2010), Kinuthia (2009), Athukorala (2005), Jomo (1993), and Alavi (1996) for discussions of trade policies and industrialization in Malaysia. The stages of industrialization in Malaysia discussed in this section are adopted from Table 1 in Tham (2010).

Even during the first implementation of import substitution policies in 1957-1967, tariff rates were low compared to those in other developing countries, and non-tariff barriers were rarely used to protect domestic industries (Athukorala, 2005).⁴

In 1968, because the protected firms failed to export and create employment, in addition to limited domestic demand, Malaysia abandoned import substitution policy and started adopting a more export-oriented industrialization.⁵ To attract foreign direct investment (FDI), free trade zones (FTZs) were established in 1972. However, the inter-ethnic riot in 1969 induced the government to introduce the New Economic Policy (NEP), which, among other things, promoted income redistribution and imposed restrictions on ownership of firms by the non-Malays and non-natives of the country. As a result, FDI in manufacturing, including in the electronics industry, fell. According to Tham (2010), because of these ownership restrictions, among other things, the contribution of MNCs to manufacturing exports fell from 70 per cent in 1970 to 42 per cent in 1985.

However, the ownership restrictions were later relaxed for firms that export more than 80 per cent of their products so that the contribution of MNCs in manufacturing exports increased to 70 per cent in 2000.⁶ Some of these exporting firms were also awarded pioneer status, which provides income tax breaks for up to five years. The government also offered investment incentives for purchases of capital goods. As a result, a wave of relocation of US and Japanese factories to Malaysia followed, including firms in the electronics industry.

In 1980-85, Malaysia made an about-face by returning to import substitution policy, in particular in heavy industries such as automotive, steel, and cement industries, spearheaded by joint ventures between state-owned enterprises and MNCs. In accordance with the infant industry argument, and trying to imitate the success of industrialization in Korea, Malaysia protected these heavy industries with high tariff rates. By 1984, the average tariff rate had increased to 26 per cent (Athukorala, 2005).

⁴ Athukorala (2005) estimates that in 1965 the average tariff rate was 13 per cent. Only a handful of industries were protected by tariff rates of more than 30 per cent.

⁵ The key statutes in this stage of industrialization are the Investment Incentives Act 1968, Free Trade Zone Act 1971, Industrial Coordination Act 1975, and Foreign Investment Committee 1974.

⁶ See Tham (2010).

Since 1986, because of the fiscal and trade deficits suffered by the Malaysian government, Malaysia abandoned the import substitution policy and has been adopting a more liberal trade policy. To attract more FDI, Malaysia relaxed equity restrictions for export-oriented firms further. The government also offered generous investment incentives through the Promotion of Investment Act 1986. A second wave of relocation of manufactures then followed, this time from Japan and other East Asian countries.

Malaysia has been reducing its tariff rates, partly through its participation in FTAs. With the ASEAN Free Trade Area (AFTA) put in place in 1992, through the implementation of the Common Effective Preferential Tariff scheme, tariff rates of most goods traded among ASEAN member countries have been gradually reduced to zero. Malaysia has also concluded FTAs with Japan, Pakistan, New Zealand, and Chile, and is currently negotiating FTAs with, among others, the US, EU and Australia. The recent establishment of ASEAN+1 FTAs will have opened the Malaysian economy further to some of the largest economies in the region, namely Japan, China, Korea, India, Australia and New Zealand.

Malaysia's trade openness has been inducing increasing trade between Malaysia and the other ASEAN member countries as well as with the FTA partners. Because of the eventual creation of one market for goods and services in the region through AFTA and ASEAN+1 FTAs, industries in the region may become more fragmented. The design of the supply chains of some of these industries may have changed, and may continue changing.

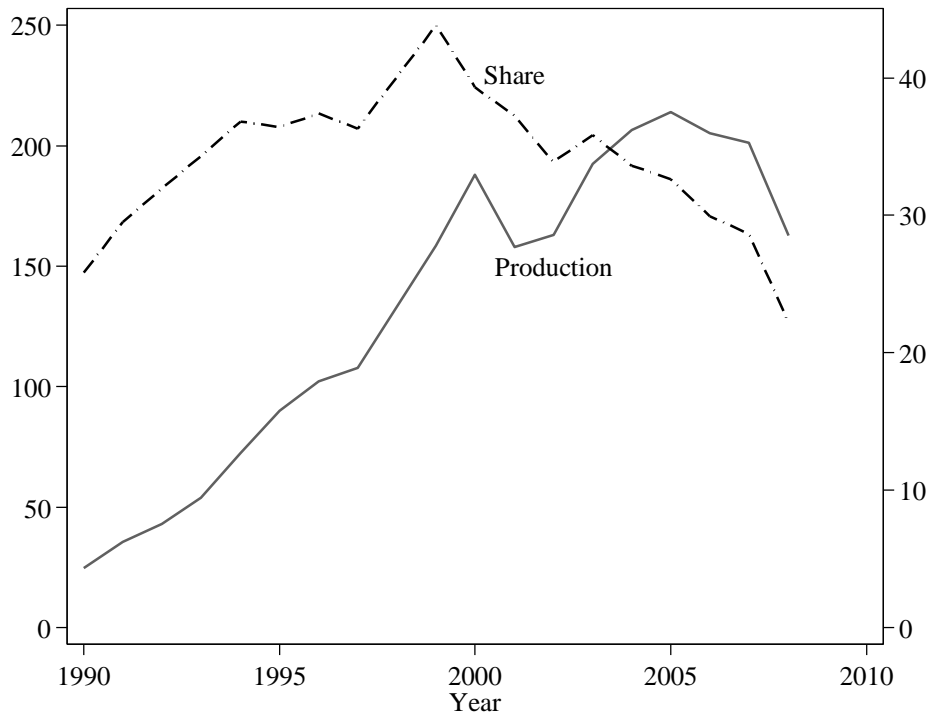
One such industry that is likely to go through this transformation is the electronics industry in Malaysia, which is the subject of the case study in this paper.

2.2. Production of Malaysia's Electronics Industry

The trend in production of Malaysia's electronics industry closely follows the cycle of external demand (see Figure 2). When the world economy expanded in the 1990s, production had been growing rapidly at about 22 per cent per year on average. When the external demand shrank in 2001 due to the dot-com bust, production contracted by 17 per cent.

The Malaysian production recovered quickly, however. As the world economy grew from the year 2002 to 2006, production had been growing by 23 per cent per year on average. When the global financial crisis hit major world economies in 2008, Malaysia's production declined again, contracting by 20 per cent. Preliminary data show that production has started increasing as the economic growth of the US and the developed countries picked up in 2009.

Figure 2. The Production of the Electronics Industry (2005 Constant RM billion) and its Share in the Manufacturing Sector



Source: Malaysia's Department of Statistics and the authors' own calculation.
Note: The data for the year 1998 are linearly extrapolated. See Appendix 1 for the definition of the electronics industry.

The production of the electronics industry tends to move in line with trends in the world economy because many firms in the industry are exporters. Most of the largest firms in the industry export more than 80 per cent of their products. Therefore, if the developed countries fall into recession, the demand for Malaysia's electronics industry will contract as well, and, as a result, production will fall. In fact, it is likely that

external demand for Malaysia's electronics industry is highly income elastic. Wong (2008), for example, finds that the long-run income elasticity of export demand for Malaysia's electronic products is larger than one. A fall of GDP in the export market by 1 per cent will, therefore, lead to a decline in Malaysia's exports by more than 1 per cent.⁷

The share of the production of the electronics industry in the manufacturing sector has a similar pattern. It had been increasing until 1999 when the production of the electronics industry was more than 40 per cent of the manufacturing sector. It has been declining since, however. By 2008, the share of the electronics industry had fallen to only about 22 per cent of the manufacturing sector.

2.3. The Composition of Output

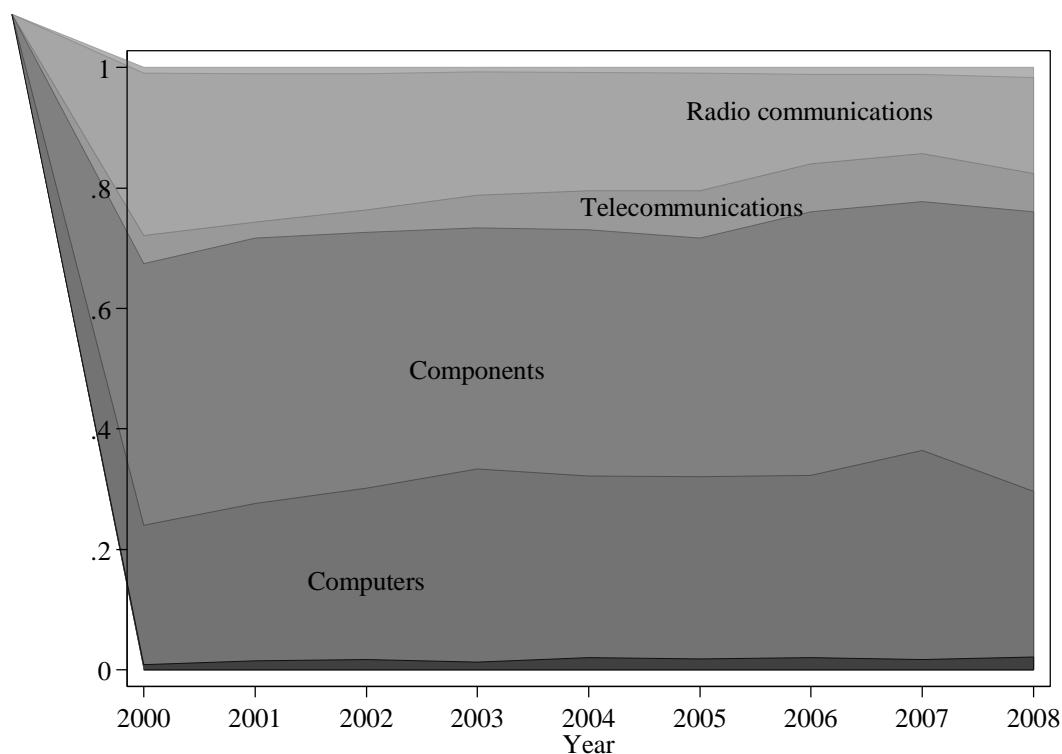
Electronic components has always been the largest part of the electronics industry's production in Malaysia (see Figure 3). In the year 2000, components accounted for about 43 per cent of production. Radio communications and computers came second and third, respectively. In the year 2000, components and computers accounted for more than 67 per cent of total production of the electronics industry.

Since then, these two products have been dominating the industry. Over the past decade since the late 1990s, their proportion has been increasing so that in 2008 components and computers accounted for more than 74 per cent of the production of the electronics industry.

The increase of the proportion of components and computers in total production, in addition to the increasing share of telecommunications, has been at the expense of radio communications. In the late 1990s, radio communications had 27 per cent of industry production. In 2008, its share fell to 16 per cent. Meanwhile, the share of consumer electronics has been quite stable, at about 2 per cent of the production of the electronics industry since the year 2000.

⁷ Wong (2008) also finds the demand is price elastic.

Figure 3. The Composition of the Electronics Industry by Products



Source: Malaysia's Department of Statistics and the authors' own calculation.

Note: The areas at the bottom and at the top of the figure represent consumer and industrial electronics, respectively. See Appendix 2 for the definition of the electronic products.

2.4. The Productivity of Workers

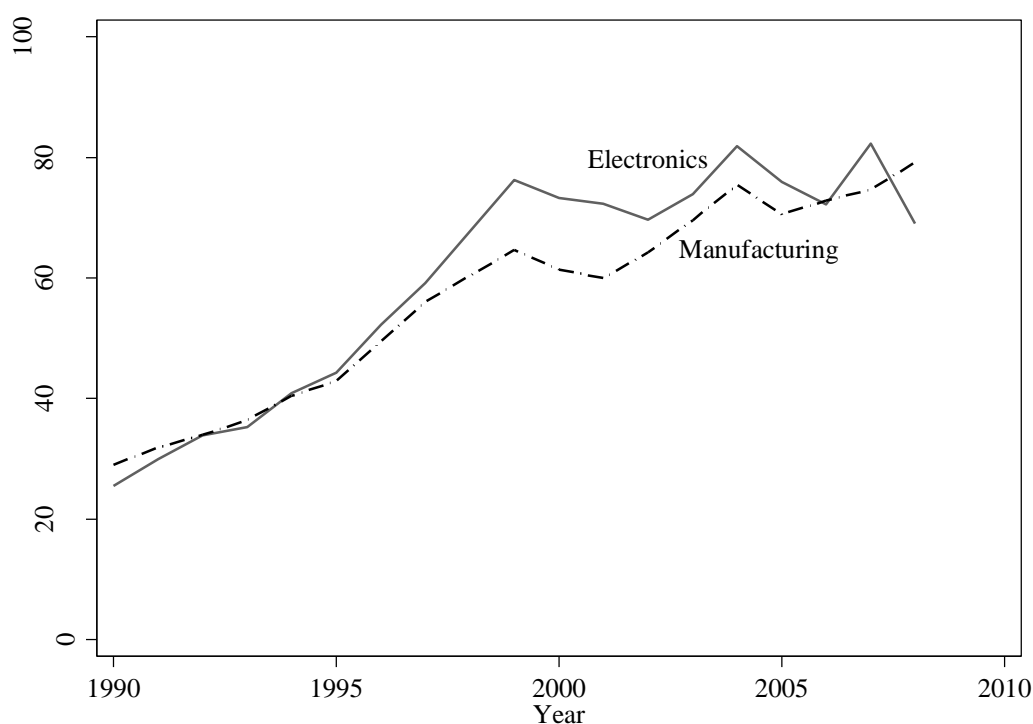
Productivity of workers in the electronics industry has been increasing since the early 1990s (see Figure 4). In 1990, the productivity, which we define as value added per worker, was about RM25,000 in 2005 constant ringgit. Almost two decades later in 2009, the productivity had more than doubled to about RM70,000 per worker.

Productivity in the electronics industry had been growing at 16 per cent per year on average in the 1990s. It has slowed down, and been fluctuating, since the 2001 dot-com bust. Overall, its time trend is similar to that of productivity of the manufacturing sector, which indicates that the change in capital intensity of the electronics industry does not differ much from that in other industries in the manufacturing sector.

This rather stagnant and fluctuating productivity might simply be due to the cycle of external demand for Malaysia's electronics industry. It is also possibly due to the industry not making significant investments to improve the industry's technological capabilities. Rasiah (2009), for example, examines the electronics industry in South-

East Asian economies. He finds that among the countries in the region, only Singapore has improved its electronics industry at the designing and development stage of production. Other countries, including Malaysia, have continued to focus on the assembly, packaging and testing of electronic products.

Figure 4. The Productivity of the Electronics Industry and the Manufacturing Sector



Source: Malaysia's Department of Statistics and the authors' own calculation.

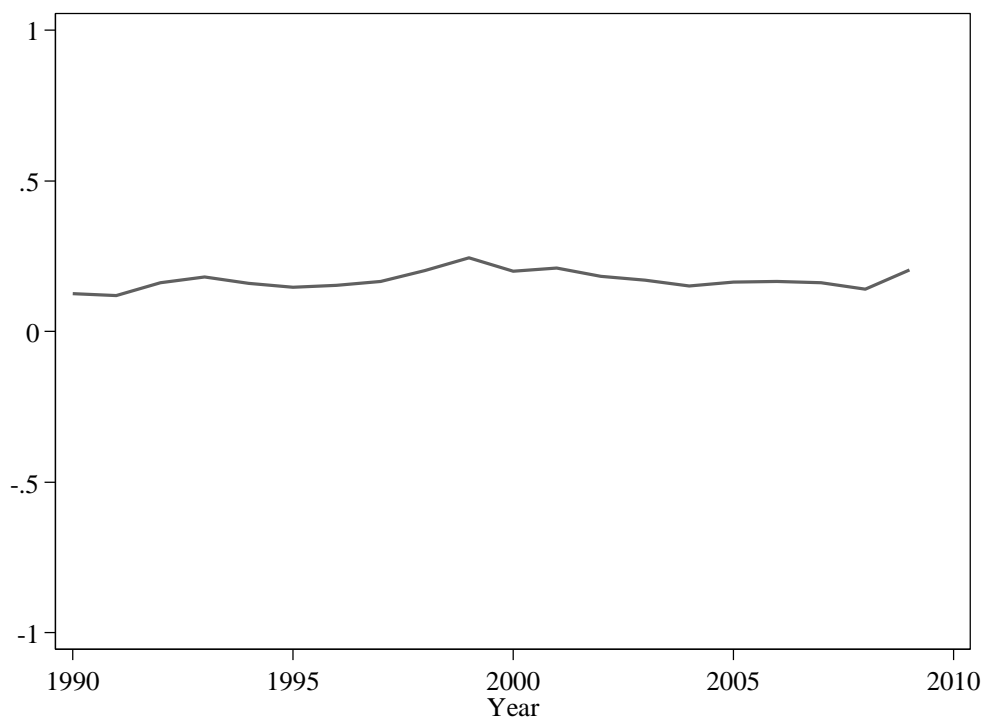
Note: Productivity is defined as value added per worker in 2005 constant thousand ringgit per worker. The data for the year 1998 are linearly extrapolated. See Appendix 1 for the definition of the electronics industry.

2.5. The Industry's Revealed Comparative Advantage

Overall, Malaysia does not seem to have RCA in producing electronic products. Moreover, its RCA has not changed much since the 1990s (see Figure 5). Using the ratio of net exports to trade as a measure of RCA, we find that Malaysia's RCA in

producing electronic products was about 0.12 in 1990.⁸ It increased to 0.25 in the late 1990s, though later declined back to 0.2 in 2009.

Figure 5. The Revealed Comparative Advantage (RCA) of the Electronics Industry



Source: Comtrade and the authors' own calculation.

Note: RCA is defined as the ratio of net-exports to trade. See Appendix 1 for the definition of the electronics industry.

Conversely, Mahani and Loke (2008) find that Malaysia's RCA of the electrical and electronics industry increased from 2.82 in 2001 to 3.19 in 2005. However, they use Balassa's (1965) measure of the RCA, which is based on the values of exports only. Nevertheless, even using Balassa's measure, the industry's RCA did not improve much during the early 2000s.⁹

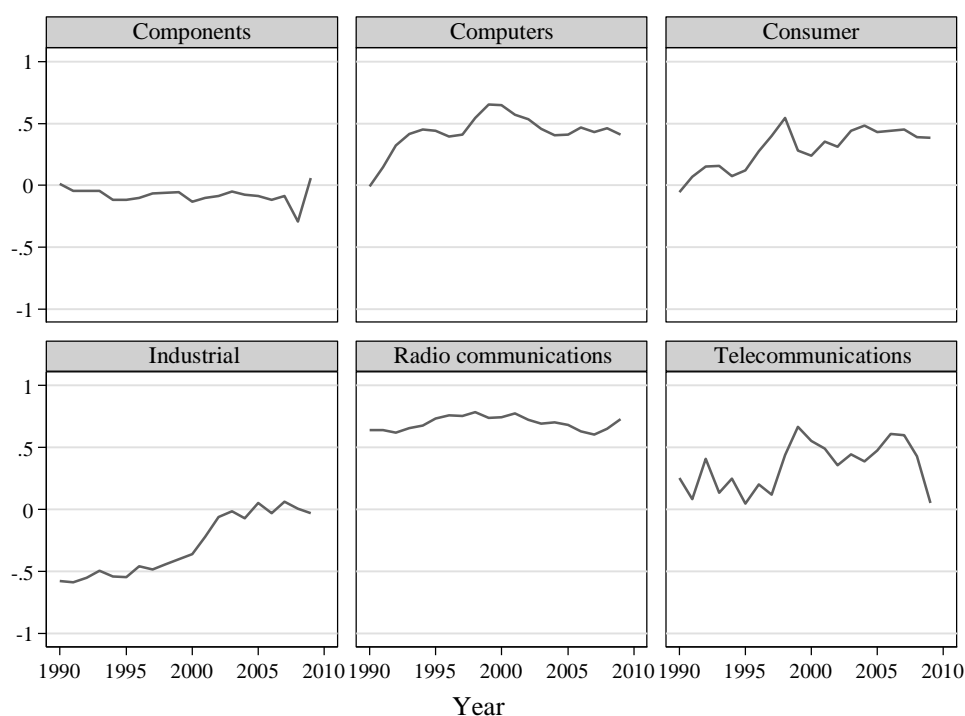
Looking closer at the RCA at the product level, we find that Malaysia has negative, though small in magnitude, RCA in electronic components (see Figure 6). This negative RCA and the large trades in components seem to be the reason why Malaysia's

⁸ We calculate the RCA as follows: $RCA_{ij} = \frac{X_{ij} - M_{ij}}{X_{ij} + M_{ij}}$, where X and M are exports and imports, respectively, i indicates country, and j product. See, for example, Greenaway and Milner (1993).

⁹ Mahani and Loke (2008) also find that Malaysia's RCA of electrical and electronics industry in 2005 was lower than that of wood products, but higher than those of metal, textiles, and transport equipment.

electronics industry does not have high RCA as shown in Figure 5. The RCAs in computers and consumer electronics are positive and have been increasing. The RCA in radio communications has always been high since the 1990s, which indicates that Malaysia has revealed comparative advantage in producing these final goods.

Figure 6. The RCA of the Electronics Industry by Products



Source: Comtrade and the authors' own calculation.

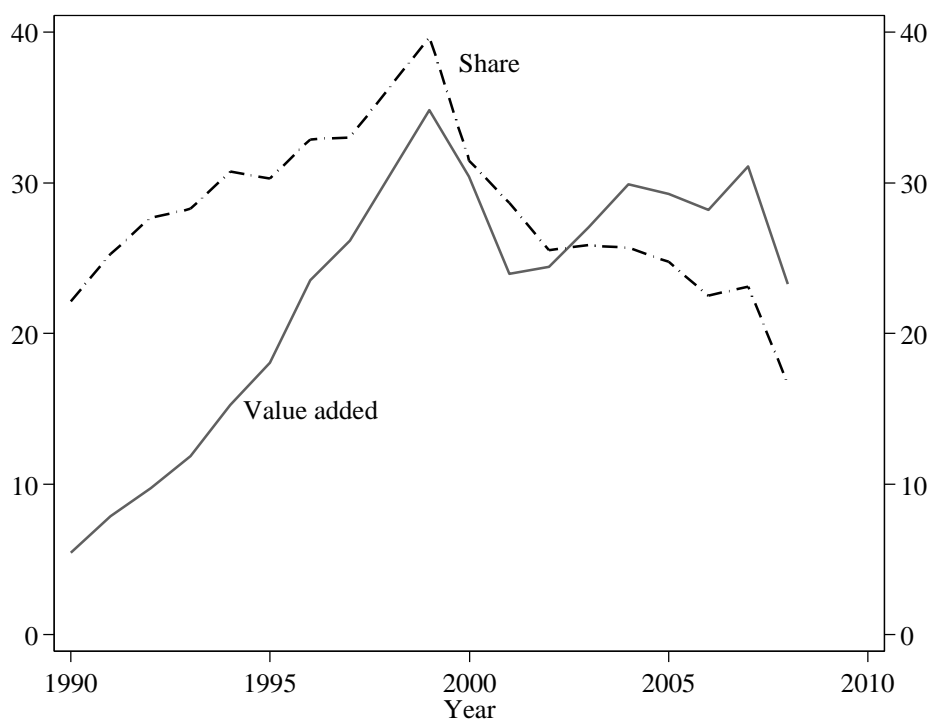
Note: RCA is defined as the ratio of net-exports to trade. See Appendix 2 for the definition of the electronic products.

The RCA in telecommunications is positive, though fluctuating. The RCA in industrial electronics has been increasing: In the 1990s Malaysia had revealed comparative disadvantage in this product, and recently the RCA has been fluctuating near zero.

2.6. Value Added and Employment

The trend of the value added of the electronics industry mimics that of production (see Figure 7). As production expanded in the 1990s, the value added was also increasing rapidly. It took a dip when the industry contracted in 2001, though it increased quickly when the external demand for electronic products recovered. Value added declined again in the aftermath of the global financial crisis in 2008.

Figure 7. The Value Added of the Electronics Industry (2005 constant RM billion) and Its Share in the Manufacturing Sector



Source: Malaysia's Department of Statistics and the authors' own calculation.

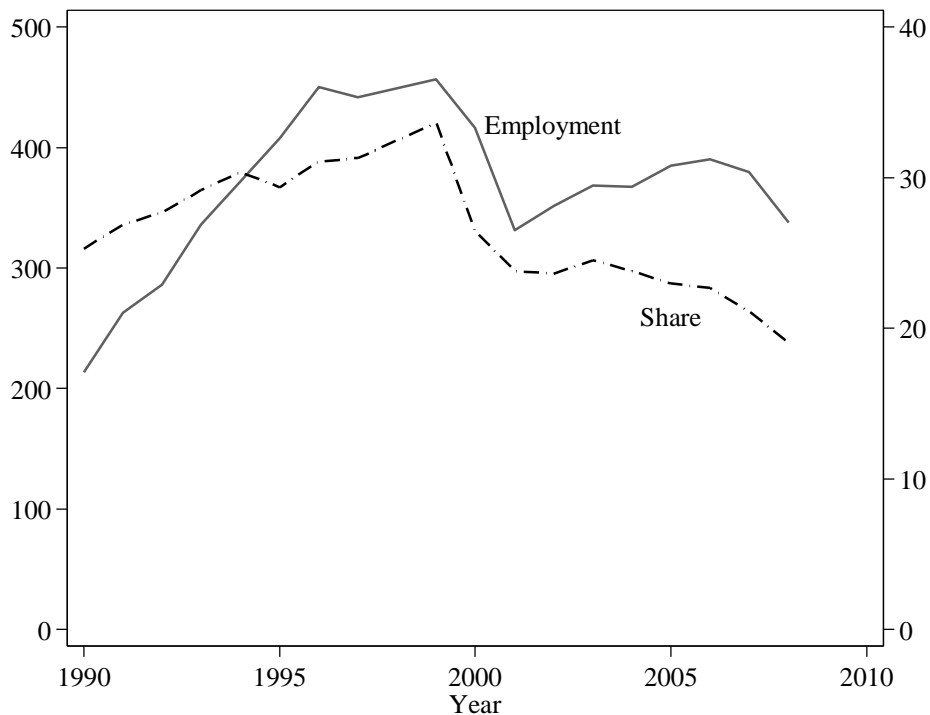
Note: Productivity is defined as value added per worker in 2005 constant thousand ringgit per worker. The data for the year 1998 are linearly extrapolated. See Appendix 1 for the definition of the electronics industry.

The share of value added of the electronics industry has an inverted V-shape. It had been increasing from about 22 per cent of the value added in the manufacturing sector in 1990 to almost 40 per cent in 1999. It has declined ever since, however, so that in 2008 the value added of the electronics industry fell below its level two decades earlier.

The patterns of employment are also similar, increasing until 2000, and declining during the dot-com bust (see Figure 8). Employment levels recovered slightly as the world economy grew in the early 2000s, but declined again in 2008.

The share of employment of the electronics industry has exhibited the same patterns. In 1990, 25 per cent of employment in the manufacturing sector was in the electronics industry. It reached the highest proportion in 1999 at more than 30 per cent. Since then, the share of employment of the industry in the manufacturing sector has been declining. In 2008, the electronics industry employed less than 20 per cent of workers in the manufacturing sector.

Figure 8. Employment in the Electronics Industry and its Share in the Manufacturing Sector



Source: Malaysia's Department of Statistics and the authors' own calculation.

Note: The data for the year 1998 are linearly extrapolated. See Appendix 1 for the definition of the electronics industry.

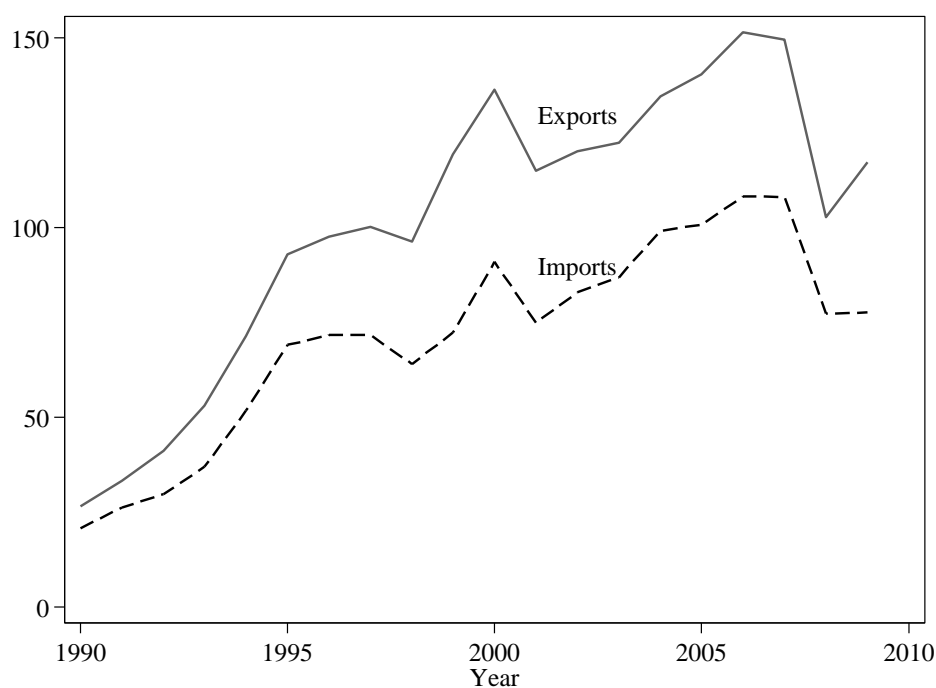
3. The Map of the Supply Chain

We now discuss the map of the supply chain. First, we describe the trends and the composition of trade in electronic products. Then, we examine the map of trade flows of the electronics industry. We conclude with an analysis of intra-industry trade, tariff rates, and trade facilitation.

3.1. The Trends of Trade Flows

Malaysia's exports and imports of electronic products, like the trends of production discussed in section 2, follow closely the boom and bust cycle of external demand (see Figure 9). Trade had grown rapidly during the 1990s until it reached its peak in 2000. Exports and imports declined in 2001 when external demand fell, though the flows recovered quickly up until the global financial crisis in 2008. Exports and imports fell sharply in 2008, but again recovered somewhat in the following year.

Figure 9. The Exports and Imports of the Electronics Industry, 2009 US\$ billion



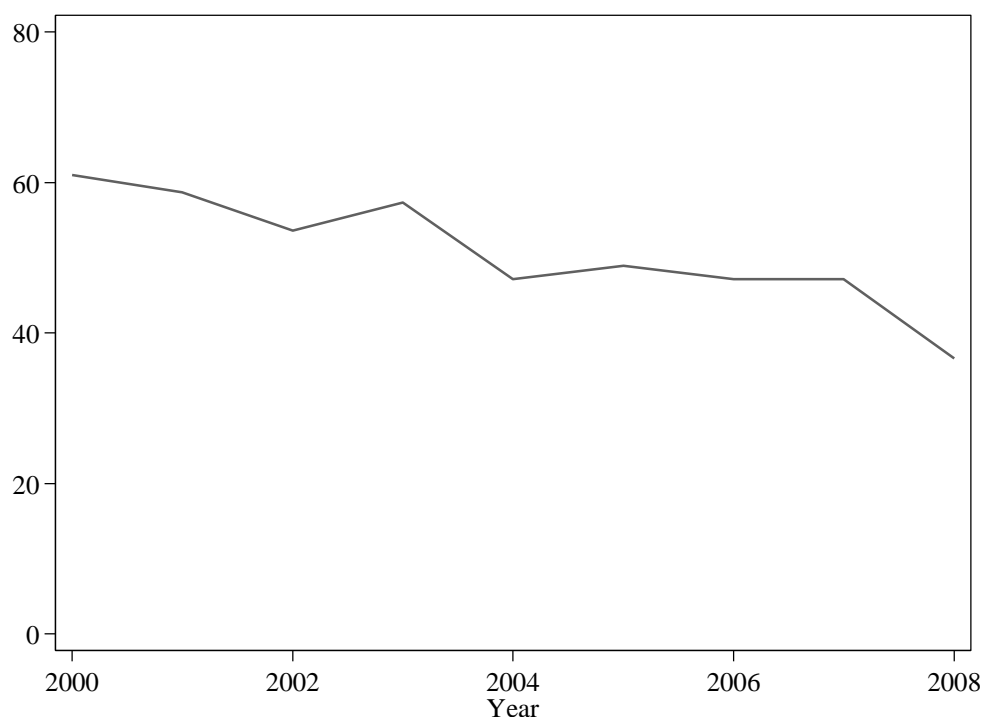
Source: Comtrade and the authors' own calculation.

Note: See Appendix 1 for the definition of the electronics industry.

Exports and imports of the electronics industry tend to move in tandem. When exports rise, imports do as well. When imports take a dip, so do exports. This co-movement of exports and imports indicates the heavy reliance of firms in the electronics industry in Malaysia on imports, in particular on imports of components. Over time, the gap between exports and imports, the net exports, tends to increase. In 1990, the net exports were about 22 per cent of exports. In 2007, the figure rose to 34 per cent.

Even though production and exports recovered quickly after the dot-com bust in 2001, the share of the electronics industry's exports in the manufacturing sector has been declining since 2000 (see Figure 10). It accounted for about 60 per cent of manufacturing exports in 2000. After the global financial crisis in 2008, the contribution of the electronics industry's exports fell to below 40 per cent.

Figure 10. The Share of the Electronics Industry's Exports in the Manufacturing Sector



Source: Malaysia's Department of Statistics and the authors' own calculation.

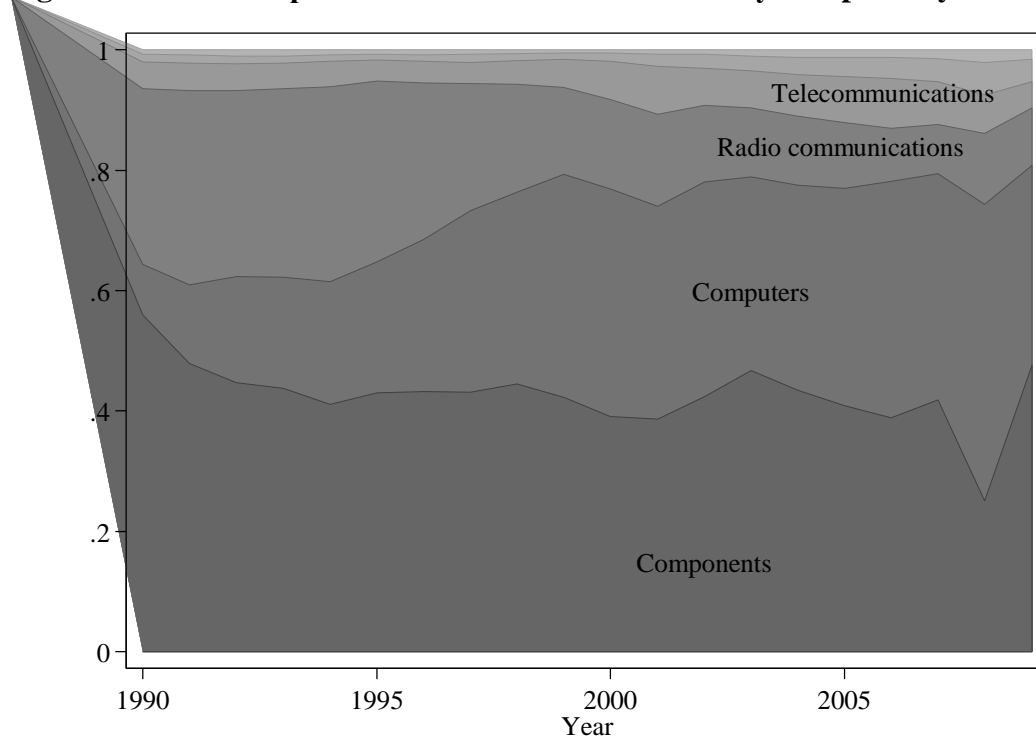
Note: See Appendix 1 for the definition of the electronics industry.

3.2. The Composition of Trades

Consistent with the composition of production, most of exports from the electronics industry in Malaysia are components and computers (see Figure 11). Since the 1990s, components have accounted for more than 40 per cent of exports. Together with exports of computers, whose share has been increasing, they accounted for about 80 per cent of exports in 2009. Meanwhile, the share of radio communications has fallen from about 30 per cent in 1990 to about 10 per cent in 2009.

The increasing share of computers in the industry's exports is in line with the finding that the industry has RCA in producing computers, though this might be also because of the large increase in the external demand for computers in the past two decades. Radio communications products have lost a large part of their export share, however, despite the industry's high RCA in these products.

Figure 11. The Composition of the Electronics Industry's Exports by Products



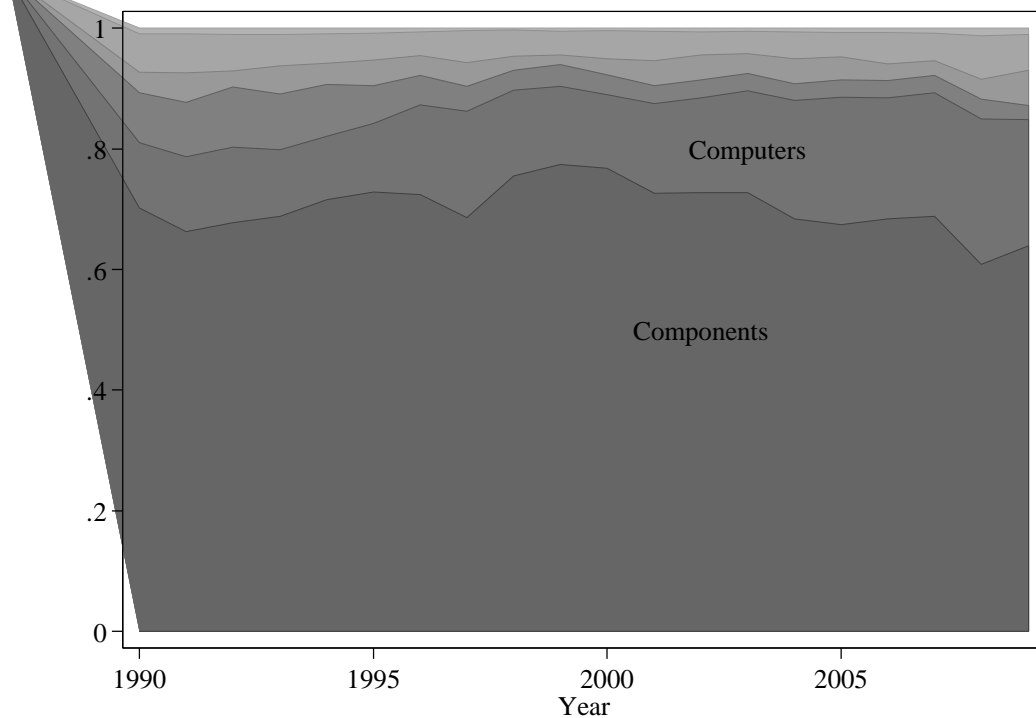
Source: Comtrade and the authors' own calculation.

Note: The areas at the top and bottom of the figure represent consumer and industrial electronics, respectively. See Appendix 2 for the definition of the electronic products

The composition of imports is even more concentrated towards components (see Figure 12). The proportion of components in imports has been about 70 per cent since the early 1990s. Together with imports of computers, which have been increasing slightly at the expense of radio communications, they accounted for 85 per cent of electronics industry imports.

The proportions of imports of telecommunications, consumer electronics, and industrial electronics, on the other hand, have been always very small.

Figure 12. The Composition of the Electronics Industry’s Imports by Products



Source: Comtrade and the authors’ own calculation.

Note: The four areas above ‘computers’ represent radio communications, telecommunications, industrial electronics, and consumer electronics, respectively, from the bottom to the top. See Appendix 2 for the definition of the electronic products.

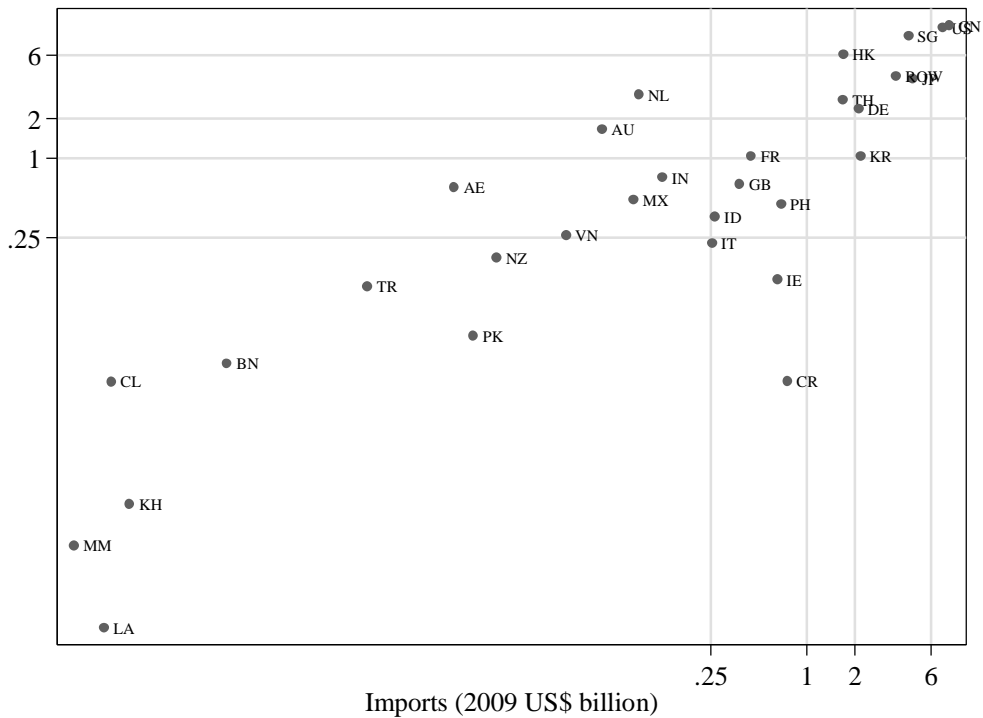
3.3. The Map of Trade Flows

China, the US, Singapore, Japan and Hong Kong were Malaysia’s major trading partners in electronic products in 2009 (see Figure 13). Malaysia trades heavily with these five countries: They accounted for two-thirds of Malaysia’s trades of electronic products in 2009. Malaysia had a trade surplus in electronic products with all of these countries except Japan. As shown in Figure 13, China, the US, Singapore and Hong

Kong are located above the 45-degree line, which indicates that Malaysia's exports to each of these countries were larger than the corresponding imports.

Among ASEAN member countries, besides Singapore, Malaysia's largest trading partners are Thailand, the Philippines and Indonesia. It has significant trade with Vietnam, though much smaller, while trades with the remaining ASEAN member countries such as Laos, Myanmar, Brunei and Cambodia are very small.

Figure 13. The Exports and Imports of Electronics Industry with Major Trading Partners and ASEAN Member Countries, 2009 US\$ billion



Source: Comtrade and the authors' own calculation.

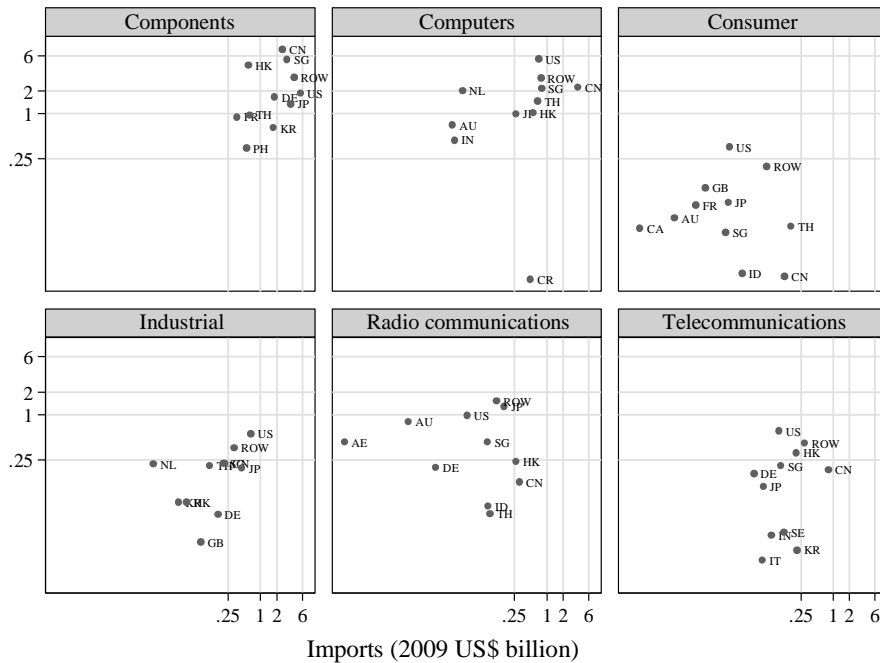
Note: Both axes are in logarithmic scale. See Appendix 1 for the definition of the electronics industry. See Appendix 3 for the description of the country codes.

Malaysia is also a large trader with some European countries such as Germany, United Kingdom (UK), France, the Netherlands, Ireland and Italy, as well as some of the FTA partner countries, in particular South Korea and Australia.

Malaysia has trade surpluses with most of these major trading partners: Most of the countries in Figure 13 are above the 45-degree line. Countries with whom Malaysia had the largest trading surplus in 2009 were Hong Kong, Singapore, Netherlands, US, China and Australia. Among these major trading partners, ASEAN member countries, and FTA partner countries, Malaysia has large trade deficits in electronic products with South Korea, Costa Rica, Japan and Ireland. Among the ASEAN member countries, Malaysia has a trade deficit with the Philippines only.

A closer look at the map of trade flows by products reveals a similar picture. The US, Singapore, Japan, Hong Kong and China are Malaysia's major trading partners in most products. (See Figure 14, which shows the 10 largest importers or exporters of electronic products from/to Malaysia.) Among these five countries, only Hong Kong is not among the 10 largest exporters or importers for all products: Hong Kong only appears in the list of major trading partners for one product, i.e. consumer electronics.

Figure 14. Exports and Imports of the Electronics Industry in 2009 by Products with Major Trading Partners and ASEAN Member Countries, 2009 US\$ billion



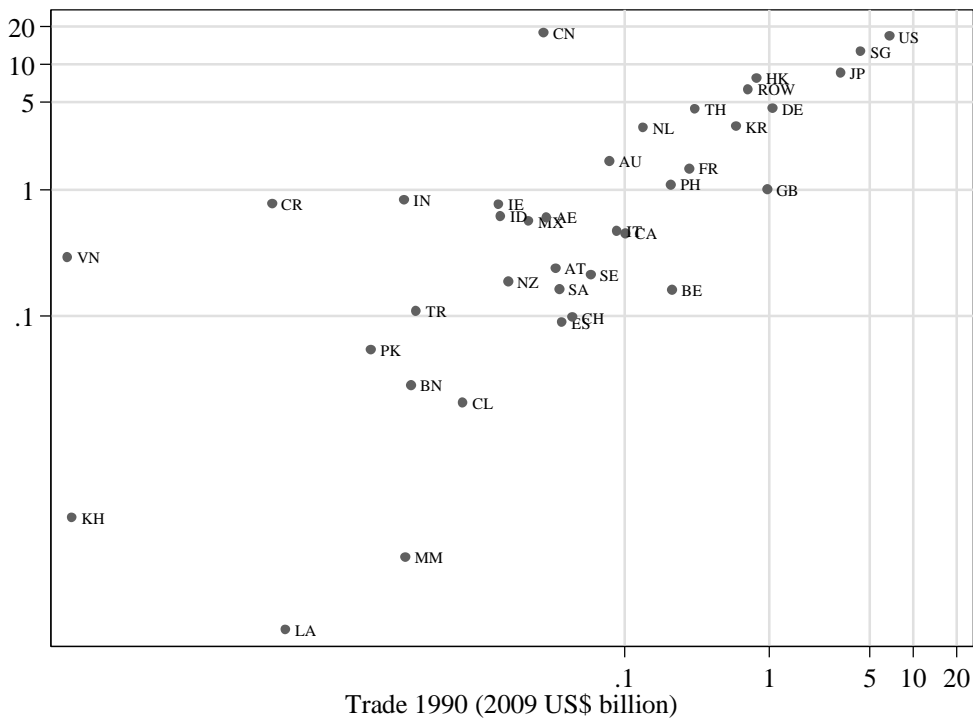
Source: Comtrade and the authors' own calculation.

Note: Both axes are in logarithmic scale. See Appendix 2 for the definition of the electronic products. See Appendix 3 for the description of the country codes.

Among ASEAN member countries, besides Singapore, Thailand was a major trading partner in all products, except telecommunications. The Philippines appears in the list of major trading partners in components, while Indonesia features in consumer electronics and radio communications. Other ASEAN member countries do not make the list. Other FTA partner countries that are in the list are South Korea and Australia.

These trade patterns have not changed much since the 1990s (see Figure 15, which shows Malaysia's major trading partners in 1990 and 2009). The US, Singapore, Japan and Hong Kong have been Malaysia's major trading partners since 1990. The same applies to Germany, UK and South Korea. Among Malaysia's largest trading partners in 2009, only China was not a major trading partner in 1990. Among ASEAN member countries, Thailand and the Philippines have been major trading partners since the 1990s.

Figure 15. Electronics Industry Trade with Major Trading Partners and ASEAN Member Countries, 1990 and 2009, 2009 US\$ billion



Source: Comtrade and the authors' own calculation.

Note: Trade is defined as the sum of exports and imports. Both axes are in logarithmic scale. See Appendix 1 for the definition of the electronics industry. See Appendix 3 for the description of the country codes.

Trade in electronic products with these major trading partners and ASEAN member countries has been growing in the past two decades. Most of the countries in Figure 15 are plotted above the 45-degree line. Some of the largest growth in trade was between Malaysia and China, with trade value increasing by more than 650 times over the last two decades. Malaysia's trade with Indonesia, India and Vietnam has also been increasing, by 44, 283 and 21,500 times, respectively.

We expect that, given Malaysia's participation in AFTA and other FTAs, the shares of trade between Malaysia and its FTA partners would have increased. Baier and Bergstrand (2009), for example, find that FTAs increase members' trade. However, as we see in Figure 15, the patterns of trades between Malaysia and its trading partners have not changed significantly. Urata and Kiyota (2005) also find that, using a CGE model, FTAs do not significantly affect the trade patterns of East Asian economies: Even though intra-regional trade increases, extra-regional trade of East Asian economies also expands rapidly.

3.4. The Intra-Industry Trade

To examine the nature of trade in intermediate inputs, i.e. components, we calculate some measures of intra-industry trade of electronic components following Fontagne and Freudenberg (1997).

First, we identify whether the trade of a good is one-way trade or intra-industry trade using the ratio of the minimum to the maximum of exports and imports. If the minimum of exports and imports is less than 10 per cent of the maximum, we regard the trade of the good as one-way trade; otherwise, it is a two-way trade. Then, if the trade is intra-industry trade, we look at the ratio of export and import prices to determine whether the trade is HIIT or VIIT. If the price ratio is close to one, the trade is HIIT; otherwise, it is VIIT.¹⁰

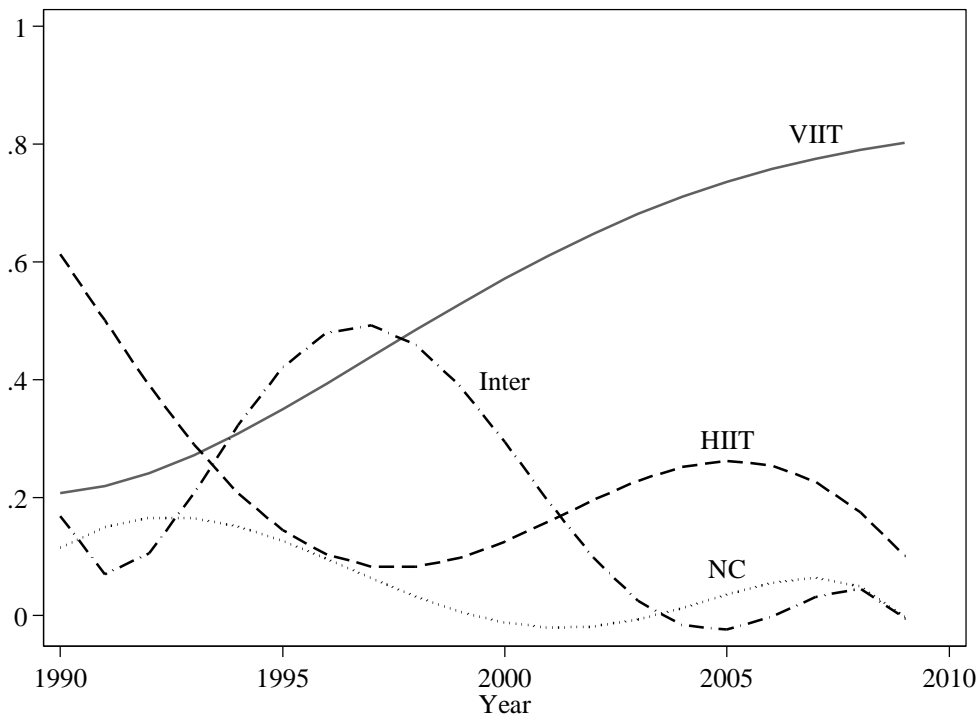
Figure 16 shows the proportions of trades that are inter- or intra-industry trade. Because the changes of the proportions are erratic from one year to another, we present

¹⁰ A trade is one-way trade if $\frac{\text{Min}(X,M)}{\text{Max}(X,M)} \leq 0.1$ and intra-industry trade otherwise. If a trade is two-way trade, and $\frac{1}{1.25} \leq \frac{P^X}{P^M} \leq 1.25$, the trade is HIIT; otherwise, it is VIIT. X, M, P^X , and P^M are exports, imports, the price of exports and the price of imports, respectively.

the trend lines of these proportions approximated using polynomial functions of degree four or five.

One feature of the trends is that the proportion of VIIT has been increasing since the early 1990s. In 1990, VIIT was about 20 per cent of trade. Two decades later, it was about 80 per cent. The increase in the proportion of VIIT came at the expense of HIIT and inter-industry trade. The proportion of HIIT has fallen from more than 50 per cent in 1990 to less than 20 per cent in 2009. Inter-industry trade has also fallen to less than 10 per cent in 2009.

Figure 16. The Proportion of VIIT, HIIT and Inter-Industry Trade (Inter) of the Electronic Components



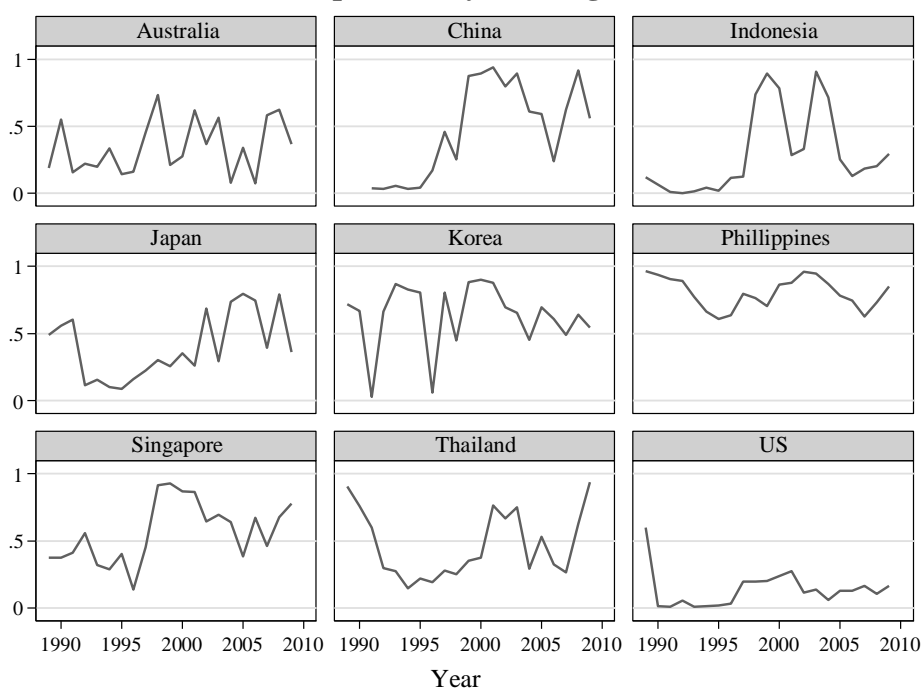
Source: Comtrade and the authors' own calculation.

Note: These measures are calculated using a method proposed by Fontagne and Freudenberg (1997). The lines are trend lines approximated using polynomial functions of degree four or five. NC indicates the proportion of trades whose unit values are not available, and hence are not categorized. See Appendix 2 for the definition of the electronic components.

The increase in intra-industry trade, in particular VIIT, is in line with the findings in the literature. Egger, Egger and Greenaway (2008), for example, find that regional trade agreements among the Organization for Economic Cooperation and Development (OECD) economies increase intra-industry trade and reduce inter-industry trade. Ando (2006) also shows that VIIT in East Asia increased during the 1990s, while one-way trade declined. She attributes this change to the dramatic increase in trade of machinery parts and components. Fukasaku (1992) also finds that intra-industry trade among Asia-Pacific economies had been increasing since the mid-1980s.

The electronics industry in particular tends to exhibit large intra-industry trade. Lall, Albaladejo and Zhang (2004), for example, suggest that fragmentation of an industry depends on four factors: the divisibility of production processes, its factor intensity, its complexity of the technologies, and value-to-weight ratio of the product. They argue that the electronics industry has these four characteristics.

Figure 17. The Proportion of VIIT, HIIT and Inter-Industry Trade (Inter) of the Electronic Components by Trading Partners



Source: Comtrade and the authors' own calculation.

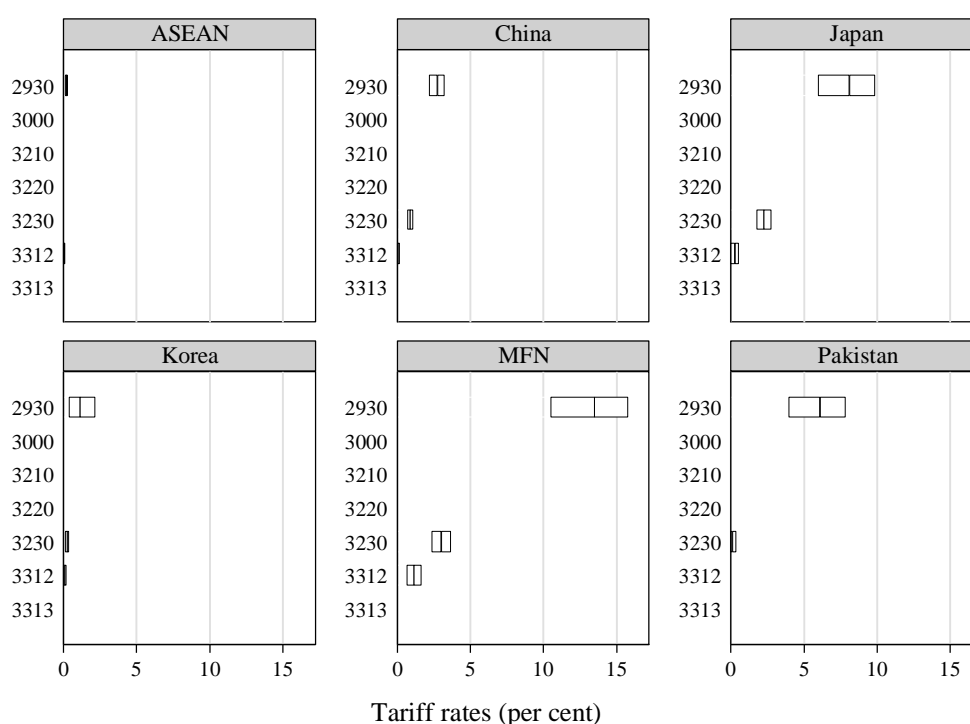
Note: These measures are calculated using a method proposed by Fontagne and Freudenberg (1997). The lines are trend lines approximated using polynomial functions of degree four or five. NC indicates the proportion of trades whose unit values are not available, and hence are not categorized. See Appendix 2 for the definition of the electronic components.

The trends of the proportions of VIIT differ across trading partners, as shown in Figure 17. For example, the proportion of VIIT in the Philippines has always been high. The proportion of VIIT with China increased during the second half of the 1990s. It has fluctuated sharply since, although it has remained high in the later 2000s. The proportion of VIIT with the US, on the other hand, has been low since the 1990s.

3.5. Import Tariffs

Malaysia has been an open economy since its independence, except during the two stints in which Malaysia promoted import substitution policy in the late 1960s and early 1980s. Import tariff rates, therefore, have typically been low. Even in 1965, the average nominal tariff rate was estimated to be as low as 13 per cent (Athukorala, 2005). Since 2006, the average tariff rate has been lower than 8 per cent.

Figure 18. The Averages of Applied Tariff Rates of Electronic Products by FTAs, 2009



Source: WTO's tariff database and the authors' own calculation.

Note: The left side, middle, and right sides of the horizontal bars indicate the minimum, average and maximum rates, respectively. The products are consumer (2930), computers (3000), components (3210), telecommunications (3220), radio communications (3230), and industrial electronics (3312 and 3313). See also Appendix 2 for the definition of the electronic products.

Most electronic products enjoy zero or very low applied tariff rates, as shown in Figure 18. Among the seven electronics products shown in the figure, only consumer electronics is protected to some extent using import tariffs: The minimum, average and maximum of the most-favoured nations (MFN) applied rates are 11, 14 and 16 per cent, respectively. Tariffs of imports of consumer goods from FTAs partner countries are lower, with tariffs for ASEAN member countries to be almost zero.

Lower than 4 per cent tariffs are imposed on radio communications products and electronic instruments, with close to zero tariffs for FTA partner countries. There are no tariffs imposed on computers, components, telecommunications and industrial electronics.

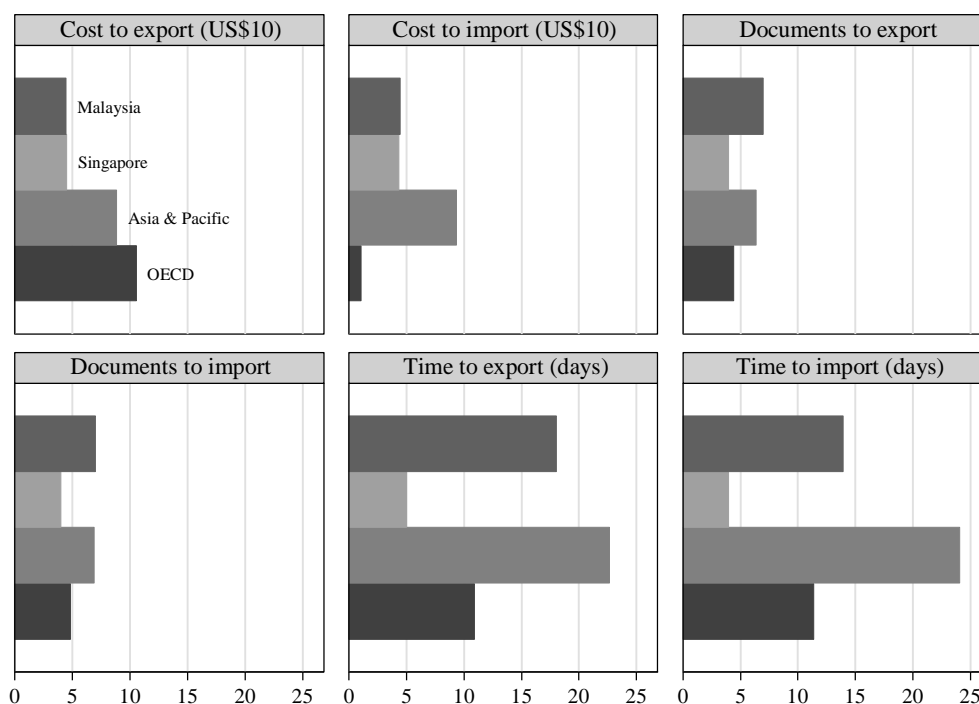
3.6. Trade Facilitation

Malaysia's export-oriented economy facilitates trade relatively well. According to the World Bank's *Doing Business* (2011), for example, Malaysia was ranked at 37 in the world on the measures of trade across borders in 2010 (see Figure 19).

Malaysia sits far ahead of other ASEAN member countries except for Singapore and Thailand. Indonesia, the Philippines and Vietnam, for example, are ranked at 47, 61 and 63, respectively. Malaysia also fares better than China at 50 and India at 100.

Malaysia's costs to export and to import are comparable to Singapore's. They are about half of the average costs of countries in Asia and the Pacific. The numbers of documents required in Malaysia are larger than the numbers in Singapore, though they are similar to the averages of Asia and the Pacific.

Figure 19. Some Measures of Trade Facilitation in 2010



Source: World Bank's *Doing Business*.

Note: Costs to export and import are shown in multiples of US\$10; documents are in terms of the numbers of documents required; and time is the number days it takes to export or import one container.

Among the six measures of trading across borders, Malaysia does not do well compared to Singapore and the OECD countries with regard to the time to export and to import. It takes about 3.5 times longer to export and import in Malaysia compared to the time it takes in Singapore. However, Malaysia's time to export and import is still lower than the averages of countries in Asia and the Pacific.

4. Challenges and Impediments to Trade

We now discuss the challenges and impediments to trade faced by firms in the electronics industry in Malaysia. This discussion is based on interviews of managers of firms in the industry. See Table 1 for the summary of the results of the interviews.

First, we briefly describe the profiles of the firms. Second, we examine whether the FTAs affect the design of the supply chains. Then, we discuss trade facilitation issues faced by exporters and importers, their use of provisions of the FTAs, non-trade barriers and regulatory issues in export markets, the government's efforts to promote the use of the FTAs, the firms' research and development activities, and their linkages with SMEs.

4.1. The Profiles of the Firms

We identified five MNCs and one large local manufacturer in the Klang Valley. We also chose three firms from a database of SMEs. We interviewed the managers of three out of the nine firms.

Two of the three firms, henceforth referred to as Firm 1 and Firm 2, produced final goods and components mainly for export markets.¹¹ They imported components from other ASEAN countries and beyond, a large part of these through intra-firm trade.¹² They also imported final goods that were not produced in Malaysia from their manufacturers overseas.¹³

The other firm, Firm 3, did not manufacture final goods in Malaysia, though it had a manufacturer of passive components in the Klang Valley. These components were

¹¹ Firm 1 and Firm 2's major export markets for final goods were Japan, US, Europe, Australia and ASEAN member countries. More than 80 per cent of their products were exported. Firm 1 produced LCD TVs, air conditioners, refrigerators, telephone/fax devices, audio/video players, and passive components such as capacitors, resistors and inductors. Firm 2 produced audio and video players, LCD TVs, and passive components.

¹² Firm 2, for example, imported 40-50 per cent of components through intra-firm trade.

¹³ Firm 1 imported, among other things, automotive electronics from Thailand, computers from China and Japan, and active components from Singapore. Firm 2 imported, among other things, cameras from Thailand, batteries from Singapore, and active components from Japan.

mainly for export markets.¹⁴ Firm 3 imported final goods from Thailand, Indonesia, Singapore and China, and sold these products in the local market.¹⁵

The firms were large MNCs with thousands of employees.¹⁶ They were established in Malaysia in the 1970s in the Penang FTZ and in the Klang Valley. They also had manufacturing, sales and services firms in a few other ASEAN member countries, and regional sales offices in Singapore.¹⁷

¹⁴ These passive components include capacitors, resistors and inductors.

¹⁵ Firm 3 imported LCD TVs from its manufacturer in Indonesia, washing machines and refrigerators from Thailand, and DVD players from China and Singapore.

¹⁶ Firm 1 had about 20,000 employees, while Firm 2 had about 7,000 employees. Firm 1 had 14 subsidiaries in Malaysia.

¹⁷ The three firms had manufacturing firms in Thailand and Singapore. Firm 1 also had manufacturing firms in the Philippines, while Firm 3 had one manufacturer in Indonesia. They all had sales offices in most other ASEAN member countries.

Table 1. Summary of What the Managers Think About Malaysia’s FTAs and the Electronics Industry in Malaysia

	What the managers say	Evidence	Reasons provided
The effects of the FTAs on production network	Malaysia’s FTAs do not change their business strategies, production network and export-import decisions.	The firms have closed or relocated some of their subsidiaries in Malaysia and Indonesia. The firms produce products in one country to serve local demand and exports. One of the firms used to disassemble final goods in FTZs in Malaysia, and later have the parts reassembled.	Non-FTA related factors such as political uncertainties, strict labour laws, high labour costs, or blatant corruption. This strategy has been adopted since the 1970s. Import duties of final goods used to be high, but have fallen under AFTA.
Trade facilitation issues	They do not have complaints about trade facilitation.	The customs procedures are straightforward, smooth, and fast; the costs of imports and exports are acceptable.	All paperwork can be done online through Dagang Net.
The use of FTA provisions	They aware of the FTAs and use the FTA provisions.	The FTA provisions are used for final goods but not for components. The rules of origin are relatively unimportant.	The tariff rates for components are zero. The procedure of application of certificates of origin through Dagang Net is straightforward.
Regulatory issues and non-tariff barriers	They do not raise any complaints about regulatory issues and non-tariff barriers.	One of the firms is concerned with the Malaysia’s STA 2010. They are also concerned about issues that are not covered by FTAs such as excise duties.	It may take more time to complete the paperwork for exports. Import duties are zero, but non-tariff barriers may be high.
Promotion of FTAs	FTAs are promoted by government agencies and the Federation of Malaysian Manufacturers.	The agencies occasionally organize seminars or workshops on FTAs.	They find these training and support helpful, though perhaps it is the SMEs that gain the most.
R&D activities	Their R&D activities are very limited.	The development, design, and engineering of new products are done in the R&D divisions of the parent company.	They do R&D for minor modifications of products only.
Linkages with SMEs	They do not have linkages with SMEs.	The firms sell their electronic components to SMEs; the values of the sales are small, however.	They do not buy many products or services from these SMEs.

Source: Authors’ interviews of managers of firms in the electronics industry in Malaysia.

4.2. The Effects of the FTAs on Production Network

Managers of the three firms did not think that Malaysia's FTAs change their business strategies, production network and export-import decisions. Firm 1, however, has closed or relocated some of its subsidiaries in Malaysia to China since the mid-1990s.¹⁸ Firm 1 and Firm 2 have also closed their manufacturing firms in Indonesia.

The managers of Firm 1 and Firm 2 indicated that the main reasons why they closed their manufacturing firms in Indonesia were Indonesia's political uncertainties, strict labour laws, and blatant corruption. Firm 1 moved some of their subsidiaries in Malaysia to China due to, among other things, China's cheaper labour costs and large demand for electronic products. The manager of Firm 1 suggested, however, that they kept 14 manufacturing firms in Malaysia because Malaysia has reliable infrastructure, high-skilled labour, and a good network of supporting industries.

There were some indications that the three firms have designed their supply chains to exploit the FTAs. Firm 1, for example, had manufacturers of automotive electronics in Thailand, but not in other countries in the region. The main reason for setting up the firm in Thailand was that the automotive industry in Thailand is the largest and the most developed in the region. Given the FTAs, Firm 1 then had these automotive electronics exported to other ASEAN member countries, including Malaysia. Firm 1 also had manufacturers of air conditioners in Malaysia, but not in any other countries in the region. In fact, these factories were Firm 1's largest manufacturers of air conditioners in the world, with the products exported not only to other countries in the region, but to countries all over the world. Firm 2 produced batteries and active components in the region only in Singapore and cameras in Thailand. Firm 3 produced LCD TVs in the region only in Indonesia, washing machines and refrigerators in Thailand, and DVD players in Singapore.

It is important to note that the three firms had been adopting this production network since the 1970s. Except for the relocation of factories from Malaysia to

¹⁸ In the early 1990s, Firm 1 had about 40,000 employees. At the time of this study, this had fallen to about 20,000 only.

China, and the closing of manufacturers in Indonesia, the three firms had not changed other aspects of the design of their supply chains.

Firm 3 has changed its business models in Malaysia since the mid-1990s. Since the 1970s, Firm 3 had imported final goods to Malaysia. Due to the high tariff rates, Firm 3 had sub-contractors to disassemble the final goods in free trade zones in Malaysia, transported the parts out of the free trade zones to the Klang Valley, and had the parts reassembled by local manufacturers. However, in the past few years prior to the interview, because of the falling import duties of final goods under AFTA, Firm 3 had been importing these final goods without having them disassembled and reassembled.

This anecdotal evidence on factory relocations and changing business models, suggest that, to some extent, the FTAs do affect the production network and export-import decisions of firms in the electronics industry in Malaysia, although other factors such as infrastructure, labor costs, and political uncertainties may have more important roles.

4.3. Trade Facilitation Issues

The managers of the three firms said that they did not have complaints about trade facilitation in Malaysia.¹⁹ According to them, the customs procedures were straightforward, smooth and fast; the costs of imports and exports were acceptable; the numbers of documents to import and export were minimal; and the time to export and import was satisfactory. Typically, it took two days for customs clearance. Sometimes, it may take four to five days if there was traffic congestion at the ports.²⁰

Conversely, findings in the literature shows that trade facilitation issues are one of the reasons why firms do not use FTA provisions. Wignaraja, Lazaro and DeGuzman (2010), for example, find that delays and administrative costs comprise one of the most important impediments to the use of FTAs.

¹⁹ Firm 1 and Firm 2 had trade facilitation handled by their own subsidiaries of supply chain management. Firm 3 hired a freight forwarder to handle its imports and exports. Imports from Thailand and Singapore were typically by land, while from other countries by sea. Given the networks of highways in Malaysia, transportation from the borders or ports to the firms' warehouses was swift.

²⁰ A manager of Firm 2 said that customs clearance at the North Port, an older port in Malaysia, typically took a longer time.

Besides the fact that the three firms we interviewed were large firms, trade facilitation in Malaysia may not be a problem because it is actually quite good. When firms export or import, all paperwork can be done online through Dagang Net, a government-linked trade facilitation and e-commerce service provider.²¹ Firms can submit trade declarations and manifests online.²² They can also apply for permit approval from permit issuing agencies, apply for certificates of origin, and make customs duty payments through the website. Some of these products are eDeclare, ePermit, eManifest, ePCO (Electronic Preferential Certificate of Origin) and ePayment.²³

These Dagang Net products minimize paperwork and time to import or export. The eDeclare, for example, provides not only online submission of trade declarations, but also access to the database of tariff codes and rates. Upon approval of permits, Dagang Net electronically sends the permits to Customs for validation and cross-referencing against the Customs Information System. For certificates of origin application, the preparation and submission of costs to the Ministry of International Trade and Industry (MITI), the approval or rejection of the application of costs, and the submission and approval of certificate of origin forms are done online. Upon approval of a certificate of origin, an exporter would just need to print the certificate of origin, and have it endorsed by MITI.²⁴

The pricing of the products is reasonable, according to the managers of the three firms. The eDeclare, for example, has a one-off charge of RM500 and annual fees of RM600. Transaction charges are RM0.88 per Kbyte.²⁵ The ePCO costs an initial RM500 plus RM200 annual fees, and RM5 to RM8 transaction charges per approved certificate of origin.

²¹ Dagang Net was established in 1989. It is owned by Khazanah Nasional Berhad, an investment holding arm of the Government of Malaysia, and managed by Time Engineering Berhad. Its website is <http://www.dagangnet.com>.

²² There are three modes of submission: (1) complete the data entry online; (2) download forms, complete them, and upload the forms to the website; and (3) install an 'enterprise version' of the software on the firms' own Local Area Network.

²³ The description of these products is available on the Dagang Net website.

²⁴ The ePCO covers ASEAN Industrial Cooperation, ASEAN Trade in Goods Agreement, FTAs and Generalized System of Preferences.

²⁵ At about RM3/US\$, the one-off charges and annual fees are about US\$167 and US\$200, respectively. The transaction charges are about 30 cents of US\$ per Kbyte.

Dagang Net also offers training programmes on their products at a reasonable price. The eDeclare one-day training, for example, costs RM350 per person or RM750 to RM1,500 per trainer for on-site training. New subscribers are entitled to one day of training free of charge.

If anything, the manager of Firm 3 complained about the time it takes to complete the paperwork for exports of new products. Regular exports and imports take a few days only, but the preparation of paperwork for a new product may take a few months. The manager also suggested that it would save time and resources if the endorsement of certificate of origin could be done online. At the time of writing, after having the certificate of origin approved, it must be printed and sent to MITI for endorsement.

4.4. The Use of FTA Provisions

All three firms were aware of the FTAs and used the FTA provisions for exports and imports of final goods. Firm 1 and Firm 2 used most of the ASEAN+1 FTAs as well as Malaysia's own FTAs. Firm 3 used AFTA as well as FTAs with China and Japan.

The finding that the three firms used FTA provisions is, to some extent, in line with, for example, Takahashi and Urata (2009). From a survey of Japanese firms, they find that larger firms are more likely to use FTAs. It is also in line with Wignaraja, Lazaro and DeGuzman (2010), who find that old firms are more likely to use FTAs. The three firms whose managers we interviewed were large and old ones. Moreover, our finding is similar to Kohpaiboon and Yamashita (2011) that FTA utilization rates of firms in the automotive industry in Thailand are high. However, our finding is in contrast with Wignaraja, Lazaro and DeGuzman (2010) that foreign-owned firms are less likely to use FTAs.

The manager of Firm 3, in particular, said that they always made sure that all of their imports of final goods from Thailand, Indonesia and Singapore satisfied the 40 per cent ASEAN content requirements. Without Form D, which is the certificate of origin for AFTA, Firm 3 would have to pay 10-15 per cent duties for household appliances imported from, for example, Thailand. If its exporter in Thailand

provided Form D, however, Firm 3 would just have to pay the 10 per cent sales tax while the import duties would be slashed to zero.

This finding on the use of FTA provision for final goods is in line with Takahashi and Urata (2009) that many firms are not discouraged by the small tariff preference of FTAs. However, it is in contrast with Hayakawa et. al. (2009), who find that in Malaysia, Japanese firms do not use FTAs because of low or zero tariff rates.

However, for exports or imports of components, the three firms did not use the FTA provisions. The tariff rates for components are zero. Therefore, according to the manager of Firm 1, for example, the use of the FTA provisions becomes pointless.

The three firms' use of FTA provisions did not seem to be notably affected by other measures such as duty drawback schemes and access to special zones. Nevertheless, this might be partly because the three firms had manufacturers outside of the free trade zones.

Access to FTZs used to be important. Until the early and mid-1990s, firms in the free trade zones had enjoyed zero tariff rates as long as they exported more than 80 per cent of their products. At the time of this study, however, because of the zero tariffs rates, according to the manager of Firm 1, locating in the zones did not add value in terms of savings from lower import duties. Manufacturers in the Klang Valley, for example, could also enjoy very low or zero duties if they satisfied the requirements of the FTAs.²⁶

The managers also thought that the rules of origin had little importance. The procedure of application of certificates of origin through Dagang Net was straightforward. Even though it took time to have a new application approved, once they had a certificate of origin, regular exports and imports were typically fast and smooth.

This finding on the certificate of origin is in contrast with Takahashi and Urata (2009), who find that the difficulty in acquiring certificates of origin is one of the most important reasons why firms do not use FTA provisions. But, perhaps, because

²⁶ Firms located outside of the free trade zones could also enjoy benefits such as Pioneer status, which provides a five-year partial exemption from the payment of income tax, or investment tax allowances. See, for example, MIDA (2009).

the three firms whose managers we interviewed were large firms, they could spend resources to learn how to apply for certificates of origin. Our finding is in line with Hayakawa et. al. (2009), who find that most Japanese firms in Malaysia do not think that the procedures of the application of certificates of origin are too complicated.

4.5. Regulatory Issues and Non-Tariff Barriers

In general, the managers of the three firms did not raise any complaints about regulatory issues and non-tariff barriers that they faced in export markets. They did not point out major impediments to trade that they faced when they imported or exported either.

The manager of the Firm 1 was concerned about the Malaysia's STA 2010, which was passed by the Parliament of Malaysia on 5 April 2010, commenced on 1 April 2011, and fully implemented on 1 July 2011.²⁷ He worried that, given the STA, it would take more time to complete the paperwork for exports of, for example, navigation products. He acknowledged, however, that this worry might be just because the regulation was new, and he had yet to see how strictly the government would implement the Act, and how complicated the application procedures would be.

In any case, Dagang Net offers ePermit STA, an online submission of applications for the STA permit. A firm that wants to use the ePermit STA needs to pre-register, which is subject to an approval by MITI and other agencies. Once the registration is approved, the firm could apply for STA permit as it does for any other permits.

The managers were also concerned about issues not covered by FTAs such as excise duties. Imports of automotive parts from Thailand, for example, may have zero import duties. However, because the automotive industry in Malaysia is protected, Malaysia's Customs may impose 80-90 per cent excise duties on imports of automotive electronics.

As for regulatory issues or non-tariff barriers in export markets, the managers said that they do not face many problems. Their importers overseas enjoyed low or zero import duties as long as they provided the certificates of origin for their exports

²⁷ The STA 2010 is implemented as required by the United Nations to control exports of goods that may be used to develop and produce weapons of mass destruction and their delivery system.

from Malaysia. They had to comply with the regulations that had been implemented in export markets, however, such as the inspections of technical regulation and standards.

4.6. Promotion of FTAs

MITI occasionally organizes seminars or workshops on FTAs and trade policies in general. The Federation of Malaysian Manufacturers, in cooperation with MITI, for example, organized a one-day seminar on Malaysian FTAs for firms in Malaysia.²⁸ Malaysia Industrial Development Authority (MIDA) and Malaysia External Trade Development Corporation (MATRADE) also provide support for Malaysian exporters as well as buyers and investors from overseas. MATRADE also publishes booklets on FTAs, which can be downloaded from their website.²⁹

Whenever there are new FTAs or regulations that are implemented, the government usually holds seminars and workshops. The Attorney General's Chambers, for example, recently organized a seminar on the STA 2010 to help firms in Malaysia to understand what the Act is and how to comply with the new regulation.³⁰ Dagang Net also provides training for firms on how to use their products, which includes how to declare trade, apply for permits, and apply for certificates of origin.³¹

The managers of the three firms indicated that they found this training and support helpful, though perhaps it was the SMEs that gained the most benefits from this promotion of FTAs.

In short, the managers of the three firms seemed to be very aware of FTAs. This finding is different from, for example, Takahashi and Urata (2009) and Wignaraja, Lazaro and DeGuzman (2010). They find that the lack of information is the most important impediment to using FTAs.

²⁸ The theme of the seminar was 'Create and Expand Your Markets through Malaysian FTAs'. It was held on 20 March 2010 in Kuala Lumpur.

²⁹ MATRADE's publications on FTAs are available on http://www.matrade.gov.my/cms/content.jsp?id=com.tms.cms.section.Section_MATRADEPublication

³⁰ The theme of the forum was 'Strategic Trade Act 2010 Forum: Proactive Deterrence against Proliferation of Weapons of Mass Destruction'. It was held on 2-3 March 2011 in Putrajaya.

³¹ See the discussion on these training programmes in the section on trade facilitation above.

4.7. R&D Activities and Linkages with SMEs

Firm 1 and Firm 2 had research and development (R&D) divisions in Malaysia, although their R&D activities were very limited. The development, design and engineering of new products were done in the R&D divisions of the parent company overseas.

The manager of Firm 1 said that they do R&D for minor modifications of products only, for example, if the export destination countries require different technical specifications. Neither the sales division of final goods nor the components manufacturer for Firm 3 was engaged in R&D.

The managers also said that their firms' focus on assembling, manufacturing, and marketing of electronic products was likely to stay for a long time. They did not expect that the R&D activities of their firms to increase. Therefore, Rasiah's (2009) finding that Malaysia's electronics industry is trapped in the assembly, packaging and testing of electronic products is likely to hold in the near future.

The three firms did not seem to have linkages with SMEs. Firm 1 and Firm 2 sold their electronic components to SMEs. The values of the sales were small, however, because most of Firms 1 and 2's products were exported. Moreover, the three firms did not buy significant amounts of products or services from these SMEs. The managers of Firm 1 and Firm 2, for example, said that they bought bulky items only from SMEs such as packaging materials.

The managers thought that their relationship with the SMEs would not change much in the near future. It is, therefore, unlikely that we will see stronger linkages between MNCs in the electronics industry and the SMEs in Malaysia.

5. Concluding Remarks and Policy Implications

We have shown that Malaysia's electronics industry has grown fast in the past few decades, and has large intra-industry trade, in particular in electronic components. The co-movement between production of the electronics industry and the world economy is perhaps inevitable, given the export orientation of firms in the industry. However, the stagnant productivity of workers since the early 2000s, and the non-existence of Malaysia's revealed comparative advantage in producing electronic products, are worrying.

Considering the trade liberalization that Malaysia has been adopting, the increase in the fragmentation of the electronics industry, and the eventual creation of a single market for goods and services in the region, the Government of Malaysia would, therefore, need to help addressing several challenges and impediments that firms in the electronics industry are facing.

We offer several policy recommendations. One, even though the firms whose managers we interviewed were aware of the FTAs and used the FTA provisions, it is likely that many SMEs are not. The government, therefore, with the help from Dagang Net and the federations of manufacturers, would need to continue promoting the FTAs and the use of products offered by Dagang Net.

Two, some firms in the electronics industry do not seem to use ASEAN--Australia--New Zealand, ASEAN--Korea, and ASEAN--India; many of them use AFTA, ASEAN--China, and ASEAN-Japan only, in addition to Malaysia's own FTAs. It may take time for firms to start taking advantage of these new ASEAN+1 FTAs, but the government could disseminate information on the FTAs to make sure that firms, SMEs in particular, are aware of the ASEAN+1 FTAs.

Three, the government would need to streamline the procedures of applications used by Dagang Net, in particular the applications for the certificates of origin and the STA permits.

Four, the government would need to remove some of the non-tariff barriers to trade. For example, to make the economy more competitive, the government should consider removing the excise duties currently imposed on automotive electronics.

Five, it may be difficult to increase linkages between large firms and SMEs, but the government could push some of its SMEs development programmes further to help the SMEs to grow so that they have the technological capabilities required by the large firms.

Six, it is unlikely that R&D activities of the firms in the electronics industry will increase in the near future. On the other hand, other countries in the region such as Indonesia and Vietnam may become more attractive to foreign investors given their cheaper labor costs and growing skilled labour force, which may induce some MNCs in Malaysia to relocate their factories to the neighbouring countries. Moreover, ASEAN+1 FTAs and Malaysia's own FTAs would induce firms to engage in further fragmentation of the electronics industry.

Therefore, to graduate into the design and development stage of production in the electronics industry, Malaysia would need to make its economy more attractive to foreign investors by, for example, strengthening the government institutions and amending the NEP further. Moreover, Malaysia also needs to make the economy more attractive to skilled labor. In addition to retaining local talent, Malaysia would also need to attract skilled labor from neighbouring countries. Only if Malaysia has a sufficiently large pool of skilled labor, strong government institutions, and a vibrant network of supporting SMEs will it be able to induce the MNCs in the electronics industry to move from the assembly and manufacturing to higher value-added production of electronic goods.

References

- Alavi, R. (1996) 'Industrialising in Malaysia: Import Substitution and Infant Industry Performance', Routledge.
- Ando, M. (2006) 'Fragmentation and Vertical Intra-Industry Trade in East Asia', *North American Journal of Economics and Finance*, 17: 257-81.
- Athukorala, P.-C. (2005) 'Trade Policy in Malaysia: Liberalization Process, Structure of Protection, and Reform Agenda', *ASEAN Economic Bulletin*, 22(1): 19-34.
- Baiera, S.L. and Bergstrand, J.H. (2009) 'Estimating the Effects of Free Trade Agreements on International Trade Flows Using Matching Econometrics', *Journal of International Economics*, 77(1): 63-76.
- Balassa, B. (1965) 'Trade Liberalization and Revealed Comparative Advantage', *Manchester School of Economics and Statistics*, 33(2): 99-124.
- Egger, H., Egger, P. and Greenaway, D. (2008) 'The Trade Structure Effects of Endogenous Regional Trade Agreements', *Journal of International Economics*, 74: 278-98.
- Fontagne, L. and Freudenberg, M. (1997) 'Intra-Industry Trade: Methodological Issues Reconsidered', CEPII Working Paper No. 97/02.
- Fukasaku, K. (1992) 'Economic Regionalisation and Intra-Industry Trade: Pacific-Asian Perspectives', OECD Development Centre Working Paper No. 53.
- Greenaway, D. and Milner, C. (1993) 'Trade and Industrial Policy in Developing Countries: A Manual of Policy Analysis', Palgrave Macmillan.
- Hayakawa, K., Hiratsuka, D., Shiino, K. and Sukegawa, S. (2009) 'Who Uses FTAs?', IDE Discussion Paper No. 207.
- Jomo, K.S. (1993) *Industrialising Malaysia: Policy, Performance, Prospects*, Routledge.
- Kinuthia, B.K. (2009) 'Industrialization in Malaysia: Changing role of Government and Foreign Firms', DEGIT XIV Conference Paper.
- Kohpaiboon, A. and Yamashita, N. (2011) 'FTAs and Supply Chain in Thai Automotive Industry', ERIA Working Paper.
- Lall, S., Albaladejo, M. and Zhang, J. (2004) 'Mapping fragmentation: electronics and automobiles in East Asia and Latin America', *Oxford Development Studies*, 32(3): 407-32.
- Mahani, Z.A. and Loke, W.H. (2008) 'Revealed Comparative Advantage of Malaysian Exports: The Case for Changing Export Composition', *Asian Economic Papers*, 7(3): 130-47.
- MIDA (2009) 'Malaysia Investment in the Manufacturing Sector: Policies, Incentives and Facilities', Malaysian Industrial Development Authority.
- Rasiah, R. (2009) 'Expansion and Slowdown in Southeast Asian Electronics Manufacturing', *Journal of the Asia Pacific Economy*, 14(2): 123-37.

- Takahashi, K. and Urata, S. (2009) 'On the Use of FTAs by Japanese Firms: Further Evidence', in C. Findlay and S. Urata (eds), *Free Trade Agreements in the Asia Pacific*, pp. 241-58, Singapore: World Scientific.
- Tham, S.Y. (2010) 'Trade Policies and Industrialization in Malaysia', GEP Workshop 2010, Kuala Lumpur.
- Urata, S. and Kiyota, K. (2005) 'The Impacts of an East Asia Free Trade Agreement on Foreign Trade in East Asia' in T. Ito and A.K. Rose (eds), *International Trade in East Asia*, NBER-East Asia Seminar on Economics, Volume 14, University of Chicago Press.
- Wignaraja, G., Lazaro, D. and DeGuzman, G. (2010) 'FTAs and Philippine Business: Evidence from Transport, Food, and Electronics Firms', ADBI Working Paper Series No. 185.
- Wong, K.N. (2008) 'Disaggregated Export Demand of Malaysia: Evidence from the Electronics Industry', *Economics Bulletin*, 6(6): 1-14.
- World Bank's Doing Business. (2011). Accessed July 2011, from <http://www.doingbusiness.org/data/exploretopics/trading-across-borders>.

Appendix

Appendix 1. The Definition of Electronics Industry Used in the Analyses of Data from Malaysia's Department of Statistics

The Malaysia's Department of Statistics has used the Malaysia Standard Industrial Classification (MSIC) 2000 for its industry statistics since the year 2000. This MSIC 2000 conforms closely to the International Standard Industrial Classification (ISIC) Revision 3.1. For the years 2000-08, therefore, we define the electronics industry as all the items listed in Table A1.

Before the year 2000, DOS had used the MSIC 1972. For the years before 2000, therefore, we define the electronics industry using the MSIC 1972 framework. The electronics industry includes all the items listed in Table A1. DOS did not do industry survey in 1998. The data for the year 1998 are linearly extrapolated using data for the adjacent years.

Table A1. Products Included in the Definition of Electronics Industry Used in the Analyses of Data from Malaysia's Department of Statistics

Items	Descriptions
<i>Years 1990-99</i>	
38199	Manufacture of other fabricated metal products, n.e.c.
38250	Manufacture of office, computing and accounting machinery
38291	Manufacture of refrigerating, exhaust, ventilating and air-conditioning machinery
38321	Radio and television sets, sound reproducing and recording equipment
38322	Gramophone records and prerecorded magnetic tape
38329	Semi-conductors and other electronic components and communication equipment and
38330	Manufacture of electrical appliances and housewares
38510	Manufacture of professional and scientific and measuring and controlling equipment, n.e.c.
<i>Years 2000-08</i>	
29300	Manufacture of domestic appliances n.e.c.
30001	Manufacture of office and accounting machinery
30002	Manufacture of computers and computer peripherals
32101	Manufacture of semi-conductor devices
32102	Manufacture of electronic valves and tubes and printed circuit boards
32109	Manufacture of other electronic components n.e.c
32200	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
32300	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
33120	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
33130	Manufacture of industrial process control equipment

Source: The framework used for the years 1990-99 is the Malaysia Standard Industrial Classification (MSIC) 1972. For the years 2000-08 is MSIC 2000.

Appendix 2. The Definition of Electronic Products Used in the Analyses of Comtrade Data

As we explain in Appendix 1, we define the electronics industry as the classes with the following International Standard Industrial Classification (ISIC) Revision 3.1 or the MSIC 2000: Classes 2930, 3000, 3210, 3220, 3230, 3312, and 3313. Then, we regroup these seven classes into six products as shown in Table A2.

Table A2. The Definitions of Products Used in the Analyses of Comtrade Data

ISIC	Descriptions of Classes	Products
2930	Manufacture of domestic appliances n.e.c.	Consumer
3000	Manufacture of office, accounting and computing machinery	Computers
3210	Manufacture of electronic valves and tubes and other electronic components	Components
3220	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	Telecommunications
3230	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods	Radio communications
3312	Manufacture of instruments and appliances for measuring checking, testing, navigating and other purposes, except industrial process control equipment	Industrial
3313	Manufacture of industrial process control equipment	Industrial

Source: The ISIC is Rev.3.1.

Note: The definitions of the products are authors' own. Classes 3312 and 3313 are categorized as one product, i.e. industrial electronics.

We use the HS 2002 – SITC Revision 3 correspondence table to get the HS codes of each of the six products above.³² For data that include the period before the year 2002, we convert the HS 2002 into HS 1992 using the HS 2002 – HS 1992 conversion table.³³

³² The correspondence table is available at <http://unstats.un.org/unsd/cr/registry/regot.asp>.

³³ The conversion table is available at http://unstats.un.org/unsd/trade/conversions/HS_Correlation_and_Conversion_tables.htm.

Appendix 3. The Description of Country Codes

Figures 13, 14 and 15 use the country codes shown in Table A3.

ROW stands for the rest of the world; it indicates other countries not included in each of the figures. It may, therefore, differ from one figure to another.

Table A3. The Descriptions of Country Codes Used in Figures 13-15

Code	Name	Code	Name
AE	United Arab Emirates	KH	Cambodia
AU	Australia	KR	South Korea
BN	Brunei Darussalam	LA	Laos
CA	Canada	MM	Myanmar
CL	Chile	MX	Mexico
CN	China	NL	Netherlands
CR	Costa Rica	NZ	New Zealand
DE	Germany	PH	Philippines
FR	France	PK	Pakistan
GB	United Kingdom	SE	Sweden
HK	Hong Kong	SG	Singapore
ID	Indonesia	TH	Thailand
IE	Ireland	TR	Turkey
IN	India	US	United States of America
IT	Italy	VN	Vietnam
JP	Japan	ROW	The rest of the world

Source: The codes are the two-digit International Organization for Standardization country codes, which are accessible at http://www.iso.org/iso/country_codes/iso_3166_code_lists/country_names_and_code_elements.htm.