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Trade in Information and Communications Technology and its Contribution to Trade and Innovation

Nobuo Kiriyama

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Abstract

TRADE IN INFORMATION AND COMMUNICATIONS TECHNOLOGY AND ITS CONTRIBUTION TO TRADE AND INNOVATION

by

Nobuo Kiriyama, OECD Trade and Agriculture Directorate

Information and communications technology (ICT) has been seen as a major contributor to productivity growth and as a key tool for innovation. Trade liberalisation can play a role in encouraging ICT adoption by fostering competition and by reducing ICT prices.

While the trade in ICT goods has more than doubled since the mid-1990s, the share of trade involving low and middle income countries has significantly increased, with China now being the largest trader. During the same period, tariff levels have declined thanks in part to the Information Technology Agreement (ITA), although substantial tariffs remain with respect to ICT goods not covered by the ITA and by those imposed by non-participants to the ITA.

The multilateral trading system produced early successes in the ITA and the negotiations on basic telecommunications at the World Trade Organization (WTO), but the progress has since been more modest. Yet it provides opportunities to further trade liberalisation in ICT goods, both with respect to tariffs and to non-tariff issues, not least through the Doha negotiations.

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JEL classification: F13, F14, L63, O24

Keywords: Information and communication technology (ICT), information technology agreement (ITA), World Trade Organization (WTO), multilateral trade negotiations, non-agricultural market access (NAMA).

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Executive Summary

It is widely recognised that the ICT sector has made significant contributions to innovation, both in terms of productivity growth in ICT output and by investment in ICT capital goods, with greater emphasis on the latter in recent years. Trade liberalisation can play a role in encouraging ICT adoption by fostering competition in general and in reducing the cost of ICT inputs in particular. Trade in ICT goods has more than doubled since the mid-1990s, despite the two significant downturns in the beginning and the end of the 2000s and continuously falling prices of ICT goods. Since the mid-1990s, the share of trade involving low and middle income countries has substantially increased, and now accounts for 60% of world trade in ICT goods. In particular, China is now the largest exporter of ICT goods. On the other hand, the share of trade in ICT goods in world trade declined in the 2000s, and some OECD countries experienced negative growth in their exports. Amid the recent financial crisis, trade in ICT goods declined by 15% overall, although it started to grow since the end of 2009.

Electronic components comprise 30% of ICT trade, and the share of telecommunications equipment has been increasing, especially for trade involving low and middle income countries, while the share of computer related equipment is declining, especially in high income countries. Two thirds of exports from high income countries to low and middle income counties are parts and components, while exports of finished goods are expanding from low and middle income countries. This pattern is consistent with significant cross-border production sharing, although the share of trade in intermediate goods does not appear to have been expanding over recent years.

Tariff levels have declined substantially, thanks to the implementation of the Information Technology Agreement (ITA) as well as through unilateral liberalisation initiatives and free trade agreements. However, substantial tariffs remain with respect to ICT goods which are not covered by the ITA and those imposed by countries who are not participants in the ITA.

Trade in ICT services has expanded even more than trade in ICT goods, especially in OECD countries, and the “trade collapse” in 2009 was much milder in services than in goods. Here, too, emerging countries such as India and China are gaining significant weight as major traders of ICT services.

The multilateral trading system has played a significant role in liberalising trade in the ICT sector, both through the successes of the ITA and the negotiations on basic telecommunications at the WTO. However, subsequent progress has been modest, as seen in the work programme on e-commerce and the ITA II negotiation. ITA participants are also working on other issues foreseen in the ITA, with tangible results yet to be achieved. More recently, interpretation of the scope of duty-free treatment under the ITA has surfaced as an important policy agenda item and lead to a WTO panel case in 2008-10.

In the meantime, proposals have been tabbed in the DDA negotiations to pursue tariff and non-tariff liberalisation in electronics, including the ICT, sector, the outcome of which depends on the success of the DDA negotiations. Given that tariff liberalisation on a broader range of ICT goods with participation of a larger number of countries, as well as addressing non-tariff issues, remains unfinished business, the DDA alongside work based on the existing ITA framework provides WTO members with opportunities to further trade liberalisation in the ICT sector.

1. Introduction

Information and communication technology (ICT) has always been associated with trade and innovation. Sumerians invented the earliest form of writing around 3100 BC, pressed by the need of booming trade. It was transferred to Egypt, connected with an ancient trade route, and was combined with papyrus, which became a large export item through the port of Alexandria. The alphabet, invented around 1700 BC, was spread by Phoenicians, traders across the Mediterranean Sea. The alphabet and papyrus later became a carrier of Greek thoughts and knowledge throughout the Mediterranean with Alexandria as a centre of book publishing in the Hellenistic world. China's paper making technology, transferred through the Silk Road to the West, eventually replaced papyrus. Although information processing are made much more efficient by computing technology, and communication is made faster by introducing electronics-based transmission, the development of information and communication technologies, ancient to modern, has been inextricably linked to trade (Fang, 1997; Robinson, 1999).

The ICT sector is known for its rapid technological progress, epitomised by "Moore's Law", which results in a high rate of total factor productivity growth in the ICT sector and falling ICT prices. In response, firms engaged in large investment in ICT capital to improve productivity. These two together constitute the direct contribution from ICT to productivity growth of the economy (Jorgenson *et al.*, 2008). With ICT becoming more common in societies, more attention is being paid to the benefit of the latter, or the benefits of ICT as inputs to productivity growth. Prompted by the "Solow paradox"[1] early on, analyses still continue to proliferate in order to better understand the mechanics of ICT use and productivity growth to account for the productivity resurgence in the United States since the mid-1990s[2] and the reasons for significant variations of productivity in other countries.[3] Microeconomic evidence emphasises the complexity of the link from ICT to productivity, typically requiring large complementary investments and innovations

1. R. Solow, "We'd better watch out", New York Times Book Review, 12 July, 1987 ("You can see the computer age everywhere but in the productivity statistics"); New York Times, 12 March 2000 ("You can now see computers in the productivity statistics"); The Economist (2003) ("The 'productivity paradox' has been solved."), cited in The Economist "The broadband myth", 23 May 2008.

2. Jorgenson *et al.* (2008) Table 1 shows that US economic growth in 1995-2000 was driven by productivity growth in ICT producing sector and ICT investment by ICT using sectors, and that it remains a substantial source of growth although the absolute impact of ICT declined since then. Alternative to the productivity approach using growth accounting to measure the economic impact is "social savings" approach (Craft, 2004), which is discussed in Part 2. See Draca *et al.* (2006) for literature survey.

3. Inklaar *et al.* (2007) studies productivity gap among seven OECD members and found that services sector (in particular business services) contributes to gap in both productivity growth and its level. Van Ark *et al.* (2008) emphasises the role of regulatory environment for this productivity gap. Fukao *et al.* (2009) found high productivity growth in ICT-producing sectors but relatively weaker ICT-usage effects in Japan and Korea. However, the productivity gap itself may be changing in recent years, although what contributes to it has not been elaborated. See OECD (2009a, p. 31).

in areas such as business organisation and workplace practices,[4] and business journals are regularly filled with articles on how to make use of information technology to improve businesses.

OECD Innovation Strategy (OECD, 2010a) emphasises the importance to "[e]nable the use of ICTs as a key tool for innovation" as one of the policy principles. Developing countries also have had keen interest in ICT deployment for their economic development. Widespread use of mobile phones in developing countries is often touted as a typical example of technological leapfrogging,[5] and more gains can be expected as long as necessary framework conditions are satisfied.[6]

Trade liberalisation can play a role in encouraging ICT adoption by fostering competition and in reducing the cost of ICT inputs. OECD studies found various factors that affect the levels of the diffusion of ICT. Pilat and Delvin (2004) found that ICT adoption is affected by the direct costs of ICT, e.g. the costs of ICT equipment, telecommunications, and the ability of a firm to absorb new technology such as ICT. Conway *et al. (*2006) found that product market regulation[7] has a detrimental impact on ICT investment and location decisions of multinational enterprises, and regulation is particularly harmful for ICT-intensive sectors, perhaps because well-functioning product markets increase the incentive and lower the cost of incorporating new technologies into production process. Policy makers and commentators have frequently emphasised the benefit on the import side.[8] While trade is instrumental in facilitating the introduction and use of a variety of ICTs, ICT, in turn, plays a role in facilitating international business activities. This two-way-path together contributes to innovation by business and the economy as a whole.

4. Using firm level data, Bresnahan *et al.* (2002), Brynjolfsson and Hitt (2003) and Council of Economic Advisers (2007) emphasise complementary organisational change for productivity growth by IT investment. See also Bloom *et al.* (2007) (the role of firm organizational capital and intangible investment); Currie and Kerrin (2004) (political and cultural constraint connected to knowledge management using ICT).

5. The Economist, "Mobile Phones and Development", 7 July 2005; "Limits of Leapfrogging", 7 February 2008; "Not just talk", 27 January 2011; OECD (2010a, Box 6.3) for examples of "pro-development innovative [ICT] applications in Africa"; Aker and Mbiti (2010).

6. See Indjikian and Siegel (2005) for survey of studies focused on impact of ICT investment in developing countries.

7. In this study, an aggregate indicator of regulatory conditions in seven non-manufacturing sectors is used as a proxy for economy-wide product market regulation (Conway *et al.*, 2006, para. 9).

8. Keynote Address to the ITA Symposium of the WTO, H.E. Mr. Don Stephenson, Ambassador of Canada and Chairman of the Negotiating Group on Market Access (28-29 March 2007) ("Canada viewed the Information Technology Agreement as means for promoting a significantly more open and stable international trading environment for technology and investment."); Mathew J. Slaughter, "Happy Birthday ITA", Wall Street Journal, 17 July 2007 ("The globalization of IT hardware – trade deficits and all – has helped boost average U.S. living standards."); Alan Friedman "At Least 25 countries to Join Far-Reaching Deal to Cut Tariffs; Trade Ministers Agree on Global High-Tech Accord", International Herald Tribune, 13 December 1996.

In recent decades, there have been important transformations in ICT trade. Trade in ICT goods until the mid-1990s was dominated by the US, Europe and Japan, but since then, developing countries, especially China, have emerged as major players, in particular as exporters. The ICT/electronics industry has become known for its global production networks, characterised by vertical specialisation and fragmentation of production. This period also was when trade liberalisation in ICT goods was being implemented on a global scale, particularly through commitments made under the Information Technology Agreement (ITA) agreed at the World Trade Organization (WTO). Not only trade in ICT goods but trade in ICT services surged during this period. Although OECD countries occupy a dominant place in trade in ICT services, China and India have been rapidly developing as major players. These developments in ICT trade and evolution of import tariffs are the focus of Section 2.

The third and final section reviews the multilateral trading system in relation to the ICT sector. The WTO since its creation in 1995 recorded early successes in the field of trade in ICT, i.e. liberalisation of trade in ICT goods by adopting the ITA and in telecommunication services by concluding the negotiations on basic telecommunications. Various initiatives have been introduced since then reflecting technological development and business needs, including through the Doha Development Agenda (DDA) process. However, tangible results have not yet been achieved, and in the meantime certain issues surrounding the ITA have emerged. Section 3 will review these developments and the work underway to complete this agenda.

2. Evolution of Trade and Tariff Profiles in ICT Sector

This section reviews the evolution of trade and tariff proviles since the mid-1990s in the information and communication technology (ICT) sector. This period was marked by a series of contrasts due to the "IT bubble" (variously termed the "Internet bubble" or "dot com bubble") and its collapse, and the more recent global financial crisis. It was also a period when trade liberalisation resulting from the Uruguay Round as well as post-Uruguay Round negotiations under the WTO took effect (Section 3), and increasing recognition has been given to the importance of ICT for the economy at large.[9]

This section first examines the evolution of trade in ICT goods as well as changes in tariff profiles, and then trade in ICT services. It concludes by looking at recent developments in trade of ICT goods and services.

1. Trade in ICT goods

1.1 The scope of ICT goods

There is no single definition of ICT goods. The scope can vary depending on the context and the purpose and may change overtime due to technological developments. This section makes reference to two lists of ICT goods. First is the OECD's ICT goods classification (OECD 2003, hereinafter "OECD list"), which was developed "to facilitate the construction of internationally comparable indicators on ICT trade and ICT production".[10] The second is the product list attached to the WTO's Information Technology Agreement (ITA).[11] While the two lists are similar, differences do exist; e.g. many of the items under "audio and video equipment" and "other ICT goods" in the OECD list are not covered by the ITA, and software (recorded media) is covered by the ITA but not by the OECD list. This paper will focus on those listed in Attachment A, Section 1 of the ITA (hereinafter "ITA goods", see Box 1) and other ICT goods in the OECD list (hereinafter "non-ITA ICT goods").[12] The set of products that combines "ITA goods" and "non-ITA ICT goods" will be called "ICT goods".[13]

9. There has been a regular monitoring of development of ICT trade in the OECD's Committee for Information, Computer and Communications Policy and for OECD Information Technology Outlook. The current study supplements these on-going works from different angles and data collection.

10. This has been revised and the new definition no longer uses HS classification, commonly used for trade statistics, although correspondence table to HS classification (HS2007, 2002 and 1996) has since been developed. The revision has also narrowed the scope of ICT goods, leaving out many of "other ICT goods" but adding several items (e.g. 8524.91, 8524.99, 9009.12 and 9504.10). See OECD (2009b), OECD (2010b, p.72) and OECD (2010c). This paper relies on OECD (2003) for the purpose of compiling trade and tariff data.

11. WTO, Ministerial Declaration on Trade in Information Technology Products (WT/MIN(96)/16, 13 December 1996).

12. The studies that focused on ITA products include Bora (2004), Joseph and Parayil (2006), WTO (20007), Finger (2007), Anderson and Mohs (2010). OECD (2008b) and OECD

Box 1. Estimating trade in ITA goods

The ITA defines the covered products in two attachments: Attachment A lists the HS headings or parts thereof to be covered; Attachment B lists specific products to be covered by an ITA wherever they are classified in the HS (Chapeau of the Attachments of the ITA).

Attachment A is further divided into two sections; Section 2 is entitled "Semiconductor manufacturing and testing equipment and parts thereof" ("Attachment A-2").

Trade in Attachment A-1 items can be captured based on the "HS headings" given in the Attachment. In contrast, for Attachment B items (alongside many of the Attachment A-2 items which follow the same method of identification), as different countries may use different customs codes to accord duty free treatment, these items escape proper evaluation of trade performance. Work by ITA participants to reduce these classification divergences involving Attachment B have not been completed (see Section 3 below). Nevertheless, ITA participants have developed a list* of candidate HS six-digit codes that may correspond to Attachment B as well as many of Attachment A-2 items. Based on this, the export value of those that may be covered by Attachment B or Attachment A-2 but not by Attachment A-1 in 2007 was USD 420 billion.

This still overestimates the "true" trade value of the covered products, since some of the six-digit codes identified by the ITA participants may contain items that are not considered to be covered by the ITA. This is also the case with Attachment A-1 items, as some of the items make it explicit that only a part of the listed six-digit codes are covered by the ITA. While the Harmonized System of Classification by the World Customs Organization (WCO) has harmonised the codes at six-digit level, countries are free to assign national codes as long as the common six-digit codes are observed, and it is not obvious which of those national codes correspond to the ITA products.

The trade figures in this paper are compiled assuming that all goods covered by the six-digit codes are within the scope of the ITA. The margin of overestimation as a result of this is likely to be smaller than the case with Attachment B. Considering the data accuracy and much larger trade value for Attachment A-1, this section focuses on the products covered by the Attachment A-1, and refers to these products simply as "ITA goods".

*WTO, Committee of Participants on the Expansion on Trade in Information Technology Products, *Classification Divergences, Note by the Secretariat* (G/IT/W/6/Rev.3, 20 December 2004).

1.2 Evolution of trade in ICT goods

World trade in ICT goods more than doubled between the mid-1990s and the late 2000s, despite a brief decline in 2001 in the aftermath of the IT bubble and another decline during the global financial crisis in 2009 (Figure 1[a]),[14] and despite the general

(2009d) as well as UNCTAD (2007) pp.114-20 (see also p.132) focused on ICT products based on the OECD list. Feenstra *et al.*, analysed the impact of tariff elimination on information technology products on the US economy and show that falling import prices and improvements in import variety in ITA products together contributed to terms-of-trade gain that can account for close to 0.2 percentage points per year of the productivity growth of the US in 1995-2006.

13. This does not, of course, mean to say that this is the whole universe of ICT goods. ICT goods could be defined in a variety of ways. See cf. OECD (2008b).

14. All trade statistics are taken from UN Comtrade in the World Integrated Trade Solution (WITS), based on the HS Nomenclature 1996 edition (HS1996), and they are supplemented by HS1992 data except Figures 7-9 (product compositions). The list of ICT goods in HS1992 was prepared by transposing back from the original lists of goods (OECD list and ITA A-1) based on HS2002 and 1996 for the purpose of this study with the correspondence table available in the WITS. UN Comtrade contains trade statistics under multiple HS versions, made available by conversion of the original data by the United Nations. Although adding figures under multiple HS versions leads to certain biases, transposition between HS1996 and HS2002 in itself had no impact on measurement of the flows of ICT goods, and there is but limited the bias from supplementing data with HS1992. The benefit

decline of prices in ICT goods.[15] Exports by low and middle income countries (LMICs) grew much faster than those by high income countries (HICs) both in the 1990s and the 2000s, and were less affected by the two downturns (Table 1). As a result, trade between HICs has declined to 42% in 2009 from 71% in 1995, and more than half of world trade is taking place between the two income groups (Figure 1[b]). Trade between LMICs is growing fast, albeit from much lower levels.[16]

Table 1. Annualised export growth rate of ICT goods by income group pair

	1995-2009	1995-2000	2001-09	2000-01	2008-09
Total exports	6.1%	10.5%	9.2%	-11.9%	-14.9%
HIC to HIC	2.3%	8.4%	4.0%	-14.4%	-19.0%
HIC to LMIC	9.0%	11.6%	13.5%	-6.6%	-15.2%
LMIC to HIC	13.4%	19.2%	16.2%	-6.2%	-9.9%
LMIC to LMIC	21.9%	28.7%	24.2%	3.4%	-4.3%

Note: HIC: high income countries, LMIC: low and middle income countries.

Source: UN Comtrade in the WITS

This contribution of LMICs is much more pronounced in the ICT sector than in overall world trade, where the 1995 share of trade between HICs was similarly about 70%, and still stands at 50% in 2009, whereas the share of trade between the two income groups remains less than 40% (Figure 2). Trade between LMICs accounts for a smaller share in the ICT sector but has been growing faster over the period. This confirms that participation by developing countries has been the key driver of trade in ICT goods over the past 15 years.

Trade in ICT goods was also seriously affected by the global financial crisis in late 2008 to 2009. Monthly trade statistics of major traders (OECD, 2010b)[17] illustrates a steep loss of exports as well as their sharp recoveries; exports started to grow by the end of 2009.

of supplementing missing data is much greater as doing otherwise would underestimate the trade figures in the late 1990s and overestimate the growth of trade, although this procedure still leaves some important omissions, most notably Chinese Taipei in 1995 and 1996. However, substantial bias comes from the introduction of HS2007, which has made a number of important classification changes involving many ICT goods. Therefore, trade figures after 2007 should be treated with care, as it contains major breaks from previous years. See OECD (2008b, p. 108) and OECD (2009a, para. 6). See also Section 3 for on-going transposition works in the WTO. Finally, trade values include internal trade in the EU.

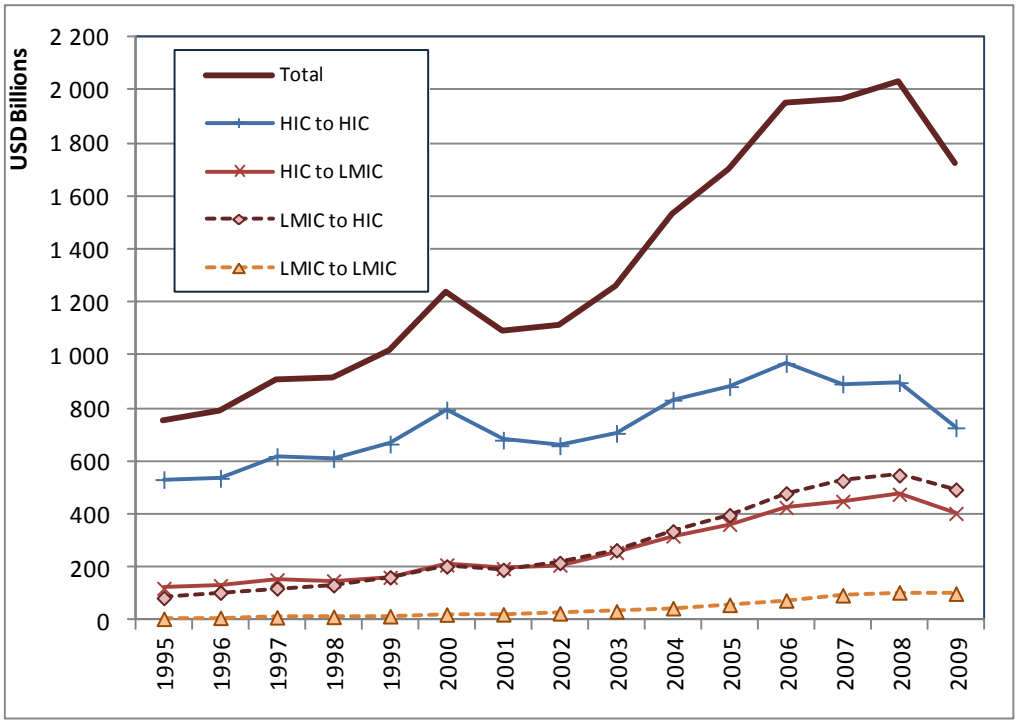
15. Finger (2007) (on US data); see cf. OECD (2006, p. 64).

16. This follows Kowalski and Shepherd (2006). The income categorisation is in accordance with the World Bank list of economies (January 2011). Chinese Taipei is included in the high income group for the purpose of the analysis here.

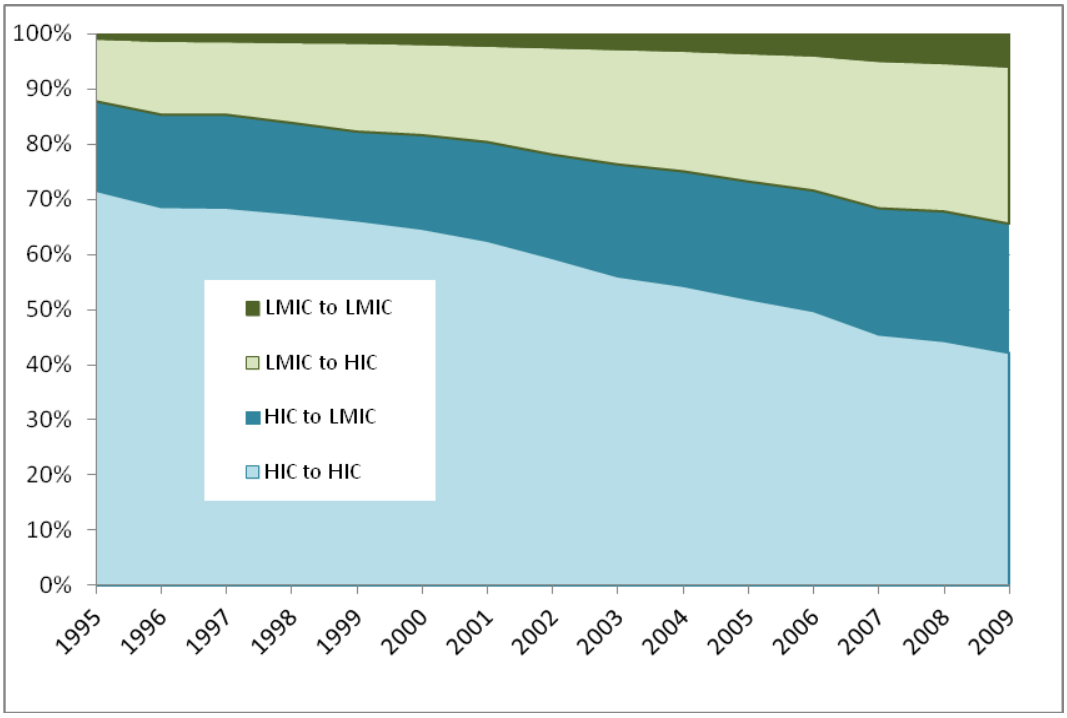
17. See in particular pp.71-74 and 101-03.

Figure 1. Exports in ICT goods, by income group pair

(a) export value



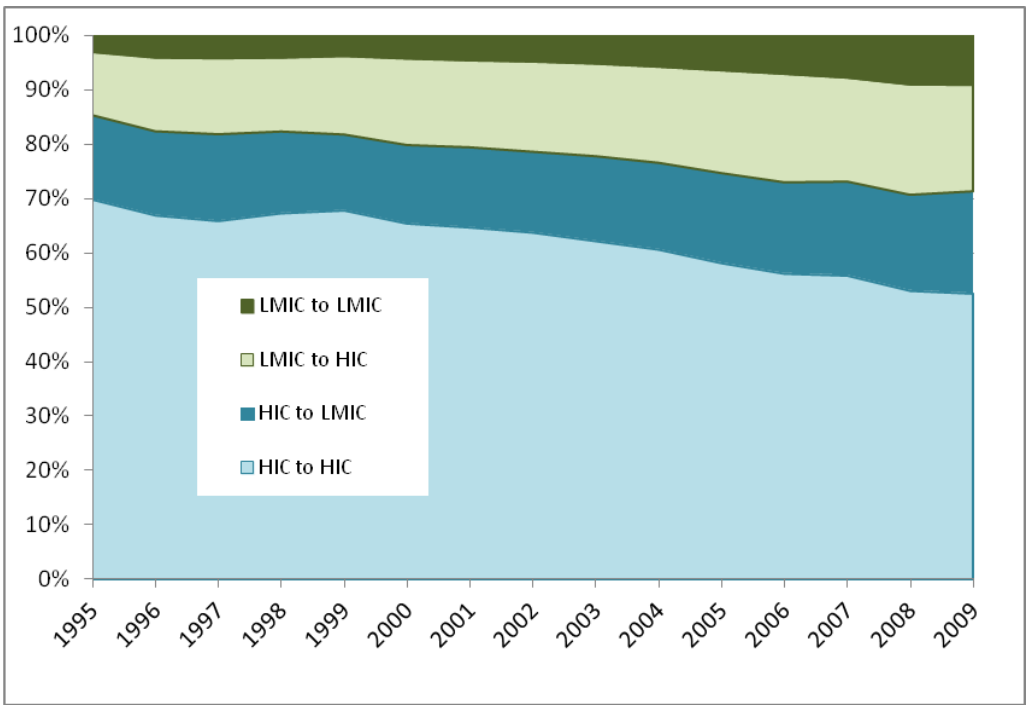
(b) % share



Note: See the text for the definition of "ICT goods" in this paper.

Source: UN Comtrade

Figure 2. Exports in all commodities, % share by income group pair



Source: UN Comtrade

1.3 Country composition

Figure 3(a) shows the export values and growth rates of the top 20 exporters (plus external trade by the EU) of ITA goods. In 1995, when the idea of an information technology agreement started to be discussed, the United States, Europe and Japan were the dominant traders in ITA goods. Since then this has substantially changed, most notably with the emergence of China, now the largest exporter and as well as importer of ITA goods.[18] Exports by Hong Kong, China have also grown rapidly, largely due to re-exports and re-imports. While China, Hong Kong, China, Hungary and Czech Republic sustained growth rates over 10% in both the 1990s and the 2000s, some OECD countries among the top 20 recorded a negative growth, especially in the 2000s. Figure 3(b) shows that ITA goods are major trading items for many Asian economies, although the share of ITA goods in total exports declined in most of the largest exporting countries in the 2000s.

In comparison, Figure 4(a) shows the similar figures for non-ITA ICT goods. Alongside China, many new EU Member States (Slovak Republic, Hungary, Poland and Czech Republic) experienced double-digit growth. The shares of these goods in trade in all commodities in many Asian economies have retreated since 1995, and instead they occupy significant proportion of exports in Slovak Republic, Hungary and Mexico (Figure 4[b]).

18. Emergence of China as a major player in ICT sector is discussed in OECD (2006), Chapter 3.

China has also become the largest importer of ITA goods, although import values are more uniformly distributed. The United States remains the largest importer of non-ITA ICT goods (Figure 5).

Figure 6 illustrates the changes in trade patterns in 1995-2009. The x-axis represents the revealed comparative advantage ("RCA")[19] of each country in 1995, and the y-axis represents its changes in 1995-2009 (RCA_{2009}-RCA_{1995}). For both ITA goods and non-ITA ICT goods, countries with higher initial levels of RCA experienced a decline in the levels of RCA by 2009. A more detailed statistical analysis in the appendix also shows that, after controlling for type of products, this relocation effect is statistically significant. This overall tendency is very visible within the sample that reduced RCA during the specified periods, and the size of such relocation is systematically larger with respect to non-ITA goods in 2001-2006 peiord within this group of samples. How this relocation has happened in this manner merits further investigation.

Among the countries which have not participated in the ITA, by far the largest trader of ICT goods is Mexico. Other large traders include Brazil, Russia and South Africa. Non-ITA participants (including non-WTO members) comprise 3% of exports and 7% of imports in ITA goods, and 8-9% of trade in non-ITA ICT goods (Table 2).

19. The RCA index of country i for product j is measured by the product's share in the country's exports in relation to its share in world trade: RCAij = (xij/Xit) / (xwj/Xwt), where xij and xwj are the values of country i's exports of product j and world exports of product j and where Xit and Xwt refer to the country's total exports and world total exports. A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product. See e.g. World Bank, Data and statistics (http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/EXTEAPREGTOPINTECOTRA/0,,contentMDK:20551648~pagePK:34004173~piPK:34003707~theSitePK:580005,00.html#5).

Table 2. Trade in ICT goods by non-ITA participants

(a) Major traders

USD billions, 2009	Exports		Imports	
	ITA goods	Non-ITA	ITA goods	Non-ITA
Mexico	34.4	22.6	50.1	5.9
Brazil	2.6	0.5	13.6	2.9
Russia	1.0	1.2	12.0	3.8
South Africa	0.7	0.4	5.9	1.2

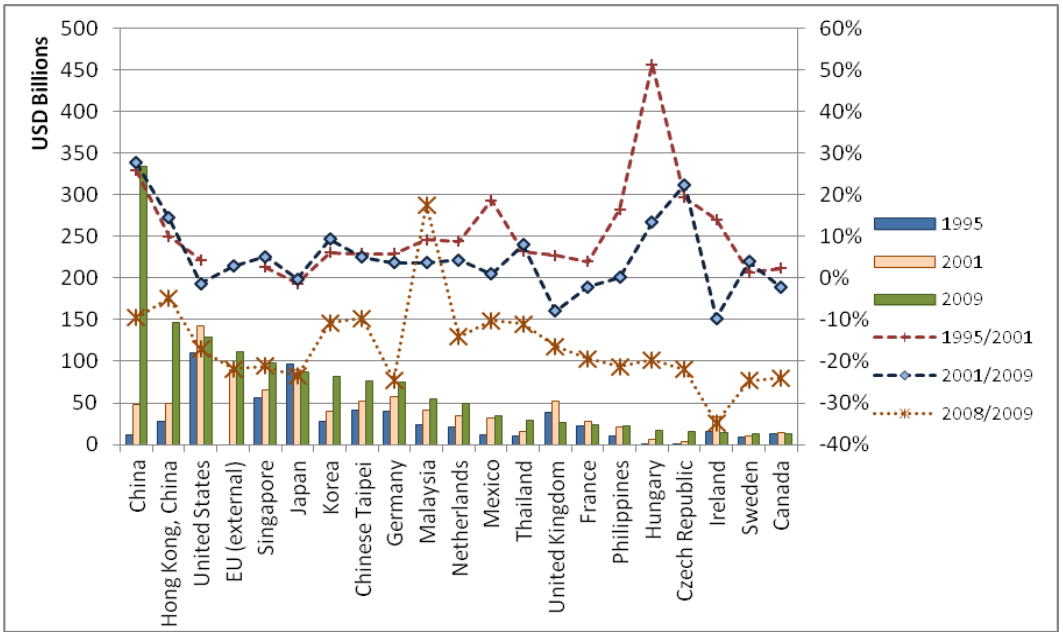
(b) Trade share by non-ITA participants

	ITA goods		Non-ITA ICT goods	
	2006	2009	2006	2009
Exports	2.7%	2.9%	8.7%	9.4%
Imports	6.8%	7.3%	8.3%	8.6%

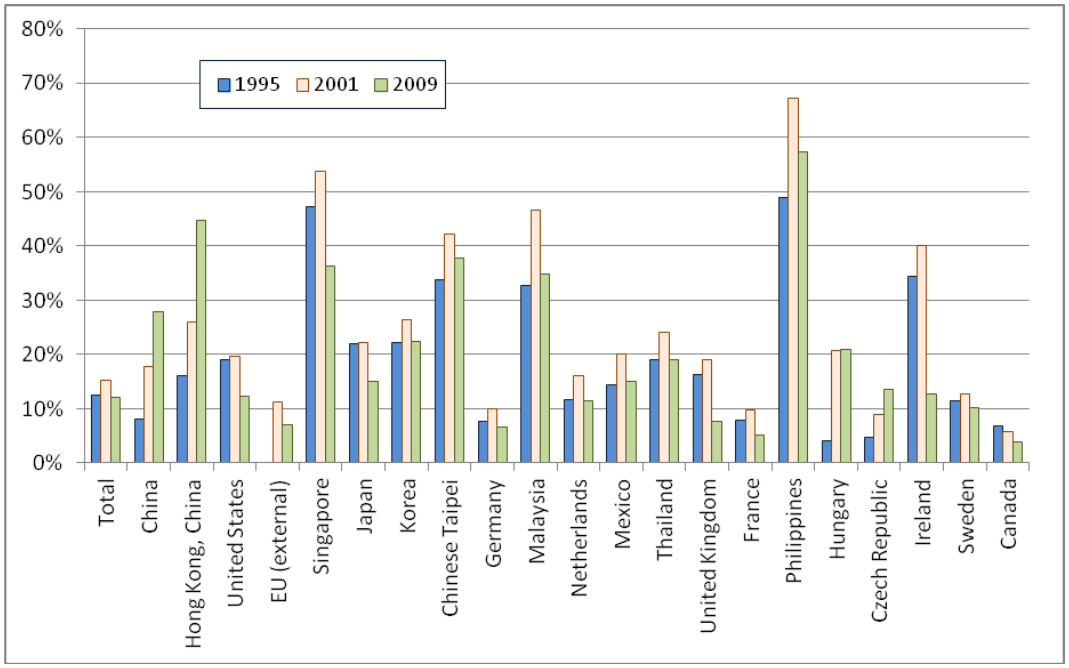
Source: UN Comtrade in the WITS

Figure 3. Major exporters, ITA goods

(a) export values and growth rates



(b) % share in total exports in each country

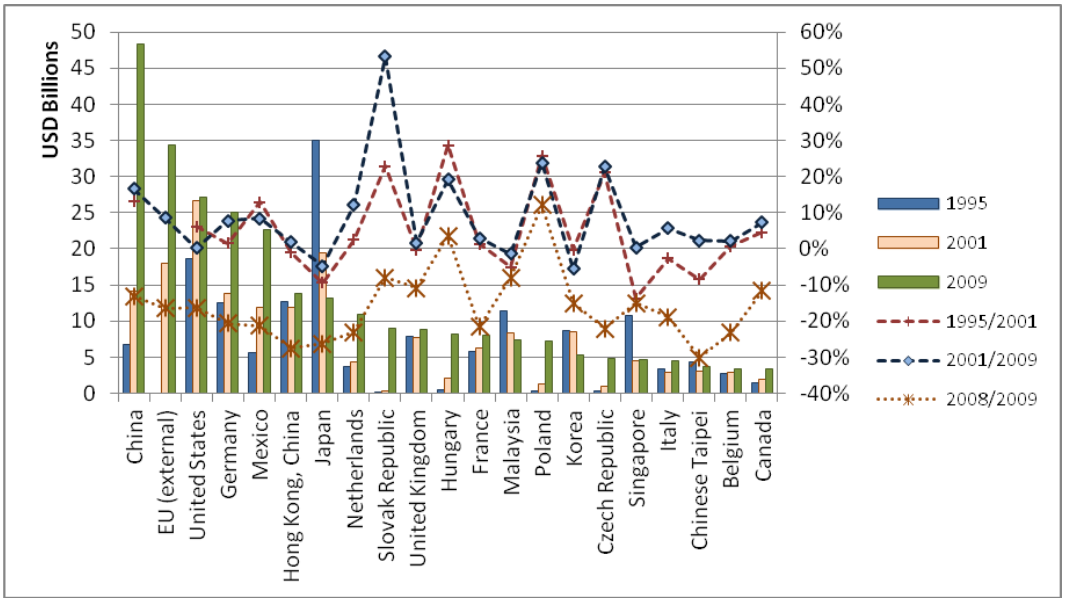


Note: Due to missing values in the database, the figure in 1995 for the Philippines is replaced by the figure in 1996 and for Chinese Taipei in 1997.

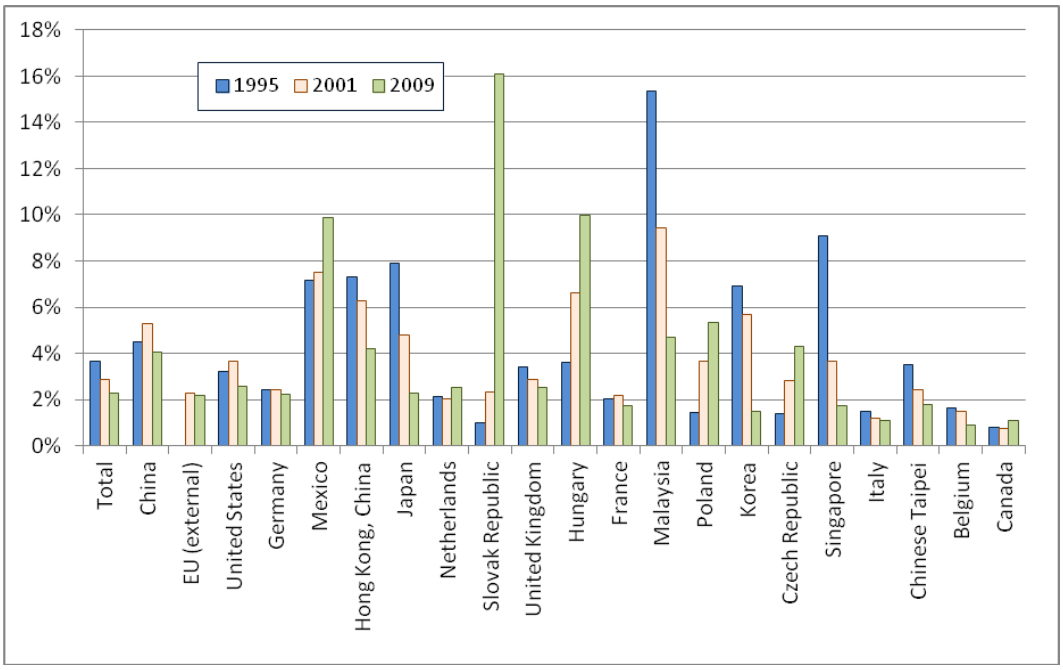
Source: UN Comtrade

Figure 4. Major exporters, non-ITA ICT goods

(a) export values and growth rates



(b) % share in total exports in each country

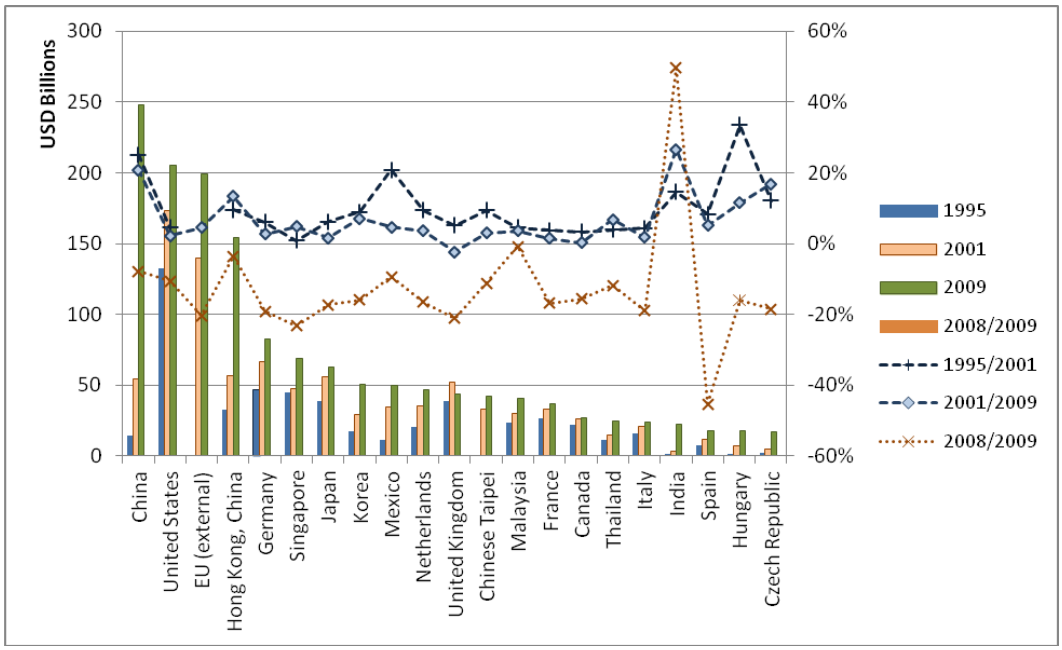


Note: Due to missing values in the database, the figure in 1995 for Chinese Taipei is replaced by the figure in 1997. The figure for Belgium in 1995 is for Belgium-Luxembourg.

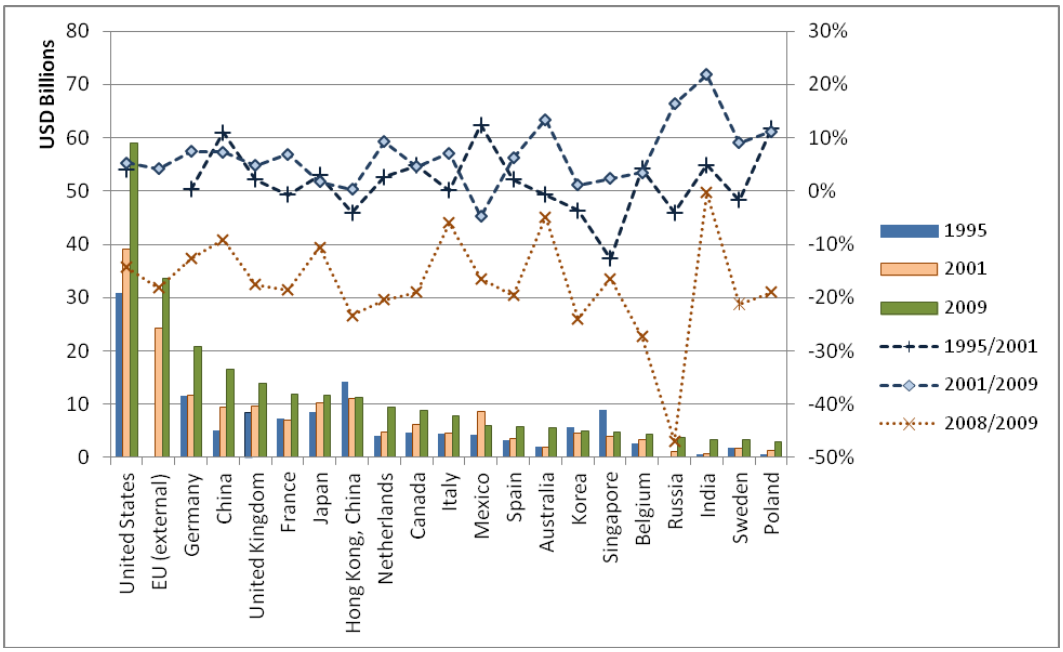
Source: UN Comtrade

Figure 5. Major importers of ICT goods

(a) ITA goods



(b) non-ITA ICT goods

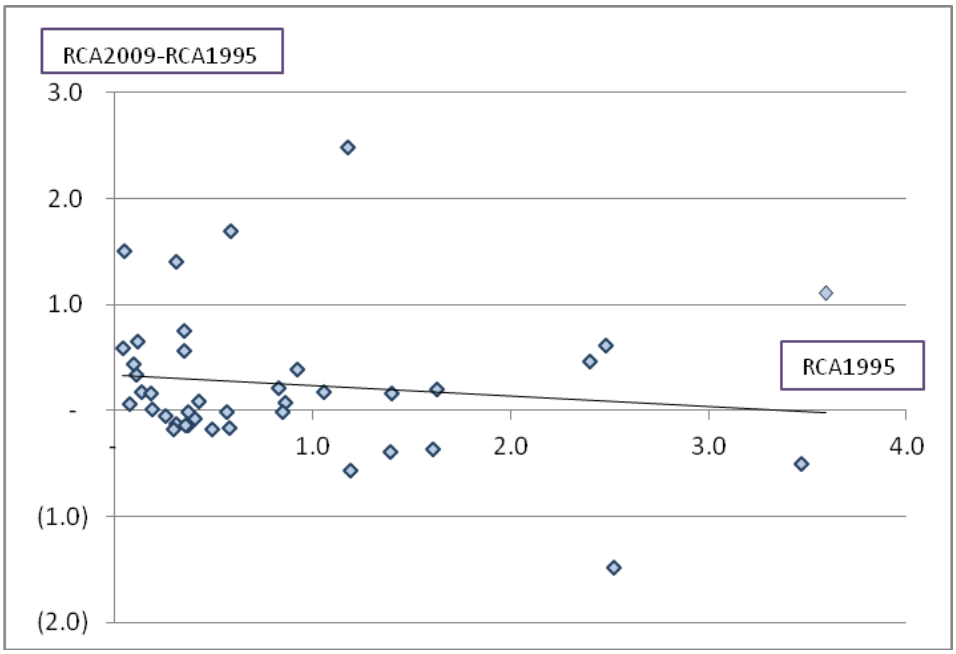


Note: Due to missing values in the database, the figure in 1995 for Russia is replaced by the figure in 1996, and for Chinese Taipei in 1997. The figure for Belgium in 1995 is for Belgium-Luxembourg.

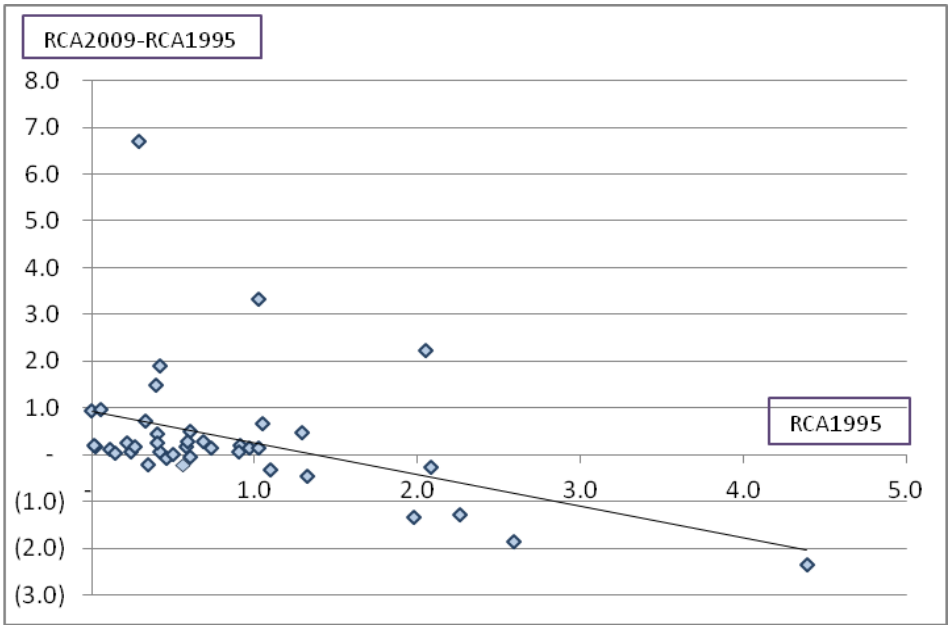
Source: UN Comtrade

Figure 6. Revealed comparative advantage in 1995 and its changes in 1995-2009

(a) ITA goods



(b) non-ITA ICT goods



Note: The graph shows the 40 largest ITA goods exporters. Due to missing values in the database, the figure in 1995 for the Philippines is replaced by the figure in 1996 and for Chinese Taipei in 1997.

Source: UN Comtrade

1.4 Product composition[20]

Figure 7 shows one product composition of trade in ICT goods in 1999-2009. The sub-category is based on the OECD list. Throughout the 2000s, the share of computer and related equipment decreased while the shares of telecommunication equipment and audio and video equipment expanded. Most of the exports in non-ITA ICT goods belong to audio and video equipment or other ICT goods.

Electronic components is the category most heavily traded, continuing to occupy more than 30% of trade in ICT goods. In particular, this category makes up nearly half of the exports from HICs to LMICs. Growth in trade involving LMICs, on the other hand, has been driven most notably by telecommunications equipment. In trade between HICs, the share of computer and related equipment is diminishing, while the shares of audio and video equipment and other ICT goods are increasing (Figure 8).

Figure 9 shows another product composition of trade in ICT goods based on the Broad Economic Categories ("BEC") as defined by the United Nations.[21] Trade in ICT goods is dominated by "capital goods" and "capital goods - parts and accessories", which together comprise 90% of trade in ICT goods. Trade in parts and accessories occupies a particularly large part of exports from HICs to LMICs, which is consistent with the presence of production sharing between the income groups, although the ratio of trade in parts and accessories overall declined in 1995-2009. In contrast, trade in finished goods, in particular exports from LMICs in capital goods (e.g. computers, telephones, video cameras), have been expanding its share. "Consumer goods, durables" (mostly audio and video equipment), "consumer goods, semi-durables" (recording media), and "industrial supplies, processed" (mostly cables), though much smaller, also account for a larger proportion of trade than before.

The five largest export items by income group pair are listed in Table A.1. The items most commonly traded are: computer related equipment (HS8471), their parts (8473.30), transmission apparatus (8525.20) and electronic integrated circuits (8542), and the largest among non-ITA goods in export value is reception apparatus for television (8528.12). Although heavily traded items are common among these income group pairs, their shares are consistent with the general observation set out above; while the shares of electronic integrated circuits are high in exports from HIC to LMIC, computer related equipment and telecommunications equipment are large export items for LMICs. Finally, these top five items typically occupy 40-50% of ICT goods export in a given income group pair.

Generally, the ICT/electronics industry has been known for fragmentation of the production process,[22] and the significant proportion of trade in intermediate goods (parts

20. Trade data in this sub-section (Figures 7-9) are not supplemented by HS1992 data, which makes differences for trade figures in 1990s.

21. The correlation table between the BEC and the HS assigns a BEC category to each HS six-digit subheadings. Although the BEC is a convenient tool to analyse trade data by their use, this categorisation is made based on their characteristics instead of their actual use (De Backer and Yamano, 2008, p.7).

22. Using Input-Output tables, De Backer and Yamano (2008) pp.19-20 found that "sourcing of intermediates abroad is more prominent in higher technology industries than in lower technology industries", and that offshoring is more prominent in computers and TV/radio/communications equipment than textile sector; Inomata (2008) Figure 3 shows the machinery sector was at the highest level of international fragmentation (in terms of

and accessories and processed goods in the BEC) shown in Figure 9 is consistent with it. The figure also shows, on the other hand, that the share of trade in intermediate goods has not increased during the period.[23] This may signal a growing tendency to purchase parts and components from local markets,[24] and /or a growing importance of developing countries as a market for final goods, in addition to as a production base.

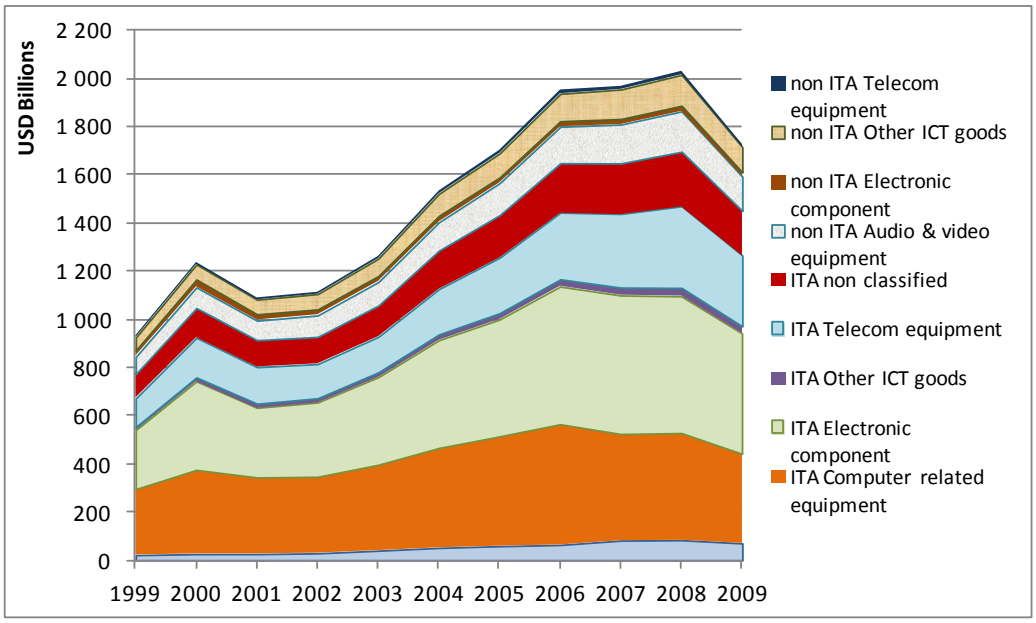
"length" of supply chains) in East Asia in 2000, while transport equipment was rapidly catching up in 1999-2000.

23. Yokota (2008), Figure 3 reports trade in parts and components and final goods in electronics from 1980 to 2005, which suggests that trade in parts and components had grown more rapidly than trade in final goods between 1988 and 2000, but trade in final goods picked up thereafter; Hiratsuka (2008) Figure 4 reports similar patterns across different regions (East Asia, NAFTA and the European Union), although this is not the point emphasised in these papers. See also Onodera, 2008, p.38.

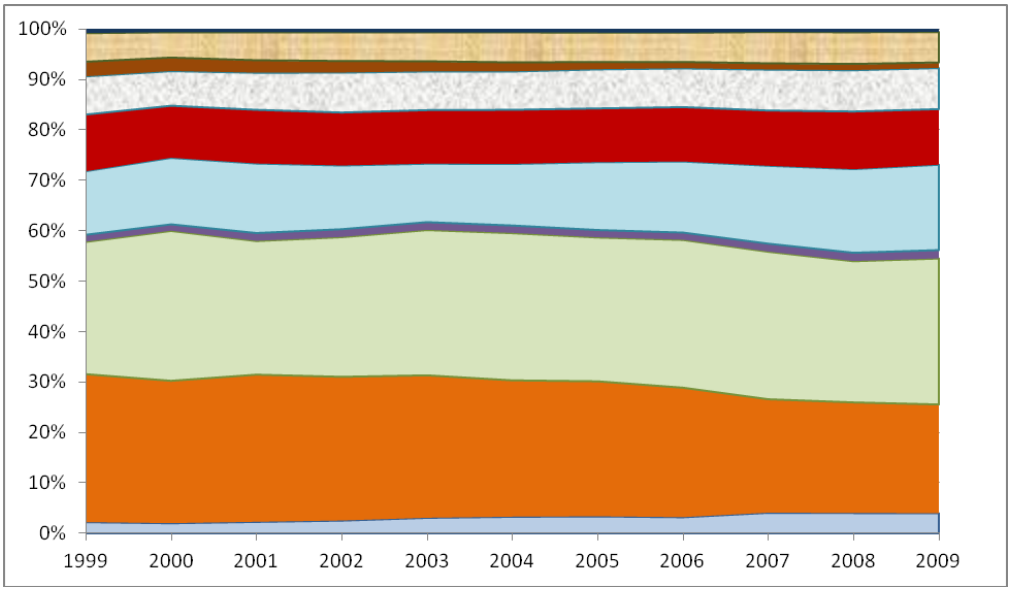
24. Ando and Kimura (2006), studying Japanese firms in machinery sector operating in East Asia, shows the declining trend in purchases from Japan (p.18).

Figure 7. Exports in ICT goods, by product category

(a) export value



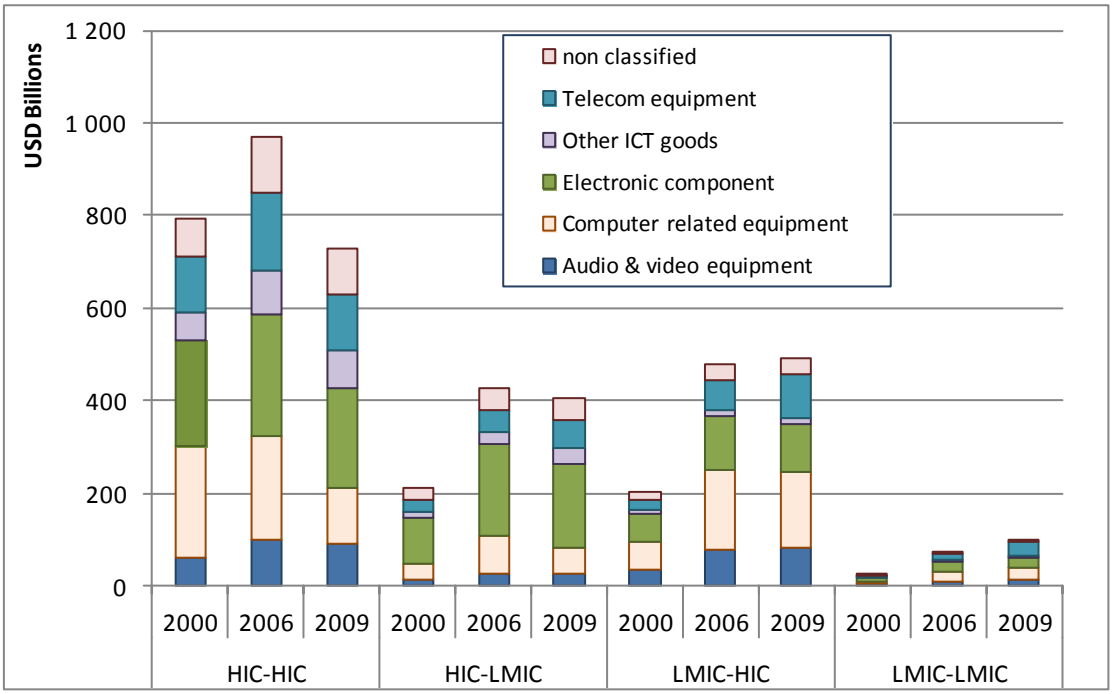
(b) % share



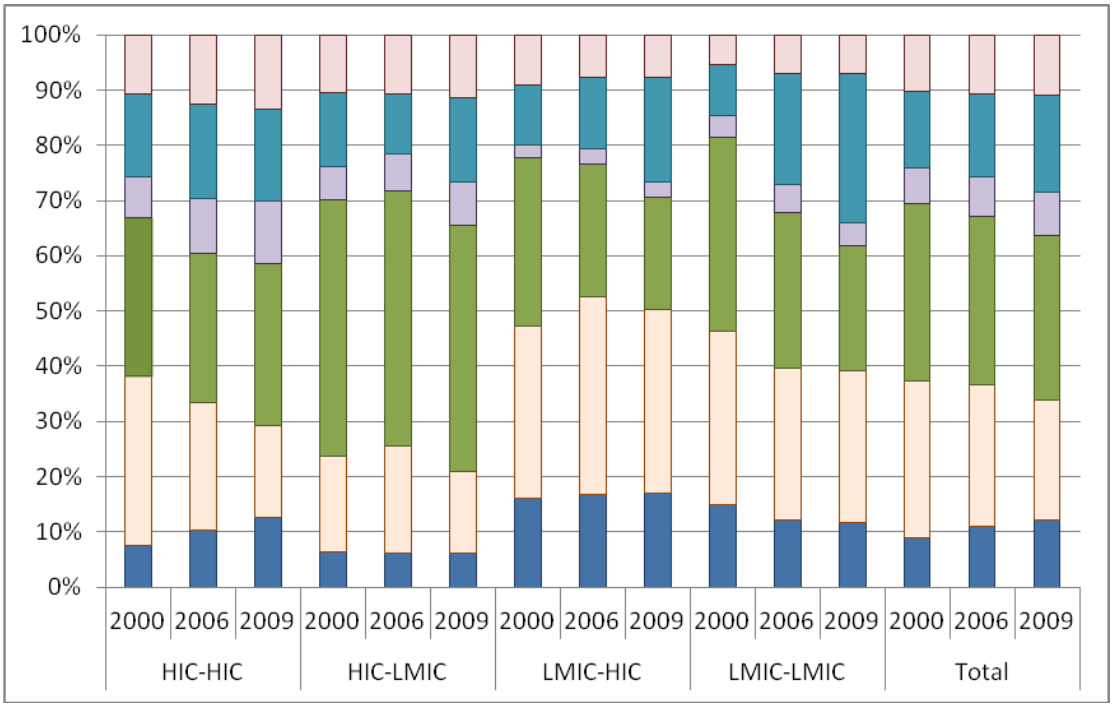
Source: UN Comtrade

Figure 8. Exports in ICT goods, by product category and income group

(a) export value



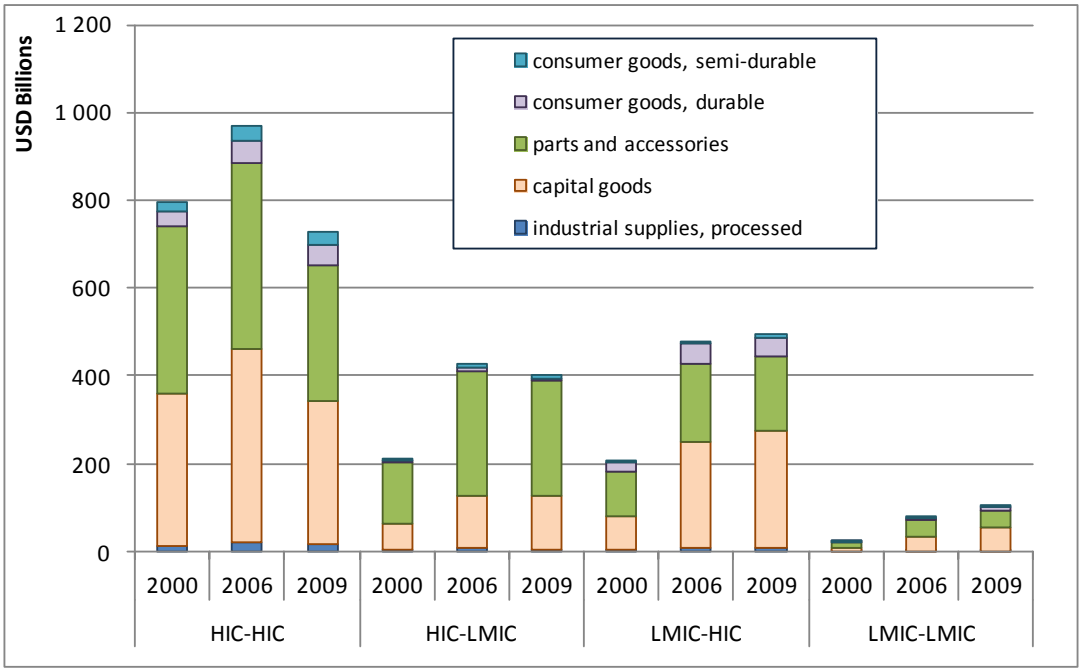
(b) % share



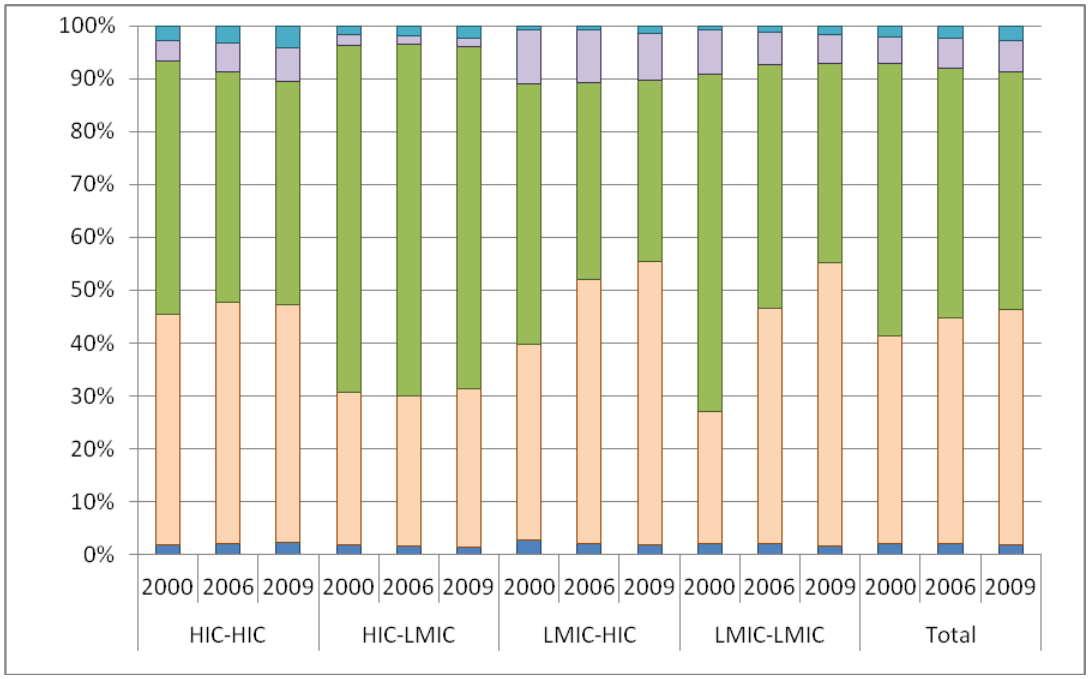
Source: UN Comtrade

Figure 9. Exports in ICT goods, by BEC and income group

(a) export value



(b) % share



Source: UN Comtrade

2. Tariff profiles

The ITA participants made commitments to eliminating tariffs on products covered by the ITA through "equal rate reductions […] beginning 1997 and concluding in 2000" (ITA, para.2). Exceptions to this timeframe have been granted on a case-by-case basis.[25]

Table 3(a) shows the evolution of average tariff levels (MFN, applied).[26] High income ITA participants (ITA-HIC) eliminated their tariffs on the products covered by the ITA by 2000.[27] The reduction of tariffs on ITA goods by "ITA-MIC"[28] and by "ITA-RAM" reflects either (a) their longer periods of staging to complete tariff elimination or (b) new commitments made by new WTO members and by new ITA participants. The table also shows that tariff rates on non-ITA ICT goods and tariff rates imposed by non-ITA participants have also declined, although levels are still substantial. Moreover, tariff rates applied on non-ITA goods or those applied by non-ITA participants are typically much lower than the bound rates.[29]

25. Some countries (El Salvador and Morocco) have not transferred their commitment under the ITA to their legal instrument (concession schedules). See WTO Committee of Participants on the Expansion of Trade in Information Technology Products, Status of Implementation (G/IT/1/Rev.43, 28 October 2010).

26. Tariff data are taken from UNCTAD/TRAINS, supplemented by WTO/IDB, both from the WITS. HS nomenclatures used therein vary depending on the year and the reporting country. Since the data after 2007 are not comparable to those until 2006 due to the classification changes, tariff analysis here does not go beyond 2006. On the other hand, the data in the 1990s suffer substantial missing data. When the data are still missing, they are supplemented by those in 2002 or 2005 if available. Countries are grouped in accordance with World Bank list of economies (January 2011), except the EU(25) and Chinese Taipei (categorised as high income for the purpose of this study), and the latest status of participation in the ITA. ITA tariffs in selected economies can be found in WTO (2007, p.15).

27. Lower rates in 2006 than in 2001 in ITA-HIC on ITA goods reflect EU accession of Hungary and Malta, which had not participated in the ITA. Positive duties reflect the fact that "ITA goods" covers some products which are in fact not covered by the ITA. See Box 1.

28. There are currently no low income countries in this category.

29. Simple average bound rates of non-ITA participants on ICT goods and of middle income ITA participants on non-ITA ICT goods are typically around 30%.

Table 3. Evolution of tariff profiles

(a) average MFN applied tariff rates

	ITA goods				Non-ITA ICT goods			
	simple average		weighted average		simple average		weighted average	
	2001	2006	2001	2006	2001	2006	2001	2006
ITA-HIC	1.76	1.52	0.41	0.37	3.66	2.73	2.67	2.57
ITA-MIC	4.81	2.18	2.45	1.05	9.33	6.60	9.40	6.82
ITA-RAM	5.98	2.30	6.25	0.53	9.11	6.29	12,2	7.14
Non-ITA	11.4	8.00	9.13	4.20	12.7	9.89	15.0	11.0

(b) estimate of tariff revenue share on ICT goods (%)

	2001	2006
ITA participants, HIC	18	38
ITA participants, MIC	11	12
ITA participants, RAM	33	14
Non-ITA participants	34	26
ROW	5	9

Notes:

1. ITA-HIC: high income ITA participants except RAMs; ITA-MIC: middle income ITA participants except RAMs; ITA-RAM: ITA participants which acceded to the WTO after its establishment in 1995 (recently acceded members of the WTO (RAMs): Albania, Bulgaria, China, Chinese Taipei, Croatia, Georgia, Jordan, Kyrgyz Republic, Moldova, Oman, Panama, Saudi Arabia, Ukraine); Non-ITA: 10 largest traders in ICT goods among those which have not participated in the ITA (Argentina, Brazil, Chile, Colombia, Mexico, Nigeria, Russia, South Africa, Tunisia, Venezuela).

2. "Simple average" is calculated by taking the simple average of each country's simple average MFN applied tariffs for ICT goods (generated by the database) within the country group; "weighted average" is the average of weighted average MFN applied tariffs for ICT goods (generated by the database) weighed by import share within the country group. "Tariff revenue" is calculated by [weighted average of effective applied tariffs] x [import value]. "Effective applied tariffs" in this calculation reflect bilateral preferential tariffs beyond MFN applied tariffs. The weighted averages in the WITS are available down to the second decimal place (in %), but at very low levels of tariffs there can be significant biases. Also, divergence between trade years and tariff years (due to unavailability of data in the database) to calculate weighted average create biases.Finally, the amount of duties actually collected at customs is not identical to this calculation because of rules of origin, special incentive schemes and other factors that are not reflected in duty rates in the database.

Source: UNCTAD/TRAINS, WTO/IDB

Beyond MFN tariffs, preferential tariffs are often available due to a reciprocal preferential agreement or unilateral preferential treatment. Table 3(b) shows the estimate of tariff revenue share calculated based on the lowest available bilateral tariff rates. ITA participants together collect 64% of the duties on ICT goods, while the remaining 36% is collected by non participants. The share increased in high income ITA participants, given

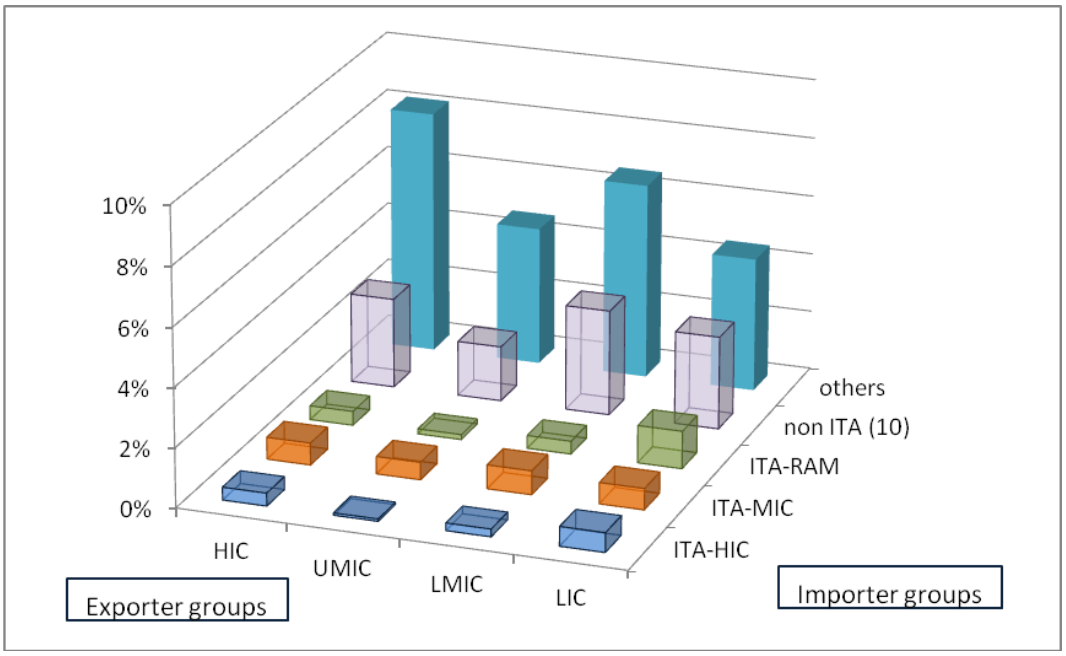
that their tariff elimination was completed by 2000, before the time period covered in the table; the reduction in tariffs by non-ITA participants took place in the 2000s including through bilateral free trade agreements.

The levels of tariff revenue should be seen in light of the scale of trade. Effective average tariff rates can be calculated by dividing the amount of tariff revenues by import values, which is shown in Figure 10. This confirms that, while the tariff rates by ITA participants on ITA goods are minimal, much higher tariffs are imposed on these goods by non-participants, and tariffs on non-ITA ICT goods are generally higher still. In addition, there is also a tendency for imports from lower income countries to face higher tariffs on non-ITA ICT goods.

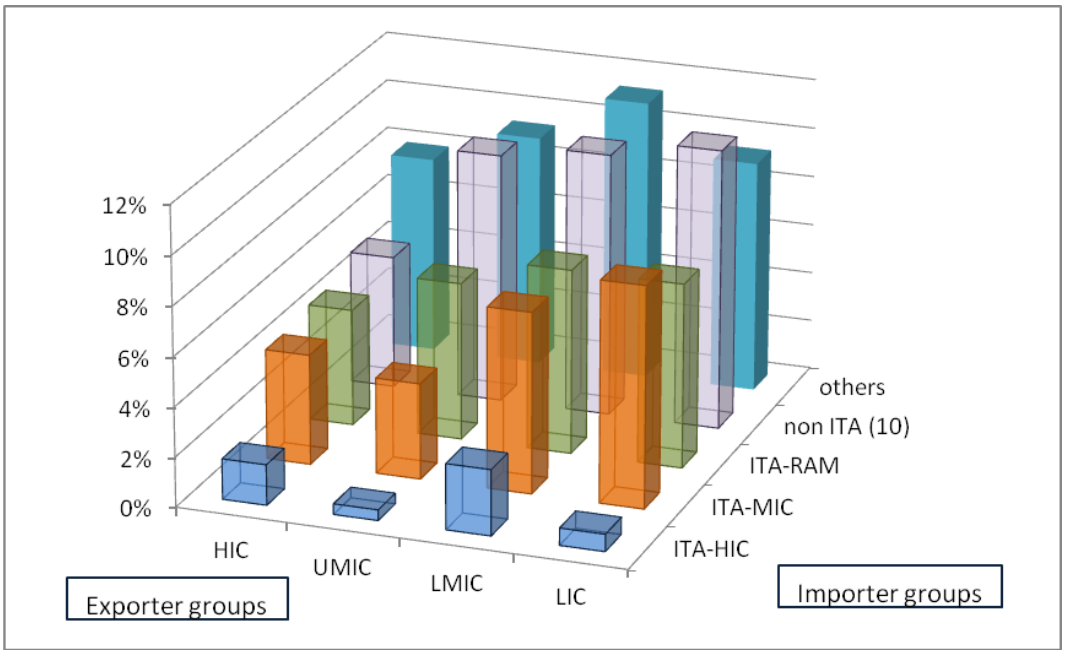
These tariff profiles imply that, while tariffs on ICT goods have generally been reduced significantly, due to the success of the ITA, substantial tariffs remain with respect to the remaining ICT goods as well as those imposed by non-ITA participants. Despite the broad scope of tariff elimination under the ITA with the participation of a large number of countries, there is further room for tariff reduction and elimination in terms of both products and countries.

Figure 10. Average effective tariff rates by country group pair, 2006

(a) ITA goods



(b) Non-ITA ICT goods



Note: HIC: high income, UMIC: upper middle income, LMIC: lower middle income, LIC: low income

See also note 1 for Table 3 and footnote 26.

Source: UNCTAD/TRAINS, WTO/IDB

3. Trade in ICT services

Figure 11 shows the trade in computer and information services and in communication services for the 20 largest traders (i.e. exports plus imports), based on balance of payments statistics.[30] For both segments, trade values have expanded by over 10% a year in the 2000s for many of the major traders, which includes many OECD countries. ICT services trade is "by far the most dynamic OECD ICT export component" (OECD, 2010b). The figures show declines in trade value in 2008-09, but this drop was not as steep as was the case for trade in ICT goods.

The largest exporters by far of computer and information services in 2009 were India and Ireland,[31] whereas the United States and Germany were the largest importers. In addition to India, China is growing rapidly as an exporter, and other emerging economies such as Brazil and Russia are also active importers (Figure 11[a]).[32] It is interesting to note that strong growth of India here coincides with strong import growth in ITA goods (see Figure 5).[33]

OECD (2010b) notes that trends in communication services trade are difficult to interpret, since values are highly influenced by firm ownership and alliance structure, and progress in the deregulation in communications in various countries and exports in other services heavily affect the trade values. Largest exporters in 2009 were the United States, Kuwait and the United Kingdom, while the largest importers were the United States, the United Kingdom and Germany.

30. This is in line with the OECD (2010b, pp.85-86). "Communications services" comprises postal and courier services as well as telecommunications services, and "computer and information services" covers computer services and information services, which comprises news agency services and other information provision services. The scope of ICT services can also vary; OECD (2006, pp. 111-16) included business services, and UNCTAD (2007, p.120) goes much broader in its discussions on trade in ICT services to include insurance services, financial services, royalties and license fees and personal, cultural and recreational services. Note also that OECD (2006, pp.117-18) discusses substantial discrepancies in services trade statistics among trading partners and from industry statistics, particularly for countries such as India and China. Services are defined in terms of the nature of the services, not the method of delivery. Downloaded software is covered by the computer services, while downloaded audiovisual products are covered by the audiovisual services. Downloaded content that is not software or audiovisual or related products is included in information services. See United Nations (2010).

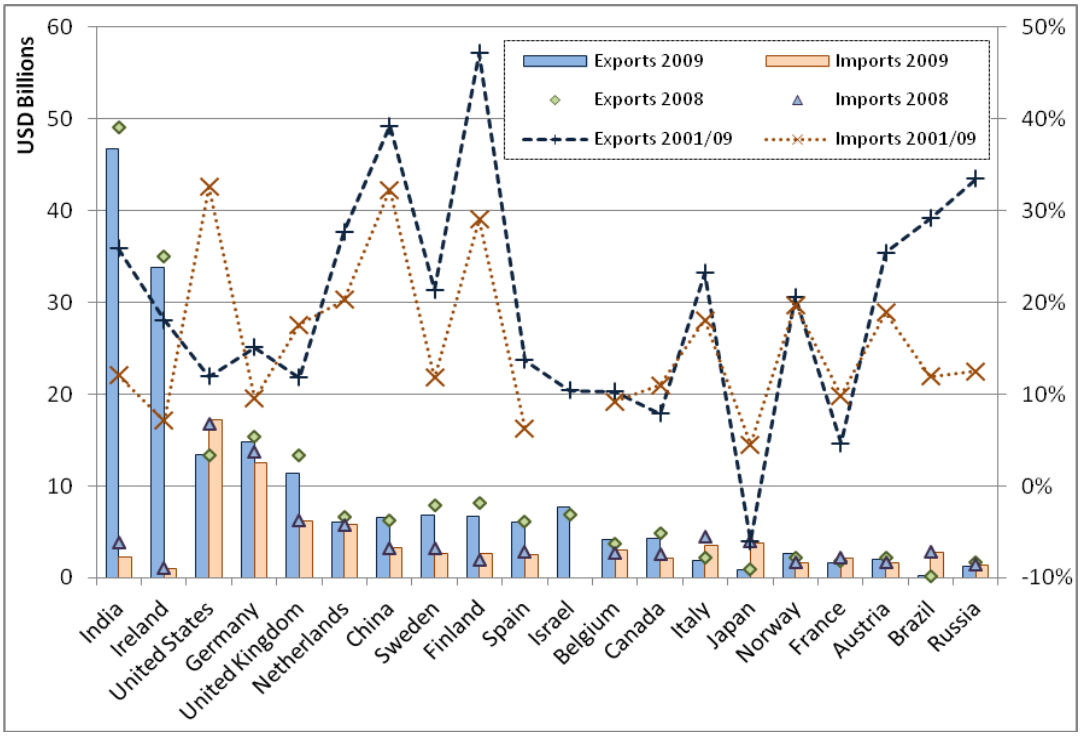
31. The figures for Ireland include software license fees in computer and information services, while other countries record these separately under "royalties and license fees". See OECD (2010b, p. 85).

32. Engman (2007) reports the emergence of business process services (BPS) and information technology services (ITS) in China and India as well as Czech Republic and the Philippines.

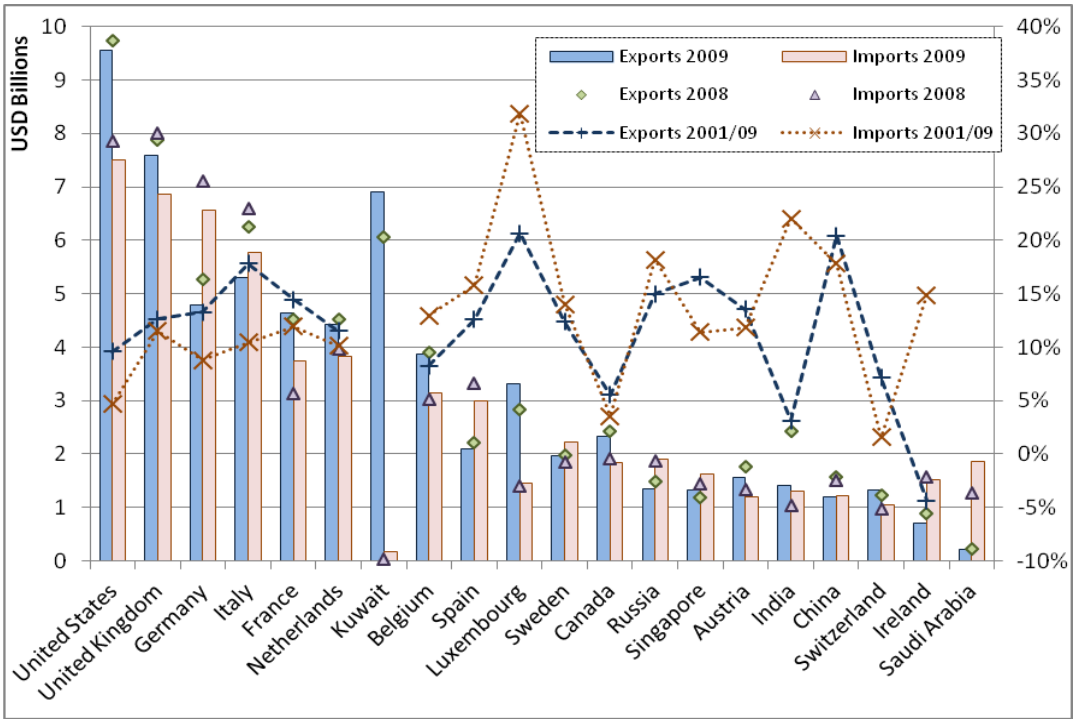
33. Information Technology Action Plan of India (4 July 1998) listed participation in the ITA and tariff elimination of the covered products as one of the "incentives" "for creating a congenial ambiance for exporters of IT Software and IT Services (including IT enabled services) to reach the export target of USD 50 billion by the year 2008". For origins of the software industry in India and the interactions with trade policy, see O'Connor (2003), Dossani (2005) and "Transcript of "An Interview With N.R. Narayana Murthy'", YaleGlobal, 5 June 2006.

Figure 11. Trade in ICT services

(a) Computer and information services



(b) Communication services



Note: The figures for Belgium in 2001 are the figures for Belgium-Luxembourg.

Source: IMF, Blanace of Payments Statistics

4. Reflection of trade in ICT goods and services and possible policy issues

Trade in ICT goods and services has generally recorded robust growth since the mid-1990s. Trade in ICT goods has more than doubled, with impressive participation of developing countries and with tariff elimination following commitments made under the ITA. However, growth slowed in the 2000s compared with the 1990s, and the share of ICT goods in total merchandise trade receded during this period.

The success of the ITA has resulted in tariff elimination in a broad range of ICT goods. On the other hand, tariffs remain significant for some non-ITA participants, although tariff reductions by many of them either on a unilateral basis or as a part of their bilateral preferential trade agreements. As well, non negligible duties are imposed on ICT products that remain outside of the ITA.[34]

The value of WTO disciplines was especially strongly felt during the global decline of trade in late 2008 and 2009. Even though trade measures taken involving the ICT sector were limited compared to some other sectors, some were imposed.[35] The fact that import duties were not involved at the height of the financial crisis underlines the value as well as the limits to the types of disciplines against protectionism under the ITA.

The strong growth of ICT services in recent years demonstrates the existence of strong demand and supply capacity in this sector. As the supply and demand in ICT services are linked to the wider availability of ICT goods, trade liberalisation in both goods and services during the Uruguay Round and under the WTO can be characterised as having laid the groundwork for the recent acceleration of trade in ICT services.[36]

34. Miroudot (2008) emphasises the importance of multilateral trade liberalisation since bilateral trade and FDI flows depend also on barriers between markets in the rest of the world.

35. Measures reported in WTO (2009) and Newfarmer and Gamberoni (2009) are: imposition of non-automatic licensing requirements on TVs and other manufactures goods, introduction of a reference price covering TV and other sensitive products (Argentina), export support measures on products including electrical products (China), requirement that electronics and other categories of products would be permitted in only five ports and airports, and increase in tariffs on electronic parts and other tariff lines (Indonesia). On the other hand, Philippines has reportedly eliminated import duties for multichip packages (MCP), amplifiers and other electronic integrated circuits. See OECD (2010d) for more general a discussion on “trade collapse” and policy responses.

36 Blyde and Sinyavskaya (2010) shows that liberalisation of trade in services, in particular communication services, has an important poslitive impact on trade in goods.

3. the Multilateral Trading Regime and Trade in the ICT Sector and Future Challenges

This section will look at how the multilateral trading system has played a role in enhancing global ICT trade, and the role it could play in future. This section will first review what has been done to date, i.e. the negotiations on the ITA and basic telecommunications, as well as on the e-commerce work programme and ITA II. It will then turn to more recent developments, especially in the ITA and DDA/NAMA negotiations where substantial work has been done, specifically addressing trade in ICT goods, and point to unfinished business.[37]

1. From early success to modest progress

1.1 The ITA and basic telecommunications negotiations

The conclusion of the ITA and the basic telecommunications negotiations in 1996-97 were significant achievements not just for the ICT sector but for the new-born multilateral trading system. Negotiations on basic telecommunications were already foreseen in the final package of the Uruguay Round signed in April 1994.[38] In contrast, the idea of the ITA took shape and developed in a broader economic policy context.

At this time the creation of a "global information society" was high on the policy agenda as one of the broad economic policies to encourage innovation and spur growth

37. Discussions in this section closely follow the original official documents to the extent possible, while being informed by relevant preceding studies. Aronson (1998), Bacchetta *et al.* (1998, p.47) and McLarty (1999, pp. 11-20) describes the negotiating history of basic telecommunications. Fliess and Sauvé (1997) provides a detailed negotiating history of the ITA. Johnson and Kitzmiller (1998, pp.5-6) has a detailed reference of industry inputs to the process. Tasker (2007) cites various documents that show "original intent" of the ITA. Nanto (1997, p.12), Borrus and Cohen (1997) Section II, Okamoto (2004, pp.34-38), Dreyer and Hindley (2008) and Mann and Xue (2009, pp.186-7) also have descriptions of the process. Excerpts of the key policy documents toward establishing the ITA is re-produced in the Appendix. Wunsch-Vincent (2005) details WTO instruments relating to ICT trade and e-commerce.

38. Decision on Negotiations on Basic Telecommunications, paras. 1 and 5. See also Annex on Negotiation on Basic Telecommunications to the General Agreement on Trade in Services (GATS). This arrangement was to effectively "deferring the negotiations on basic telecommunication services" so that "they would be able to take advantage of the rapidly changing situation of new technologies and regulatory reforms involving greater reliance on markets" Bacchetta *et al.* (1998, p.47).

and employment.[39] The trade policy agenda was not initially a part of the discussions on the global information society among G7 ministers,[40] but the IT industries of Europe, Japan and the United States took the opportunity and agreed to a set of industry recommendations to G7 ministers in early 1995, one of the key being tariff elimination on IT products.[41] This agenda was further pursued when the Trans-Atlantic Business Dialogue was launched in Seville, November 1995, attended by top business and government leaders in the EU and the US, and it was agreed at the EU/US Summit in December 1995 to launch "a specific exercise in order to attempt to conclude an information technology agreement".[42] With the "information society" remaining the key motivation, the policy agenda now included a trade initiative.

By the summer of 1996, the negotiations received support from the Quad (Canada, the European Union, Japan and the United States) trade ministers and G7 leaders, and the OECD Ministerial Council and APEC trade ministers took specific note of the initiative. The idea of the Information Technology Agreement was formally communicated to the WTO in October,[43] as efforts stepped up in various forums.[44] APEC Leaders in November called for the conclusion of an information technology agreement by the WTO Ministerial Conference.[45]

At the WTO Ministerial Meeting held in Singapore in December 1996, the Ministerial Declaration on Trade in information Technology Products ("ITA") was agreed by 14 Members (counting the European Communities as one) accounting for over 80% of world trade in covered products.[46] Additional negotiations[47] secured participation representing

39. Naples G7 Summit Communiqué (8-10 July, 1994), under "Jobs and Growth"; Halifax G7 Summit Communiqué (16 June 1995), under "Growth and Employment".

40. See G7 Ministerial Conference on the Global Information Society: Ministerial Conference summary (1995). The conference was mostly attended by ministers responsible for telecommunications and industry, rather than for trade (pp.8-9).

41. Johnson and Kitzmiller (1998, p.5).

42. The New Transatlantic Agenda (December 3 1995, EU/US Summit: Madrid, Spain)

43. WTO Committee on Market Access, Communication from the United States (G/MA/W/8, 4 October 1996). This document sets out "to move into the Information Age" as the key motivation of the initiative. It also contains a succinct illustration of the development of the initiative in 1995-96.

44. EU Council in October, on preparation of the WTO ministerial Council in Singapore, expressed satisfaction at the state of preparations, taking note of the outcome of Quad meeting on ITA negotiations. See also EU Council Resolution on new policy priorities regarding the information society, approved by the Council on 8 October 1996 (setting promotion of ITA negotiations as among the policy priorities). APEC Senior Officials discussed the issue in the Meeting on 18-20 October 1996, Manila, Philippines.

45. APEC Economic Leaders Declaration: From Vision to Action (25 November 1996), para. 13.

46. News articles report the negotiations in the sidelines of Singapore Ministerial between the EU and the US that brought about a breakthrough. See e.g. Michael Richardson "WTO Nears Agreement on Information Technology Trade", International Herald Tribune ("IHT") (7 December 1996): Alan Friedman "Chance of WTO Technology Deal is Looking Good Again" IHT (10 December 1996); Alan Friedman "EU Takes Step Back on High-Tech Pact" IHT (11 December 1996); Richard W. Stevenson "U.S. and Europe Agree on Freeing Technology Trade" The New York Times ("NYT") (12 December 1996); Alan Friedman

90% of world trade by March, and at the start of the implementation in July,[48] the 28 participants comprised 93% of world trade.[49] China also announced its intention to participate later in 1997.[50]

In February 1997, negotiations on basic telecommunications were also concluded with participation of 69 Members, and entered into force in February 1998. These achievements were widely welcomed at high levels;[51] a policy document by the European Commission expressed its expectations of its economic impact:

> *High telecommunication tariffs have long been a major stumbling-block for electronic commerce in Europe. However, the implementation of the package of telecommunications liberalisation measures is already leading to lower prices and to more flexible pricing schemes. The take-up of electronic commerce is significantly higher in the most competitive markets. The WTO Agreement on Basic Telecommunications will contribute directly to the emergence of a global marketplace in electronic commerce. Similarly, recent international agreements to eliminate tariff (ITA) and non-tariff barriers (MRA [mutual recognition agreement]) should rapidly bring down the cost of key information technology products, encourage the take up of electronic commerce, and reinforce European competitiveness. Removing capacity bottlenecks and providing high-bandwidth infrastructure is another challenge for Europe – a challenge actively addressed both by the private sector and by the [European] Community.*[52]

1.2 E-Commerce work programme and ITA II

After these early successes, there have been a couple of other initiatives relating to ICT trade in the WTO.[53] One is the work programme on electronic commerce in 1998.[54]

"At Least 25 Countries to Join Far-Reaching Deal to Cut Tariffs: Trade Ministers Agree on Global High-Tech Accord" IHT (13 December 1996).

47. ITA, Annex, Para. 4.

48. WTO Council of Trade in Goods, Implementation of the Ministerial Declaration on Trade in Information Technology Products (G/L/160, 2 April 1997), para. 2; and the Declaration, Annex 2(a)(i).

49. Status of Implementation (G/IT/1, 28 July 1997).

50. John M. Broder "Summit in Washington: The Overview; U.S. and China Reach Trade Pacts but Clash on Rights", NYT, 30 October 1997.

51. OECD Meeting of the Council at Ministerial Level, 26-27 May 1997, para. 20; Meeting of Ministers Responsible for Trade, Montreal, Canada, May 8-10 1997, Statement of the Chair; APEC Economic Leaders Declaration: Connecting the APEC Community (Vancouver, Canada, 25 November 1997), para. 8; Amsterdam European Council on 16 and 17 June 1997; Geneva WTO Ministerial Declaration, 20 May 1998, para.2.

52. European Commission (1997), Executive Summary Section II "Ensuring access to the global marketplace: infrastructures, technologies and services".

53. Another liberalisation initiative was done in financial services. See Adlung (2009).

54. Adopted by the General Council on 25 September 1999, following the Declaration on global electronic commerce, 20 May 1998 (WT/MIN(98)/DEC/2). The work programme defined electronic commerce for its purpose as "the production, distribution, marketing,

Electronic commerce requires necessary hardware and software and access to communication networks. With the successes on these fronts,[55] e-commerce appeared to have been a natural next step.[56] The work programme laid out a number of issues to examine,[57] but after ten years, the examination of issues under the Work Programme was declared as still not being complete.[58] The WTO Ministerial Conferences in 2005 agreed "to reinvigorate the work, including the development-related issues under the Work Programme and discussions on the trade treatment, inter alia, of electronically delivered software" and declared "members will continue their current practice of not imposing customs duties on electronic transmissions" ("moratorium").[59]

Another initiative is the so-called "ITA II". The implementation of the ITA started with the high expectation of further revising the ITA, especially the possibility of incorporating additional products.[60] The Committee of Participants on the Expansion of Trade in Information Technology Products of the WTO ("the ITA Committee") started substantive work on additional information technology products in 1998[61] based on submissions by 14 participants.[62] In November 1998 the Chair of the Committee offered a

sale or delivery of goods and services by electronic means" (para. 1.3). However, this is not necessarily the universal definition of e-commerce. See e.g. OECD (2009).

55. Bacchetta *et al.* (1998, p. 46).

56. Wunsch-Vincent (2005) notes the initiative in the WTO was taken by Egypt at the Committee of Trade and Development (WT/COMTD/W/38, 3 March 1998). Other international bodies were also working on this issue. See OECD Council Meeting at Ministerial Level, 27-28 April 1998, para. 21; APEC Economic Leaders Declaration, para. 15; European Commission (1997).

57. Work programme, paras. 2-5; see also "WTO Agreements and Electronic Commerce" (WT/GC/W/90, 14 July 1998).

58. Ministerial Declaration (WT/MIN(05)/DEC), adopted on 18 December 2005 ("Hong Kong declaration"), para. 46. The history involving the Work Programme on Electronic Commerce is detailed in Wunsch-Vincent (2005, pp. 5-30).

59. Declaration on global electronic commerce, ibid note 54; Ministerial declaration (WT/MIN(01)/DEC/1), adopted on 14 November 2001 (Doha declaration), para. 34; Hong Kong declaration, para. 46. See also "Dedicated Discussions under the auspices of the General Council on Cross-Cutting Issues related to Electronic Commerce", Report to the 1-2 December 2005 meeting of the General Council (WT/GC/W/555, 21 November 2005), paras. 7, 10 and 13. This moratorium was further extended until 2011 at the Ministerial Conference in December 2009 (WT/L/782, 11 December 2009).

60. Specific procedure for this negotiation was established in "Procedures for Consultations on and Review of Product Coverage", attached to G/L/160, supra note 48, para. 7. APEC Ministers and Quad Ministers in May 1997 expressed their intention to pursue the objective.

61. WTO NEWS PRESS/90 on 16 February 1998, "More information technology products proposed for tariff elimination", www.wto.int/english/news_e/pres98_e/pr90_e.htm.

62. Proposed Additions to Product Coverage were submitted by Canada; Switzerland; the European Communities; Hong Kong, China; Israel; Chinese Taipei; Japan; Australia; Singapore; Turkey; the Philippines; Norway; the United States; and Malaysia (G/IT/SPEC/1-14).

"Proposal" on product coverage with some 200 items.[63] Although the majority of the participants indicated that they could accept the proposal, Malaysia noted that the proposal did not include the products it had requested[64] and "India expressed serious concern that certain security-related products that it considered to be non-IT products were on the list".[65] It remained on the agenda of the Committee, but no discussions took place on this matter in 1999.[66] Although the OECD Ministerial Council in May 1999 called for early conclusion of an ITA-2,[67] and adopting ITA II was one of the goals of the United States for the Seattle WTO Ministerial Conference in December 1999,[68] after the setback of the Seattle Ministerial, ITA II has no longer been an independent agenda item at the Committee meetings.

The ITA Committee has also been working on other issues foreseen in the text of the ITA, but tangible results have yet to be achieved (Box 2).

63. WTO NEWS on 27 November 1998, "Final ITA II package to be considered on 11 December", www.wto.int/english/news_e/news98_e/itaprx.htm.

64. Malaysia had submitted 11 audio-visual items (G/IT/SPEC/14).

65. WTO NEWS on 14 December 1998, "Participants agree to resume ITA II talks in February 1999" www.wto.int/english/news_e/news98_e/ita2pr.htm.

66. Report (1999) of the Committee of Participants on the Expansion of Trade in Information Technology Products (G/L/332, 14 October 1999), para. 10.

67. OECD Council Meeting at Ministerial Level, 26-27 May 1999, Communiqué, para. 8.

68. The White House Office of the Press Secretary, The Clinton Administration Agenda for the Seattle WTO, November 24, 1999, http://clinton4.nara.gov/WH/New/html/19991124.html.

Box 2. Work in the WTO's ITA Committee[69]

a. Non-Tariff Measures (NTMs)

(i) NTM Work Programme (G/IT/19, 11 November 2000)

Based on a proposal by Australia, the Committee approved a work programme comprised of three phases: identify NTMs, examine the economic and development impact of them, and consider the outcome of the two phases. A survey was conducted for phase 1, and several papers were submitted for phase 2.[70] Beyond that the Committee has been more focused on the next item.

(ii) A Pilot Project on EMC/EMI Conformity Assessment (G/IT/SPEC/Q3/2, 30 January 2002)

Canada proposed this pilot project, noting that while EMC/EMI (electro-magnetic compatibility/electro-magnetic interference) regulatory requirements for IT products and components were based on international standards, the differing conformity assessment requirements constituted a barrier to market access, and proposed a survey to evaluate the situation and develop specific proposals for appropriate action. Based on the survey and discussions, Canada summarised the existing conformity assessment procedures into six types and called for simplification of the procedures. It developed "Guidelines for EMC/EMI Conformity Assessment Procedures",[71] and a list of types of procedures used by ITA participants has been drafted.[72] The guidelines have no legal status, and specific solutions are yet to be worked out.

b. Divergence in Classification

Attachment B of the ITA is a positive list of specific products to be covered "wherever they are classified in the HS".[73] Because HS codes assigned to Attachment B items can differ across countries, the ITA instructs the participants to "consider" the issue and sets out the "common objective of achieving, where appropriate, a common classification within existing HS nomenclature".[74]

After preliminary work by the Secretariat in 1997-1999,[75] informal meetings of customs experts were held in 1999, 2000 and 2002 on Attachment B items,[76] and on this basis the Secretariat categorised Attachment B items into Lists I to V according to the degree of divergence/consensus.[77]

The Committee apparently endorsed the classification of List I(A) and (B) once back in 2005,[78] and discussions since then has been concentrated on List V (items referred back to the Committee).[79] On List III (items sent to the

69. In addition to documents cited, minutes of the meetings of the ITA Committee (G/IT/M/30 onwards) have been consulted.

70. G/IT/SOEC/Q2/11/Rev.1 (14 April 2003); Submissions by Australia (G/IT/SPEC/Q3/1, 17 October 2001), by the EC (G/IT/SPEC/Q3/3, 2 August 2002), and by the US (G/IT/SPEC/Q3/6, 16 October 2002).

71. G/IT/25 (17 February 2005).

72. Latest update is found in G/IT/W/17/Rev. 4 (16 October 2007).

73. Dreyer and Hindley (2008) notes that this approach was adopted in order to cover the multifunctional products without agreeing on their classification.

74. ITA, Annex para. 5.

75. G/IT/2Add.1/Rev.1 (29 July 1999).

76. This includes "for Attachment B" under Attachment 1-Section 2. The report of the last meeting noted that "[t]he group believed they had gone as far as possible at this point in time at the technical level and therefore thought this should now be taken up actively in the formal Committee." G/IT/14/Rev,1/Add,1 (15 April 2003).

77. G/IT/W/6/Rev.3 (20 December 2004).

78. The minutes of the meeting on 24 February 2005 (G/IT/M/42).

79. The latest summary is contained in G/IT/W/20 (13 March 2006).

WCO), the reply from the WCO was delivered in 2006,[80] but no further action has been taken. There has been little discussion on List IV (items where no further progress could be achieved by customs experts). More recently, there has been a renewed initiative to seek endorsement of List I(A).[81]

c. Increased Participation

After starting with 14 Members in December 1996, participation expanded to 28 participants in July 1997, and currently stands at 46 participants (counting the EU as one), covering 97% of world trade.[82]

More recent participants joined as a part of their accession commitments (e.g. China, Ukraine, Vietnam), as a result of FTA negotiations with the US (e.g. Bahrain, Central American countries)[83] or EU enlargement (e.g. Hungary), or following national policy decisions to pursue an open regime in ICT trade (e.g. Mauritius, Egypt).[84] But some Members with significant trade are still outside the ITA. Even among "participants", some have not yet transformed their commitment to a legal obligation (El Salvador and Morocco).

2. New developments and current issues: the ITA and the DDA

After the Doha Development Agenda (DDA) was launched in 2001, the IT/electronics industry has had high expectations that it would solve the remaining ICT tariff and non-tariff issues.[85] With the DDA negotiations still ongoing, maintaining the effectiveness of the ITA has become an important issue for the multilateral trading system.

80. G/IT/26 (21 March 2006), G/IT/26/Add.1 (25 October 2006), G/IT/26/Add.2 (19 March 2007).

81. G/IT/W/30, 11 March 2009.

82. G/IT/1/Rev.43 (28 October 2010).

83. Commitments to participate in the ITA have been made by Colombia in the context of FTA negotiations with the US. Department of Commerce, U.S.-Colombia Free Trade Agreement Market Access Results: Information Technology Agreement Products (August 2006), www.ita.doc.gov/td/tradepolicy/sector%20reports/colombia_ita.pdf.

84. Cabinet Decisions taken on 12 February 1999, Prime Minister's Office, Mauritius (noting that ITA participation is "a further step strengthening the status of Mauritius as a WTO-compliant country, thereby promoting transfer of Information Technology into our country".), www.gov.mu/portal/site/pmosite/menuitem.4ca0efdee47462e7440a600248a521ca/?content_id=71d4534d7bff7010VgnVCM100000ca6a12acRCRD. Hashem (2004) notes the goals of ITA participation by Egypt as: reducing producers' cost, encouraging consumer demand, encouraging innovation and development, and creating job opportunities.

85. See e.g. "Global ICT/Electronics Industry Message to the WTO Ministerial in Hong Kong regarding Market Access Negotiations for ICT/Electronics and Electrical Products", issued industry associations from Colombia, Ecuador, Europe, Canada, Israel, Ireland, Japan, Korea, India, Philippines, the US, 13 December 2005; 11th World Electronic Forum Communiqué (14-16 September 2005, London), www.wefonline.org/docs/wef_london/wef_london_communique.doc; 2008 ABAC (APEC Business Advisory Council) Recommendations on Innovation, IPR and ICT Enabled Growth, www.ncapec.org/reports/2009%20Executive%20Roundtable/2008%20ABAC%20Recommendations%20on%20Innovation.doc. See also Matthew J. Slaughter, "Happy Birthday ITA", WSJ (17 July 2007).

2.1 Product coverage of the ITA

(a) Interpretation of the product coverage

The coverage of the ITA is defined in the Attachments (A and B), with respect to which the participants must bind and eliminate customs duties (ITA, para.2). There have occasionally been disagreements on the interpretation of specific items. Japan raised an issue at an ITA Committee meeting in 2003, stating that a participant had been treating digital cameras as a non-ITA item since January 2002. The United States raised another issue in 2004 involving "thermistor devices". Japan raised the issue of digital cameras with another participant in 2005.

These were eventually solved through bilateral contacts, but the issue of the interpretation of product coverage of the ITA was creeping up as a policy agenda beyond the bilateral context. For example, one speaker who discussed non-tariff barriers at the WTO IT Symposium in 2004 placed "product classification – ITA" or "interpretation of Harmonized System (HS)", which can result in inconsistent classification interpretation across countries and delays, at the top of the list of non-tariff barriers involving IT trade.[86]A series of ITA Committee meetings in 2006-07 held lively discussions as to how best to maintain the ITA in the presence of technological development, including a session with industry representatives in January 2007.[87] The central theme was the possible impact of innovation. The ICT sector is highly innovative and the products are continuously becoming more sophisticated and/or incorporating new functionalities (e.g. digital cameras with moving image recording function, mobile phones with TV or GPS functions). This can lead different ITA participants to impose different tariff treatment of ICT goods.

For example, the European Union observed that adding certain functionalities could change their classification to the one which may not fall within the ITA, and in order for such products to be covered by the ITA, negotiations such as ITA II would be needed, as foreseen in the Annex of the ITA (para. 3); the United States took the view that if ITA product coverage had been limited to less sophisticated versions of the products that existed at the time the Agreement, there might be few products currently on the market that would be eligible for duty-free treatment, and this would not be what the ITA had envisaged, which stated "[e]ach party's trade regime should evolve in a manner that enhances market access opportunities for information technology products" (para.1).[88]

86. Verma (2004). Other non-tariff barriers in the list includes customs valuation, import licensing, countervailing measures and anti-dumping, technical barriers to trade, TRIPS, TRIMS and government procurement.

87. See EICTA (European Information & Communications Technology Industry Association) website www.eicta.org/index.php?id=36&id_article=94; JEITA (Japan Electronics and Information Technology Industries Association) website www.jeita.or.jp/english/press/2007/0118/index.htm. Same concern has also been expressed by APEC ministers at the successive APEC Ministerial Meetings and the Meetings of APEC Ministers responsible for Trade from 2006 through 2008.

88. Drawn on the Committee meeting discussions in 2007, as well as Communications from the United States "Coverage for Information Technology Products under the Information Technology Agreement (ITA)", G/IT/W/21 (24 July 2006); G/IT/W/23 (23 October 2006); G/IT/W/26 (12 January 2007), and Communication from the European Communities "Review of the Information Technology Agreement (ITA)", G/IT/W/28 (TN/MA/W/107). EU Council subsequently authorised the Commission to open negotiation on the review of

The industry stressed the need for maintenance of the ITA in a session with the ITA Committee in January 2007, highlighting the contribution of technological innovation in ICT and expressing their concern about increasing degree of discrepancies in interpretation of product coverage of the ITA.[89]

In May and June 2008, the United States, Japan and Chinese Taipei requested formal consultations with the European Communities under the dispute settlement procedure of the WTO regarding the tariff treatment that the EC accords to certain information technology products.[90] The case was reviewed by a single panel, which issued its report on 16 August 2010 (*see* Box 3 for details). The panel report was not appealed and adopted by the Dispute Settlement Body (DSB) on 21 September 2010. The parties have agreed that the European Union will implement the recommendations and rulings of the DSB by 30 June 2011.[91]

Box 3. The Panel report on "EC – Tariff Treatment of Certain Information Technology Products"

The case concerns the tariff treatment of certain "flat panel display devices" (FPDs), "set-top boxes which have a communication function" (STBCs) and "multifunctional digital machines" (MFMs). The co-complainants claimed that the European Communities is required to accord duty-free tariff treatment to these items under the EC Schedule of Concession pursuant to the commitment under the ITA (Panel report, para. 2.1), instead of positive duties which have been imposed (up to 14%, 13.9% and 6% respectively).

As the Panel noted, "[o]ne of the issues to consider is, to what extent is the state of technology that existed at the time of the negotiations relevant to determining the scope of the commitments. A related issue is, how should technological development, product evolution and 'new products', be dealt with in interpreting concessions" (para. 7.596). This statement was made in the context of the FPDs, where the EC argued, in rejecting the claims by the co-complainants on the FPDs, among others, "a monitor that can be used today as the output unit of an automatic data-processing machine is fundamentally different from ADP (automatic data processing machines) monitors that were used and defined in 1996 when the ITA was negotiated", and "these new products must be subject to negotiations" (para. 7.593).

To determine the scope of the EC's commitment on FPDs, the Panel examined "the ordinary meaning of the terms of the European Communities' FPDs commitment", which is "Flat panel display devices […] for products falling within this agreement […]". The Panel observed "there is no express limitation on technical characteristics" in this commitment, and concluded "while the flat panel display devices at issue must be designed for use with an automatic data processing machine there is no requirement for exclusivity, such that the concession would be limited to apparatus that only display or reproduce signals from products falling within the ITA, including automatic data-processing machines" (para. 7.597). The Panel took the view, therefore, that "there is no need to consider further the particular status of technology at the time of negotiating the concession in assessing the scope of the concession before us" (para. 7.600). For the Panel, the state of technology at the time of the negotiations was "of limited relevance" (para. 7.601).

On the STBCs, the EC illustrated the technological development of the STBCs since 1996 and argued "[w]hile these latter models retained a communication function […] these products represent a new or "merged category" of products focused on video recording." (para. 7.950) The Panel, similarly relying on the ordinary meaning of the terms, which is "Set top boxes which have a communication function: a microprocessor based device incorporating a modem

the information technology agreement (Press Release, 2959th Council Meeting, Agriculture and Fisheries, 7 September 2009).

89. EICTA, JEITA and U.S. High-Tech Trade Coalition, Industry Case for Maintenance of the Information Technology Agreement (ITA), 18 January 2007.

90. European Communities and its Member States – Tariff Treatment of Certain Information Technology Products (DS375, DS376, DS377).

91. WTO, European Communities and its Member States – Tariff Treatment of Certain Information Technoogy Product: Agreement under Article 21.3(b) of the DSU, WT/DS375/16 (6 January 2011).

for gaining access to the Internet and having a function of interactive information exchange", established that "[t]hese apparatus […] may handle one or several functionalities". (para. 7.954)

On MFMs the parties presented different understandings of the technology. In particular, "[t]he European Communities […] argues that contrary to the complainant's assertions MFMs are not 'technologically advanced versions of printers' but rather are best described as 'the result of a process of technological convergence whereby different devices, each with a specific function (photocopiers, printers and/or facsimile machines), have been merged into a single machine capable of performing simultaneously various functions.' The European Communities asserts that these machines were developed from a 'photocopier basis'" (para. 7.1375). Thus, "MFMs which can 'photocopy' in black and white 12 or more pages per minute" was classified by the EC "as a photocopier under CN code 9009 12 00 [under HS2002] which sets a 6 per cent duty rate" (para. 7.1221).

"The complainants submit that ADP MFMs [those that are connectable to ADP or networks] are covered by the duty-free concession in subheading 8471 60 in the EC Schedule ('Automatic data-processing machines and units thereof'; 'Input or output units, whether or not containing storage units in the same housing')" (para. 7.1243), whereas non-ADP MFMs (those that are connectable to telephone lines) "fall within the European Communities' duty-free concession in the EC Schedule for 'facsimile machines' in subheading 8517 21" (para. 7.1507). The Panel concluded "none of the MFMs at issue fall within the scope of the concession in HS1996 subheading 9009.12" (para. 7.1488), and at least some of the MFMs fall within the scope of the subheading 8471.60 (for ADP MFMs) or 8517.21 (non-ADP-MFMs) (paras. 7.1488 and 7.1536).

The Panel therefore "found that the European Communities has acted inconsistently with Articles II:1(a) and II:1(b) of the GATT 1994", and it recommended "that the Dispute Settlement Body request the European Communities to bring the relevant measures into conformity with its obligations under the GATT 1994" (para. 8.24). This conclusion is specific to the wording of the commitment and the characteristics of the products in question. While the Panel did not accept the view that technological development after the negotiation disqualifies the product from duty-free treatment, the Panel also recognised the possibility that "through the inclusion of additional features or incorporation into another product, an apparatus may no longer be described as, in essence, a 'set top box which ha[s] a communication function' and would not be covered by the concession" (para. 7.954). Neither did the Panel preclude the possibility that some FPDs in question may fall within a dutiable HS number, on which the Panel did not see it necessary to make any finding (para. 7.672).

It is also noteworthy that the Panel took the view that the relevant "object and purpose" which provide the context in interpreting the commitment are those of the WTO Agreement including the GATT 1994, namely "to provide security and predictability in the reciprocal and mutually advantageous arrangements directed to the substantial reduction of tariffs and barriers to trade". The Panel, on the other hand, did not agree that the provisions of the ITA (e.g. "[e]ach party's trade regime should evolve in a manner that enhances market access opportunities for information technology products" or "to achieve maximum freedom of world trade in information technology products") are relevant in determining the object and purpose (paras. 7.548 and 7.1328).

Thus, while the Panel report has provided much clarity to the intensely discussed issue of how technological development may impact commitments under the ITA, there remain potential issues that may need to be answered in future.

Source: WTO, European Communities and its Member States – Tariff Treatment of Certain Information Technology Products: Reports of the Panel (WT/DS375/R, WT/DS386/R. WT/DS377/R, 16 August 2010).

Note: Footnotes and italics accompanying the texts quoted here are omitted.

(b) Revisions of HS nomenclature

Another issue regarding the ITA coverage has been changes in HS nomenclature. Attachment A of the ITA is based on HS1996, but the WCO regularly revises the HS nomenclature, and two revisions (HS2002 and HS2007) have already taken place since the ITA was adopted. In particular, the revision from HS2002 to HS2007 has a larger and complicated impact on classification of IT products.[92] Today the codes in the national schedules actually applied at customs (HS2007) are different from those in Attachment A (HS1996), and simply comparing the two may not reveal whether the commitment under

92. G/IT/W/22 (20 October 2006).

the ITA is being observed or not. It may also be possible that different countries are operating under different understandings of the ITA coverage under HS2007.[93] This issue was initially brought up in the discussions at the WTO IT Symposium in 2004,[94] and later Japan submitted a communication[95] suggesting that the Committee should take steps to update the customs codes of the Attachment from HS 1996 to HS 2002 and HS 2007 with a view to enhancing transparency and predictability of product coverage of the ITA. Following the discussions on this proposal, the Secretariat prepared a "model" list of ITA products in HS2002 and HS2007 for further discussion in the Committee.[96]

(c) Classification divergences (Attachment B)

The long-standing work of the ITA Committee on "classification divergence" of the Attachment B (see Box 2) can also contribute to clarifying the product coverage. The communication from Japan above noted the need to accelerate the ongoing work on Attachment B, without specifying further details. List V and III have been on agenda, but List IV has not even been discussed in recent years. The status of List I, and how the endorsement, if achieved, will be implemented has still not been clarified. Moreover, these works have been underway on the basis of HS1996, even though HS2007 is already being implemented.

2.2 DDA negotiations

DDA negotiations cover sectoral tariff elimination and non-tariff barriers (NTBs) as a part of non-agricultural market access (NAMA) negotiations, and WTO Members have actively utilised these opportunities to seek solutions to the issues relating to trade in ICT goods. While the results of these efforts are contingent on the success of the DDA as a whole, the following developments in NAMA negotiations are particularly noteworthy.[97]

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93. Concession schedules that include the obligation under the ITA will be transposed into new HS nomenclature under a different committee of the WTO, but many of them were still in HS1996 and only in the process of transposing into HS2002. See "Situation of Schedules of WTO Members", G/MA/W/23/Rev.6 (19 March 2009). Transposition to HS2007 was foreseen to take place well beyond the beginning of 2007. "A Procedure for the Introduction of Harmonized System 2007 Changes to Schedules of Concessions Using the Consolidated Tariff Schedules (CTS) Database", Decision of 15 December 2006 (WT/L/673, 18 December 2006). Given this situation, the new concession schedule after completion of the DDA is envisaged to be made based on HS2002, not HS2007. Fourth Revision of Draft Modalities for Non-Agricultural Market Access, TN/MA/W/103/Rev.3 (6 December 2008) ("NAMA Text"), para. 3.

94. G/IT/W/14 (20 December 2004).

95. G/IT/W/25 (24 November 2005) para. 4.

96. Minutes of the Meeting of 29 March 2007, paras. 5.4-5.8 (G/IT/M/48, 2 November 2007). Similar HS transposition exercise took place regarding the Agreement on Trade in Civil Aircraft (TCA/4, 23 November 2001), and transposition into HS2007 has been on the agenda in 2007-2008 (Committee on Trade in Civil Aircraft, Minutes of the Meeting of 10 November 2008, TCA/M/24, 17 December 2008).

97. In negotiations on Services, discussions on ICT related services have been also taking place. The summary of recent discussions is contained in: Services Signalling Conference: Report by the Chairman of the TNC, JOB(08)/93 (30 July 2008), available from www.wto.org/english/tratop_e/dda_e/meet08_texts_e.htm. See also Liberalization of

(a) Sectoral tariff liberalisation

In general, classification will become an issue when tariff levels of closely related products are significantly different (Jackson, 1997). Problems of classification will be resolved if differences in tariff levels are eliminated. In the context of the ITA, ITA II could have to some extent prevented the problem if it had been successful.[98] DDA negotiations that started in 2001 opened another opportunity to achieve this. Discussions on the possibility of tariff elimination on specific sectors started soon after the adoption of NAMA Framework in July 2004,[99] which acknowledged that "a sectorial tariff component, aiming at elimination or harmonization is another key element" in NAMA negotiations, although it was "supplementary" to the "core" modality of formula reduction.[100]

Discussions on tariff elimination in the electronic/electrical (E/E) sector led by Japan was one such sectoral initiative, and the proposals were tabled in July 2005 as among the first sectoral proposals based on the NAMA Framework,[101] and subsequently in April 2006,[102] jointly by six Members including developed and developing countries. It aims to "cover a very broad range of products" to cope with "convergence among products",[103] and it proposes tariff elimination of a range of ICT products and other electronics/electrical products (including semiconductor manufacturing equipment, as in the case of the ITA) with special and differential treatment for developing countries, on

Telecommunication Services, TN/S/W/50 (1 July 2005); Joint Statement on the Negotiations on Computer and Related Services, TN/S/W/38 (25 February 2005); Understanding on the scope of coverage of CPC 84 – Computer Related Services, TN/S/W/60, S/CSC/W/51 (26 January 2007). The process before 2006 is in Wunsch-Vincent (2008).

98. The original ITA itself worked as a solution to the problem that had existed before. Tariff treatment of LAN equipment and personal computers with multimedia capability by certain EU Member States had been the subject of dispute between the European Communities and the US (WT/DS62/AB/R, WT/DS67/AB/R, WT/DS68/AB/R, 5 June 1998), but tariffs for those products were eliminated under the ITA. See US GAO (2000) p.74.

99. The preceding negotiation before July Framework in 2004 is described in Wunsch-Vincent (2006).

100. Annex B "Framework for Establishing Modalities in Market Access for Non-Agricultural Products" ("NAMA Framework") paras. 7, 12 in Doha Work Programme, Decision Adopted by the General Council on 1 August 2004, WT/L/579 (2 August 2004). See also Hong Kong Declaration, para. 16.

101. Alongside a proposal on chemicals. Prior to NAMA Framework, WTO Members had submitted their thoughts about elements of NAMA modalities, which often included sectoral elements; e.g. Canada (expanding existing arrangements, new sectors (fish, forest, etc.), TN/MA/W/9, 15 October 2002), EC (textile, etc., TN/MA/W/11, 31 October 2002); Japan (expanding existing arrangements (ITA, chemicals), new sectors (consumer electronics, etc.), TN/MA/W/15, 20 November 2002); US (global implementation of existing arrangements (ITA, civil aircraft), new sectors (electronics, etc.), TN/MA/W/18, 5 December 2002),

102. "Tariff elimination in the Electronics/Electrical Sector", TN/MA/W/59 (4 July 2005); TN/MA/W/69 (28 April 2006), communication from Hong Kong, China; Japan; Korea; Singapore; Thailand; and the United States.

103. TN/MA/W/69, ibid, para. 4.

the condition of achieving "critical mass" defined as 90% of the world trade.[104] In a related move, the European Communities also submitted a communication to the ITA Committee as well as the NAMA negotiating group in 2008, proposing a "review of product coverage" of the ITA, "such as […] negotiating the inclusion of products that present specific challenges for ITA members, and in particular of multi-functional products".[105] The EU reiterated its proposal at an ITA Committee meeting which was held after the WTO Panel report was formally adopted.[106]

(b) NTB proposals

As in the NTM work programme of the ITA Committee, work on non-tariff issues requires identification of the specific problem to be followed by exploration of the solution. Negotiations on NTBs in NAMA[107] also started with identification by Members' notifications of NTBs to the negotiating group.[108]The negotiating group examined the notifications and identified those that should be discussed in NAMA negotiations, and those that should be addressed elsewhere were referred to an appropriate body. Alongside this process, Members also pursued "vertical" initiatives to examine NTBs, one of these being electronic products,[109] led by Korea,[110] where issues such as standards-related issues, duplicative testing, minimum import price systems, redundant customs inspections and customs classifications were discussed until early 2006.[111] The European Communities introduced a separate proposal focusing on TBT-related issues involving electronic goods in 2007. The United States also introduced its proposal on electrical safety and EMC in 2008.[112] While the subject matter is closely related to the ongoing pilot project in the ITA Committee, these proposals, unlike the EMC/EMI Guidelines, aim at finding specific solutions by creating certain legal instruments.

In addition, the 2008 EC communication proposes negotiations to "eliminate all and prevent the creation of new non-tariff barriers affecting these products", in particular

104. The latest proposal is contained in the NAMA text, Annex 6.

105. G/IT/W/28, TN/MA/W/107 (15 September 2008). It is not recorded in the latest NAMA text (para.10 and Annex 6) that was issued after the communication came out.

106. WTO, "EU Pushes for Review of Information Technology Agreement" 2010 News Items (11 November 2010) (www.wto.org/english/news_e/news10_e/ita_11nov10_e.htm).

107. Doha Declaration, para. 16.

108. NAMA Framework, para. 14.

109. Hong Kong Declaration, Annex B: "Report by the Chairman of the Negotiating Group on Market Access to the TNC", para. 26

110. NTBs of the Electronics Industry: Korea's Contribution to Vertical Approach to NTBs Negotiations, TN/MA/W/6/Add. 4 (8 November 2004).

111. Progress Report: Discussions on Electronic NTBs, TN/MA/W/6/Add.5 (6 October 2005).

112. WTO, Negotiating Group on Market Access, "Negotiating Text: Understanding on the Interpretation of the Agreement on Technical Barriers to Trade as Applied to Trade in Electronics", Communication from the European Union (TN/MA/W/129, 7 December 2009); "Negotiating Text on Non-Tariff Barriers Pertaining to the Electrical Safety and Electromagnetic Compatibility (EMC) of Electronic Goods", Communication from the United States (TN/MA/W/105, 26 November 2010).

"agreement on substantive provisions concerning the recognition of internationally agreed standards and methods of conformity assessment".

3. Achievement and outstanding issues in the multilateral trading system

The WTO has made a genuine effort to play a role in enhancing ICT trade. The achievement of the ITA was especially unique, as it "was a self-contained sectoral initiative that grew out of the potential benefits recognized by the participants to their national development policies".[113] Still, in the face of the increasing trade policy needs to reflect technological developments, the WTO has played a role as a forum for discussions, often involving industry representatives, and has successfully raised awareness about existing problems. The dispute settlement mechanism of the WTO played a significant role in resolving issues involving three products. This outcome is specific to the wording of the commitments and the characteristics of the products in question. In view of constantly evolving technologies, the appropriate tariff treatment of new products may give rise to other instances of diverging interpretations of existing commitments.

It is often pointed out that significant declines in tariffs have made non-tariff barriers much more important than tariffs. The ITA has demonstrated that this is not completely the case with regard to trade in ICT goods. Moreover, as shown in Section 2 there remain substantial tariff barriers – those imposed by non-ITA participants, as well as those facing ICT goods which are not covered by the ITA.

This is not to discount the importance of addressing well-defined non-tariff issues involving ICT goods. One study (Hedlund and Atkinson, 2007) cites the following trade-related issues involving information technology: tariffs, taxes, antitrust laws, subsidies, theft of content and intellectual property, market access restrictions by use of standards, data privacy rules, government procurement, limitations to encryption, restrictions on refurbished equipment, barriers to telecommunications investment and services, limitations on foreign investment, limits on telecommunications interconnection and blocking of internet services. Recent trade measures in the face of the global financial crisis have also demonstrated types of measures that can be employed to curb trade flows (see Section 2). The current ITA leaves out concrete disciplines on most of these.

In this context, the DDA has offered an opportunity to make real progress in broad fronts in various negotiating groups, including non-agricultural market access, services, rules (antidumping, subsidies), and trade facilitation. In particular, tariff and non-tariff issues specific to ICT goods trade have been pursued and substantial work has been done in the NAMA process (Table 4). On tariffs, initiatives for sectoral tariff liberalisation have been actively pursued in the NAMA negotiating group (Table 5). On the non-tariff side, negotiating proposals have been tabled that cover similar subjects as the pilot project in the ITA Committee but that aim at providing specific and concrete solutions (Table 6). While these proposals are independent of the framework of the ITA and the substance such as product coverage and participation can be tailored through negotiations, the success of these initiatives is dependent on the overall success of the DDA, and sectoral

113. WTO Director-General Pascal Lamy, in opening the WTO Information Technology Symposium, 28 March 2007.

tariff liberalisation remains among the major substantive gaps that need to be filled in the negotiations.[114]

In the ITA Committee, too, there have been lively discussions in recent years about how best to maintain the effectiveness of the ITA, with useful contributions from the participants as well as the industry. The discussions have concerned the product coverage (classification divergences on Attachment B, interpretation of covered products, HS transposition, and possible expansion), the scope of disciplines (non-tariff measures) and expanding participation. Tangible results have not so far been achieved. Until solutions are achieved by concluding the DDA, these issues will need to be addressed in order to maintain the relevance of the ITA in the face of continuous product innovation in the ICT sector. Unlike the negotiations through the DDA, the outcome of such work is not dependent on the overall outcome of the DDA, as long as consensus among ITA participants is achieved (Tables 5 and 6).

Thus, tariff liberalisation on the broader scope of ICT goods with participation of a larger number of countries as well as addressing non-tariff issues remain unfinished business for WTO Members. Both the DDA negotiations and the framework foreseen in the ITA can serve as avenues to further work toward possible trade liberalisation in the ICT sector.

Table 4. Overview of developments to date and outstanding issues

	Developments	Outstanding
Scope of tariff elimination	- ITA II negotiation was pursued, but then shelved. - NAMA sectoral proposal on E/E has been submitted by six Members. - EC submitted proposal to expand the ITA coverage.	- E/E proposal needs further negotiation to achieve critical mass to be part of DDA results. - Substance (modality) is yet to be specified in the EC paper.
NTMs	- The ITA Committee agreed on work programme; priority given on the pilot project on EMC conformity assessment. - Related NAMA NTB proposals have been submitted by US and EC.	- EMC survey not completed, and specific solutions not yet examined. Other NTMs not yet been discussed. - NAMA NTB proposals yet to garner sufficient support to be part of DDA results.
Classification divergence	- Attachment B items have been categorised into Lists I to V. List I agreed. - List III had been referred to the WCO and the Committee has received the reply. - List V under discussion.	- Status of List I. Treatment of List III is pending. No discussion on List IV. Discussion on List V is still on-going. - Discussion is still based on HS1996. No discussions on HS2002 or HS2007.
HS Transposition	A “model list” prepared by the WTO Secretariat.	The way forward remains uncertain.
Participation	Participants have increased to 46 (counting the EU as one) covering 97% of world trade.	Some major players still remain outside the ITA.

114. See Statements by Pascal Lamy, Director General of the WTO, to the Trade Negotiations Committee, 17 December 2008, and in an informal meeting of the TNC, 29 March 2011.

Table 5. Expansion of ITA product coverage and NAMA sectoral tariff elimination

	ITA Expansion	NAMA Sectoral
Product coverage	Additional to current coverage, yet to be specified.	Up to negotiations. E/E proposal sets out specific product coverage (including all ITA products).
Participation	Current ITA participants must agree on the additional products by consensus.[115] EC paper proposes to "include major producers of IT products still outside the ITA".	Up to negotiations, without regard to participation in the ITA. E/E proposal proposes critical mass of 90%.
Special and differential treatment (S&D)	Original ITA allowed for time extension through staging, but no exception to tariff elimination.	Up to negotiations. E/E proposal provides the possibility of time extension through staging and limited possibility of maintaining certain tariffs.

Table 6. Works on the NTMs in the ITA Committee and the NTBs proposals in NAMA negotiations

	ITA - NTM	NAMA - NTB
Product Coverage	ITA products[116]	Can be made broader than ITA products
Participation	ITA participants	WTO Members
Subject covered	Conformity assessment procedures for EMC/EMI	Standards, technical regulations as well as conformity assessment procedures related to the electrical safety and EMC (EU, US)[117]
Instrument	Guidelines (no legal status)	Legal instrument ("Understanding")

115. ITA, Annex, para. 3.

116. Wireless telecommunication equipment is excluded in the original survey (G/IT/SPEC/Q3/2, 30 January 2002).

117. The proposed disciplines on the subjects covered in the two proposals are different.

Appendix

Product composition of trade in ICT goods

Table A.1. Top five export items by income group pair

2001, 2006 and 2009 (billion USD, HS1996)

2001	1	2	3	4	5	2006	1	2	3	4	5	2009	1	2	3	4	5
HIC to HIC																	
847330	x	C	P	84	12%	852520	x	T	C	110	11%	854230	x	E	P	131	18%
854213	x	E	P	53	8%	847330	x	C	P	98	10%	852520	x	T	C	46	6%
852520	x	T	C	42	6%	854213	x	E	P	97	10%	847330*	x	C	P	39	5%
847170	x	C	C	34	5%	854230	x	E	P	46	5%	851780	x	T	C	35	5%
847160	x	C	C	29	4%	852990	(x)	E	P	32	3%	852812	-	A	D	31	4%
HIC to LMIC																	
854213	x	E	P	22	11%	854213	x	E	P	66	17%	854230	x	E	P	110	27%
847330	x	C	P	20	10%	847330	x	C	P	51	13%	847330*	x	C	P	31	8%
854230	x	E	P	11	6%	852990	(x)	E	P	36	9%	851790	x	T	P	27	7%
852990	(x)	E	P	11	5%	854230	x	E	P	33	8%	852990*	(x)	E	P	19	5%
852520	x	T	C	10	5%	852520	x	T	C	26	7%	852520	x	T	C	15	4%
LMIC to HIC																	
847330	x	C	P	25	13%	847330	x	C	P	45	9%	847130*	x	C	C	65	13%
847160	x	C	C	13	7%	847130	x	C	C	45	9%	852520	x	T	C	45	9%
852520	x	T	C	11	6%	852520	x	T	C	41	8%	854230	x	E	P	38	8%
852812	-	A	D	11	6%	847160	x	C	C	32	7%	852812	-	A	D	34	7%
847170	x	C	C	9	5%	852812	-	A	D	28	6%	847330*	x	C	P	33	7%
LMIC to LMIC																	
847330	x	C	P	6	26%	847330	x	C	P	10	13%	854230	x	E	P	12	12%
852520	x	T	C	1	5%	852520	x	T	C	10	13%	852520	x	T	C	12	12%
854250	x	E	P	1	4%	854213	x	E	P	5	7%	847330*	x	C	P	9	9%
852990	(x)	E	P	1	4%	847170	x	C	C	4	5%	847130	x	C	C	7	7%
854011	-	E	P	1	4%	852990	(x)	E	P	3	5%	847170	x	C	C	6	6%

Note: Column 1: ITA A-1 coverage ("x": covered, "(x)": partially covered, "-": not covered); Column 2: ICT category (A: audio and video equipment, C: computer and related equipment, E: electronic components, T: telecommunication equipment, O: other ICT goods; Column 3: BEC category (P: parts & accessories, C: capital goods, D: durable), Column 4: export value (USD billions); Column 5: share in the total ICT goods export in the given income group pair.

The codes which did not exist under the HS versions applicable in each year (HS2002 for 2006 and HS2007 for 2009) are shaded, and the codes whose scope had been diminished under the HS versions applicable in each year are shown with asterisks. The figures for these items lack comparability with previous years, even if the HS six-digit codes shown in the table are the same. See supra note 14

Source: UN Comtrade in the WITS

Relocation of ICT goods exports

Following Figure 6, the table below shows the results from estimating the following equation by the ordinary least squares (OLS):

$$(RCA_{t+1}-RCA_t)_{ij} = \beta_1 * RCA_{tij} + \beta_2 * RCA_{itj} * ITA_i + \beta_3\ ITA_i + \beta_4 * D_i + \varepsilon_{ijt}$$

where t represents a year, i a product type (audio and video, computer related, electronic component, telecommunications, other ICT, non-classified, which are further devided into ITA and non-ITA categories, except "computer related" and "non-classified"; 10 product types in all), j an exporting country (the 40 largest ITA goods exporters, in line with Figure 6), and D a set of product dummies.

Table A.2(a). Estimation results

	1997-2001	2001-06	1997-2006	1997-2009
RCA (initial year)	-0.1695052+	-.1859987	-0.3669381+	-0.4252925+
	(0.0855702)	(.1129772)	(0.144842)	(0.1793616)
RCA*ITA	0.0313339	.1019193 (.1193692)	0.0977084	0.026976
	(0.1099413)		(0.1694598)	(0.2012122)
R-squared	0.0987	0.0599	0.1380	0.1364
N	330	390	330	330

Note: robust standard errors in the parentheses

*: p-value<.01, +: 0.1<p-value<.05, #: 0.5<p-value<.10

There are broad similarities in the results. First, the signs for RCA in the initial year for each estimation (2001 for the second column and 1997 for the rest) are negative and generally statistically significant (except 2001-06), after controlling for the types of products, and generally larger if the period of estimation is longer. This suggests that exporters which were highly specialised in ICT goods exports in the initial year tend to reduce their specialisation over time. Second, the signs for the interactive term (RCA*ITA) is generally not statistically significant, although signs are positive. This suggests that the patterns of relocation of ICT exports are not systematically different between ITA goods and non-ITA ICT goods. None of the product dummies are statistically significant (not reported in the table).

(b) Estimation results

	$(RCA_{t+1}-RCA_t)>0$			$(RCA_{t+1}-RCA_t)<0$		
	1997-2001	2001-06	1997-2006	1997-2001	2001-06	1997-2006
RCA (initial year)	.1474307*	.2073964#	.2032989	-.2864483*	-.39889*	-.5672408*
	(.0550546)	(.10757)	(.1459657)	(.0971392)	(.0641022)	(.0641824)
RCA*ITA	-.0332447	-.0182405	-.0174308	.0429323	.2256689*	.1524954#
	(.0926628)	(.1280478)	(.1827417)	(.1103955)	(.0761508)	(.0838813)
R-squared	0.4376	0.3851	0.3665	0.6594	0.7113	0.8468
N	207	194	190	123	196	140

Table A.2(b) shows the results of regressions when samples are divided into two groups, those which increased RCA and the others that reduced RCA. The results show some distinct differences between the two groups and with the aggregate estimation results in Table A.2(a). First, among the samples that increased RCA, the coefficients for RCA (initial year) is positive and statistically significant, but the coefficients for RCA*ITA is not statistically significant. This suggests that exporters which were highly

specialised in ICT goods exports in the initial year enhanced their specialisation over time within this group, whether or not the product is covered by the ITA. In contrast, among the samples that reduced RCA, the coefficients for RCA (initial year) is negative and statistically highly significant, but the coefficients for RCA*ITA is significantly positive in 2001-06 period. This implies that the exporters which were highly specialised in ICT goods exports in the initial year reduced their specialisation over time, and this tendency is systematically stronger for non-ITA products between 2001 and 2006. Moreover, the coefficients for the ITA dummy for the 2001-06 and 1997-2006 are negative and statistically significant, implying that the specialisation of ITA products have declined among this second group of samples more than non-ITA products, after controlling for their initial levels of RCA.

Key official documents concerning the ITA (Excerpts)

Naples G7 Summit Communiqué (8-10 July 1994)

Jobs and Growth

"We will concentrate on the following structural measures. We will: […]

– encourage and promote innovation and the spread of new technologies including, in particular, the development of an open, competitive and integrated worldwide information infrastructure; we agreed to convene in Brussels a meeting of our relevant Ministers to follow up these issues;"

Halifax G7 Summit Communiqué (June 16 1995)

Growth and Employment

"10. We welcome the results of the G7 Information Society conference held in Brussels in February, including the eight core policy principles agreed to by Ministers, and encourage implementation of the series of pilot projects designed to help promote innovation and the spread of new technologies. […]"

The New Transatlantic Agenda (December 3 1995; EU/US Summit: Madrid, Spain)

III CONTRIBUTING TO THE EXPANSION OF WORLD TRADE AND CLOSER ECONOMIC RELATIONS

"We will contribute to the expansion of world trade by fully implementing our Uruguay Round commitments, work for the completion of the unfinished business by the agreed timetables and encourage a successful and substantive outcome for the Singapore WTO Ministerial Meeting in December 1996. In this context we will explore the possibility of agreeing on a mutually satisfactory package of tariff reductions on industrial products, and we will consider which, if any, Uruguay Round obligations on tariffs can be implemented on an accelerated basis. In view of the importance of the information society, we are launching a specific exercise in order to attempt to conclude an information technology agreement."

OECD Meeting of the Council at Ministerial Level, Communiqué (Paris, 21-22 May 1996)

PLAN OF ACTION

"9. Ministers stress that strengthening the open and rules-based multilateral system will give renewed impetus to ongoing multilateral trade liberalisation efforts […]. To that end they commit to:"

"(iv) – address the growing need for the further development of the multilateral trading system by:"

"pursuing all possibilities for further trade liberalisation, noting current work towards an information technology agreement; recalling OECD work on new issues , giving further consideration to these issues with a view to determining how to proceed;"

G7 Economic Communiqué: Making a Success of Globalization for the Benefit of All (Lyon, 28 June 1996)

II. PROMOTING STRONG AND MUTUALLY BENEFICIAL GROWTH OF TRADE AND INVESTMENT

"22. Together with our partners we will work for the success of the first ministerial conference of the WTO in December 1996. We will ensure full and effective implementation of the Uruguay Round results according to the agreed timetables.[…]

We strongly support the conclusion of a mutually beneficial Information Technology Agreement."

Second Meeting of APEC Ministers in Charge of Trade, STATEMENT OF THE CHAIR (Christchurch, New Zealand, 15-16 July 1996)

"10 . We also considered further liberalisation initiatives that might be undertaken beyond the built-in agenda. We agreed that consideration should be given to further work on improvement of market access for industrial products. We discussed the possibility of undertaking more limited sectoral initiatives, perhaps in the shorter term. In this context we listened with interest to an explanation of the proposal for an Information Technology Agreement, which would contribute to APEC liberalisation objectives, and determined that we would consider this further in the lead up to the Singapore Ministerial Conference.[…]"

EU Council Resolution on new policy priorities regarding the information society (Approved by the Council on 8 October 1996)

"In view of the recent developments and the progress achieved in establishing the information society, the Council stressed the need for an up-to-date action plan […].

[The Council] requested Member States and the Commission to secure close cooperation between the different programmes and activities in the area of information and communication technologies, to promote negotiations on the Information Technology Agreement (ITA), and to look into the problem of the distribution of illegal material over electronic networks.[…]"

APEC ECONOMIC LEADERS DECLARATION: FROM VISION TO ACTION (Subic, The Philippines, 25 November 1996)

Multilateral Trading System

"13. We endorse initiatives for freer and non-discriminatory trade in goods and services. Recognizing the importance of information technology in the 21st century, APEC Leaders call for the conclusion of an information technology agreement by the WTO Ministerial Conference that would substantially eliminate tariffs by the year 2000, recognizing need for flexibility as negotiations in Geneva proceed."

SINGAPORE WTO MINISTERIAL 1996: MINISTERIAL DECLARATION (Adopted on 13 December 1996)

"18. Taking note that a number of Members have agreed on a Declaration on Trade in Information Technology Products, we welcome the initiative taken by a number of WTO Members and other States or separate customs territories which have applied to accede to the WTO, who have agreed to tariff elimination for trade in information technology products on an MFN basis […]."

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