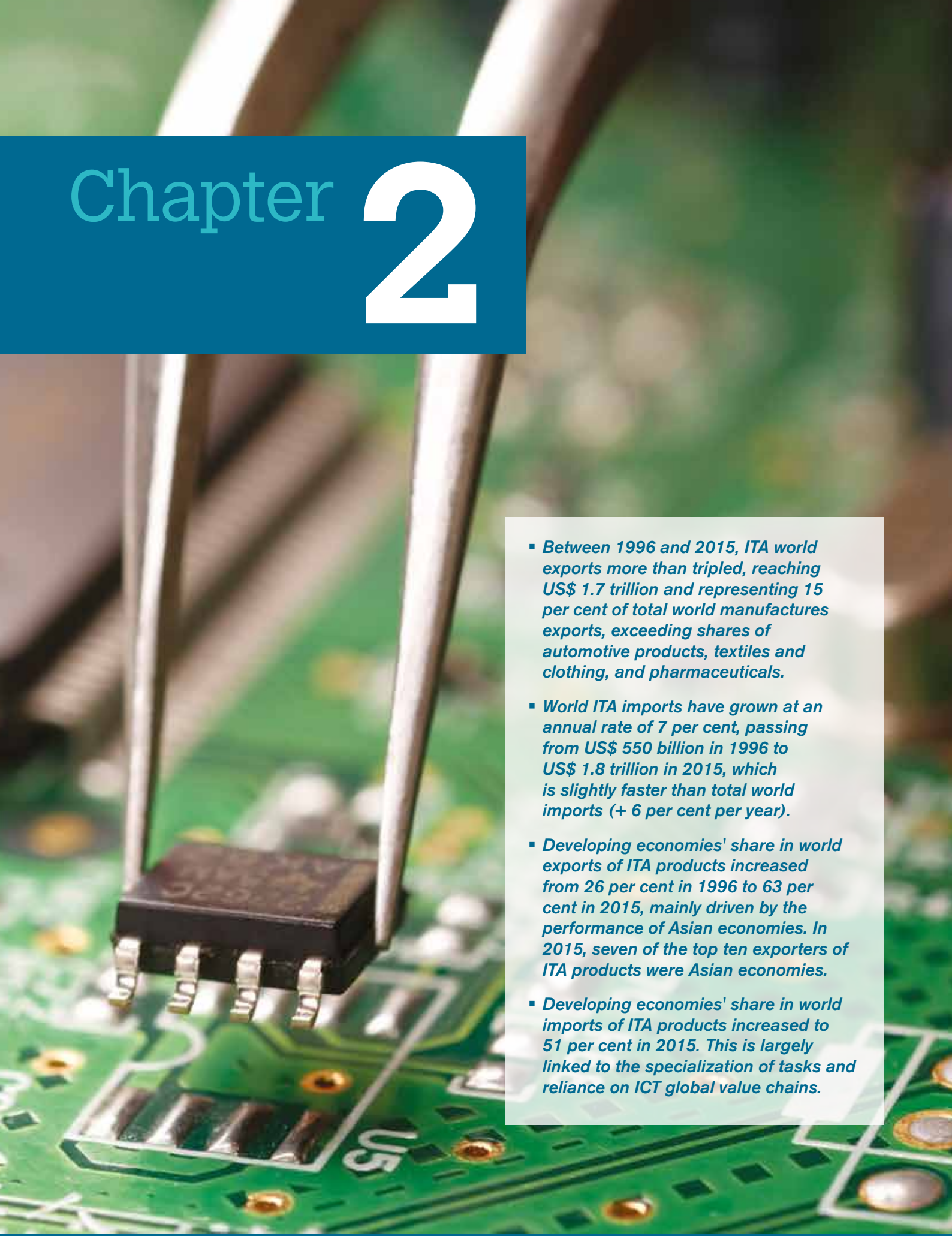
# Chapter 2



- *Between 1996 and 2015, ITA world exports more than tripled, reaching US$ 1.7 trillion and representing 15 per cent of total world manufactures exports, exceeding shares of automotive products, textiles and clothing, and pharmaceuticals.*
- *World ITA imports have grown at an annual rate of 7 per cent, passing from US$ 550 billion in 1996 to US$ 1.8 trillion in 2015, which is slightly faster than total world imports (+ 6 per cent per year).*
- *Developing economies' share in world exports of ITA products increased from 26 per cent in 1996 to 63 per cent in 2015, mainly driven by the performance of Asian economies. In 2015, seven of the top ten exporters of ITA products were Asian economies.*
- *Developing economies' share in world imports of ITA products increased to 51 per cent in 2015. This is largely linked to the specialization of tasks and reliance on ICT global value chains.*

# Key statistics and trends in ITA trade

This chapter provides an overview of tariffs and trade under the ITA for the period 1996 to 2015. For tariffs, the chapter focuses on profiles of members that joined the ITA from 2012 onwards, as there were no changes in the tariff structure of ITA participants that joined previous to 2012.[1] The vast majority of ITA participants have in fact completed the tariff phase-out periods and entirely removed import duties and other duties and charges on all covered products.[2] The most recent trends in ITA tariffs and trade for those WTO members that are key players in the sector but have not joined the agreement (hereafter called "non-participants") have also been included this chapter.

The statistical analysis in this chapter is based on a number of methodological assumptions which are described in the Appendix.

Given the importance of trade in intermediate goods, this chapter also presents the "Trade in Value Added" (TiVA) statistical approach as a tool to analyse transactions taking place within global value chains (GVCs) in ITA-related industries. It also provides an overview of how ITA participants are performing in GVCs and what their level of integration is.

## A. Tariff profile of new ITA participants

The ITA includes 82 WTO members today. The vast majority of them have already completed their tariff elimination commitments on all ITA products. Since the 15th anniversary of the ITA in 2012, seven WTO members have joined the ITA. These are Afghanistan, Kazakhstan, Qatar, the Russian Federation, Montenegro, Seychelles and Tajikistan.[3] With the exception of Qatar, the rest joined the ITA as part of their WTO accession process and agreed to bind and eliminate duties on all products covered by the ITA. In general, the initial tariff commitments of members that join the ITA as part of their accession process were more liberal than those of other participants, and in most cases these commitments were implemented upon accession. In other cases, additional time was needed to complete the domestic procedures or the formal process of modifying the WTO schedule of concessions in order to have full participant status.[4]

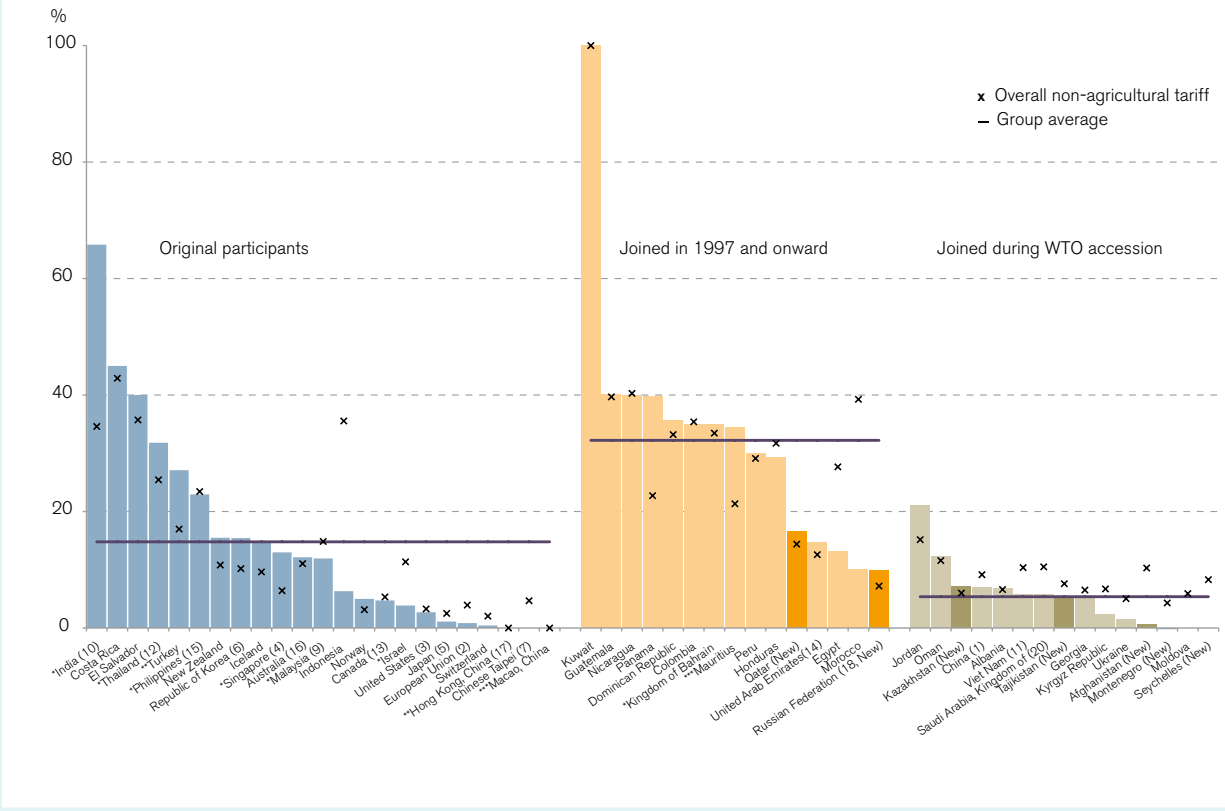
Figure 2.1 shows the average initial bound tariffs on ITA products (i.e. the starting point for tariff reduction) and compares it with the average bound tariff on non-agricultural products for all ITA participants divided in three categories ("original" participants, or participants in the ITA prior to 1997; members that joined in 1997 or after; and members that joined as part of their accession to the WTO). As indicated, members that joined the ITA as part of their accession process to the WTO (showed in green in the figure) generally have more liberal base commitments as compared to other participants.

The only new participant of the seven that has been a WTO member since January 1996 is Qatar. Qatar is a member of the Gulf Cooperation Council (GCC) and applies the GCC Common External Tariff (CET). Its bound tariffs on ITA products at the time of accession averaged 16.5 per cent and were the highest among recent participants. The other five members of the GCC are also participants in the ITA, hence the GCC CET takes into account their respective ITA commitments.

The Russian Federation joined the WTO in August 2012 and agreed to participate in the ITA as part of its accession negotiations. However, the process of modification and approval of its ITA schedule took time and the Russian Federation did not become a full participant in the ITA until September 2013. The Russian Federation is a member the Eurasian Customs Union (EACU), to which Kazakhstan also belongs. Kazakhstan joined both the WTO and the ITA in 2015, and implemented its ITA commitments upon accession. Upon joining, the Russian Federation's and Kazakhstan's base duties on products covered by the ITA were less than 10 per cent.

Afghanistan, Montenegro and Seychelles are the newest ITA participants that have the lowest bound duties on ITA products, at less than 1 per cent. Seychelles provided duty-free treatment for all ITA products during its accession year.

## Figure 2.1: Overall average bound tariffs on non-agricultural products and average initial bound tariffs on ITA products




Source: WTO Integrated Data Base (IDB) and Consolidated Tariff Schedules database (CTS).
Note: Asterisk/s before the name of the economy indicates less than 85 per cent binding coverage for non-agricultural products: *** < 35%; ** 35% - 60%; * 60% - 85%
Darker shade within each group refers to recent (i.e. new) participants. Rank as top 20 importers in 2015 is indicated in parentheses.
"New" refers to participants that joined in or mid-2012.

## B. Tariff profile of non-ITA participants

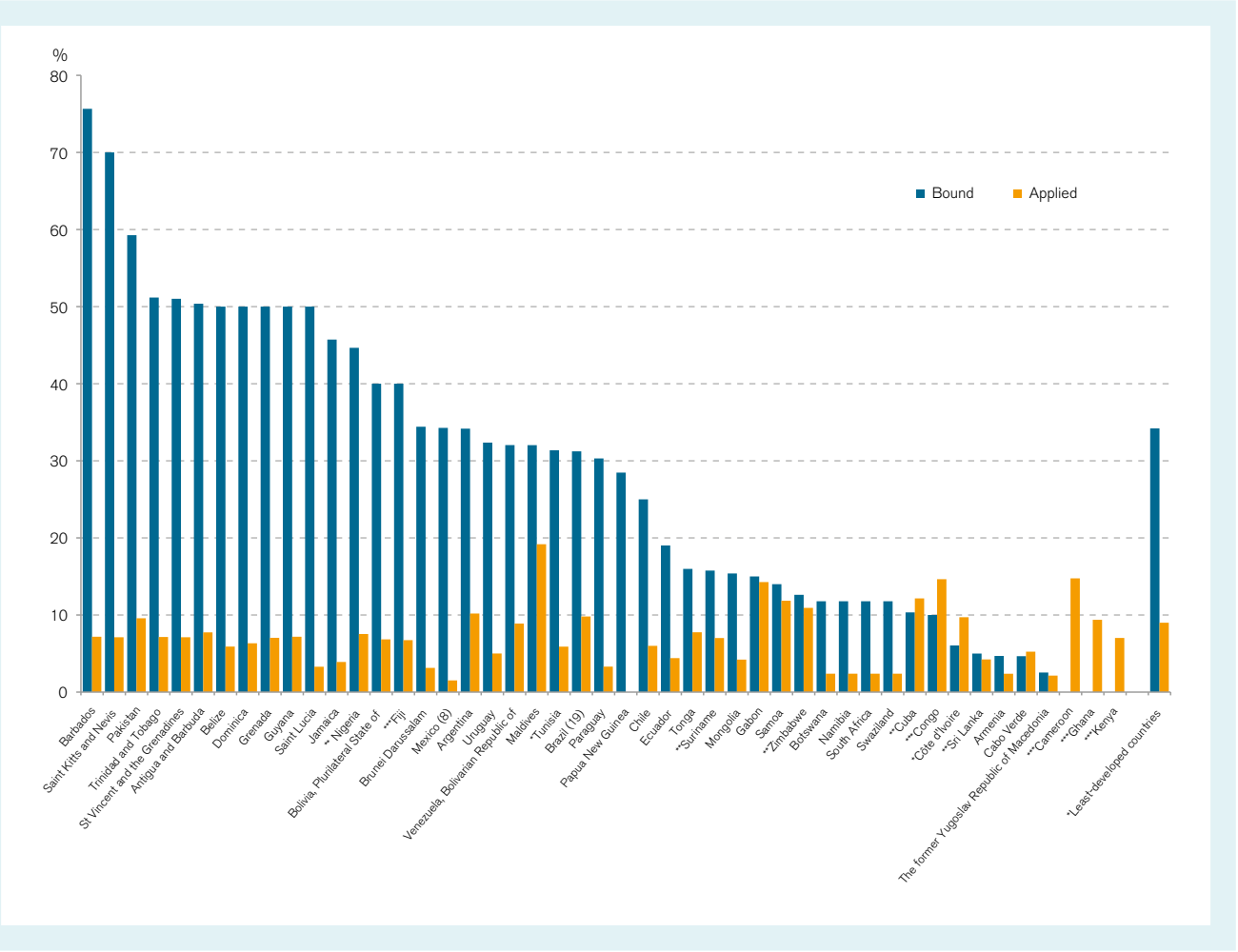
Tariffs applied by non-participants on ITA products remain generally high. Their level of tariff concessions on ITA products has not recorded significant changes. This is true both for the level of bound tariffs and the binding coverage (i.e. the percentage of tariff lines inscribed in the schedule with a bound duty). The difference between applied and bound duties on ITA products by non-ITA participants is shown in Figure 2.2. As can be seen, the situation among non-participants varies considerably with the majority of non-ITA participants with bound duties that are much higher than their applied rates.

Mexico and Brazil stand out as the two non-participants in the top 30 ITA importers; they rank 8th and 19th

***Tariffs applied by non-participants on ITA products remain generally high.***

respectively in 2015 (see Annex Table 2.1). These two members have full tariff bindings on ITA products but the level of their bound duties remains high compared to their applied rates. Therefore, the "binding overhang", that is, the difference between the duties actually applied by a member and the maximum bound rates recorded in its WTO schedule of concessions, remains high.

## Figure 2.2: Bound and latest applied tariffs of non-ITA participants




Source: WTO, IDB and CTS databases.
Note: Asterisk/s before the country name indicates less than 90 per cent binding coverage for ITA products. *** <10%; ** 10% - 50%; * 50% - 90%.

For example, in 2016 Mexico's applied MFN tariff on ITA products remained at 1.5 per cent, which is almost the same level as in 2010, hence its binding overhang persists at around 33 per cent. Similarly, Brazil's 2016 average applied MFN tariff of 10 per cent has decreased by more than 1 percentage point as compared to 2010, thus its binding overhang has reached 21 per cent. Figure 2.2 also shows that high binding overhang is a common feature of most non-participants.

Among non-participants, the member with full binding coverage and lowest bound duty (3 per cent) for ITA products is the former Yugoslav Republic of Macedonia On applied tariffs, Papua New Guinea provides duty-free treatment to ITA imports ; however, its corresponding bound duties on ITA products are as high as 28 per cent. On the other end, Djibouti, which is a least-developed country (LDC), had the highest applied tariff of all non-participants at 21 per cent in 2014, followed by Maldives, which graduated from LDC status in 2011 and whose most recent applied tariff stood at 19 per cent.

With respect to binding coverage of ITA products, there are 10 non-participants – of which seven (Burundi, Chad, Gambia, Mozambique, Myanmar, Tanzania and Togo) are LDCs and three (Cameroon, Ghana and Kenya) are non-LDCs – that are fully unbound, meaning that they have no scheduled commitments on tariff lines covered by the ITA.

More generally, average binding coverage for non-participants that are not LDCs is 80 per cent, with an average bound duty of 30 per cent, whereas average applied rates remain at around 7 per cent, which is mostly unchanged from the corresponding level of five years ago.

Table 2.1 shows the distribution of the most recent MFN applied tariffs for all non-participants, including LDCs. While only one member has no duties on imports of ITA products and a quarter of them impose relatively low duties (5 per cent or less), 17 members impose fairly high tariffs at more than 10 per cent. The vast majority of non-participants apply duties ranging between 5 and 10 per cent.

### Table 2.1: Frequency distribution of the latest average MFN applied tariffs on ITA products for non participants

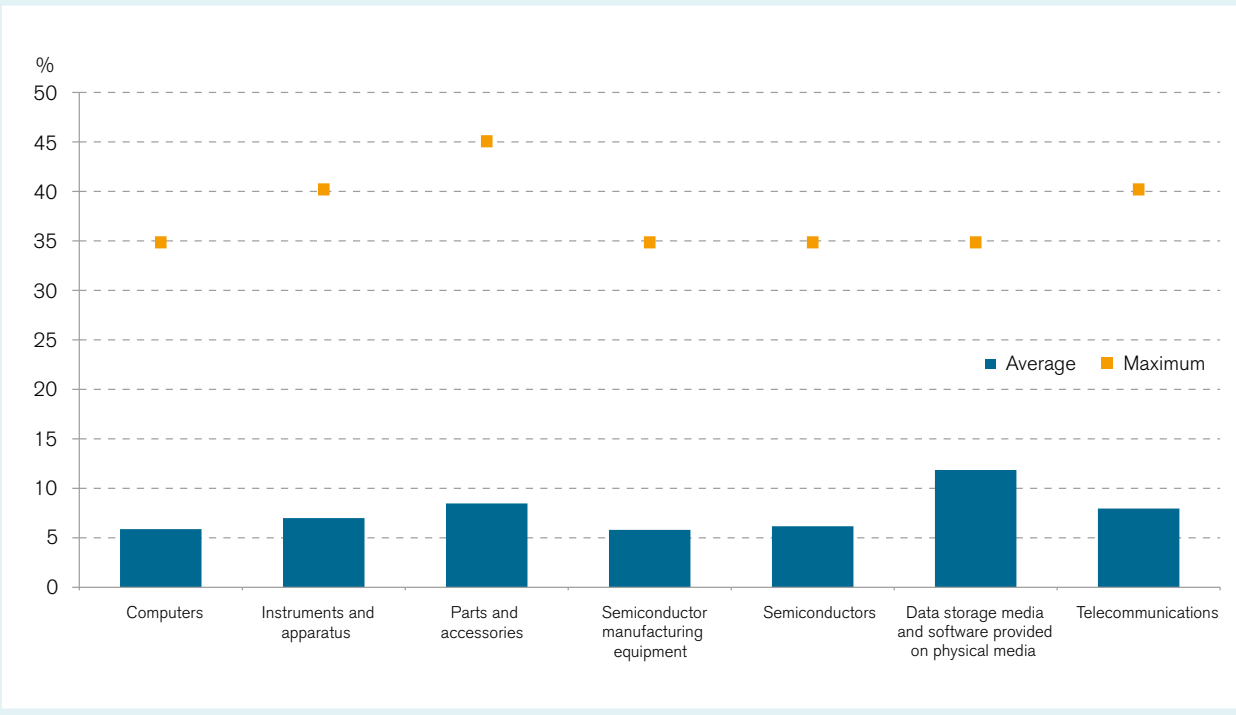
| MFN applied duty range on ITA products | Number of non-participants, including LDCs |
|---|---|
| Duty free | 1 |
| Dutiable – less than or equal to 5% | 19 |
| 5% - 10% | 45 |
| 10% - 15% | 14 |
| Greater than 15% | 3 |

Source: WTO IDB.

***Between 1996 and 2015, world exports of ITA products increased from US$ 549 billion in 1996 to US$ 1,653 billion in 2015.***

Figure 2.3 gives an overview of the average and maximum applied duties by non-participants on the different broad product categories covered by the ITA.[5] The product category with the highest duty, at 12 per cent, is "data storage media and software provided on physical media". However, in some cases tariffs applied at the product or tariff line level can be as high as 45 per cent. This is the case in the category of "Parts and accessories" for which in some non-participants a duty of up to 45 per cent is applied on imports of audio frequency electric amplifiers (HS 851840).

### Figure 2.3: Average and maximum applied tariff on ITA products for non-participants, by product category




Source: WTO IDB.

## C. Trade flows: ITA exports more than tripled in spite of falling prices

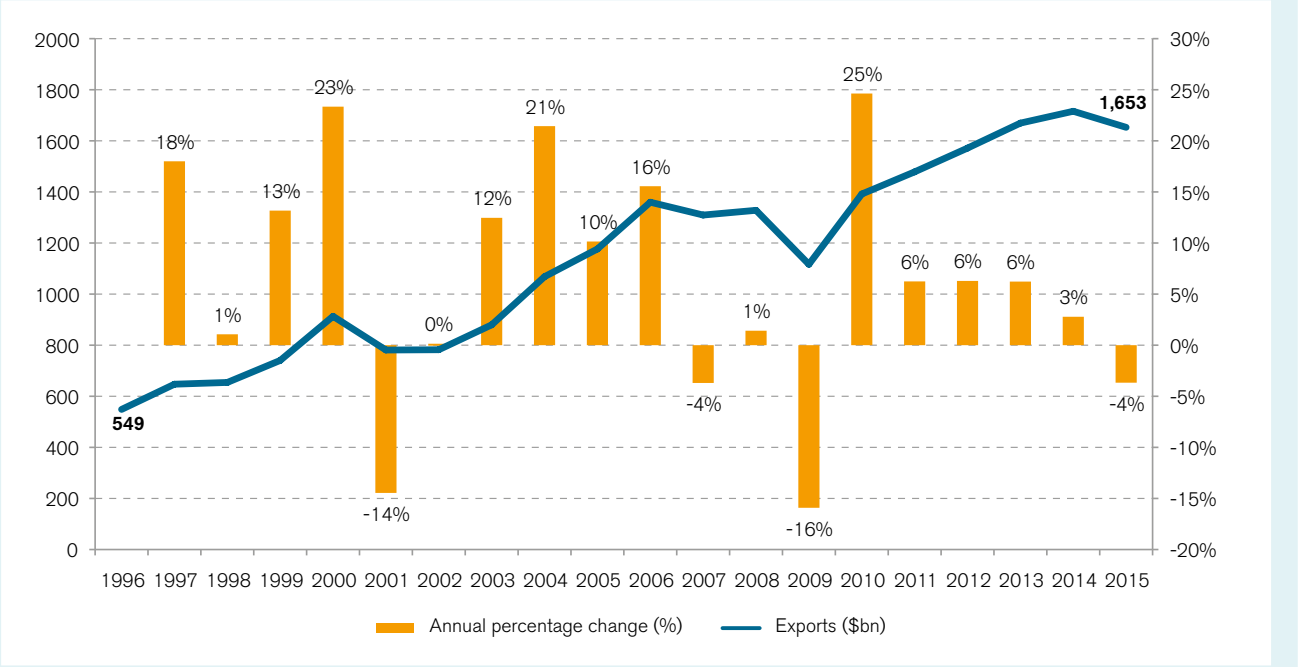
Between 1996 and 2015, world exports of ITA products increased from US$ 549 billion in 1996 to US$ 1,653 billion in 2015 (see Figure 2.4). This represents an average annual increase of 6 per cent during this period. The highest annual percentage change (+25 per cent) was observed in 2010 – a sort of base effect after the strong decline (-16 per cent) of the crisis year 2009. During 2011 to 2013, the growth rate of ITA exports was rather constant at 6 per cent per year, followed by 3 per cent in 2014 and a decline of 4 per cent during the most recent year studied, 2015.

In 2015, world exports of ITA products reached a share of 15 per cent in total manufactures exports, up from 11 per cent in 1996 (see Figure 2.5).[6] This exceeds the respective shares of other important product categories in 2015 such as automotive products (12 per cent), textiles and clothing (7 per cent) and pharmaceuticals (5 per cent). The development of the share of ITA products during 1996-2015 was, however, not straightforward; while there was a constant increase in terms of share between 1996 and the peak-year 2000 (an increase of 20 per cent), development in the years after 2000 was characterized by a tendency to stagnate or even decrease.

***In 2015, world exports of ITA products reached a share of 15 per cent in total manufactures exports, up from 11 per cent in 1996.***

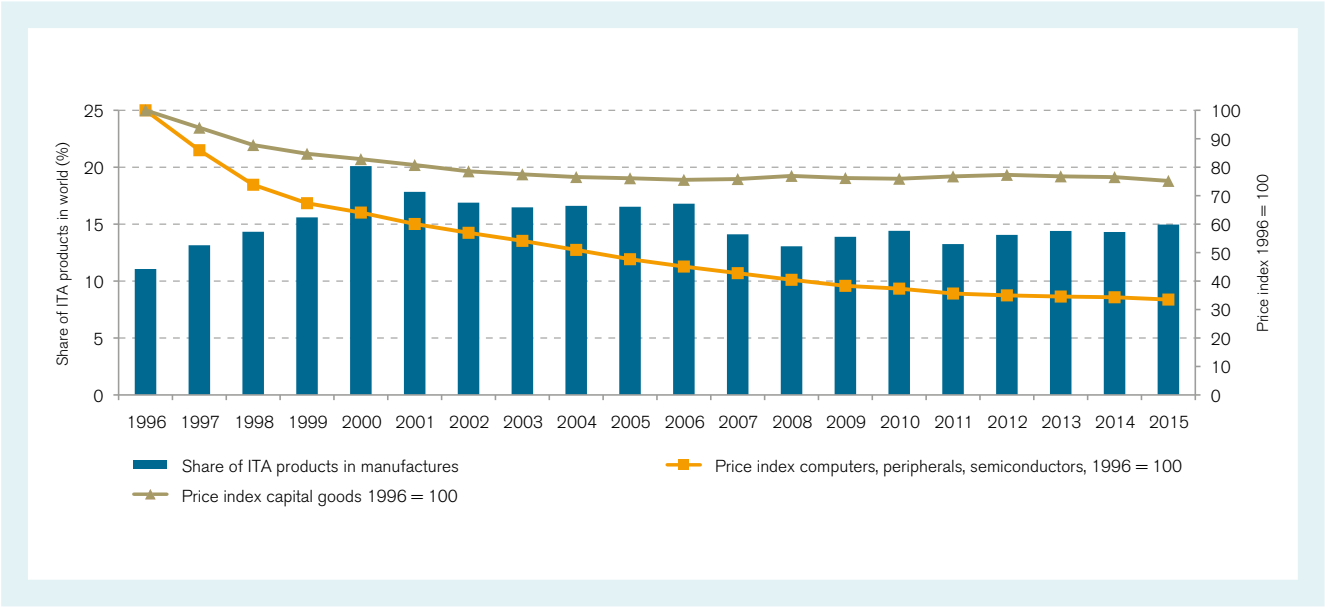
These shares have remained remarkably high, despite considerable decreases in the prices of some of the main ITA product categories. The US Bureau of Labor Statistics estimated the import price level in 2015 for the category "computers, peripherals and semiconductors" to be around 66 per cent below the respective level of 1996, while the average import prices for capital goods in total were only about 25 per cent below the level 1996. Therefore, and as a result of significant price reductions and increased performance, consumers and producers importing IT products as inputs to their industry have benefited from an unprecedented reduction in the price paid for computational power.

**Figure 2.4: World exports of ITA products, 1996-2015**
(billion US$ and percentage change)




Source: WTO Secretariat, based on UN Comtrade.

**Figure 2.5: Share of ITA products in world exports of manufactures and price index of US imports of capital goods and of computers, peripherals and semiconductors, 1996-2015** (percentage share)




Source: WTO Secretariat, based on UN Comtrade, WTO estimates and US Bureau of Labor Statistics.

## D. Leading exporters of ITA products

Developing economies' share in world exports of ITA products more than doubled in the past 20 years, increasing from 26 per cent in 1996 to 63 per cent in 2015. This is higher than their share in world total exports, which grew from 27 per cent to 43 per cent in the same period. Asia's share increased sharply in the period, rising from 44 per cent of global exports of ITA products in 1996 to 70 per cent in 2015 (see Figure 2.6).

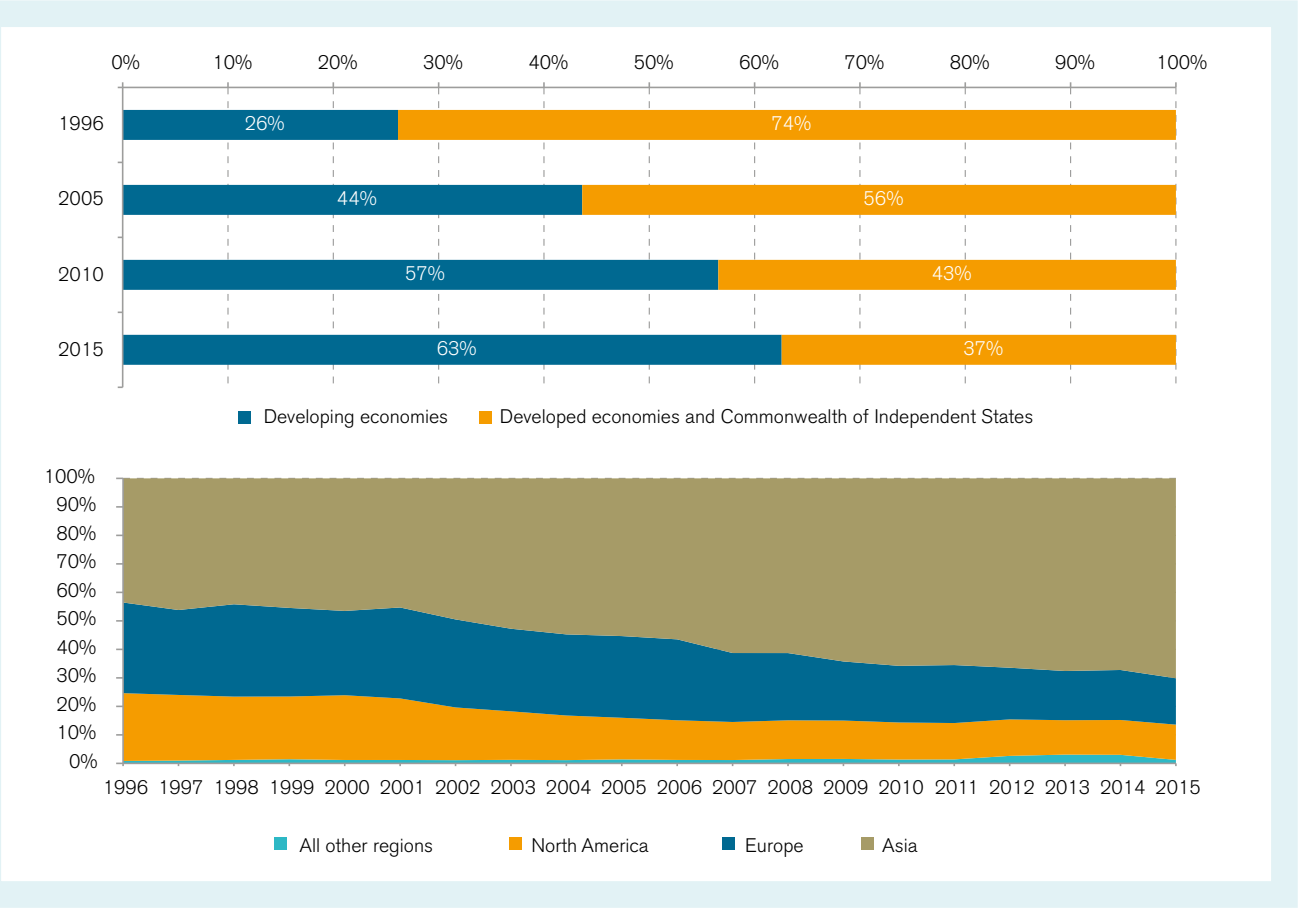
Figure 2.7 shows the leading exporters of ITA products for the years 1996 and 2015. While in 1996, the European Union (then EU-15, whereas it had become EU-28 in 2015) was still the top exporter of ITA products – with an export market share of 31 per cent – that situation had distinctly changed in 2015. At this time, with China covering one-third of world exports of ITA products, the share of the European Union's exports had decreased to 16 per cent, putting the European Union in second place after China. The export share of the United States (the world's second-largest exporter in 1996) fell from 20 per cent in 1996 to 9 per cent in 2015. If the European Union is considered as a single entity, seven of the top ten exporters in 2015 were Asian economies, as compared to six in 1996.

***Developing economies' share in world exports of ITA products more than doubled in the past 20 years, increasing from 26 per cent in 1996 to 63 per cent in 2015.***

Within the European Union, the largest exporters of ITA products in 1996 were the United Kingdom (representing 6.5 per cent), Germany (5.9 per cent) and the Netherlands (4.1 per cent). In 2015, the European ranking was led by Germany, whose share in world exports of ITA products was 4.0 per cent, followed by the Netherlands (3.3 per cent) and France (1.3 per cent).

Within the top 30 exporters of ITA products in 2015 (see Annex Table 2.2), Viet Nam was the most dynamic, with the highest average annual increase of 50 per cent between 1996 and 2015. Rising from a very low level in 1996 (US$ 30 million), Viet Nam's exports

**Figure 2.6: Exports of ITA products by economic and geographic region** (percentage share)




Source: WTO Secretariat, based on UN Comtrade.

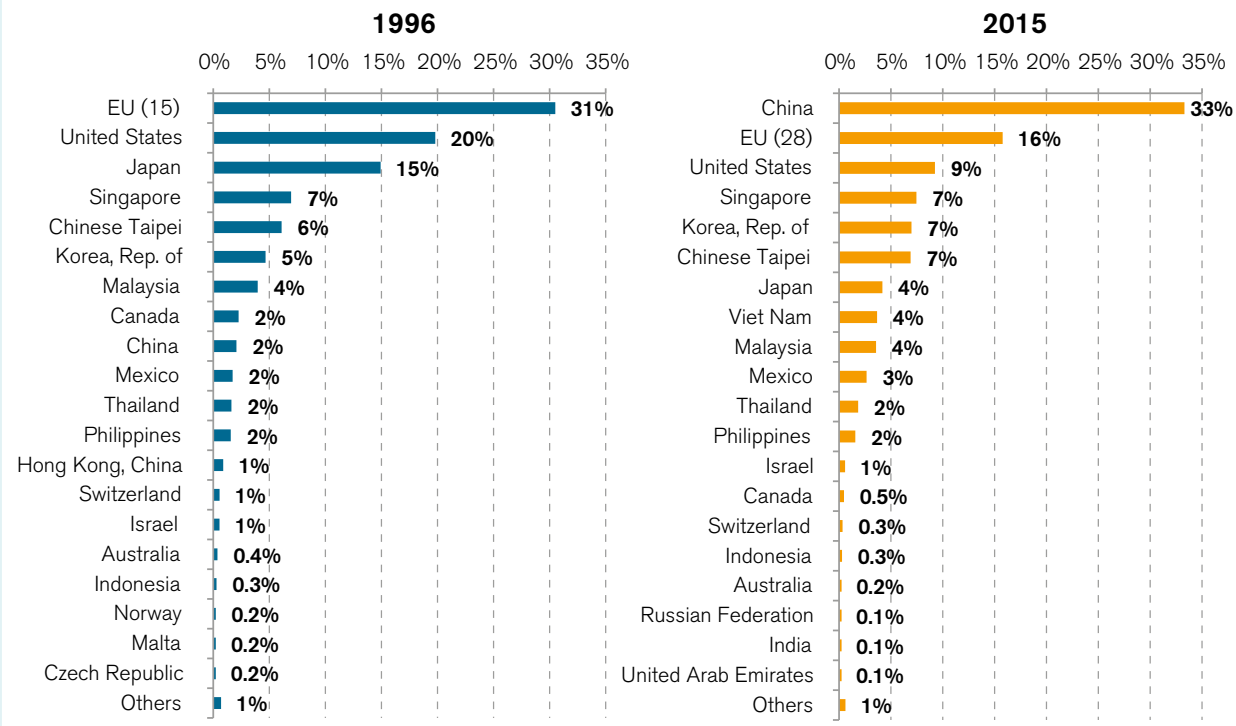
reached a value of US$ 6 billion in 2015, placing it in eighth position in 2015. The second-highest average annual growth was observed for Bahrain (up by 27 per cent per annum), followed by China (23 per cent).

Other participants experiencing strong growth in their exports of ITA products between 1996 and 2015 include the United Arab Emirates (19 per cent per annum, mostly for re-exports) and the Russian Federation (17 per cent). Among the developing economies that do not participate in the ITA, Mexico is still the most important trader, with an export value of US$ 43.9 billion in 2015 (up by 8 per cent per annum). Most Mexican exports of ITA products are currently destined for the United States under the North American Free Trade Agreement (NAFTA).

Regarding the development of the share of ITA participants in global exports of ITA products, between 1996 and 2002 there was a continuous decline, from 95.6 per cent in 1996 to 87.9 per cent in 2002. In 2003, with the participation of Bahrain, China, Egypt and Morocco in the ITA agreement, the share increased markedly and peaked at 97.5 per cent in 2007. In subsequent years, the share stagnated slightly, despite the accession of new participants (such as Montenegro in 2012, Qatar, Russia and Tajikistan in 2013, Afghanistan and Seychelles in 2014, and Kazakhstan in 2015). Nonetheless, with a share of 97.1 per cent in 2015, ITA participants still account for almost the totality of global exports of ITA products.

***Within the top 30 exporters of ITA products in 2015, Viet Nam was the most dynamic, with the highest average annual increase of 50 per cent between 1996 and 2015.***

**Figure 2.7: Leading exporters of ITA products: shares in world exports of ITA products** (percentage share)




Source: WTO Secretariat, based on UN Comtrade.

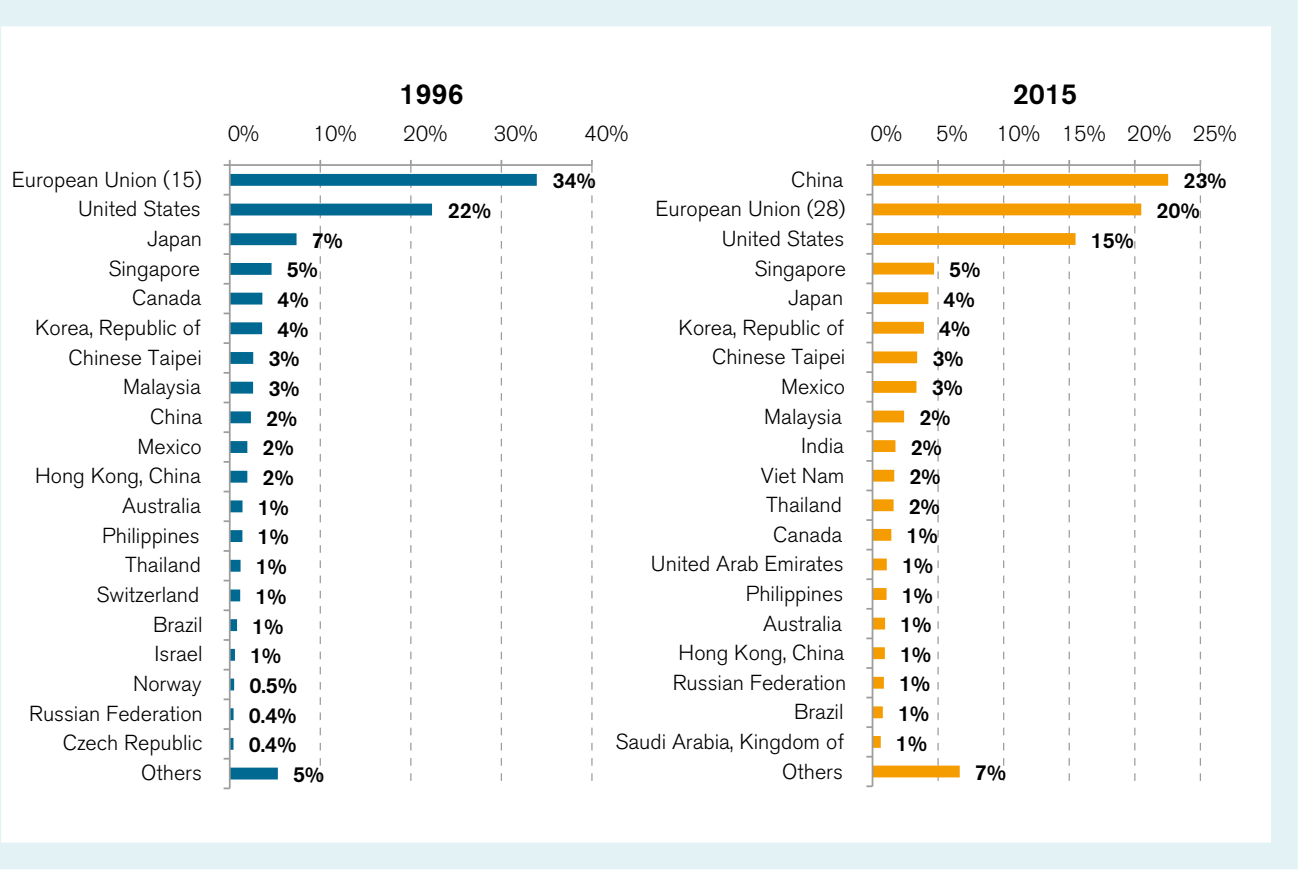
## E. Leading ITA importers

Between 1996 and 2015, world imports of ITA products increased from US$ 550 billion to US$ 1,831 billion, which represents an average annual increase of 7 per cent. During the same period, world total imports grew by 6 per cent per annum. The largest importers of ITA products generally also tend to be the largest exporters. Much of the growth since 1996 can be attributed to higher demand by developing economies, for while in 1996, developing economies accounted for 24 per cent of world imports of ITA products, this share increased to 51 per cent by 2015. This is largely linked to the specialization of tasks and reliance on global supply chains in the manufacture of ITA products, with developing economies often involved in the final or further assembly of components previously imported from developed economies.

As can be seen in Figure 2.8, in 2015 China was the largest importer of ITA products (22.5 per cent share of global imports of ITA products), followed by the European Union (28) (20.5 per cent), the United States (15.5 per cent), Singapore (4.7 per cent) and Japan (4.3 per cent). Regarding growth rates, the highest annual percentage changes over the whole period were recorded for Viet Nam (+28 per cent per annum), India (+20 per cent per annum) and the United Arab Emirates (+18 per cent per annum, mostly in re-exports). Imports by developed-economy markets have continued to grow, but at a much slower rate compared with developing economies.

Of the non-participants, Mexico was the largest importer of ITA products in terms of value, followed by Brazil, South Africa, Argentina and Chile. Imports of ITA products have also increased in non-participants, in particular for Mexico (up by 10 per cent per year). In terms of geographical groupings, imports of ITA products in the Middle East (+12 per cent per annum) and the Commonwealth of Independent States (+11 per cent per annum) rose the most, while imports in Europe (+4 per cent per annum) and North America (+5 per cent per annum) rose the least (see Annex Table 2.1 for a list of the 30 leading importers of ITA products).

**Figure 2.8: Leading importers of ITA products: shares in world imports of ITA products**
(percentage share)




Source: WTO Secretariat, based on UN Comtrade.

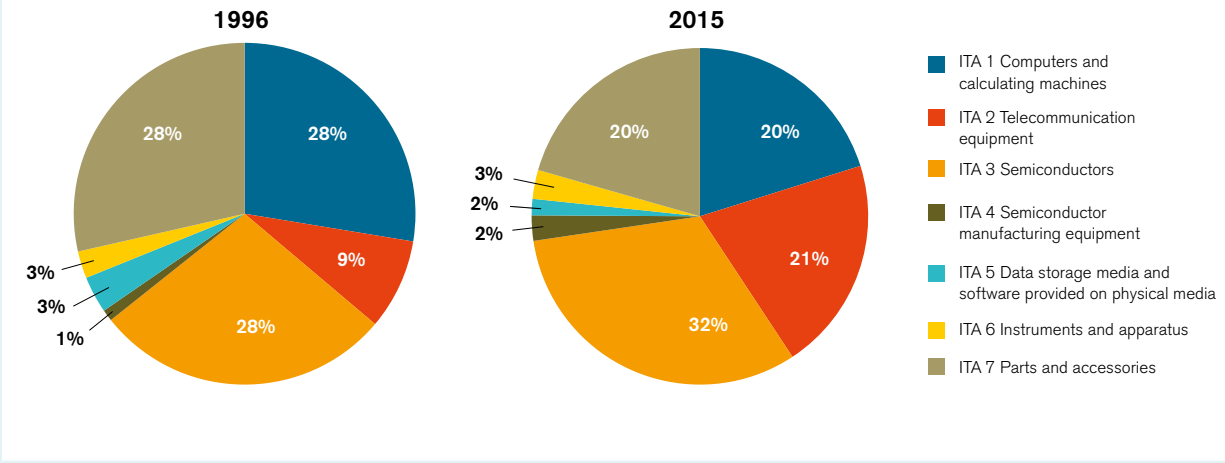
## F. Trade in ITA products, by product category

Figures 2.9 and 2.10 compare the share of ITA products categories between 1996 and 2015, both for exports and imports. In 1996, "semiconductors" and "computers and calculating machines" represented the categories with the highest shares (28 per cent each) in ITA world exports; 20 years later, the highest share was for "semiconductors" (32 per cent). It was followed by "telecommunication equipment", the share of which increased from 9 per cent in 1996 to 21 per cent in 2015. "Computers and calculating machines" (20 per cent) fell to fourth position in 2015, after "parts and accessories" (20 per cent). The most distinct positive change in terms of share was observed for exports of "telecommunication equipment", with an increase of twelve percentage points, which is largely explained by the increasing popularity of mobile phones, including smartphones. The shares of "parts and accessories" and of "computers and calculating machines" lost most in terms of share in world exports (-8 percentage points and -7 percentage points respectively).

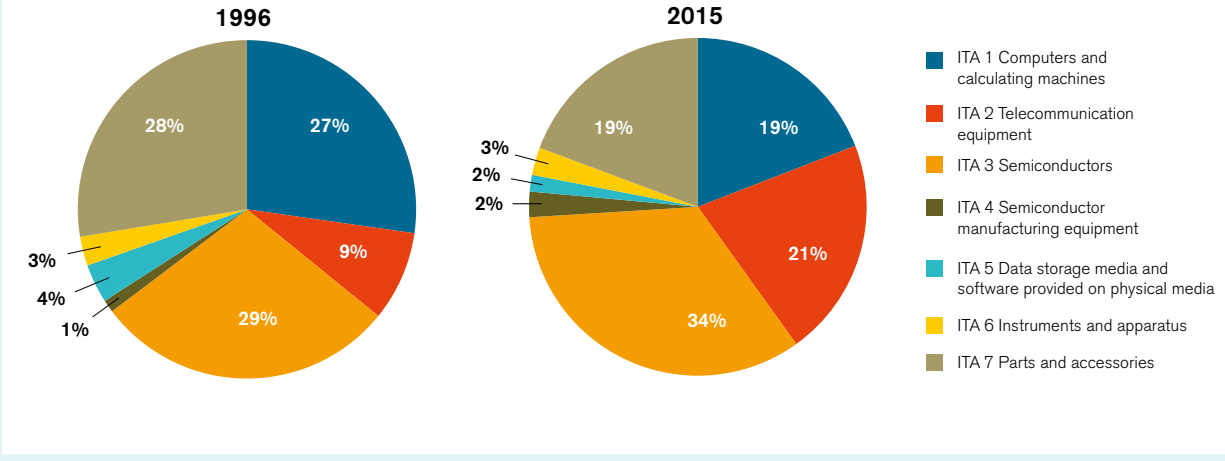
A similar development occurred for imports. The share of "telecommunication equipment" more than doubled from 9 per cent in 1996 to 21 per cent in 2015, and "semiconductors" increased by five percentage points. The shares of "computers and calculating machines", "parts and accessories", and "data storage media and software provided on physical media" all decreased, while the share of "semiconductor manufacturing equipment" showed a slight increase (by 1 percentage point).

Although the market shares for several of these product categories diminished over the past 20 years due to advances in technology, all product categories increased in value terms between 1996 and 2015, both for exports and imports. Only during the last 10 years was there a decrease in exports of "data storage media and software provided on physical media" (-0.7 per cent per annum) which is explained by a higher degree of online dissemination of data/software. The greatest average annual rises were for "telecommunication equipment" (11.0 per cent for exports and 11.7 per cent for imports), followed by "semiconductor manufacturing equipment" (up by 10.6 per cent for both flows) (see Tables 2.2 and 2.3).

## Figure 2.9: World exports of ITA products, by product category (percentage share)




## Figure 2.10: World imports of ITA products, by product category (percentage share)




Source: WTO Secretariat, based on UN Comtrade.

Annex Table 2.3 shows the top ten exporters and importers for each ITA product category, comparing 1996 with 2015. China was the largest exporter in 2015 for four of the seven product categories – namely for "computers and calculating machines" (export market share of 46 per cent), "telecommunication equipment" (48 per cent), "semiconductors" (20 per cent) and "parts and accessories" (35 per cent). The EU-28 was the top exporter for "instruments and apparatus" (market share of 24 per cent) and "data storage media and software provided on physical media" (42 per cent); Japan was the leading exporter of "semiconductor manufacturing equipment" (market share of 27 per cent).

The highest increases in export market share between 1996 and 2015 were reached by China, for "telecommunication equipment" (+44 percentage points in market share), "computers and calculating machines" (+43 percentage points) and "parts and accessories" (+33 percentage points). The highest losses in market share were observed for the EU-28 for exports of "telecommunication equipment" (-33 percentage points), "instruments and apparatus" (-22 percentage points) and "parts and accessories" (-17 percentage points). Chinese Taipei gained 18 percentage points for exports of "instruments and apparatus" (reaching a market share of 20 per cent in 2015), while

Singapore rose by 10 percentage points for exports of "semiconductors" (market share of 16 per cent in 2015).

The European Union was still the largest importer in four out of seven categories in 2015 – namely "computers and calculating machines" (import market share of 32 per cent), "telecommunication equipment" (29 per cent), "instruments and apparatus" (30 per cent) and "data storage media and software provided on physical media" (30 per cent). Its market share of global imports has nonetheless declined since 1996, amid a notable rise in imports to developing economies across all categories. China was the leading importer of "semiconductors" (import market share of 42 per cent), "semiconductor manufacturing equipment" (24 per cent) and "parts and accessories" (27 per cent). The highest changes in market share in both exports and imports were observed for China, with the highest increase in "semiconductors" (+39 percentage points between 1996 and 2015).

## Table 2.2: World exports of ITA products, by product category (billion dollars and percentage share)

| ITA product category | Value (US$ bn) | | | Average annual change (%) | | |
|---|---|---|---|---|---|---|
| | 1996 | 2005 | 2015 | 1996-2015 | 1996-2005 | 2005-2015 |
| ITA 1 Computers and calculating machines | 151 | 264 | 333 | 4.2 | 6.4 | 2.3 |
| ITA 2 Telecommunication equipment | 47 | 180 | 340 | 11.0 | 16.1 | 6.5 |
| ITA 3 Semiconductors | 154 | 322 | 528 | 6.7 | 8.5 | 5.1 |
| ITA 4 Semiconductor manufacturing equipment | 6 | 17 | 40 | 10.6 | 12.2 | 9.1 |
| ITA 5 Data storage media and software provided on physical media | 19 | 28 | 26 | 1.6 | 4.3 | -0.7 |
| ITA 6 Instruments and apparatus | 14 | 27 | 46 | 6.4 | 7.3 | 5.6 |
| ITA 7 Parts and accessories | 157 | 339 | 340 | 4.2 | 8.9 | 0.0 |
| Total | 548.5 | 1176.7 | 1652.8 | 6.0 | 8.8 | 3.5 |

Source: WTO Secretariat, based on UN Comtrade database.

## Table 2.3: World imports of ITA products, by product category (billion dollars and percentage share)

| ITA product category | Value (US$ bn) | | | Average annual change (%) | | |
|---|---|---|---|---|---|---|
| | 1996 | 2005 | 2015 | 1996-2015 | 1996-2005 | 2005-2015 |
| ITA 1 Computers and calculating machines | 150 | 284 | 350 | 4.6 | 7.3 | 2.1 |
| ITA 2 Telecommunication equipment | 47 | 174 | 384 | 11.7 | 15.6 | 8.2 |
| ITA 3 Semiconductors | 159 | 378 | 621 | 7.4 | 10.1 | 5.1 |
| ITA 4 Semiconductor manufacturing equipment | 7 | 17 | 45 | 10.6 | 10.8 | 10.3 |
| ITA 5 Data storage media and software provided on physical media | 20 | 28 | 29 | 1.9 | 3.4 | 0.5 |
| ITA 6 Instruments and apparatus | 15 | 28 | 48 | 6.3 | 6.8 | 5.7 |
| ITA 7 Parts and accessories | 152 | 343 | 354 | 4.6 | 9.5 | 0.3 |
| Total | 550.0 | 1251.4 | 1831.1 | 6.5 | 9.6 | 3.9 |

Source: WTO Secretariat, based on UN Comtrade database.

## G. Trade in ITA products, by HS subheading

There have been profound changes in the type of ITA products that are being traded, and the trend is to have a higher concentration in fewer categories of products as measured by the number of HS subheadings. While the top ten HS subheadings accounted for 65 per cent of exports of ITA products in 1996, the equivalent figure for 2015 was 76 per cent.

The sequence and composition of the ten most exported ITA products have changed since 1996 (see Figure 2.11). Of the top ten HS subheadings in 1996, seven were still in the top ten in 2015, but with markedly changed shares and/or with a distinctly different ranking. The new products in the top ten list were:

- "Portable digital automatic data processing machines, weighing not more than 10 kg, consisting of at least a central processing unit, a keyboard and a display",
- "Electric apparatus for line telephony, telegraphy: other apparatus" and
- "Photosensitive/photovoltaic/LED semiconductor devices".

The products that had disappeared from the top ten were:

- "Metal oxide semiconductors (MOS technology)",
- "Monolithic integrated circuits, except digital" and
- "Parts for radio/TV transmit/receive equipment, nes".[7]

While back in 1996, "Parts and accessories of data processing equipment, nes" had been the product with the highest share in IT exports (15 per cent), its position dropped to sixth with a share of only 6 per cent in 2016 (-9 percentage points). The second most exported product of 1996, "Metal oxide semiconductors (MOS technology)", disappeared completely from the top ten products, with its share dropping to 1 per cent (from 11 per cent in 1996). The role of "storage units" (which had the third highest share in 1996) in ITA exports was much less important in 2016 (top seven in 2015; -4 percentage points in terms of share). The most-exported ITA product in 2016 was 'Other monolithic integrated circuits' with a share of 25 per cent in all ITA exports (up from 4 per cent in 1996), followed by 'Transmit-receive apparatus for radio, TV, etc.' (share of 12 per cent, up from 4 per cent) and 'Portable digital automatic data processing machines, weighing not more than 10 kg, consisting of at least a central processing unit, a keyboard and a display' (share of 7 per cent, up from 2 per cent).

Though this development is partially explained by the different structure of HS1996 and HS2012, and in particular aggregation of certain product categories under HS2007, other factors may include technological innovation, consumer preferences and price developments. Metal oxide semiconductors (MOS technology) (HS1996 subheading 8542.13) provide an example of technological development. Changes resulting from technological innovation, in particular machines capable of performing two or more previously separate functions, and variations in consumer preferences are often interconnected. For example, the share of portable computers (HS1996 subheading 8471.30) went up by 5 percentage points between 1996 and 2015; this had been driven by both technical progress in terms of the miniaturization of electronic components and by a growing preference for the flexibility of laptops and netbooks over traditional desktop computers. The surge in demand for smartphones provides another example.

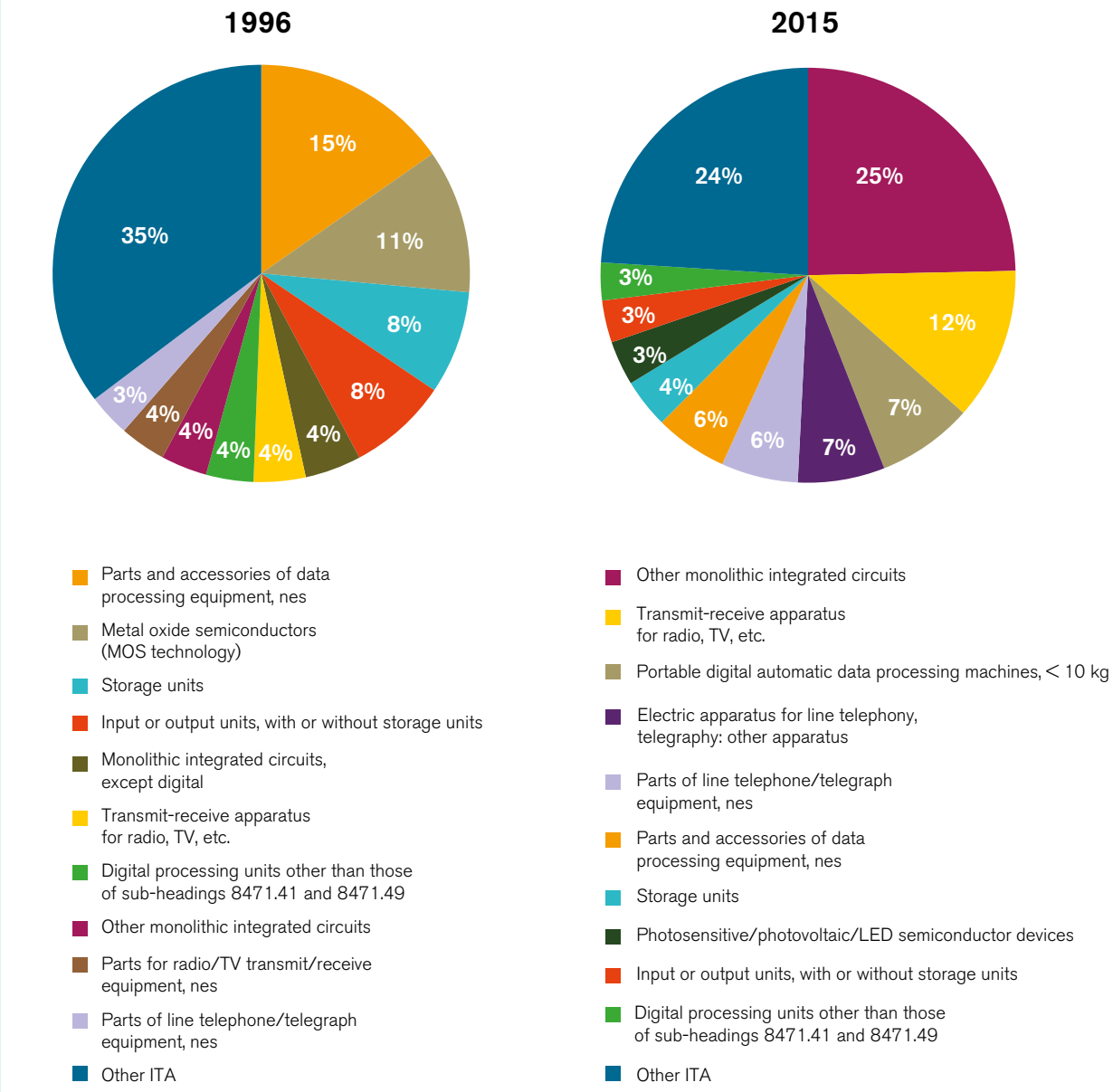
## H. Share of ITA products in total trade of major traders

The role of ITA products regarding total merchandise exports and imports varies significantly among the major players in international merchandise trade (see Figure 2.12). The highest shares of ITA products in their exports were observed for the Philippines (22 per cent in 2015, up from 21 per cent in 1996), Chinese Taipei (20 per cent, up from 15 per cent) and Singapore (18 per cent, down from 28 per cent). For several economies, such as Argentina, Australia, Brazil, Chile, Colombia, India, Norway, Russian Federation, South Africa and Turkey, ITA products were of very little significance in terms of share in total exports (shares all below 1 per cent in 2015).

Regarding imports, the highest shares of ITA in total imports were recorded for Singapore (14 per cent in 2015, down from 16 per cent in 1996), Hong Kong, China [8] (14 per cent, down from 22 per cent), the Philippines (14 per cent in both 2016 and 1996) and Chinese Taipei (14 per cent, up from 9 per cent). The lowest shares were observed for Morocco, Switzerland and Bahrain (all 2 per cent or less in 2015).

For most of the economies shown in Figure 2.12, the share of ITA in total trade decreased between 1996 and 2015. One reason is that, as explained above, ITA products have become cheaper over this period, whereas some non-ITA related products have increased their value, thereby affecting the share of ITA trade in total trade. Exceptions to this phenomenon are economies such as Viet Nam

**Figure 2.11: World exports of ITA products: top 10 HS subheadings** (percentage share)



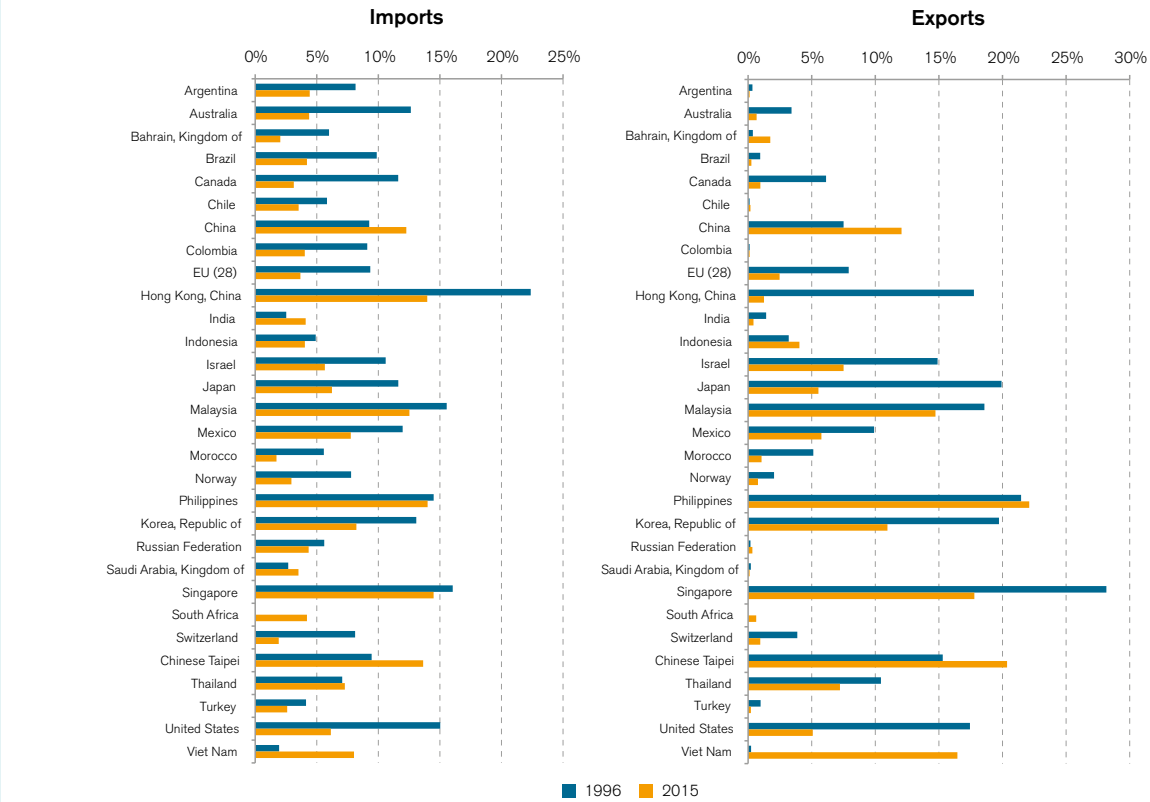

Source: WTO Secretariat, based on UN Comtrade.

and China, where the share of ITA products in total trade increased between 1996 and 2015 (+16 percentage points in Viet Nam's exports and +5 percentage points in China's exports) in spite of the circumstances mentioned above. The economies with the highest losses were Hong Kong (China) and Japan, where the shares went down by 17 and 14 percentage points respectively.

## I. Trade in intermediate goods as evidence of global value chains

Apart from the stage in the production chain where final products meet final demand, trade that takes place within GVCs is essentially characterized by trade in

## Figure 2.12: Share of ITA products in total imports/exports of major traders, 1996 versus 2015 (percentage share)




Source: WTO Secretariat, based on UN Comtrade.

intermediates. This is also true for ICT supply chains in which numerous production steps deal with the manufacture of sophisticated electronic components.

Intermediate goods are defined as those produced for incorporation at a later stage in the production of a final good, which then is classified either as a consumption or investment good. Transistors and electronic circuits used in smartphones are examples of intermediate goods. The distinction between intermediate and final goods is not always straightforward, as some goods can be used as final goods by households, but can also be purchased by industries for intermediate consumption. Based on the United Nations Classification by Broad Economic Categories (BEC), intermediate goods as referred to within this chapter include all parts and accessories (BEC codes 42 and 53) as well as industrial primary and processed intermediate goods (BEC codes 111, 121, 21 and 22). Fuels and lubricants are excluded.

When focusing on major global manufacturers such as the European Union (EU extra-trade only), China, Japan or the United States, the most traded electronic components are monolithic integrated circuits (i.e. chips or microchips). As shown in Figure 2.13, the latter turn out to be the top intermediate goods both exported and imported by China, Japan and the United States. Integrated circuits are particularly significant for China, as they represented 22.5 per cent of the total imports of industrial inputs in 2015 (against 17.7 per cent in 2010), which confirms the leading role of China as an assembler of electronic consumer goods. As for Japan, the shares observed for integrated circuits were very similar in both its total exports and imports of intermediate goods, around 6.7 per cent in 2015, as shown in Figure 2.13. This may reflect the prominent role of Japan in the Asian ICT GVCs, in which Japan imports low or middle-technology electronic circuits and exports high value-added parts and components designed for final production steps and, in particular, assembly, to other South East Asian economies. The United States is a net exporter of monolithic integrated circuits, and these are mainly destined for Mexico and South-East Asia.

Several BEC categories related to car parts and accessories, like "Motor vehicles parts, nes", "Transmissions for motor vehicles" or "Parts and accessories of bodies for motor vehicles". These also appear to be major intermediate goods traded by the economies under review. This is for example the case for Japan and the United States, whose carmakers outsource a significant part of their production to developing economies. As for the European Union, car-related inputs do not appear as much in the top traded intermediate goods. Since only EU extra-trade is considered, this may reflect that automobile GVCs in Europe mainly take place within EU member economies. In this respect, strong industrial relationships have been set up in the automobile sector between Germany and certain Eastern European economies such as the Czech Republic and Poland, especially since they joined the European Union in 2004. Several BEC categories related to the aircraft industry ("Aircraft parts, nes" or parts of "Turbo-jet engines") appear in the top 10 intermediate goods traded by the European Union with non-EU partners, thus reflecting that the European air industry has outsourced some of its production out of the EU area. The same categories appear in both the export and import side, suggesting potential back-and-forth exchanges of aircraft parts between the European Union and its external manufacturing partners.

Data on trade in intermediate goods therefore provide insights into the activity taking place within international production chains. However, by recording international transactions each time a good crosses a border, gross trade statistics count the value of intermediate goods exchanged within GVCs as many times as they cross the border. In addition, traditional import statistics normally record as the "country of origin" the last country in the production chain where a substantial transformation has taken place or where the good changes tariff codes. This fails to reflect the geographical fragmentation of the manufacturing process and the transaction value assigned to the last country cannot be used as an indication of the value added of this country.

The degree of overestimation due to multiple counting is suggested by Figure 2.13, where the same electronic parts and components are exported and imported by all the economies under review. Trade in value added terms (TiVA) avoids this multiple counting issue observed in gross statistics. With TiVA, the geographical origins of the value added are identified and separated and there is no duplication of values. This approach is illustrated in the next section.

## J. Insights on Trade in Value Added (TiVA) and GVCs in ITA-related industries

Trade in Value Added (TiVA) is a statistical approach that allows traditional gross trade flows splitting into value-added components, mainly along the lines of domestic or foreign origin.

The domestic value-added content of exports represents the level of domestic inputs used for the production of exported goods and services and describes the actual contribution of trade to an economy. The foreign content of exports, also referred to as vertical specialization, corresponds to the value added of inputs imported from GVC partners in order to produce the exported goods and services.

TiVA data and GVC-related indicators used in this box are sourced from the OECD-WTO TiVA database. The latter is incrementally improved for its coverage of economies. Currently, data are available for a set of benchmark years up to 2011 and for 34 industries based on the International Standard Industrial Classification ISIC (Revision 3). Under the ISIC, the industry that best approximates ITA product coverage is "computer, electronic and optical equipment" (ISIC Rev. 3 codes 30, 32 and 333). On the services side, the "Computer and related activities" industry (ISIC Rev. 3 code 72) can also considered to examine the role of ITA-related services.

Figure 2.14 shows the levels of domestic and foreign value added content in exports of "Computer, electronic and optical equipment" in 2011.

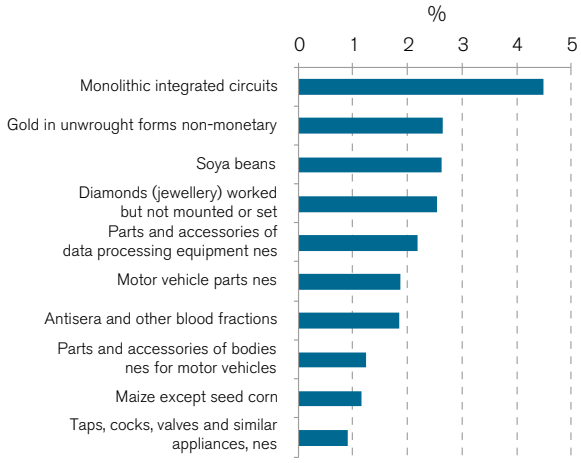
Most developed economies incorporate a large share of domestic value added in their ITA-related exports, above 60 per cent. One developing economy, the Philippines, presents the same pattern. Indeed, it successfully attracted export-oriented foreign direct investment in the electronics industry, especially in the area of semi-conductor assembling and integrated circuits.

A high share of domestic value added reflects not only the capacity to produce manufactured inputs but also to provide services embedded in the industrial process. These so-called "manu-services" play a growing role in the manufacturing industry especially for the development of sophisticated products. For instance, France's and Japan's exports of "Computer, electronic and optical equipment" products contained a large proportion of domestic services value added in 2011, respectively 55 per cent and 29 per cent.

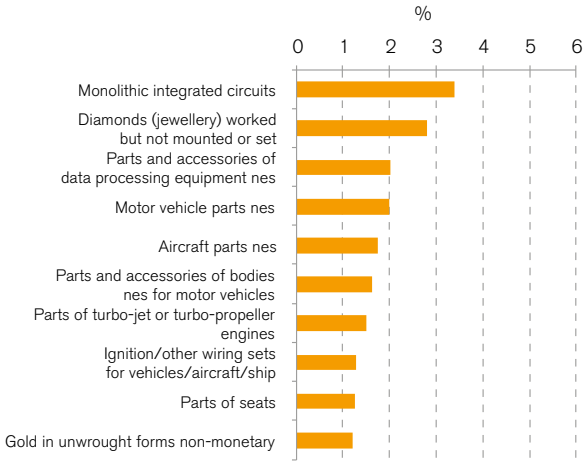
## Figure 2.13: Trade in intermediates goods by selected ITA participants – top 10 products of intermediate goods, share (%) in total exports and imports of intermediate goods, 2015

### United States

**Top 10 products of intermediate goods, share (%) in total exports of intermediate goods, 2015**

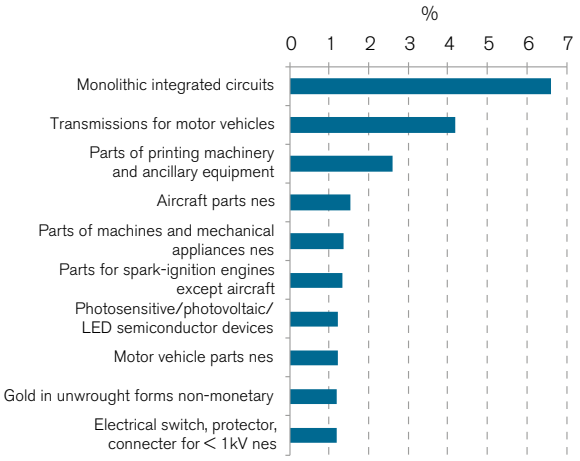



**Top 10 products of intermediate goods, share (%) in total imports of intermediate goods, 2015**

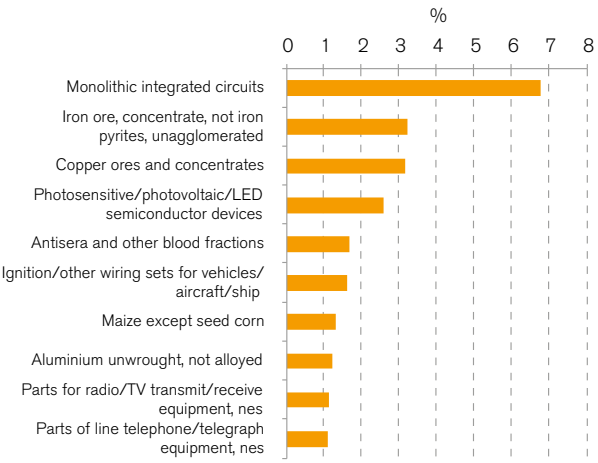



### Japan

**Top 10 products of intermediate goods, share (%) in total exports of intermediate goods, 2015**



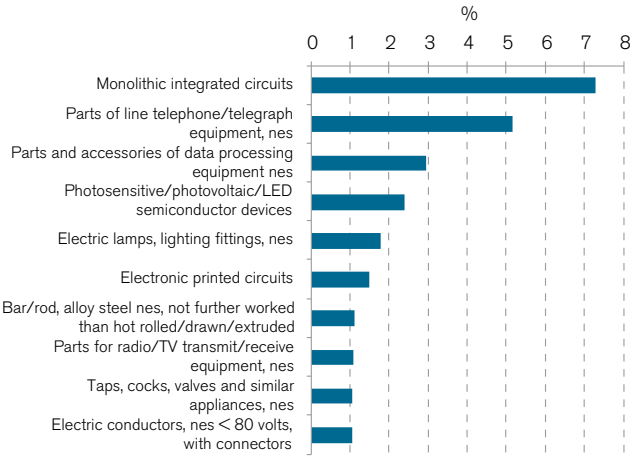

**Top 10 products of intermediate goods, share (%) in total imports of intermediate goods, 2015**



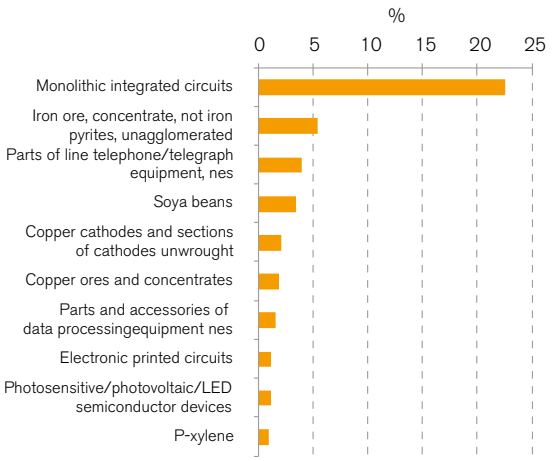

Source: UN Comtrade database.

## China

**Top 10 products of intermediate goods, share (%) in total exports of intermediate goods, 2015**

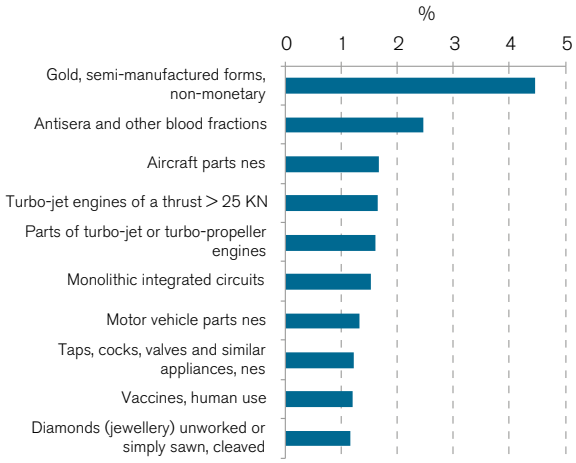



**Top 10 products of intermediate goods, share (%) in total imports of intermediate goods, 2015**

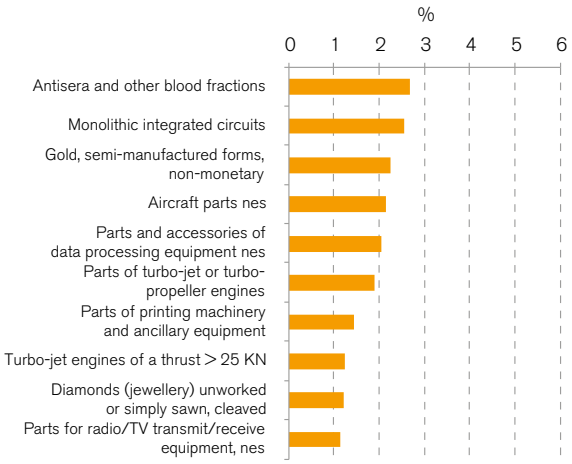



## EU (28) extra-trade

**Top 10 products of intermediate goods, share (%) in total exports of intermediate goods, 2015**




**Top 10 products of intermediate goods, share (%) in total imports of intermediate goods, 2015**



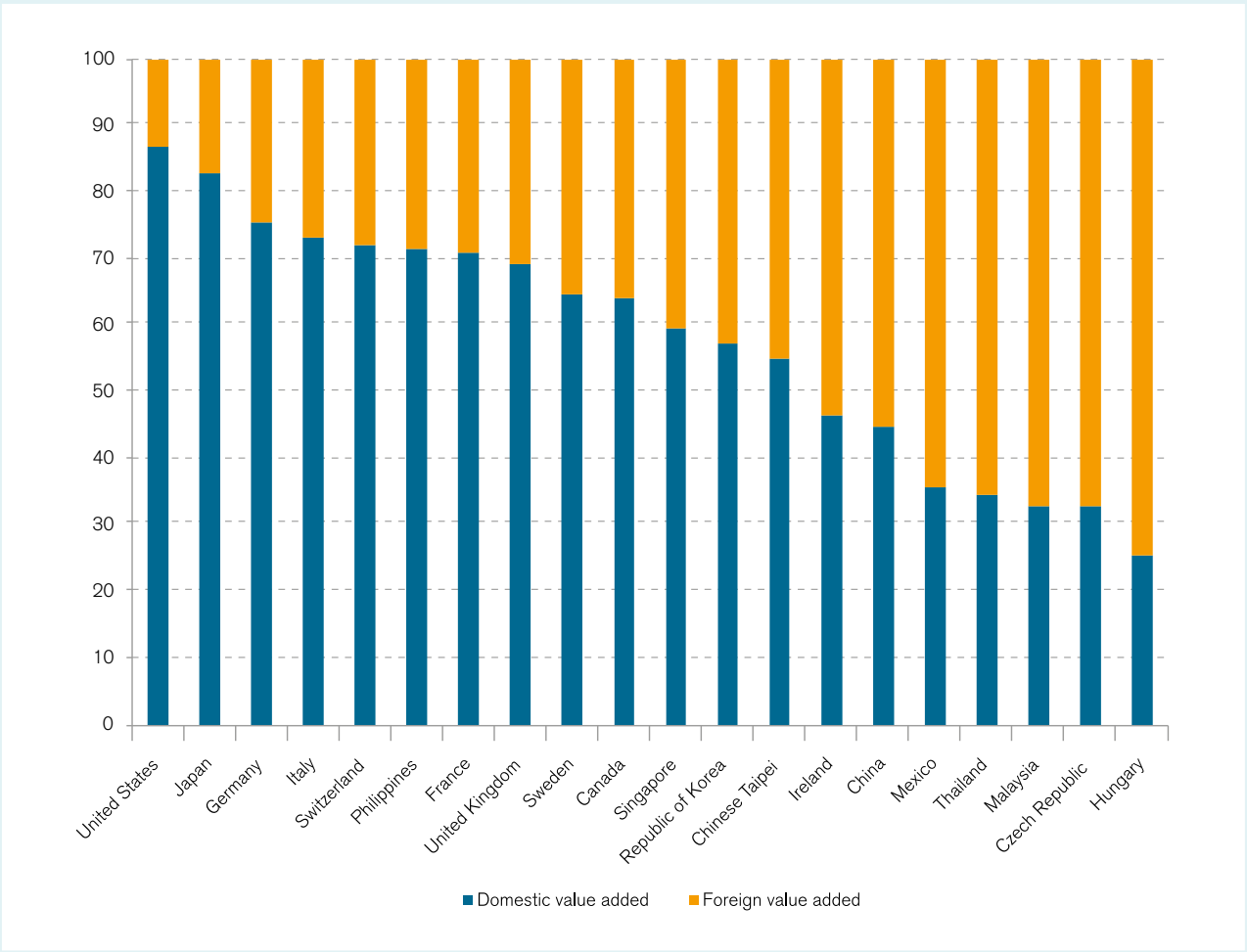

Source: UN Comtrade database.

In contrast to France and Japan, Hungary and the Czech Republic include mostly foreign value-added inputs in their exports of ITA-related products, with rates of vertical specialization amounting respectively to 74.1 per cent and 67.1 per cent. Since they joined the European Union in 2004, both these economies have developed industrial linkages with European supply chains, notably in the ITA sector, as they import hardware components for computer assembly and export. ASEAN (i.e. Association of Southeast Asian Nations) economies like Malaysia and Thailand play a similar role in the Asian electronics industry by specializing in labour-intensive activities relying on significant imports of electronic components.

Additionally, economies highly involved in processing trade, such as China and Mexico, present high rates of vertical specialization in ITA-related industries, respectively 55 per cent and 64.1 per cent in 2011, demonstrating that processing zones' exports rely almost entirely on the import of inputs.

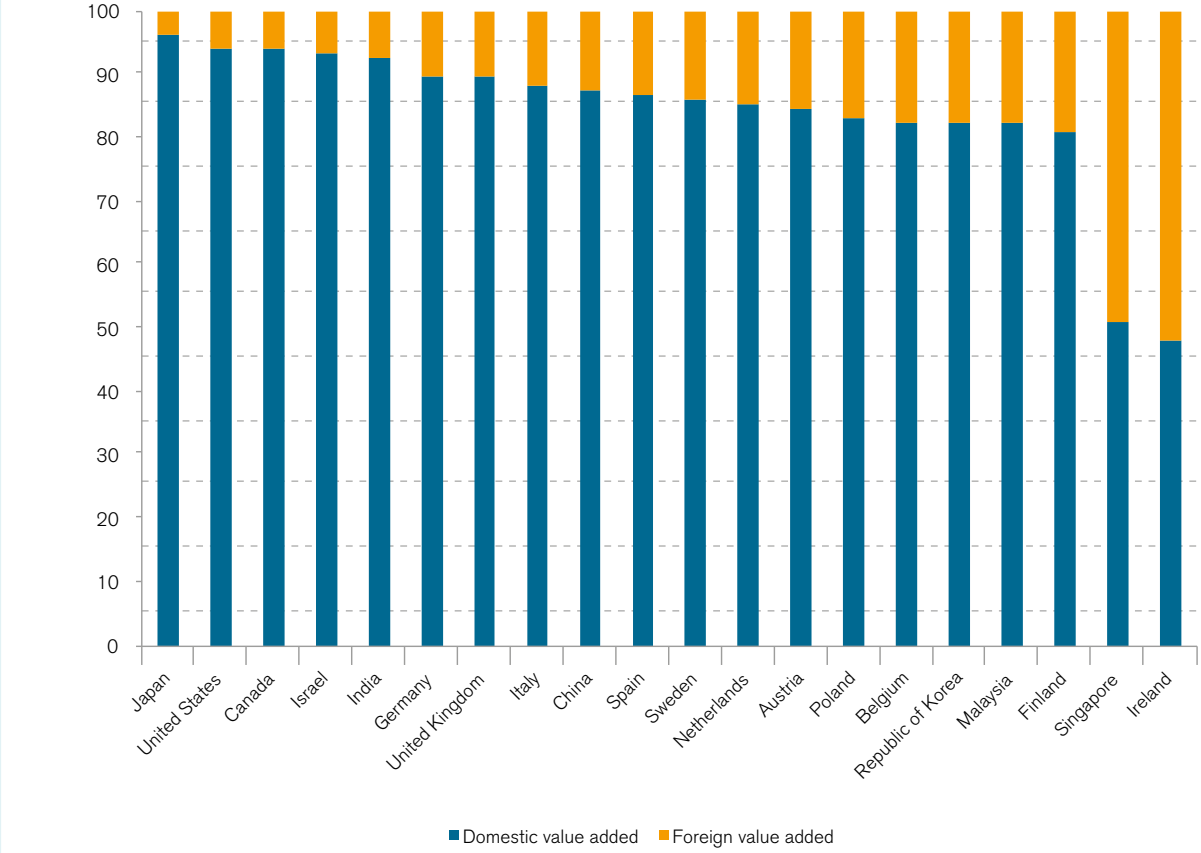
For most of the economies shown in Figure 2.15, the exports of computer and related services are primarily composed of domestic value added, which often represents more than 80 per cent of the whole value-added content. Ireland and Singapore stand out from this line with shares of foreign value-added content in their exports of computer services amounting to around 50 per cent in 2011. In general, the imported inputs embedded to services exports relate to a large extent to other "intermediate" services hired to foreign companies, thus illustrating the development of services networks. For example, services represented respectively 86 per cent and 73 per cent of the foreign value added contained in Ireland's and Singapore's exports of computer services in 2011.

**Figure 2.14: Domestic and foreign value-added content in exports of computer, electronic and optical equipment, major exporters, 2011** (percentage of total exports)




Source: OECD-WTO TiVA database.

**Figure 2.15: Domestic and foreign value-added content in exports of computer and related services, major exporters, 2011** (percentage of total exports)



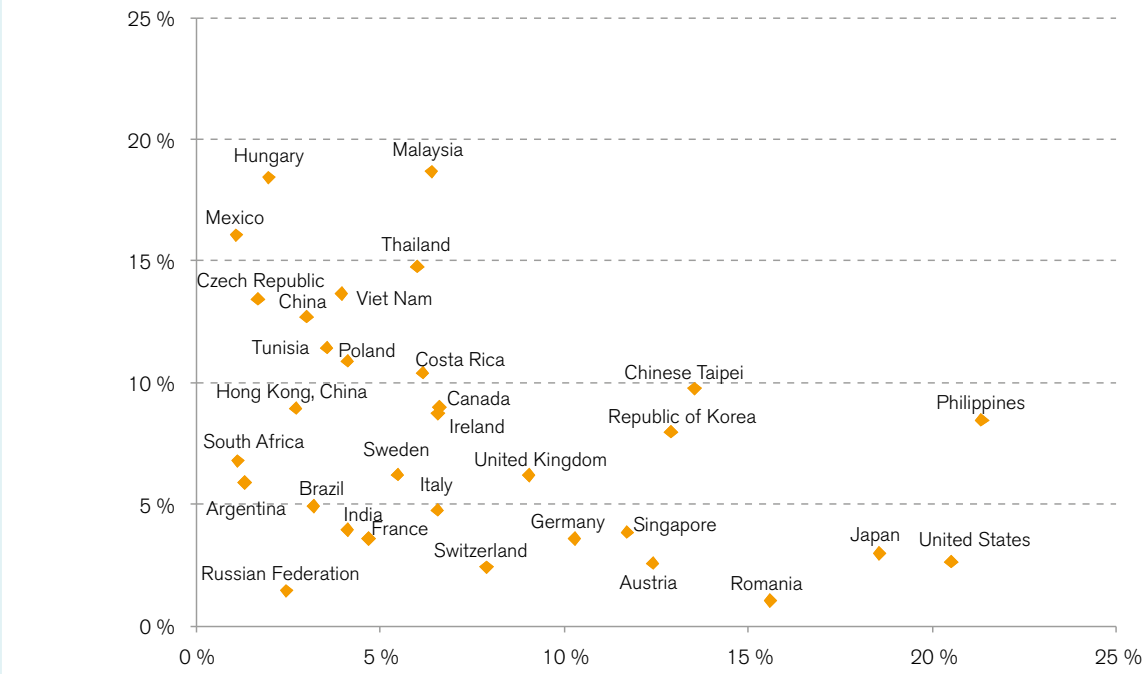

Source: OECD-WTO TiVA database.

The measurement of GVC participation draws on the TiVA approach and is composed of two elements reflecting the upstream and downstream links in the production chain. Basically, individual economies participate in global value chains by importing foreign inputs to produce the goods and services they export (backward GVC participation or vertical specialization, as mentioned above), and also by exporting domestically produced inputs to partners in charge of downstream production stages (forward GVC participation).

Figure 2.16 illustrates the forward and backward linkages for a set of exporting economies in "Computer, electronic and optical equipment" GVCs. Large economies like Japan and the United States appear to be major upstream providers of electronic components. They have the industrial capacity to produce domestically the inputs required for their production, which reduces their dependency vis-à-vis imports of value added components, as illustrated by their low rate of backward GVC participation of around 3 per cent in 2011. The Philippines are a major actor with 30 per cent of their trade in that sector stemming from or destined for GVCs, the highest share observed in sampled economies. The Philippines act as both an upstream and a downstream partner within Asian ITA-related supply chains, with a strong specialization in the production and export of electronic components. Indeed, 21 per cent of the Philippines' exports of goods in the category "computer, electronic and optical equipment" are disseminated along the sector's production chains.

The economies with the highest degrees of vertical specialization show low forward participation in GVCs, which confirms their focus on activities carried out at the end of the ITA production chain (e.g. assembling). This is the case for some Eastern European (Czech

**Figure 2.16: Forward and backward participation in GVCs producing goods in the "computer, electronic and optical equipment" category in 2011, selected economies**
(percentage of total exports in the reference industry)




Source: OECD-WTO TiVA database.

Republic, Hungary) or East Asian (Malaysia, Thailand) economies, as well as economies where processing trade is predominant, like China and Mexico. Other Central and Eastern European economies, like Austria and Romania, can be located on the opposite side of Figure 2.16. They are characterized by a stronger forward production integration and act as suppliers of specialized technological inputs in European supply chains.

Other developing economies like Viet Nam or Costa Rica are well integrated into GVCs, importing foreign inputs and, to a lesser extent, acting as upstream suppliers. Their development within GVCs is largely due to the presence of global technology corporations resulting from incentive policies to attract foreign direct investment. The Republic of Korea and Chinese Taipei hold central positions within Asian supply chains and show strong participations in ITA-related GVCs. Their total GVC participation (both forward and backward) in this sector stands respectively at 21 per cent and 23 per cent. Their higher rate of forward participation maybe related to their production and export of high value-added electronic components.

# Annex 2.1

## Annex Table 2.1: The 30 leading importers of ITA products in 2015

| Rank | Main importers | Value (US$ bn) | | Share (%) | | Average annual change (%) |
|---|---|---|---|---|---|---|
| | | 1996 | 2015 | 1996 | 2015 | 1996-2015 |
| **ITA participants** | | | | | | |
| 1 | China | 12.9 | 412.8 | 2.3 | 22.5 | 20 |
| 2 | European Union (28) | 194.0 | 375.2 | 35.3 | 20.5 | 4 |
| | Extra-EU (28) imports | 103.9 | 229.9 | 18.9 | 12.6 | 4 |
| | Intra-EU (28) imports | 90.2 | 145.3 | 16.4 | 7.9 | 3 |
| 3 | United States | 122.9 | 283.5 | 22.3 | 15.5 | 4 |
| 4 | Singapore | 25.4 | 86.0 | 4.6 | 4.7 | 7 |
| 5 | Japan | 40.6 | 78.0 | 7.4 | 4.3 | 3 |
| 6 | Korea, Republic of | 19.7 | 71.7 | 3.6 | 3.9 | 7 |
| 7 | Chinese Taipei | 14.3 | 62.3 | 2.6 | 3.4 | 8 |
| 9 | Malaysia | 14.2 | 44.1 | 2.6 | 2.4 | 6 |
| 10 | India | 1.0 | 32.0 | 0.2 | 1.7 | 20 |
| 11 | Viet Nam | 0.3 | 30.3 | 0.1 | 1.7 | 28 |
| 12 | Thailand | 6.6 | 29.4 | 1.2 | 1.6 | 8 |
| 13 | Canada | 19.8 | 26.3 | 3.6 | 1.4 | 1 |
| 14 | United Arab Emirates* | 0.8 | 19.9 | 0.1 | 1.1 | 18 |
| 15 | Philippines | 7.7 | 19.6 | 1.4 | 1.1 | 5 |
| 16 | Australia | 7.8 | 17.5 | 1.4 | 1.0 | 4 |
| 17 | Hong Kong, China | 10.7 | 17.3 | 1.9 | 0.9 | 3 |
| 18 | Russian Federation | 2.3 | 15.9 | 0.4 | 0.9 | 11 |
| 20 | Saudi Arabia, Kingdom of | 0.7 | 11.5 | 0.1 | 0.6 | 16 |
| 21 | Turkey | 1.8 | 10.8 | 0.3 | 0.6 | 10 |
| 22 | Indonesia | 2.1 | 10.7 | 0.4 | 0.6 | 9 |
| 23 | Switzerland | 6.4 | 9.7 | 1.2 | 0.5 | 2 |
| 24 | Israel | 3.2 | 7.0 | 0.6 | 0.4 | 4 |
| 27 | Norway | 2.7 | 4.5 | 0.5 | 0.2 | 3 |
| 29 | Colombia | 1.2 | 4.4 | 0.2 | 0.2 | 7 |
| 30 | Egypt | 0.5 | 3.3 | 0.1 | 0.2 | 10 |
| **ITA non-participants** | | | | | | |
| 8 | Mexico | 10.7 | 61.4 | 1.9 | 3.4 | 10 |
| 19 | Brazil | 4.4 | 14.4 | 0.8 | 0.8 | 6 |
| 25 | South Africa | … | 6.7 | … | 0.4 | - |
| 26 | Argentina | 2 | 5.3 | 0.4 | 0.3 | 5 |
| 28 | Chile | 0.8 | 4.4 | 0.1 | 0.2 | 9 |
| World** | | 550.0 | 1831.1 | 100.0 | 100.0 | 7 |

Source: WTO Secretariat based on UN Comtrade.
Notes: Figures exclude those ITA products that are grouped together with other non-ITA products in tariff and trade classifications, with exception of HS1996 "ex-"codes 8529.90 and 8456.10, which are completely included.
* Includes significant re-exports.
** World totals include intra-EU trade but exclude re-exports of Hong Kong, China. Estimates for missing reporters are based on mirror data.

## Annex Table 2.2: The 30 leading exporters of ITA products in 2015

| Rank | Main importers | Value (US$ bn) | | Share (%) | | Average annual change (%) |
|---|---|---|---|---|---|---|
| | | 1996 | 2015 | 1996 | 2015 | 1996-2015 |
| **ITA participants** | | | | | | |
| 1 | China | 11.3 | 550.5 | 2.1 | 33.3 | 23 |
| 2 | European Union (28) | 170.0 | 260.7 | 31.0 | 15.8 | 2 |
| | Extra-EU (28) exports | 60.8 | 90.7 | 11.1 | 5.5 | 2 |
| | Intra-EU (28) exports | 109.3 | 170.0 | 19.9 | 10.3 | 2 |
| 3 | United States | 108.6 | 152.8 | 19.8 | 9.2 | 2 |
| 4 | Singapore | 38.1 | 123.3 | 6.9 | 7.5 | 6 |
| 5 | Korea, Republic of | 25.6 | 115.4 | 4.7 | 7.0 | 8 |
| 6 | Chinese Taipei | 33.4 | 114.0 | 6.1 | 6.9 | 7 |
| 7 | Japan | 81.9 | 69.1 | 14.9 | 4.2 | -1 |
| 8 | Viet Nam | 0.0 | 60.6 | 0.0 | 3.7 | 50 |
| 9 | Malaysia | 21.7 | 59.0 | 4.0 | 3.6 | 5 |
| 11 | Thailand | 8.9 | 30.5 | 1.6 | 1.8 | 7 |
| 12 | Philippines | 8.6 | 25.9 | 1.6 | 1.6 | 6 |
| 13 | Israel | 3.1 | 9.6 | 0.6 | 0.6 | 6 |
| 14 | Canada | 12.4 | 7.9 | 2.3 | 0.5 | -2 |
| 15 | Switzerland | 3.1 | 5.6 | 0.6 | 0.3 | 3 |
| 16 | Indonesia | 1.6 | 4.8 | 0.3 | 0.3 | 6 |
| 17 | Australia | 2.1 | 2.5 | 0.4 | 0.2 | 1 |
| 18 | Russian Federation | 0.1 | 2.3 | 0.0 | 0.1 | 17 |
| 19 | India | 0.5 | 2.2 | 0.1 | 0.1 | 9 |
| 20 | United Arab Emirates* | 0.1 | 1.9 | 0.0 | 0.1 | 19 |
| 21 | Norway | 1.0 | 1.6 | 0.2 | 0.1 | 3 |
| 24 | Turkey | 0.2 | 0.6 | 0.0 | 0.0 | 6 |
| 25 | Bahrain, Kingdom of | 0.0 | 0.5 | 0.0 | 0.0 | 27 |
| 26 | Morocco | 0.4 | 0.5 | 0.1 | 0.0 | 1 |
| 28 | New Zealand | 0.2 | 0.4 | 0.0 | 0.0 | 4 |
| 29 | Hong Kong, China | 4.9 | 0.3 | 0.9 | 0.0 | -13 |
| 30 | Saudi Arabia, Kingdom of | 0.1 | 0.3 | 0.0 | 0.0 | 6 |
| **ITA non-participants** | | | | | | |
| 10 | Mexico | 9.5 | 43.9 | 1.7 | 2.7 | 8 |
| 22 | Brazil | 0.4 | 1.0 | 0.1 | 0.1 | 5 |
| 23 | South Africa | … | 0.9 | … | 0.1 | - |
| 27 | Tunisia | 0.0 | 0.4 | 0.0 | 0.0 | 14 |
| World** | | 548.5 | 1652.8 | 100.0 | 100.0 | 6 |

Source: WTO Secretariat based on UN Comtrade.
Notes: Figures exclude those ITA products that are grouped together with other non-IT products in tariff and trade classifications, with exception of HS1996 "ex-"codes 8529.90 and 8456.10, which are completely included.
* Includes significant re-exports.
** World totals include intra-EU trade but exclude re-exports of Hong Kong, China. Estimates for missing reporters are based on mirror data.

## Annex Table 2.3: Top ten exporters and importers of ITA products, ranked by 2015 value

(billion dollars and percentage share)

| EXPORTS | | | | | IMPORTS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Economy | Value (US$ bn) | | Share (%) | | Economy | Value (US$ bn) | | Share (%) | |
| | 1996 | 2015 | 1996 | 2015 | | 1996 | 2015 | 1996 | 2015 |
| **ITA 1 Computers and calculating machines** | | | | | | | | | |
| China | 3.9 | 153.4 | 3 | 46 | EU (28) | 64.6 | 111.4 | 43 | 32 |
| EU (28) | 49.1 | 68.5 | 32 | 21 | EU (28) extra-trade | 33.2 | 68.2 | 22 | 19 |
| EU (28) extra-trade | 9.3 | 16.8 | 6 | 5 | EU (28) intra-trade | 31.3 | 43.2 | 21 | 12 |
| EU (28) intra-trade | 39.9 | 51.7 | 26 | 16 | United States | 40.2 | 91.6 | 27 | 26 |
| United States | 25.3 | 27.7 | 17 | 8 | China | 1.0 | 28.2 | 1 | 8 |
| Mexico | 2.7 | 19.2 | 2 | 6 | Japan | 12.5 | 16.3 | 8 | 5 |
| Thailand | 4.4 | 13.5 | 3 | 4 | Mexico | 1.3 | 10.4 | 1 | 3 |
| Singapore | 20.8 | 11.0 | 14 | 3 | Canada | 6.0 | 9.1 | 4 | 3 |
| Malaysia | 6.1 | 8.3 | 4 | 2 | Australia | 2.8 | 7.2 | 2 | 2 |
| Viet Nam | 0.0 | 6.9 | 0 | 2 | Singapore | 3.6 | 7.1 | 2 | 2 |
| Korea, Republic of | 4.7 | 5.5 | 3 | 2 | Korea, Republic of | 2.5 | 6.4 | 2 | 2 |
| Philippines | 1.9 | 4.7 | 1 | 1 | India | 0.2 | 6.2 | 0 | 2 |
| **ITA 2 Telecommunication equipment** | | | | | | | | | |
| China | 1.8 | 163.7 | 4 | 48 | EU (28) | 17.6 | 111.0 | 37 | 29 |
| EU (28) | 24.3 | 62.2 | 52 | 18 | EU (28) extra-trade | 8.8 | 69.5 | 19 | 18 |
| EU (28) extra-trade | 12.3 | 18.0 | 26 | 5 | EU (28) intra-trade | 8.8 | 41.5 | 19 | 11 |
| EU (28) intra-trade | 12.0 | 44.2 | 25 | 13 | United States | 7.1 | 99.2 | 15 | 26 |
| United States | 7.9 | 32.2 | 17 | 9 | Japan | 2.9 | 20.0 | 6 | 5 |
| Viet Nam | 0.0 | 28.6 | 0 | 8 | Mexico | 0.8 | 11.7 | 2 | 3 |
| Korea, Republic of | 1.2 | 12.3 | 3 | 4 | United Arab Emirates | 0.3 | 11.4 | 1 | 3 |
| Mexico | 0.9 | 10.7 | 2 | 3 | India | 0.1 | 10.8 | 0 | 3 |
| Singapore | 0.6 | 9.5 | 1 | 3 | Canada | 1.6 | 9.5 | 3 | 2 |
| Chinese Taipei | 1.1 | 4.8 | 2 | 1 | China | 1.5 | 9.0 | 3 | 2 |
| Malaysia | 1.4 | 3.6 | 3 | 1 | Singapore | 0.9 | 7.7 | 2 | 2 |
| Canada | 1.5 | 2.2 | 3 | 1 | Saudi Arabia, Kingdom of | 0.2 | 7.5 | 0 | 2 |
| **ITA 3 Semiconductors** | | | | | | | | | |
| China | 1.1 | 104.3 | 1 | 20 | China | 3.5 | 258.5 | 2 | 42 |
| Singapore | 8.5 | 82.0 | 6 | 16 | Singapore | 12.2 | 57.2 | 8 | 9 |
| Chinese Taipei | 7.8 | 77.5 | 5 | 15 | EU (28) | 37.6 | 55.3 | 24 | 9 |
| Korea, Republic of | 15.0 | 56.9 | 10 | 11 | EU (28) extra-trade | 23.9 | 31.9 | 15 | 5 |
| EU (28) | 31.6 | 46.9 | 20 | 9 | EU (28) intra-trade | 13.7 | 23.4 | 9 | 4 |
| EU (28) extra-trade | 15.3 | 19.6 | 10 | 4 | United States | 36.9 | 40.7 | 23 | 7 |
| EU (28) intra-trade | 16.3 | 27.3 | 11 | 5 | Korea, Republic of | 9.8 | 36.0 | 6 | 6 |
| United States | 35.4 | 41.0 | 23 | 8 | Chinese Taipei | 7.6 | 34.3 | 5 | 6 |
| Malaysia | 10.3 | 33.7 | 7 | 6 | Malaysia | 10.1 | 27.4 | 6 | 4 |
| Japan | 29.6 | 31.6 | 19 | 6 | Japan | 12.8 | 24.4 | 8 | 4 |
| Philippines | 4.8 | 17.4 | 3 | 3 | Mexico | 3.7 | 18.2 | 2 | 3 |
| Viet Nam | 0.0 | 13.5 | 0 | 3 | Philippines | 4.9 | 14.3 | 3 | 2 |

| EXPORTS | | | | | IMPORTS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Economy | Value (US$ bn) | | Share (%) | | Economy | Value (US$ bn) | | Share (%) | |
| | 1996 | 2015 | 1996 | 2015 | | 1996 | 2015 | 1996 | 2015 |
| **ITA 4 Semiconductor manufacturing equipment** | | | | | | | | | |
| Japan | 2.6 | 10.8 | 43 | 27 | China | 0.1 | 10.8 | 1 | 24 |
| United States | 2.2 | 10.3 | 36 | 26 | Chinese Taipei | 1.1 | 10.2 | 17 | 23 |
| EU (28) | 1.0 | 9.1 | 16 | 23 | Korea, Republic of | 1.3 | 6.5 | 19 | 15 |
| EU (28) extra-trade | 0.7 | 7.9 | 12 | 20 | United States | 1.1 | 4.3 | 17 | 10 |
| EU (28) intra-trade | 0.3 | 1.2 | 4 | 3 | EU (28) | 1.6 | 3.7 | 24 | 8 |
| Korea, Republic of | 0.0 | 3.2 | 0 | 8 | EU (28) extra-trade | 1.3 | 2.6 | 20 | 6 |
| Singapore | 0.0 | 2.8 | 0 | 7 | EU (28) intra-trade | 0.2 | 1.1 | 4 | 3 |
| Chinese Taipei | 0.0 | 1.0 | 0 | 3 | Japan | 0.8 | 3.3 | 11 | 7 |
| China | 0.0 | 0.9 | 0 | 2 | Hong Kong, China | 0.0 | 2.1 | 0 | 5 |
| Switzerland | 0.2 | 0.9 | 3 | 2 | Singapore | 0.3 | 1.3 | 5 | 3 |
| Israel | 0.0 | 0.5 | 0 | 1 | Malaysia | 0.1 | 0.5 | 1 | 1 |
| Malaysia | 0.0 | 0.4 | 0 | 1 | Viet Nam | 0.0 | 0.3 | 0 | 1 |
| **ITA 5 Instruments and apparatus** | | | | | | | | | |
| EU (28) | 8.8 | 6.2 | 46 | 24 | EU (28) | 9.3 | 8.5 | 46 | 29 |
| EU (28) extra-trade | 2.0 | 1.5 | 10 | 6 | EU (28) extra-trade | 3.2 | 4.4 | 16 | 15 |
| EU (28) intra-trade | 6.8 | 4.7 | 36 | 18 | EU (28) intra-trade | 6.1 | 4.1 | 30 | 14 |
| Chinese Taipei | 0.4 | 5.3 | 2 | 20 | United States | 2.6 | 6.1 | 13 | 21 |
| China | 0.4 | 4.1 | 2 | 16 | China | 0.2 | 3.6 | 1 | 12 |
| Singapore | 0.3 | 3.8 | 2 | 14 | Thailand | 0.6 | 1.8 | 3 | 6 |
| Malaysia | 0.1 | 1.8 | 1 | 7 | India | 0.0 | 1.3 | 0 | 5 |
| United States | 4.1 | 1.6 | 21 | 6 | Japan | 1.0 | 1.0 | 5 | 3 |
| Japan | 2.7 | 1.2 | 14 | 4 | Singapore | 1.6 | 0.9 | 8 | 3 |
| Korea, Republic of | 1.1 | 0.8 | 6 | 3 | Chinese Taipei | 0.2 | 0.7 | 1 | 2 |
| Viet Nam | 0.0 | 0.2 | 0 | 1 | Mexico | 0.4 | 0.6 | 2 | 2 |
| Mexico | 0.5 | 0.2 | 2 | 1 | Canada | 0.8 | 0.4 | 4 | 1 |
| **ITA 6 Data storage media and software provided on physical media** | | | | | | | | | |
| EU (28) | 6.8 | 19.2 | 48 | 42 | EU (28) | 7.0 | 14.4 | 46 | 30 |
| EU (28) extra-trade | 2.6 | 10.9 | 19 | 24 | EU (28) extra-trade | 3.2 | 8.1 | 21 | 17 |
| EU (28) intra-trade | 4.2 | 8.3 | 30 | 18 | EU (28) intra-trade | 3.8 | 6.4 | 25 | 13 |
| United States | 3.5 | 10.2 | 25 | 22 | China | 0.4 | 8.2 | 2 | 17 |
| China | 0.3 | 3.7 | 2 | 8 | United States | 2.0 | 7.7 | 13 | 16 |
| Japan | 1.1 | 2.4 | 8 | 5 | Korea, Republic of | 0.7 | 1.7 | 5 | 4 |
| Singapore | 0.3 | 2.4 | 2 | 5 | Canada | 0.5 | 1.5 | 3 | 3 |
| Switzerland | 0.6 | 1.6 | 4 | 3 | Japan | 0.9 | 1.3 | 6 | 3 |
| Malaysia | 0.1 | 1.3 | 1 | 3 | Singapore | 0.3 | 1.1 | 2 | 2 |
| Mexico | 0.2 | 0.9 | 1 | 2 | Mexico | 0.3 | 1.0 | 2 | 2 |
| Canada | 0.2 | 0.8 | 2 | 2 | India | 0.1 | 1.0 | 1 | 2 |
| Korea, Republic of | 0.1 | 0.6 | 1 | 1 | Australia | 0.3 | 0.7 | 2 | 2 |

| EXPORTS | | | | | IMPORTS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Economy | Value (US$ bn) | | Share (%) | | Economy | Value (US$ bn) | | Share (%) | |
| | 1996 | 2015 | 1996 | 2015 | | 1996 | 2015 | 1996 | 2015 |
| **ITA 7 Parts and accessories** | | | | | | | | | |
| China | 3.9 | 120.4 | 3 | 35 | China | 6.2 | 94.6 | 4 | 27 |
| EU (28) | 48.5 | 48.6 | 31 | 14 | EU (28) | 56.3 | 71.0 | 37 | 20 |
| EU (28) extra-trade | 18.6 | 16.0 | 12 | 5 | EU (28) extra-trade | 30.2 | 45.4 | 20 | 13 |
| EU (28) intra-trade | 29.9 | 32.6 | 19 | 10 | EU (28) intra-trade | 26.2 | 25.5 | 17 | 7 |
| Korea, Republic of | 3.5 | 36.1 | 2 | 11 | United States | 33.0 | 33.9 | 22 | 10 |
| United States | 30.3 | 29.9 | 19 | 9 | Mexico | 4.1 | 19.1 | 3 | 5 |
| Chinese Taipei | 11.9 | 21.2 | 8 | 6 | Korea, Republic of | 3.7 | 15.8 | 2 | 4 |
| Japan | 26.8 | 18.3 | 17 | 5 | Viet Nam | 0.1 | 14.6 | 0 | 4 |
| Singapore | 7.5 | 11.9 | 5 | 3 | Japan | 9.8 | 11.7 | 6 | 3 |
| Viet Nam | 0.0 | 11.0 | 0 | 3 | Singapore | 6.5 | 10.7 | 4 | 3 |
| Malaysia | 3.6 | 9.9 | 2 | 3 | Chinese Taipei | 3.5 | 9.1 | 2 | 3 |
| Mexico | 3.6 | 9.7 | 2 | 3 | Malaysia | 2.6 | 8.9 | 2 | 3 |

Source: WTO Secretariat, based on UN Comtrade.

# Endnotes

1 For more information regarding these ITA participants, see WTO (2012), Chapter III.

2 Out of the 53 ITA participants, only three have outstanding commitments for implementation, namely Afghanistan, Colombia and Tajikistan. Afghanistan and Tajikistan joined the ITA recently and are expected to implement the last tariff cut in 2019 and 2018, respectively. Colombia's tariff reduction is scheduled to be completed this year.

3 The full list of ITA Participants, with respective accession dates, is reproduced on page 91.

4 See Chapter 3, Section A.

5 The ITA does not differentiate its product coverage beyond Attachment A (with two sections) and Attachment B. However, in this publication, ITA products have been classified into seven categories: (1) computers and calculating machines; (2) telecommunication equipment; (3) semiconductors; (4) semiconductor manufacturing equipment; (5) data storage media and software provided on physical media; (6) instruments and apparatus; and (7) parts and accessories. The same classification of ITA products was used in WTO (2012).

6 These trade data need to be treated with caution as they can be inflated by double counting where IT products are manufactured in global supply chains with components sometimes crossing borders several times.

7 "nes" indicates "not elsewhere specified".

8 Data for Hong Kong, China in this chapter refer to domestic exports and/or retained imports only.