The Expansion of the Information Technology Agreement: An Economic Assessment
Europe Direct is a service to help you find answers to your questions about the European Union.

Freephone number (*):
00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).
The Expansion of the Information Technology Agreement: An Economic Assessment
Acknowledgements

This report was prepared under the overall coordination of Lucian Cernat, Chief Economist in DG TRADE.

The main author is Stephan Nolte with contributions from Cornelis Keijzer and Vladymyr Dedobbeleer (sections 2 and 4).

Zornitsa Kutila-Dimitrova and Alessandro Antimiani contributed to the CGE analysis in section 5. The statistical sector of the Chief Economist and Trade Analysis Unit provided figures for sections 3 and 5. Christoph Albrecht reviewed relevant academic literature.

The overall report benefited from valuable comments, inputs and suggestions by colleagues in other units in DG TRADE.
Executive Summary

The first ITA has been concluded as an MFN-based plurilateral agreement at the WTO Ministerial Conference in Singapore in December 1996 and entered into force in the following year. That means even WTO members that are not participating and consequently do not engage in liberalization efforts themselves are beneficiaries of the tariff cuts agreed.

In the almost twenty years that have passed since then, the membership of the ITA has increased steeply. The products covered, however, had not changed at all, despite the IT sector having developed rapidly. For this reason, a sub-group of ITA members embarked in 2012 on negotiations for an ITA expansion in terms of product coverage which were concluded successfully in 2015 and finally agreed upon at the 10th Ministerial Conference of the WTO in Nairobi in December 2015.

The ITA expansion covers about 9-13% of current world trade with around 90% of trade in these products taking place among ITA members.

The ITA expansion has 25 members (including the EU as one member) and cuts tariffs to zero on a list of 201 products. A large part of the tariff liberalizations occur instantaneously upon entry into force, but for some sensitive products, tariff reductions are staged over up to seven years.

A detailed product-level analysis using a partial equilibrium model finds that EU exports in 191 of the 201 products may increase by 0.6 to 1.2 billion EUR, whereas imports may increase by 3.5 to 4.5 billion EUR. This analysis, however, ignores indirect effects of this liberalization. Since many of the products are inputs, direct and indirect, to other economic activities, the true economic effect may therefore be significantly underestimated. A computable general equilibrium analysis which takes due account of these indirect effects finds much stronger effects on trade. Total EU exports of goods and services increase by 5.0 to 8.3 billion EUR whereas imports are not affected significantly, resulting also in a positive effect on the EU trade balance. The effect on EU GDP is also positive, though small.

Tariff revenue losses related to the liberalization of the 201 products amount to 1.4 to 1.9 billion EUR, depending on the ultimate coverage of the agreement, which is not fully quantifiable in current trade classifications.

With a view to the future, it is shown that the EU would benefit from focussing negotiation capital on expanding the ITA in terms of country coverage and so as to reduce NTBs.
Table of Contents

Acknowledgements .................................................................................................................. 1
Executive Summary .................................................................................................................. 2
Table of Acronyms .................................................................................................................. 3
1. Introduction .......................................................................................................................... 4
2. Context and Rationale for the ITA expansion ...................................................................... 5
3. Overview of the Economic and Trade Dimensions of the ITA ........................................... 7
4. The expanded ITA: membership and product coverage ...................................................... 12
5. The potential economic effects of the ITA ......................................................................... 16
   5.1 Partial Equilibrium Analysis ......................................................................................... 16
   5.2 General Equilibrium Analysis ...................................................................................... 18
   5.3 Effect on the EU budget ............................................................................................... 21
6. Conclusions and Outlook .................................................................................................... 21
7. References .......................................................................................................................... 24
Appendix 1: Partial Equilibrium Model Equations .................................................................. 26

Table of Acronyms

CGE  Computable General Equilibrium
IT   Information Technology
ITA  Information Technology Agreement
ITA Committee Committee of Participants on the Expansion of Trade in Information Technology Products
MFN  Most Favoured Nation
MC10 Tenth WTO Ministerial Conference
MCOs Multi-Component Integrated Circuits
NTB  Non-tariff barrier
PE   Partial Equilibrium
SDoC Supplier’s Declaration of Conformity
WTO World Trade Organization
1. Introduction

In June 2012, six WTO members, among which the EU, launched negotiations to expand the 15 year old Information Technology Agreement (ITA) of the World Trade Organization (WTO) (WTO, 2016a). The ITA had existed for quite some time without the built-in review mechanism leading to an update of the product coverage by the agreement, which in a rapidly developing sector was especially problematic.

The composition of the negotiating group fluctuated over the course of the negotiations, but eventually, 25 WTO members approved the result at the 10th WTO Ministerial Conference (MC10) on 16 December in Nairobi.

With the negotiations finalized, the agreement must now be ratified by the participating WTO members. The purpose of this report is to present an economic evaluation of the negotiated outcome to the legislative bodies of the EU. To that end we proceed as follows:

In chapter two, the history of the agreement is placed in an explanatory context, in particular as regards the implications of its nature as a plurilateral agreement and the course of the negotiations embarking from an existing legal and institutional framework, the original ITA from 1996.

Chapter 3 presents a set of descriptive statistics on the economic dimensions of the agreement. Chapter 4 explains its content along the categories of geographical coverage, product coverage and the temporal dimension, i.e. the staging of the committed tariff liberalization efforts.

Chapter 5 presents the results of two quantitative modelling efforts. The first of these employs a partial equilibrium (PE) model analysing the impact of the agreement on the products it covers. In order to assess the impact the ITA expansion will have on the remainder of the economy, which is strongly suggested by many of the products liberalized being direct or indirect inputs into other production processes of the economy, a computable general equilibrium (CGE) model is applied. Moreover, this additional analytical effort appropriately captures the role of global supply chains involving the ITA products.

Chapter 6 summarizes and interprets the results. It also looks at identifying future negotiation priorities from the analytical insights gained.
2. Context and Rationale for the ITA expansion

The first Information Technology Agreement (ITA) was concluded at the Singapore Ministerial Conference in December 1996 and entered into force in 1997. At the same time, the Committee of Participants on the Expansion of Trade in Information Technology Products (ITA Committee) was created, whose aim it was to review the product coverage of the agreement, among others in the light of technological development. The ITA was agreed by 29 WTO members initially, but membership has meanwhile expanded to 81 WTO members (WTO, 2016b).¹

Unlike other trade agreements negotiated under the auspices of the WTO, the ITA is a plurilateral agreement, and so will be its expansion. That means that, although only a subset of WTO members commit to tariff reductions, it obliges its members to apply duty free treatment to all WTO members on a Most Favoured Nation (MFN) basis on all covered products (e.g. computers, telephones, but also inputs, components and machinery for production of Information Technology (IT) goods). This creates a free-riding problem for which reason it is important to ensure a critical mass in terms of membership and of trade covered. In particular, no big exporting country can be perceived to be free-riding, otherwise political momentum for a plurilateral agreement will likely collapse.

The participants of the first ITA represent more than half the WTO-members and account for 97% of trade in this sector. The ITA is credited to have played an important role in the enormous development and expansion of trade that the IT-sector has gone through over period of almost 20 years elapsed since its entry into force (including a quadrupling of trade in the sector).

However, the product coverage of ITA has not been revised in all this time, in spite of the enormous technological change that has occurred over the period. The coverage of ITA therefore became technologically outdated. Already in 1999, an attempt at review and expansion was made, but this attempt that was negotiated in the ITA Committee failed when India and Malaysia disagreed on the inclusion of televisions.

Disagreements on what is really included in the ITA, in particular when technological progress changes the character of products, led to a panel in 2008 between the EU on one side and the US, Japan and Taiwan on the other.² Following the panel report, the EU widened the scope of its duty-free treatment on multi-functional copying machines, monitors and set-top boxes.

¹ According to Henn and Mkrtchyan, two of the founding members, Taiwan and Estonia, have only later become WTO members.
² Some sources state the membership with 82, counting the EU in addition to its 28 member states as an individual member. Counting the EU28 as one, the ITA has 54 members.
When the panel results were implemented, it had become clear to the Members that updating the agreement could not be left to litigation. Product changes due to technological progress had changed the IT-sector significantly while the ITA product coverage had not been touched. The EU proposed a review of the ITA as early as 2008, but the results of the WTO panel had to be awaited before this could seriously be discussed.

After a preparatory phase, six WTO members finally launched the review in May 2012 (EU, US, Japan, Korea, Taiwan and Costa Rica). This time, the negotiations did not take place in the ITA-Committee, as not all ITA members participated. Only those members who submitted a list of ITA-products for inclusion could join the group. China joined in the fall of 2012, although with a much shorter, less ambitious list than the other countries. Finally, the group grew to 27 countries, of which finally 25 approved the result obtained at the MC10 on 16 December in Nairobi.

The participating countries negotiated informally from May 2012 to July 2015 to combine all the lists issued by the different participants into one ITA-expansion list. Problems on the inclusion or not of televisions once more threatened the process. However, finally all participants recognised that there was no chance of reaching consensus on the inclusion of televisions, as too many countries had flagged sensitivity on this product. Differences between the negotiating parties on the general level of ambition led to several suspensions of the negotiations. In November 2014 at the APEC summit in Beijing, the US and China reached an agreement on the coverage of the new list, but failed to convince countries like Korea and Taiwan to accept the results. Several members insisted on inclusion of a number of their offensive products but others refused, leading to another suspension of negotiations until spring 2015. The EU alongside other participants played a leading role in the negotiating process and chaired the meetings on coverage until finally a breakthrough on the coverage was brokered, with the support of the WTO's Director General.

Following the establishment of one list of products with tariffs to be eliminated by all, now the staging periods for tariff elimination had to be negotiated per country. While the general rules were agreed, largely following the example of the original ITA (3 years for normal staging, 5 years for sensitive products and 7 years for exceptional cases), it turned out more complicated to agree on the individual schedules per country. Some countries asked from the beginning for longer staging of many products arguing longer staging periods were justified, because more and higher duties had to be eliminated.

A number of countries insisted until the end on longer staging periods of up to 10 years. Two countries (Dominican Republic and El Salvador) renounced joining when they failed to obtain agreement on this, but the other participants (Philippines, Thailand and Colombia) finally accepted. Turkey finally renounced participation when, at the last meeting in Nairobi, it could not reach an agreement with other members on its schedule. Korea and Taiwan also included
more items in longer staging, even though these products had not been flagged as sensitive before. The EU also negotiated longer staging for some sensitive consumer products, in line with requests from the EU Member States concerned. At the same time, the EU agreed to eliminate the majority of its non-sensitive tariffs at entry into force, as did most other participants.

Some negotiating parties expressed concerns on free-riders and in particular on the possibility that participants would in the future lose the critical mass of 90%. Participants accepted a paragraph in the Ministerial Declaration that addresses this issue in a constructive manner. All participants accepted the declaration and the schedules in a final technical meeting and successful conclusion of the ITA expansion was announced as key deliverables of the Nairobi Ministerial meeting.

3. Overview of the Economic and Trade Dimensions of the ITA

The expansion of the ITA covers a significant share of world trade in goods. Figure 1 (first column) shows that out of 13.7 trillion EUR of global trade\(^3\), 1.68 trillion EUR (15.4%) are included in the ITA expansion (this figure includes trade of non-ITA members).

\textit{The expansion of the ITA covers a significant share of world trade in goods.}

The ITA expansion covers very specific products listed in two separate attachments, A and B. All of the trade under Attachment B and a part of the trade under Attachment A cannot be perfectly measured in the Harmonized System (HS) classification at 6-digit level (the common international trade classification for goods). The concerned product codes on Attachment A are so-called ex-outs, meaning that not the entire trade covered under an HS6 code will be liberalized by the ITA extension, whereas for Attachment B there is no common mapping of these specific products to the HS classification across all ITA participants, each country having its own national product codes\(^4\). While including all the HS6 codes identified to cover trade subject to the ITA expansion provides an upper bound of the value of liberalized trade, the codes under Attachment A that are not subject to ex-outs provide a lower bound. This is a distinction that will be made throughout section 3 and occasionally in subsequent sections of this report. This lower bound is labelled Attachment A in the graphs in this section, whereas the value of trade which is uncertain and which makes up for the difference between upper and lower bound is labelled Attachment A (ex) and Attachment B.

\(^3\) All figures in this report are net of intra-EU trade.

\(^4\) DG Trade compiled a list of HS6 codes under which the items on Attachment B will fall. As with the ex-out items under Attachment A, the trade recorded under these subheadings obviously overstates the amount of trade liberalized by the ITA expansion. It does, however, give an idea about the order of magnitude and defines an upper bound of the trade that could be concerned.
This lower bound, as shown in figure 1 is still 1.1 billion EUR or 13.1% of world trade in goods.

**Figure 1: World Trade in products covered by the ITA expansion, billion EUR, 2012/13**

Source: UN COMTRADE importer notifications, own calculations.

The second column in figure 1 shows the share of the trade actually covered by the expansion (net coverage) discounting exports to non-ITA countries, for which tariffs remain in place. The agreement being plurilateral, this is somewhat less than the entire global trade in these tariff lines with 0.97-1.43 trillion EUR, corresponding to 8.8-13.1% of world trade in goods. This is 85% of global trade (imports and exports) in the tariff lines covered by the ITA expansion and as much as 87% of the lines under Attachment A without ex-outs.6

Recent developments suggest that the share of ITA participants in total world trade in ITA products is growing. In 2014 world trade in ITA expansion products was flat compared to the previous two years whereas the value of trade by members of the ITA expansion increased by 2.4%. Trade in these products not covered by the agreement, i.e. imported by non-members, on the other hand even decreased by 14.2% in the same period. EU trade increased stronger than the average of ITA members. Imports increased by 3.2% and exports by 4.3%.

---

5 The definition that we employ is trade for which the agreement abolishes tariffs.

6 ITA expansion members make up for 94% of all exports of the items covered by the agreement, irrespective of whether the lower or the upper bound is used.
The weighted average EU MFN tariff on the lower bound of the trade covered by the agreement is about 1.61%, whereas the actual applied tariff is 1.23%.

Figure 2 shows the stakes of the EU28 in the ITA expansion. The EU exports 189 billion EUR in products covered by the ITA expansion, with a lower bound of 98 billion EUR. Due to the plurilateral nature, 136 billion EUR (7.7% of total extra-EU exports of goods) are liberalized by the agreement. The lower bound for this figure is 75 billion EUR (4.3% of total EU exports). EU imports, all of which are liberalized are 130-212 billion EUR, or 7.5%-12.2% of total extra-EU goods imports.

It is important to mention at this stage that the amount of trade itself is only an incomplete descriptive measure of the liberalization effort as it does not say anything about the magnitude of the barriers that will effectively be removed. The weighted average EU MFN tariff on the lower bound of the trade covered by the agreement is about 1.61%, whereas the actual applied tariff is 1.23%. The difference can be explained by imports originating in countries with which the EU has an FTA or another sort of preferential agreement in place. On the export side the...
weighted average applied tariff is about 1.12%. Including ex-out items under Attachment A leads to somewhat higher tariffs, in particular on the export side (1.24% versus 1.27% on the import side). Due to uncertainties regarding product classification, a similar quantification for items under Attachment B was not robust enough.

However, behind such low overall average tariffs there are certain tariffs that are considerably higher. Figure 3 below provides a sectoral breakdown of applied tariffs on items listed under Attachment A. The chosen level of disaggregation is the HS chapter. The figure demonstrates first that the EU and the other ITA signatories are already more open than countries outside the agreement.

Non-ITA countries have higher applied tariffs than other ITA members in all HS chapters and higher tariffs than the EU in all but one HS chapter. However, this chapter 37 makes up for a mere 0.5% of EU imports under Attachment A and for less than 0.6% of imports of other countries (members and third countries, see also figure 4). The weighted average applied import tariff of third countries on all items under Attachment A is 6.0%, more than four times the level of members.

**Figure 3: Average applied import tariffs by region and HS chapter**

![Bar chart showing average applied import tariffs by region and HS chapter](figure3.png)

**Source:** MAcMap, UN COMTRADE importer notifications, own calculations.

Figure 3 shows that apart from several higher tariffs elsewhere, EU tariffs related to the ITA expansion are concentrated in HS chapters 35, 37 and 39, whereas figure 4 reveals that trade is concentrated with about three quarters of total imports in chapters 84 and 85, and to a lesser extent in chapter 90. Other countries, both inside and outside of the ITA expansion, show a very similar concentration of trade.
Other ITA members have a tariff profile that is rather similar to that of the EU. Third countries, too, tend to have lower weighted tariffs on chapters 84, 85 and 90 than on other chapters, but the difference is much less pronounced than it is for the ITA expansion members. These tariffs are what drives the above observed difference in overall weighted average import tariffs on items under Attachment A.

Figure 4: Trade profile of items under Attachment A, share of HS chapters in total imports

Without prejudice to the quantitative analysis in section five, it should be pointed out that including only nominal tariff reductions tends to significantly underestimate the effective barriers. There is a vast body of literature showing positive effects of binding tariffs in the multilateral system and of reducing them to zero as opposed to reducing them to a smaller but still positive rate. Specifically for the original ITA agreement, Henn and Mkrtchyan (2015) show that this latter effect is significant and may well dominate the trade creation effect of the nominal tariff reduction. Interestingly, this effect is found to be larger for intermediates than for final products.
If the members of the first ITA join the ITA expansion, the trade covered will increase from 1.43 trillion EUR to 1.54 trillion EUR, corresponding to a 7.8% increase.

The membership of the first ITA increased over time from initially 29 to eventually 54 members (counting the EU Member states as one). Figure 5 shows the potential effect of a similar growth in membership for the ITA expansion for the EU. At global level if the members of the first ITA join the ITA expansion over time, the trade covered will increase from 1.43 trillion EUR to 1.54 trillion EUR, corresponding to a 7.8% increase. For the EU, figure 5 shows that exports coverage will increase from 75-136 billion EUR to 88-165 billion EUR. This is equal to an increase of 18-21%.

4. The expanded ITA: membership and product coverage

The first ITA has 54 members, counting the EU as one. These members are presented in table 1 below. The expansion agreed at the MC10 has 25 participants, whose names are shaded in grey in table 1.

---

9 If only items without ex-outs are considered, the value of covered trade increases from 0.97 trillion to 1.03 trillion or 6.5%.
These participants agreed in July 2015 on a list of 201 products for which tariffs will be eliminated. The normal staging period was agreed to be three years with tariffs eliminated in four successive linear cuts (including one at entry into force). For sensitive products, tariffs can be eliminated over five years instead, in six linear cuts. For exceptional cases longer staging periods can be invoked. There was an informal agreement between the participants in Nairobi to limit the maximum staging to seven years, as rapid changes in the IT sector would make staging beyond seven years meaningless. Eventually, all participants respected this limitation. At the proposal of Hong Kong, a provision was introduced for tariffs to be eliminated at entry into force. This proposal was widely followed and finally the majority of tariff lines will be eliminated immediately on 1 July, as can be seen in the overview of tariff elimination in the ITA expansion presented in table 2 below.

### Table 1: Members of the ITA and its expansion

<table>
<thead>
<tr>
<th>Country</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>Indonesia</td>
</tr>
<tr>
<td>Albania</td>
<td>Israel</td>
</tr>
<tr>
<td>Australia</td>
<td>Japan</td>
</tr>
<tr>
<td>Bahrain</td>
<td>Jordan</td>
</tr>
<tr>
<td>Canada</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>China</td>
<td>Korea, Republic of</td>
</tr>
<tr>
<td>Colombia</td>
<td>Kuwait</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Kyrgyz Republic</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>Liechtenstein</td>
</tr>
<tr>
<td>Egypt</td>
<td>Macao</td>
</tr>
<tr>
<td>El Salvador</td>
<td>Malaysia</td>
</tr>
<tr>
<td>European Union</td>
<td>Mauritius</td>
</tr>
<tr>
<td>Georgia</td>
<td>Moldova, Republic of</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Montenegro</td>
</tr>
<tr>
<td>Honduras</td>
<td>Morocco</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Iceland</td>
<td>Nicaragua</td>
</tr>
<tr>
<td>India</td>
<td>Norway</td>
</tr>
<tr>
<td></td>
<td>Oman</td>
</tr>
<tr>
<td></td>
<td>Panama</td>
</tr>
<tr>
<td></td>
<td>Peru</td>
</tr>
<tr>
<td></td>
<td>Philippines</td>
</tr>
<tr>
<td></td>
<td>Qatar</td>
</tr>
<tr>
<td></td>
<td>Russian Federation</td>
</tr>
<tr>
<td></td>
<td>Saudi Arabia</td>
</tr>
<tr>
<td></td>
<td>Seychelles</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
</tr>
<tr>
<td></td>
<td>Switzerland</td>
</tr>
<tr>
<td></td>
<td>Taiwan</td>
</tr>
<tr>
<td></td>
<td>Tajikistan</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
</tr>
<tr>
<td></td>
<td>Turkey</td>
</tr>
<tr>
<td></td>
<td>Ukraine</td>
</tr>
<tr>
<td></td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td></td>
<td>Vietnam</td>
</tr>
</tbody>
</table>

Source: WTO. *Members of the extension are shaded in grey
Table 2: Date of full implementation by participants according to staging matrix (in number and percentage of tariff lines (TL))

<table>
<thead>
<tr>
<th>No</th>
<th>Participant</th>
<th>ITA TL (total and %) with tariff elimination fully implemented by 1 July of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2016 TL (%)</td>
</tr>
<tr>
<td>1</td>
<td>Albania</td>
<td>339</td>
</tr>
<tr>
<td>2</td>
<td>Australia</td>
<td>294</td>
</tr>
<tr>
<td>3</td>
<td>Canada</td>
<td>509</td>
</tr>
<tr>
<td>4</td>
<td>China</td>
<td>418</td>
</tr>
<tr>
<td>5</td>
<td>Colombia</td>
<td>201</td>
</tr>
<tr>
<td>6</td>
<td>Costa Rica</td>
<td>211</td>
</tr>
<tr>
<td>7</td>
<td>European Union</td>
<td>581</td>
</tr>
<tr>
<td>8</td>
<td>Guatemala</td>
<td>220</td>
</tr>
<tr>
<td>9</td>
<td>Hong Kong</td>
<td>352</td>
</tr>
<tr>
<td>10</td>
<td>Iceland</td>
<td>388</td>
</tr>
<tr>
<td>11</td>
<td>Israel</td>
<td>197</td>
</tr>
<tr>
<td>12</td>
<td>Japan</td>
<td>211</td>
</tr>
<tr>
<td>13</td>
<td>Korea</td>
<td>833</td>
</tr>
<tr>
<td>14</td>
<td>Malaysia</td>
<td>410</td>
</tr>
<tr>
<td>15</td>
<td>Mauritius</td>
<td>211</td>
</tr>
<tr>
<td>16</td>
<td>Montenegro</td>
<td>419</td>
</tr>
<tr>
<td>17</td>
<td>New Zealand</td>
<td>430</td>
</tr>
<tr>
<td>18</td>
<td>Norway</td>
<td>302</td>
</tr>
<tr>
<td>19</td>
<td>Philippines</td>
<td>743</td>
</tr>
<tr>
<td>20</td>
<td>Singapore</td>
<td>581</td>
</tr>
<tr>
<td>21</td>
<td>Switzerland</td>
<td>251</td>
</tr>
<tr>
<td>22</td>
<td>Chinese Taipei</td>
<td>357</td>
</tr>
<tr>
<td>23</td>
<td>Thailand</td>
<td>523</td>
</tr>
<tr>
<td>24</td>
<td>Turkey</td>
<td>208</td>
</tr>
<tr>
<td>25</td>
<td>United States</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>9,639</td>
</tr>
</tbody>
</table>

Source: WTO Secretariat
Table 2 shows the scheduling of tariffs cuts for each ITA member. The EU will eliminate 77% of tariff lines at the outset, which is above the average, but less than other developed countries such as the US, Japan, Canada, Norway or Switzerland. Mauritius and Malaysia also will follow a more ambitious schedule. The EU is the only developed ITA member that negotiated seven years staging for its sensitive items (for 1.9% of its lines). Only China, Korea, Malaysia and Guatemala stage more lines in seven years. This longer staging is justified by the relatively high tariffs on some of these lines and due to the fact that some items were considered as sensitive by certain Member States.

The EU will eliminate all tariffs below 2% at the outset, as well as tariffs included in the so-called "building blocks" (HS4 headings which were originally covered by the ITA but where certain lines with tariffs were included later through re-classification). The headings concerned are printers (8483), semiconductor manufacturing equipment (8486), telephones (8517), media (8523), semiconductors (8542) and Multicomponent Integrated Circuits (MCOs, currently not readily classifiable in the HS). These categories cover together 77% of tariff lines and 40% of the duties to be eliminated by the EU.

Although ITA is a plurilateral agreement, the rules applied are strictly multilateral: tariff elimination is applied to all WTO members on an MFN basis. This was possible because, as in the original ITA, participants cover approximately 90% of the market, reducing the free-rider problem to acceptable proportions. The list of products to be liberalised is fixed for all participants. There is no possibility for exceptions. The problems and the sensitivities of certain products for countries can be solved by longer staging only, within the limits as set out above.

The list of products consists of two parts, Attachment A and B. Attachment A includes HS6 subheadings with ex-outs indicated where relevant. Where an ex-out is indicated, only the product description included will be subject to tariff elimination, while the rest of the subheading remains unchanged. In the agreed schedules, participating countries have filled-in the national tariff lines (usually at 8 or 9 digits) included in the coverage. Attachment B consists of product descriptions only. In the schedules participants have indicated the tariff lines concerned by these product descriptions. MCOs have been translated in (in most cases numerous) national tariff lines in the schedules.
5. The potential economic effects of the ITA

In this chapter, the future economic impact of the ITA expansion is assessed using two modelling approaches:

(i) a partial equilibrium (PE) model focussing on trade in the specific products liberalized by the agreement and

(ii) a computable general equilibrium (CGE) model capturing wider economic effects, given the important role of ITA products in global supply chains.

5.1 Partial Equilibrium Analysis

In order to investigate the direct trade effects on the products on the expansion list, we apply a standard PE model. The analysis is performed with an in-house model that has been developed by Francois and Manchin (2011) and used by DG Trade over the years for several detailed trade policy analyses.

Typically such PE models look at the market for one product at one time, ignoring cross-product effects and ignoring general equilibrium effects (such as changes in wages, GDP, aggregate demand, etc.) and how those variables may in turn affect the markets for IT products. As long as the changes in the markets in question are small in relation to the overall economy this is a rather reasonable simplification. Effects on agents' intertemporal decisions, in particular on investments or innovation, are not considered, either.

The model applies the ceteris paribus assumption. That means that it compares two situations which are exactly identical except for the parameter which is modified, in our case the ITA tariff rates. Essentially, this means expected market developments or any other projections for the future such as population growth or technical progress, are not taken into account.

The model has four blocks of equations. The equations govern the following relationships.\(^\text{10}\)

1. Price transmission – How does a change in producer prices translate to a change in import prices?

2. Import demand (bilateral) – How does a change in import prices affect import demand?

\(^{10}\) The model equations in algebraic notation are presented in annex 1.
3. Export supply (total) – How does a change in producer prices affect total export supply?

4. Market clearance – Imports of country A from country B should equal exports from B to A\(^\text{11}\).

The model is applied on data for bilateral trade flows as well as applied trade policies and uses three sets of parameters for the behavioural equations.

Due to the difficulties earlier explained of quantifying trade flows and tariffs for the items under Attachment B, the simulations cover the items on Attachment A only, and are carried out at HS6 level, using UN COMTRADE importer notification data for 2012 and 2013. \(^\text{12}\)

For tariffs, we use TARIC for EU import tariffs and the UN ITC MAcMap database (Bouët et al, 2008) for other countries.

Own-price elasticities of import demand have been extracted from a World Bank dataset documented in Kee et al (2008). \(^\text{13}\) Our model is executed with five aggregate regions, the EU28, other ITA members, and three groups of third countries. Import demand elasticities from Kee et al (2008) are estimated at the national level. In order to arrive at a regional level for import demand elasticities, we aggregated the national elasticities weighing them by GDP.

Elasticities of export supply and Armington elasticities of substitution are not available as readily and comprehensively from databases. We have followed pertinent academic literature to fill these values. \(^\text{14}\)

Our model contains non WTO members as a separate regional aggregate. These could theoretically be denied the market access commitments by the ITA expansion members, as the MFN principle obliges members of a plurilateral agreement only to extend the market access

\(^{11}\) Technically, equations (3) and (4) are merged in the model code. To be mathematically solvable, the number of variables has to match the number of equations of a system. Therefore, export supply does not appear as an explicit variable, but merely as a function of the producer price in the model.

\(^{12}\) For EU trade, EU notifications are used for both imports and exports. The choice of years presents a compromise between timeliness and broadness. A three-year average would have been more robust as it would have been less sensitive to outliers and misreporting. However, data for 2014 was not available from all reporters at the time of the database query. Data from 2011 would not have been compatible with the 2012 and 2013 data on account of a revision of the HS in 2012. Taking, however a three years average from before the revision would have made the data less robust because it would have been too old.

\(^{13}\) In cases of extreme estimates, elasticities have been capped to prevent overall results to be influenced by outliers.

\(^{14}\) See e.g. Laborde and Lakatos (2012). Elasticities of export supply have been set to imply almost perfectly elastic export supply.
commitments to WTO members. For simplicity, and since in practice, the EU never discriminates between WTO members and non-members, the model analysis simulates a full multilateral tariff abolition by all ITA expansion members for the items on the list vis-à-vis both WTO members and non-WTO members.

We present the results in terms of trade flows in table 3. These include two scenarios, the first of which does not take into account lines with an ex-out, among them the entire Attachment B. While the scenarios sketch lower and, respectively, upper bounds of the impact of the ITA expansion, they also mark a difference between gains that are certain, relatively speaking, and uncertain in terms of magnitude. Where only lines without ex-outs are covered, total extra EU exports increase by 610 million EUR whereas imports increase by 3.45 billion EUR. Where ex-out lines are included, the increase in exports almost doubles to 1.19 billion EUR. The increase in imports increases to 4.47 billion EUR.

<table>
<thead>
<tr>
<th></th>
<th>excluding ex-out lines</th>
<th>including ex-out lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ Exports</td>
<td>0.61</td>
<td>1.19</td>
</tr>
<tr>
<td>Δ Imports</td>
<td>3.45</td>
<td>4.47</td>
</tr>
</tbody>
</table>

Source: Own simulations.

The product level analysis also shows that gains are rather concentrated. Only regarding lines without ex-outs, 74% of the increases in exports are concentrated in ten HS6 lines. For imports, this concentration is less pronounced with the ten most important HS6 lines accounting for 64% of additional imports.\(^{15}\)

### 5.2 General Equilibrium Analysis

The partial equilibrium analysis can only partially capture the benefits of the ITA expansion. Besides the already mentioned exclusion of items listed under Attachment B, the main shortcoming is ignoring the effects in the rest of the economy. Given that a large part of the products are either direct inputs to the production of final IT goods or used as office equipment

---

\(^{15}\) These ten lines are in the case of exports 850440, 850490, 903180, 848620, 852990, 844399, 901320, 902710, 851981, 848690, and in the case of imports 851830, 852580, 370790, 853810, 900290, 370130, 852329, 901490, 844331, 880521.
and other indirect inputs in basically all firms in the economy, these second round effects can be expected to be major.

The existing literature supports this notion. Henn and Mkrtchyan (2015) find in an econometric analysis that membership in the initial ITA is not only associated with higher imports, but also with 8% higher exports of final products on the ITA list. Higher imports are what one would expect as ITA members reduce their tariffs and other countries do not. Higher exports, however, should not be expected in absence of second round effects since exports of non-members benefit from the same tariff reductions as exports of members do.

Ezell (2012) confirms this in a survey of other studies. Due to the strong interlinkages with other industries, tariffs for IT goods are found to be particularly harmful because they raise cost, decrease their usage and thereby hurt all sectors in the economy by lowering productivity and innovation. Regarding the temptation to judge a trade deal such as the ITA expansion by mercantilist logic, the study finds that import substitution strategies supported by tariffs are ineffective because of the global fragmentation of production in which countries with high trade barriers tend to either be bypassed or to accumulate high tariffs burden on key inputs for their export competitiveness. This comes on top of the harm that is caused by a reduced diffusion of IT products to other sectors because of higher prices.

In order to take into account these effects in a quantitative manner, we simulate the ITA expansion in a static CGE model.\textsuperscript{16} The static GTAP (Hertel, 1997) is a multi-region, multi-sector CGE model widely used for trade policy analyses. The model being a general model means that unlike in the PE model used in section 5.1, other key macroeconomic variables and cross-sectoral linkages are explicitly modelled.

The model does also explicitly cover cross-product relations in demand and supply (i.e. in utility functions and via factor markets). Moreover, it models a key feature to our analysis, namely intermediate consumption across sector boundaries, which, as described above, is the main rationale for expanding the analysis into general equilibrium territory\textsuperscript{17}.

\textsuperscript{16} For a description of the software and an overview of the possibilities of the model cf. Pearson and Horridge (2003).

\textsuperscript{17} These two elements, while not part of the PE model we use in section 5.1, are not restricted to the domain of general equilibrium modelling. There are ample examples of PE models employing one or both elements. Even factor markets are present in some PE models, notably land in agricultural PE models. The distinguishing feature between PE and CGE is the comprehensive coverage of all revenue streams linked to all product as well as all factor markets.
As the PE model, the version of the GTAP model we use remains comparative-static, meaning intertemporal optimization behaviour is ignored.

As we do in the PE analysis, we run an upper and a lower bound scenario. The latter still contains only those lines under Attachment A that do not have ex-outs. It is therefore directly comparable to the lower bound PE results. The upper bound scenario, however, now includes a rough estimation of the value of trade under Attachment B.\textsuperscript{18} Comparability with the upper bound PE results is therefore limited.

In order to specify the model, we use concordance tables between the HS and the GTAP\textsuperscript{19} classifications to identify the GTAP sectors that would be affected by the ITA expansion. We are able to match the list of HS6 codes to eight\textsuperscript{20} GTAP sectors. We subsequently calculate from the UN COMTRADE and MAcMAP data that we have retrieved the entire monetary value of the tariff reductions and translate that into percentage point cuts of the entire trade in these eight GTAP sectors for each of the links affected. We work with a regional aggregation of the EU, other ITA members and the rest of the world.

As expected, the scenarios show that trade is much more positively affected than shown by the PE analysis. Total extra EU exports of goods and services increase by a total of 0.20-0.34%. When related to current trade figures, this represents 5.0-8.3 billion EUR of additional exports\textsuperscript{21}. Total imports increase by 0.12-0.23% corresponding in absolute magnitude very closely to the numbers produced by the PE model.

\begin{center}
\textbf{Total extra EU exports of goods and services increase by 5.0-8.3 billion EUR of additional exports.}
\end{center}

\textsuperscript{18} Tariffs for Attachment B have been retrieved from the WITS database which itself is based on UN COMTRADE and MAcMAP.

\textsuperscript{19} Global Trade Analysis Project. The GTAP consortium issues and regularly updates a database that is being used in virtually all applied global CGE analyses.

\textsuperscript{20} Chemical, rubber and plastic products, Mineral products nec, Metal products, Motor vehicles and parts, Transport equipment nec, Electronic equipment, Machinery and equipment nec, Manufactures nec. Attachment B even contains one HS code belonging to the Textiles sector in GTAP (591190), which we, however decided not to include in the aggregate.

\textsuperscript{21} The base values of trade (2014) are 1688.8 billion EUR of imports and 1702.0 billion EUR of exports of goods as well as 602.0 billion EUR of imports and 764.9 billion EUR of exports of services (European Commission, 2016).
The CGE analysis with GTAP also showed some overall economic gains. EU28 GDP is expected to grow by 30-88 million EUR.\textsuperscript{22}

5.3 Effect on the EU budget

A final indicator that DG Trade has to calculate for all major trade policy initiatives is the tariff revenue loss associated with the agreement. For the ITA expansion, that would be 1.38 billion EUR for Attachment A without ex-outs. It would increase to 1.88 billion EUR including all ex-outs, and the products under Attachment B. This figure is however a static figure related only to the current imports of the goods under the ITA and does not take into account newly emerging trade.

6. Conclusions and Outlook

The partial equilibrium analysis has found that exports in products covered by the ITA expansion\textsuperscript{23} will probably increase by about 3.5 to 4.5 billion EUR after implementation of the agreement. Exports will increase by about 0.6 to 1.2 billion EUR.

\textit{EU28 GDP is expected to grow by 30-88 million EUR.}

Quite a few of the products covered by the agreement must be classified as inputs into other production processes. As a consequence, part of the tariff reductions, even if they were unilateral, will work as a direct cost reduction to producers as opposed to a cost reduction only benefitting consumers. The partial equilibrium model, which does not distinguish between intermediates and final products, ignores these effects. For that reason, an analysis with the GTAP CGE model has been performed. The initial hypothesis, that economy wide effects are larger than the direct effects on the products liberalized has been confirmed. Trade, in particular where exports are concerned, increases much stronger. The CGE analysis not only revealed a larger scale of trade creation than the PE would suggest, it also suggested that the effect of the ITA expansion on the EU's trade balance will be positive by about 2.0 to 3.1 billion EUR. It also showed a positive, though small, GDP effect. The EU's tariff revenue will decrease by about 1.4 to 1.9 billion EUR. This figure does not include second round effects though.

\textsuperscript{22} Percentage changes from GTAP simulations related to current (2014) data for GDP (European Commission, 2016)
\textsuperscript{23} Attachment A
As has been mentioned above, not all members of the original ITA signed up to the recent extension. Counting EU member states as one, 25 original ITA countries are members to the ITA extension. Section 3 showed that the EU exports, relatively speaking, more than other countries to the members of the original ITA that are not part of the ITA expansion. The important lesson is that the EU has a clear interest in encouraging other WTO members to join the ITA expansion. This process has been successful in the past, increasing the membership of the original ITA from 29 to 54 countries, which should allow for careful optimism that it can be repeated in the future.

As an extension of the PE analysis in chapter 5.1, we engaged in an illustrative simulation of an expanded country coverage comprising also India, Indonesia, Ukraine, Russia, and the Gulf Cooperation Council. Most of these countries, all being members of the original ITA, showed interest in joining the negotiations, but have for the time being not joined the expansion. These countries make up for about 1.3% of imports of ITA expansion members in the products under Attachment A. For the EU, they are slightly more significant, making up for 2.6% of extra EU imports in these products. Their total imports are equivalent to about 6.2% of total imports by ITA expansion members (excluding intra-EU trade).

The trade effects of expanding the geographical coverage of the ITA expansion will be quite considerable. The trade effects of expanding the geographical coverage to include these countries are, however, significantly larger than that. EU exports in products under Attachment A would increase by 0.51-0.68 billion EUR in addition to the increases discussed in section 5.1. This represents an increase by 57-84%. Imports on the other hand, would see a smaller increase since these countries account only for a small share of extra-EU imports of the products covered by the ITA expansion.

The ITA expansion negotiations succeeded to secure a deal on tariff elimination. Non-tariff barrier (NTB) reductions that were mentioned as an objective in the early stages of the negotiation have been recommended by academics (Lee-Makiyama, 2012) and have strongly been supported by industry. One part of the final agreement is a commitment by the signatories to also tackle NTBs on IT products along with keeping the list of products covered by the extension under review (WTO, 2016c). Concrete NTB reductions, however, have proven too contentious to be achieved in the recently concluded negotiations. Possible avenues to NTB reductions under the umbrella of the ITA could include:

24 Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.
The establishment of a centralized database of administrative and technical requirements; avoiding duplication of conformity assessment procedures and use of globally recognized standards; encouraging the use of e-labelling as a solution to the costly problem of the proliferation of marking requirements; harmonizing practice in the field of energy efficiency requirements; and encouraging global cooperation to avoid forced localization requirements as participants of a dedicated workshop organized by the WTO secretariat in May 2015 have concluded (WTO, 2016d).

A study commissioned earlier by DG TRADE (Thelle et al., 2010) sheds light on the possible magnitude of economic effects of such NTB reduction efforts. The study investigates only one of the barrier types mentioned above, though arguably the single most important one: conformity assessments. In a gravity model, the authors assess the trade creation resulting from countries not having a Supplier's Declaration of Conformity (SDoC) system as it exists in the EU in place, introducing such a system. Countries that have a system in place considered similar to the SDoC (in terms of compliance costs) remain unchanged. Covering only the products of the original ITA, the authors find that EU exports would increase by as much as 13 billion EUR, which is almost an order of magnitude higher than the effects the study estimates from an expansion of the product coverage.25

In the near future, ITA members are expected to bring their national customs classifications in accordance with the new realities created by the ITA expansion. Whenever necessary, new tariff lines have to be created in order to identify those products within an HS6 code that do qualify for duty free treatment. This will in the future greatly facilitate an ex-post evaluation, as it will allow a precise quantification of trade flows described now by ex-outs or listed under Attachment B.

---

25 For comparison, the authors estimate an increase in exports of 3 billion EUR resulting from a product expansion. This result is not reasonably comparable to ours from section 5.1, as they assume both a larger country coverage and a smaller product coverage than we do.
7. References


UN COMTRADE (2015). UN COMTRADE Database.

WTO (2011): EC — IT Products: One-page summary of key findings of this dispute. (https://www.wto.org/english/tratop_e/dispu_e/cases_e/1pagesum_e/ds376sum_e.pdf)


WTO (2016d): Participants urge swift conclusion to ITA 2 negotiations. (https://www.wto.org/english/news_e/news15_e/ita_08may15_e.htm)
Appendix 1: Partial Equilibrium Model Equations

The model uses the assumption of perfect competition. Although the model is programmed in GAMS, which is capable of non-linear optimization, it is solved as a sequence of linear systems of equations over which the policy shock, in our case a tariff reduction, is implemented in incremental steps and the market shares and the resulting implicit bilateral demand elasticities are updated between each solve. As is the default option, we had the model divide the shock in 50 steps.

REMARK: Model Equations are in GAMS notation

1. \[ p(\text{sector}, \text{source}, \text{destination}) = (1 + pw(\text{sector}, \text{source})) \times Ts(\text{sector}, \text{source}, \text{destination}) \times ETXs(\text{sector}, \text{source}, \text{destination}) \times we(\text{sector}, \text{source}, \text{destination}) - 1; \]

2. \[ m(\text{sector}, \text{source}, \text{destination}) = \sum_s n1(\text{sector}, \text{source}, s, \text{destination}) \times p(\text{sector}, s, \text{destination}); \]

3. \[ ex(\text{sector}, \text{source}) \times ((1 + pw(\text{sector}, \text{source})) / OTXs(\text{sector}, \text{source}) - 1) + as(\text{sector}, \text{source}) = \sum_v \phi1(\text{sector}, \text{source}, v) \times m(\text{sector}, \text{source}, v); \]

with

- \( p \) domestic market price for bilateral imports
- \( pw \) export price
- \( Ts \) change in import tariff ratio
- \( ETXs \) change in export tax ratio (not used here)
- \( we \) Price wedge associated with a quota (not used here)
- \( m \) bilateral import demand
- \( n1 \) implicit bilateral demand elasticity
- \( ex \) export supply elasticity
- \( as \) supply shock (not used here)
- \( OTXs \) change in output tax ratio
- \( \phi1 \) export shares
HOW TO OBTAIN EU PUBLICATIONS

**Free publications:**
- one copy:
  via EU Bookshop (http://bookshop.europa.eu);
- more than one copy or posters/maps:
  from the European Union’s representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm) or calling
  00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or
  hotels may charge you).

**Priced publications:**