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IMPACT OF WTO TRADE FACILITATION AGREEMENT ON TARIFF REVENUES AND BORDER FEE PROCEEDS

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Acronyms

EIF	Entry into Force
FOB	Free on Board
GDP	Real Gross Domestic Product (nominal only when indicated)
IESC	ImpactECON Global Supply Chain
ILO	International Labor Organization
IMF	International Monetary Fund
LDC/LDCs	Least Developed Country/ies
OECD	Organization for Economic Cooperation and Development
TFA	Trade Facilitation Agreement
TRQ	Tariff-Rate Quota
UN	United Nations
VAT	Value Added Tax
WTO	World Trade Organization

Executive Summary

This paper contributes to the debate within developing and LDCs about how rapidly and how deeply to implement the World Trade Organization's Trade Facilitation Agreement (WTO TFA). We have projected changes in trade, economic growth, investment, and tariff revenues and border fee proceeds using a dynamic Computable General Equilibrium (CGE) model, coupled with the authors' unique supply chain database (ImpactECON Global Supply Chain database, IESC).

We use three implementation scenarios: (1) an "Ambitious" scenario in which the TFA is completely implemented over a 10-year period, (2) a "Moderate" scenario in which the TFA is implemented over 15 years thereby taking into account some delays to the implementation of the TFA, and (3) a "Conservative" scenario in which the TFA is further delayed, with the assumption that anything not undertaken within the 15-year period will ultimately not be implemented. Partial implementation under the "Conservative" scenario assumes that developing countries and LDCs achieve only 80 percent and 66 percent of the TFA impacts respectively, due to incomplete implementation of the articles.

Trade. This study, similar to most studies of the TFA, finds that under all implementation scenarios, all regions and income groups are projected to experience an increase in trade due to the TFA. Our supply chain model indicates that the growth in the value of business intermediate goods traded will be greatest. Trade in business intermediate goods is important for developing countries to participate in global supply chains, which can, in turn foster trade-led growth,

Growth. Similarly, under all scenarios, we find that TFA implementation results in positive growth in real global GDP. When investment impacts are considered in addition to trade flows, economic growth is greater than the change in trade values alone would suggest. This is because increased investment expands the capital base and provides for long-term growth. Reduction in Customs clearance times improves the prospects for private sector investment, particularly in trade-centered sectors or businesses. This provides a powerful complementary policy for developing countries looking to maximize the benefits of the TFA: reducing barriers to foreign investment while improving Customs procedures can pay dividends.

Tariff Revenue. We quantify the increase in *tariff revenue* collections resulting from the increase in trade flowing from TFA implementation. We find that, under both the "Ambitious" and "Moderate" implementation scenarios, the TFA is projected to *increase* tariff revenues both regionally and globally. This outcome is the result of the projected expansion in trade (and consequently in tariff revenues).

Border Fee Proceeds. The TFA will require all customs fees to be in alignment with the costs of services. For modeling purposes, we have assumed a reduction in customs fees of 10 percent for developed countries and 14 percent for developing countries and LDCs as Members seek to move goods into and out of their countries more efficiently. We find, in many cases, that the growth in trade volumes offsets the reduction in border fee proceeds that would have come about were trade volumes held constant.

Ambitious Implementation Scenario. Globally, we project that tariff revenue collections will increase by over US$ 1 trillion, cumulatively, for the period 2017-2035 in our most ambitious and immediate implementation scenario (Scenario 1). Over 93 percent of these increased tariff revenues will be collected by developing and LDC countries.

Moderate Implementation Scenario. Implementation delays modeled in our second scenario produce slightly lower tariff revenue gains.

Conservative Implementation Scenario. If the TFA is only partially implemented as modeled in our third scenario, tariff revenues will still grow, but the cumulative gain will be just US$ 555 billion by 2035 and a smaller share (89 percent) of the increased revenues will go to developing and LDC countries than in either of the full implementation scenarios.

Importantly, on a country basis, in no case is only *partially* implementing the TFA found to provide higher increases in tariff revenue, GDP, or export benefits than *full* implementation would provide. In fact, a country delaying and/or partially implementing the TFA cedes competitive ground to other countries that implement the TFA more aggressively or quickly, thereby attracting investment and improving integration into global supply chains as well as long-term growth prospects.

Developing countries seeking to maximize the benefits of the TFA should consider lowering barriers to foreign investment and rapidly implementing the TFA articles to the extent possible.

1. Introduction

Negotiations for the World Trade Organization (WTO) Trade Facilitation Agreement (TFA) were concluded at the Bali Ministerial Conference in December of 2013. By February 2017, two thirds of the WTO's Members had ratified the agreement, and on February 22, 2017, the TFA entered into force (EIF). The TFA promises to speed the clearance of goods through Customs for all WTO Members. The swift, reliable, movement of cargo across international borders is expected to increase global trade, economic growth, and welfare.

The TFA stands apart from recent multi-lateral efforts to liberalize trade in several ways. First, the TFA focuses on improving efficiencies in Customs in contrast to mutual concessions on (reductions in) tariff rates, export taxes and subsidies.[1] The shift in focus away from tariff rates is significant for developing countries, since lower tariff rates often mean lower government revenues (Baunsgaard and Keen 2005). The TFA does not require these tariff and revenue trade-offs.[2] However, there are situations where TFA implementation will lower average border fees—including Customs charges paid by traders.[3]

Another area the TFA differs from earlier trade agreements is its recognition of the special implementation challenges of developing countries. The TFA allows developing countries, LDCs especially, to avail themselves of transition periods to achieve full implementation of the TFA provisions and to seek and receive implementation-related technical assistance from other WTO Members. In the case of developed countries, implementation will be required upon entry into force of the agreement. For developing and LDCs, the implementation timeframe will be outlined in their implementation schedules.

1.1. SUPPORT FOR THE TFA

Recent economic research on the TFA indicates that the TFA will increase global trade and economic welfare (OECD, 2011 and 2013; Hillberry and Zhang, 2015; Minor and Walmsley, 2015; and the WTO, 2015). The broad support for the TFA, in part, reflects the fact that improvement of Customs procedures had already become a priority for many WTO Members; governments around the world had already been making efforts to reduce barriers to the rapid clearance of goods through Customs as

[1] From this point on in the report, when we refer to tariffs, we mean import tariffs, export taxes and subsidies combined. Most trade taxes are import tariffs, but we include export taxes and subsidies in our calculations where they are reported.

[2] Some experts have noted tariff revenue may change somewhat due to the TFA since improved Customs procedures may reduce the chances of misclassification or circumvention of regulations.

[3] Article 6.2.i of the TFA states: "fees and charges for Customs processing shall be limited in amount to the approximate cost of the services rendered on, or in connection with, the specific import or export operation in question." Border fees as referenced in this paper are the same as the World Bank Doing Business border compliance costs and include all fees and charges for customs processing and may include standard customs charges, storage, inspection, security, and the handling of goods from the conveyance to the customs office. The TFA references border compliance, but does not define the elements included.

a means of boosting national competitiveness (UNCTAD, 2014). The TFA, therefore, formalized commitments many countries were already contemplating.[4]

The drive to streamline border clearance procedures, including Customs, originated with businesses. Businesses had been calling on governments to ease non-tariff barriers to trade and investment; and governments had recognized that reducing trade barriers, in turn, could contribute to national growth. Governments and businesses saw that maintaining the status quo was no longer an option, because production was characterized by fragmented international supply chains with production spanning multiple countries (Hummels et. al., 1998 and 2001 and OECD, 2015). In a world increasingly dominated by fragmented international production, barriers to trade, including delays crossing borders, are increased as goods incur trade costs each time they cross a border. Countries with slow or complicated Customs clearance processes would lose out on opportunities to participate in global supply chains. Small and developing countries, which are particularly dependent on international trade for economic growth and tariff revenues, were especially vulnerable to these trends.

In the current global context, trade facilitation is a prerequisite to obtaining and maintaining international competitiveness, growth and investment secured through opportunities in global markets. The global trade environment increasingly demands that companies source their inputs more efficiently, rationalizing and refining their complex supply chains with changes in production costs (goods, services), shipping (time and cost), and customs clearance (time and cost). WTO Members have by and large embraced the opportunity to implement an historic deal to encourage broad-based participation in this evolving global trade and production environment.

While there is little doubt that the overall impact of the TFA will be positive, economic modeling on the impacts of the agreement's implementation on clearance times, border fee proceeds, tariff revenue collections, and the costs and benefits of implementing the TFA at various speeds and to varying degrees has been limited. In the case of developing countries, the ultimate success of the TFA will be left largely in the hands of each implementing party. Implementation will be a function of the motivation of numerous local stakeholders including government officials, political and private parties (WTO 2015 p.116) as well as the support they will receive from other WTO Members.[5] Local stakeholders—especially Finance Ministries—are often concerned about what the agreement may mean for the sources and magnitude of collections (especially by Customs, which is usually a part of the Finance Ministry), and the paucity of solid modeling of the TFA's revenue impacts curbs their willingness to move expeditiously and aggressively to implement the agreement.

1.2. REPORT PURPOSE

This report seeks to help analysts and decision makers in developing countries understand the potential impacts of implementing the WTO TFA by projecting tariff revenues and border fee proceeds under three scenarios for the depth of implementation (full and partial) and for the speed of implementation

[4] The level of planning could vary from stated needs and desires to concrete budgets and schedules. In this aspect, the TFA required all countries to move toward concrete schedules and budgets, not an insignificant contribution, given the tendency for domestic priorities to overtake international ones in domestic policy.

[5] According to one survey by the WTO, more than two thirds of respondents cited the lack of national coordination among ministries and agencies, the absence of high-level political will, and the omission of trade facilitation from national development planning among the most important difficulties when implementing the TFA (WTO 2015 p.116).

(rapid to slow). To do this, a dynamic model of world trade is employed along with best available estimates of border fees and tariffs.

The first section contains a brief review of the model employed to estimate impacts, scenarios, and the data sources for estimating border fee and tariff revenues. The impacts of the TFA are then presented. We model the impact of the TFA on both tariff revenues and border fee proceeds.

2. Modeling Framework and Scenarios (2016 – 2035)

2.1. MODEL AND DATABASE

The modeling framework used to analyze the effects of the TFA on developing countries is a dynamic version of the ImpactECON Global Supply Chain model and database (IESC).[6] The IESC model is a derivative of the well-known Global Trade Analysis Project (GTAP) model and database (Hertel 1997), with additional information identifying traded goods as (a) intermediate for production or (b) final for consumption. The inclusion of global supply chains, in turn, facilitates the representation of intermediate goods moving through Customs rapidly to producers.

Computable General Equilibrium (CGE) models, such as the IESC model, combine comprehensive trade, production, and tax databases with equations to reflect the salient micro and macroeconomic theories in general use today, including production, sales, investment, and government expenditure. Economic behavior, such as consumer's and producer's responses to price changes, are based on econometric estimates from historical data.[7] A defining feature of a CGE model is its ability to account for the use of scarce resources, such as capital, natural resources, and labor (of various types) across sectors and countries. Since our model is dynamic, it projects growth over the period 2011 (the base year of the data) to 2035 to create a "business as usual" scenario (without the TFA), upon which our TFA policy scenario can then be appended.[8] The projections allow for policies to be simulated in the year when the policy is implemented, using the projected data from the "business as usual" scenario and hence the economic context for that year. The dynamic model also provides information on when impacts occur—the first year of the agreement or 15 years in the future. Our dynamic model stands in contrast to "static" models, which do not include a time dimension and usually take the economic context of the base year in which the data were collected, in this case 2011, regardless of the year the policy is expected to be implemented. With a static model, the simulation is conducted as if implementation and all the impacts occur in a single period. Finally, the use of the dynamic model allows new investment in buildings and equipment to become available to firms over time, allowing for improved representation of investment impacts which are projected to result from the TFA.

Our estimates of trade and tariff revenue impacts take as a starting point how the TFA's implementation may be expected to affect border clearance times and border fees. Reductions in cost and time are expected to increase trade, and tariff revenues on that trade. Reductions in border fees to traders translate into reductions in border fee proceeds collected.

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[6] Documentation can be found at https://impactecon.com/resources/supply-chain-model/ (Walmsley and Minor, 2015).

[7] Elasticity estimates, such as elasticities of substitution and demand, are the most common econometric estimates incorporated for these purposes.

[8] Estimates of population, work force growth, investment, productivity, and income growth are derived from public sources including the United Nations (UN), International Monetary Fund (IMF), CEPII and the International Labor Organization (ILO). These projections are used to build the future "business as usual" scenario of trade and economic growth in a world without the TFA.

We derive our estimates of border fees (see text box) from the World Bank Doing Business (DB) Trading across Borders database for 2015.[9] The DB data for border fees include fees paid to Customs agencies, and fees and charges for moving cargo from the conveyance to Customs.[10] Where additional charges such as inspection, certifications, scanning, storage, and security are frequently incurred (more than 20 percent of the time), they are also included.[11]

Tariff revenues are estimates from the GTAP Data Base for 2011 (Narayanan, Aguiar et al., 2015), the most recent year available for global trade taxes with their accompanying trade. The tariffs are estimates based on published data of tariffs, not on actual revenue collected, which may differ.[12] Data on tariff revenues as an aggregate are published by the IMF, by country.[13]

The TFA is expected to affect decisions by firms and consumers to import and export. One method economists employ to estimate the potential significance of the TFA is to estimate its impact on "trade costs" which can include any number of costs and preferences for traded goods (See OECD, 2011 and 2013).[14] These trade costs can be expressed as changes in trade volumes (usually aggregate for the whole world) or as a percentage of existing trade costs.

In this study, we take an alternative, direct, approach outlined in Walmsley and Minor (2015).[15] The direct method relates country-level data from the Organization for Economic Cooperation and Development (OECD) Trade Facilitation Indicators (TFIs)—which assesses reporting countries' current state of TFA-type clearance procedures—to the DB

BOX 1 SOME DEFINITIONS AND NOMENCLATURE

Border Fees are estimated by the World Bank DB project and include Customs costs and the handling of cargo from the conveyance to customs. Border fees for 2015 were compiled for imports and exports separately. The estimate is reported based on a shipment with a standard value of US$ 50,000. Border costs will vary depending on the commodity and even the port of entry. However, the estimates applied in this analysis employ these data as representative of all trade, apart from coal, oil, and natural gas shipments, which we exclude from border fees since they are not well represented in the DB data.

Tariff Revenues are revenues collected from applied tariff, and tariff rate quotas (TRQ) taxes reflecting free trade agreements; the rates are statutory including most favored nation (MFN) rates and preference programs in place in 2011. Revenue TRQs are assumed to be all charged as in- or out-of-quota rates and accrue to the importing governments. Where export taxes and subsidies are present, they are also included for the purposes of comprehensive revenue calculation.

[9] http://www.doingbusiness.org/data/exploretopics/trading-across-borders

[10] The DB data referenced here are called "border compliance costs" by the DB report. The DB Trading Across Borders methodology can be found at: http://www.doingbusiness.org/Methodology/Trading-Across-Borders

[11] To check the soundness of this assumption, we compared the resulting DB estimates with known Customs fees and found that the rates were similar.

[12] See Baunsgaard and Keen (2005) for a discussion of various measures of global trade tax revenues.

[13] The IMF data may also include value added (VAT) and excise taxes on imports, not included in our estimates of tariff revenue—so they are not applied here. Excluding these sales taxes on foreign goods from the calculation of tariff impacts reflects the fact that domestic and foreign sales are both subject to these taxes and to the extent that domestic goods are replaced by foreign goods, these VAT-based revenues would overstate the impact of the TFA on government revenue. The IMF estimates are provided as totals for all trade. The GTAP data are provided at the commodity level.

[14] The influence of tariffs and subsidies are excluded from trade cost estimates.

[15] Hillberry and Zhang, World Bank, 2015 also estimate border clearance times from the OECD TFI data. However, they employ a non-linear "survival" model in contrast to Walmsley and Minor's log linear regression.

Trading Across Borders data on the time currently required to clear Customs. The OECD collected TFIs for over 100 countries and scored each country's Customs practices relative to the various articles of the TFA. The OECD TFIs therefore quantify the gap between a country's current border clearance processes and what it would look like were the TFA to be fully implemented.

The time to clear customs is measured in days, but the model requires a price equivalent of the change in time before we can estimate an impact of this change (from TFA implementation) on trade volumes. We therefore, convert customs clearance times (measured in days) to tariff equivalents by employing Hummels et al. (2007), which found that a one-day reduction in trade time was roughly equivalent to a one-percent reduction in import tariffs in influencing importer preferences on where to source traded goods.[16]

A second aspect of the TFA, which is a focus in this analysis, is its potential impacts on border fees, especially Customs charges. The Doing Business database provides benchmark border fees (those fees associated with Customs clearance) incurred when crossing borders that includes Customs fees, along with inspections and certifications when they are frequently encountered.[17] To facilitate "what-if" type of analysis, for planning purposes, we assume that border fees decline by the amounts estimated by researchers for overall (end-to-end) trade costs, which includes the entire chain of trade costs, excepting trade taxes, by the OECD.[18] The OECD estimated potential trade cost reductions as varying between 10 percent for developed countries and 14 percent for developing countries.[19] These values are meant to be illustrative; each country may or may not experience a reduction in border fees. For this reason, when we refer to full implementation of the TFA, this always means the full reduction in customs clearance times implied by the TFI analysis. However, full implementation, due to the uncertainty around border fees, also refers to various assumptions on the reduction in border fees outlined above.

2.2. SCENARIOS

To illustrate the impacts of the TFA on developing countries, we construct three scenarios: (1) Ambitious (2) Moderate, and (3) Conservative implementation. Each scenario assumes the TFA will be fully implemented by developed countries upon entry into force. Developing and least developed countries are modeled with varying degrees of implementation and time horizons.

TABLE 2-1 includes the average border fees and average time to clear Customs in the baseline data. These are the values that will be reduced in the three TFA implementation scenarios. The first column lists each of three groups of countries (developed, developing, and LDCs). Each of the three country groups corresponds to assumptions regarding the phase out of the TFA—much the way the TFA articles

[16] The data and methodology employed here are identical to that presented in Walmsley and Minor 2015. Greater detail on the econometric estimation, inputs, outputs and model implementation are provided in that paper. See https://impactecon.com/resources/cge-models/.

[17] Research relating the TFI indicators to these border fees has not demonstrated a statistical relationship between border fees and the TFIs in the way that a clear relationship between the TFIs and the time to clear Customs has been established (Hillberry and Zhang, 2015). This may be because the TFI or DB data are not extensive enough. Hillberry and Zhang (2015) start with less than 100 observations and use imputation methods to fill data for a total of 180 countries.

[18] OECD. "Implementation of the WTO Trade Facilitation Agreement: The Potential Impact on Trade Costs," June 2015.

[19] These are for the mandatory components of the TFA.

specify. The average border fees (including Customs charges) for developed countries imports are 0.2 percent of FOB values. Developing countries and LDCs have higher average border fees—0.8 and 1.2 percent FOB respectively. Also included are the border fees for exports. Next are the average number of days to clear Customs for imports and exports. Developed countries average 1.3 days to clear Customs for imports, developing countries average 3.0 days and LDCs average 4.7 days to clear Customs. Similar data are provided for exports.

The table illustrates an important aspect of the TFA in relation to global supply chains and vertical production: a good exported for processing from one country to another, and then imported to a third country (developed) must cross through Customs not once, but four times to complete the trip. The time to clear Customs and border fees add up each time a border is crossed. Assuming we have a good that is exported from a developed country and sent to a LDC for further manufacturing (1.2 days exporting plus 4.7 days importing), then exported to a developed country (2.8 day exporting plus 1.3 days importing), it will then average ten days in Customs—exclusive of international and domestic transport times and costs.

TABLE 2-1: BASELINE AVERAGE BORDER FEES AND TIME TO CLEAR CUSTOMS

	Average border fees (percent fob)		Average time to clear Customs (days)	
Country group	Imports	Export	Imports	Exports
Developed	0.2%	0.3%	1.3	1.2
Developing	0.8%	0.6%	3.0	2.0
LDC	1.2%	0.6%	4.7	2.8

Source: Border fees and time to clear Customs based on World Bank Doing Business Trading Across Borders. Average border fees are based on a 2015 survey. The time to clear Customs is based on a 2011 survey.

The articles of the TFA require Members to implement best practices to reduce delays and uncertainties in the Customs clearance processes. Walmsley and Minor (2015) estimate the potential for the WTO TFA to reduce Customs clearance times. **TABLE 2-2** includes the estimated reduction in Customs clearance times associated with each scenario. Scenarios 1 and 2 assume full reduction in the number of days required to clear Customs (full implementation) and other border procedures. Scenario 3 assumes partial implementation of the TFA for developing and LDCs, so the number of days in customs clearance is reduced less in this scenario than was the case in Scenarios 1 and 2. **TABLE 2-2** also includes several assumptions on the reduction in border fees. As discussed earlier, the TFA requires countries to bring border fees into alignment with overall costs of the services, where the costs of services could be impacted by the TFA's efficiency goals. We assume these fees will decline at the estimated rate for the decline in "total trade cost" as estimated by international organizations.

TABLE 2-2: REDUCTION IN BORDER FEES AND THE TIME TO CLEAR CUSTOMS DUE TO THE TFA

Implementation scenario	Reduction by simulation		
	Border fees	Number of days to clear Customs	
		Imports	Exports
Scenario 1— Ambitious	Maximum (a)	--	--
Developed	10%	0.7	0.6
Developing	14%	1.3	0.8
LDC	14%	2.4	2.1
Scenario 2 –- Moderate	Half	--	--
Developed	5%	0.7	0.6
Developing	7%	1.3	0.8
LDC	7%	2.4	2.1
Scenario 3 —Conservative	None	--	--
Developed		0.7	0.6
Developing		1.1	0.6
LDC		1.8	1.5

Source: Reduction in border fees based on OECD 2015. Reduction in number of days from Walmsley and Minor 2015.

The TFA will be implemented over several years. For developed countries, all elements of the TFA are to be implemented upon entry into force (2017). Developing and least developed countries have been provided flexibilities in implementation, which can extend the period before full implementation. How much and when a country implements the TFA can affect economic impacts and tariff revenues. **TABLE 2-3** includes the phase-in schedule applied to the values in **TABLE 2-2**. Scenario 1 is the most ambitious, with all countries fully implementing the TFA within 10 years. Scenario 2 assumes full implementation in terms of border clearance times and moderate reductions in border fees and a 15-year timeline. Finally, Scenario 3 assumes that developing and least developed countries implement the TFA such that border clearance times are shortened by 80 percent and 66 percent respectively over a 15-year time horizon. This final scenario also illustrates the consequences of uneven implementation of the TFA: some developing countries may benefit simply because they are implementing provisions of the agreement more rapidly than others. The "leading" implementers become more attractive destinations for investment capital or for the sourcing of parts that are needed for a global supply chain; the "laggards" lose out on such opportunities.

TABLE 2-3: TFA PHASE-IN SCHEDULE

Implementation scenario	Phase-in schedule			
	EIF (2017)	5 years (2021)	10 Years (2026)	15 Years (2031)
Scenario 1 —Ambitious				
Developed	All	---	--	--
Developing	75%	All	--	--
LDC	50%	75%	All	--
Scenario 2— Moderate				
Developed	All	--	--	--
Developing	50%	75%	All	--
LDC	25%	50%	75%	All
Scenario 3 —Conservative				
Developed	All	--	--	--
Developing	None	25%	50%	80%
LDC	None	16%	33%	66%

2.3. REGIONS AND INCOME GROUPS

The model employed for the estimates is a global model with 141 countries and regions and 141 sectors.[20] Estimates for the reductions in Customs clearance times and border fees are assembled at that level. These estimates are then aggregated to regional and income groupings when solving the model. To highlight the potential impact TFA implementation could have on different regions and income groups, we aggregate the data according to the World Bank regional grouping.[21] The categorization of developed and least developed countries is based on the United Nations classification employed by the WTO.[22]

For exposition purposes, some results may be aggregated to the three income groups (developed, developing and least developed) where there is not a significant problem in generalization.

[20] The GTAP Database includes 57 sectors. The IESC effectively expands the product definition to 141 sectors when intermediate, final and investment goods are accounted for.

[21] http://data.worldbank.org/country. Appendix I also provides a list of the developing and least developed economies arranged by aggregate regions.

[22] http://www.un.org/en/development/desa/policy/cdp/ldc_info.shtml. The WTO allows countries to self-select their income grouping for trade agreement purposes. Developed and least developed countries have positively identified themselves. Developing countries are all other countries, regardless of their income level.

3. Impacts of the TFA (through 2035)

In this section, results from the three TFA scenarios are presented; with an emphasis on the developing and least developed economy impacts. Two key areas of interest are highlighted. The first is that while many previous multilateral trade agreements have been able to raise trade and real gross domestic product (GDP), these agreements have also led to a significant reduction in tariff revenues that has left some developing and least developed country governments with diminished revenues to fund ongoing government operations and new infrastructure investments. The TFA departs from earlier multilateral trade agreements in that it focuses on best practices in Customs and border clearance procedures, rather than reducing tariff rates. The impact of this is that TFA implementation will likely cause tariff revenues to rise as overall trade volumes increase. The potential impact of the TFA on tariff revenues and border fee proceeds is therefore discussed first, followed by an analysis of the macroeconomic and trade impacts of TFA implementation that drive these changes in tariff revenues and border fee proceeds.

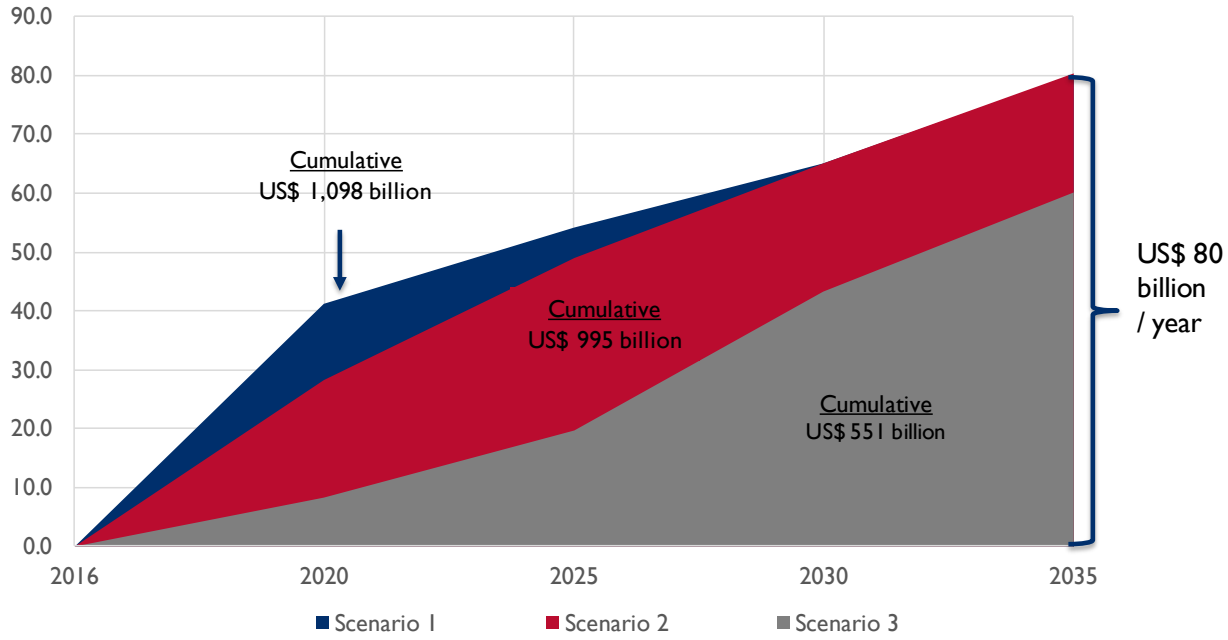
The second issue of interest is the consequences of delaying or only partially implementing the efficiencies in Customs and border clearance expected under the TFA. The extent to which improvements in Customs/border procedures under the TFA are implemented is dependent on each country's ability and political will to implement. The impact of delaying the TFA on tariff revenue, GDP, trade, and investment is therefore considered.

3.1. TARIFF REVENUES

TFA implementation is projected to increase annual global tariff revenues by US$ 60 to US$ 80 billion annually by 2035 (**FIGURE 3-1**, constant 2011 dollars).[23] We provide a range because the extent of the gains in global tariff revenues will depend on the degree of and timeline for implementation of the TFA. With ambitious and full implementation of the TFA, by 2035 (Scenario 1), developing and least developed countries will assume 95 percent of the more than US$ 80 billion annually in additional tariff revenues. When developing and least developed countries limit their implementation of the TFA (Scenario 3), overall tariff revenue growth drops by 25 percent, to just US$ 60 billion annually, with developing and LDCs' share in the incremental tariff revenues reduced to 93 percent. Scenario 2, which is full implementation of the TFA but with delays and smaller border fee reductions, will eventually (by 2030) yield increases in annual tariff revenues similar to those in Scenario 1, but as one would intuitively expect, the gains will be less in 2020 and 2025 than in the first scenario, with faster implementation.

[23] All dollar figures are in constant 2011 dollars, since the model does not include monetary instruments which would impact inflation.

FIGURE 3-1: GLOBAL TARIFF REVENUE 2016-2035, SCENARIOS 1-3 (US$ BILLIONS, DIFFERENCE FROM BASELINE)



Source: Authors' calculations. Global estimates include all WTO Members, their territories, and protectorates. Acceding Members to the WTO are included and assumed to implement the TFA agreement.

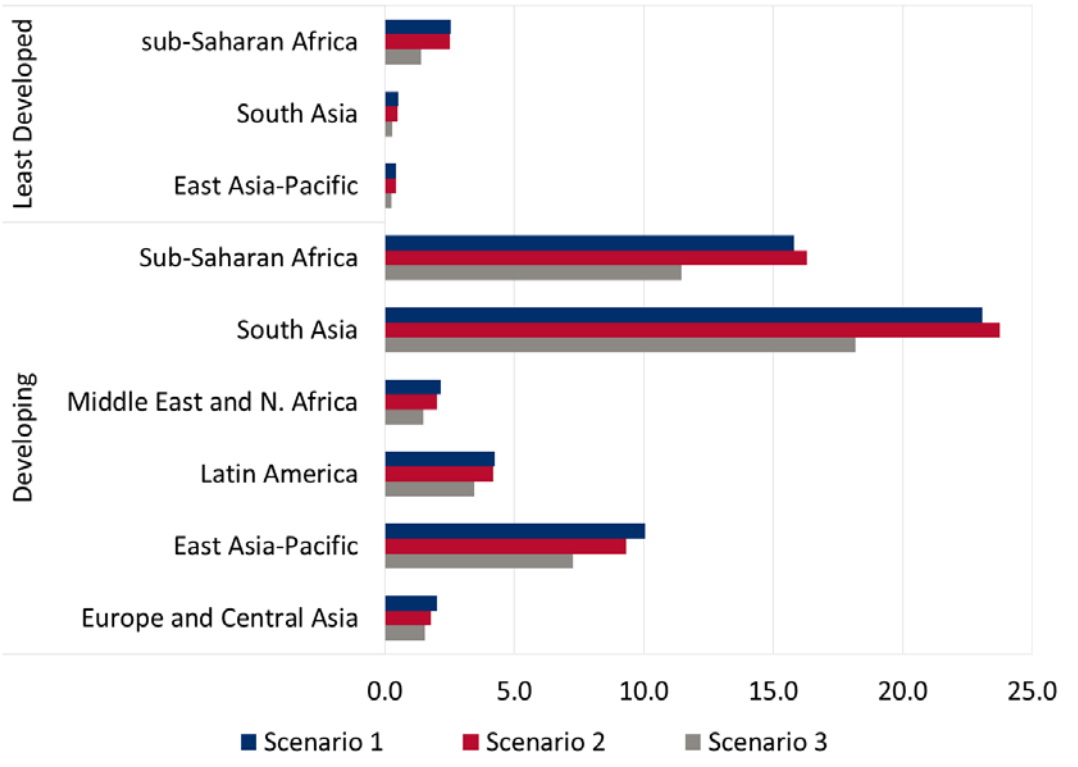
Tariff revenues rise in all regions under all three TFA scenarios (**FIGURE 3-2**).[24] Tariff revenues rise most in developing South Asia and developing sub-Saharan Africa, where annual tariff revenues of each region rise by US$ 16 and US$ 23 billion annually by 2035, respectively, in Scenario 1 (and also in Scenario 2, since the results are very similar). [25] **FIGURE 3-1** also illustrates that tariff revenues are lower in 2020 and 2025 when the implementation of the TFA is delayed, although tariff revenues are close to the same in the two scenarios by 2030 and thereafter, when initial delays in implementation are overtaken by the passage of time (**FIGURE 3-2**).

Annual tariff revenue begins in the first year the TFA enters into force (2017) and continues through 2035 in all our modeling scenarios. Cumulative tariff revenues in Scenario 1 exceed US$ 1 trillion over the period of analysis. Scenario 2 cumulative revenues are just under US$ 1 trillion, due to longer implementation period—tariff revenues before 2030 are somewhat lower. Finally, in Scenario 3, with partial implementation of the TFA, cumulative tariff revenue is reduced to US$ 551 billion or about half of Scenario 1.

[24] In fact, most sales and income tax revenues, not reported here, rise because of the TFA. In general, the higher the gains in GDP and trade from the TFA, the greater the rise in tariff revenues in both dollar terms and as a portion of GDP.

[25] In relative terms, these sums make up between 0.24 and 0.63 percent of 2035 GDP.

FIGURE 3-2: TARIFF REVENUE 2035, BY REGION, SCENARIOS 1-3 (US$ BILLIONS, DIFFERENCE FROM BASELINE)



Source: Authors' calculations.

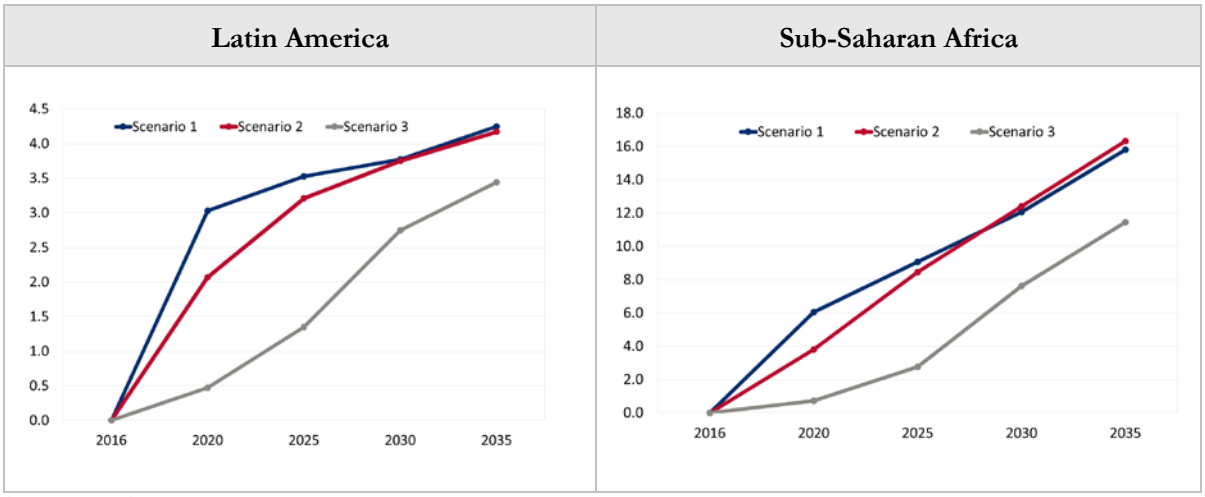
Although the norm seems to be that delaying TFA implementation (Scenario 2) results in a lower increase in tariff revenues from TFA implementation than rapid implementation (Scenario 1), there are two exceptions to this: developing South Asia and developing sub-Saharan Africa. In these two cases, delayed implementation produces higher gains in tariff revenues than does the ambitious implementation (Scenario 1). These exceptions arise because sub-Saharan Africa and South Asia import *more* when TFA implementation is delayed (whereas most regions trade less when the TFA is delayed). Why is this different in SSA and South Asia? Our assumption is that LDCs and developing countries implement the TFA differentially. The non-LDC developing countries implement the TFA faster than the LDCs do. Accordingly, non-LDC developing countries can attract more investment because they are relatively more "efficient" in border clearance than LDC's; the benefits of receiving this investment earlier than the LDCs are even greater in Scenario 2, when the TFA and the resulting investment are delayed. Higher investment causes imports to rise.[26] Thus, what appears to be an improvement in tariff revenue for South Asia and sub-Saharan Africa arising from their TFA implementation delay, is a far more complicated story that has much to do with what LDCs are doing – or not doing. In short, there are no benefits to a country delaying implementation of the TFA; there are only benefits that can be gained

[26] Economists familiar with national income accounting will recognize this as the identity (X-M) = (S-I), where S is domestic savings of government and private households; X and M are exports and imports and I is investment (domestic and foreign). Since savings only change as a proportion of income, and savings changes are small, the rise in investment causes a change in the trade balance, in this case, imports rise to maintain equilibrium with the rise in investment—all other factors held constant.

when competitor countries delay TFA implementation. We explore the investment issue further later in this chapter.

Even with the small improvement in tariff revenues in 2035 for the two regions under Scenario 2, Figure 3-3 shows, using two illustrative regions, that tariff revenues prior to 2025 are significantly lower in Scenario 2 than in Scenario 1; this is the case for all regions. Since "time is money", from a welfare point of view, it is better to have those gains sooner than later; a matter that is confirmed when tax revenues are discounted to account for the time value of money using even low discount rates (Box 2).

FIGURE 3-3: TARIFF REVENUE 2016-2035, SELECTED DEVELOPING COUNTRIES, SCENARIOS 1-3 (ANNUAL PERCENT DIFFERENCE FROM BASELINE)



Source: Authors' calculations.

Returning to a discussion of global, rather than regional, scenarios, we now examine Scenario 3, conservative implementation of the TFA. As **FIGURE 3-1** showed, the annual gains in tariff revenues are less than in Scenarios 1 and 2. This is true for all periods studied; the gap remains substantial in 2035, the latest year projected. The lower tariff revenues in Scenario 3 result from the partial implementation of the TFA—highlighting the benefits of full implementation discussed earlier. For instance, the share of tariff revenue in GDP of developing sub-Saharan Africa is substantially less in Scenario 3 (conservative implementation) than it is in Scenario 1 (ambitious implementation), 0.47 percent as compared to 0.63 percent.

Appendix Table A1 includes tariff revenues as a share of GDP for over 100 developing and least developed countries. The table includes the initial share in 2011 based on IMF or GTAP data, as well as the cumulative change in tariff revenue in 2035 as a share of GDP under the three scenarios.

BOX 2 –DISCOUNTING CASH FLOWS

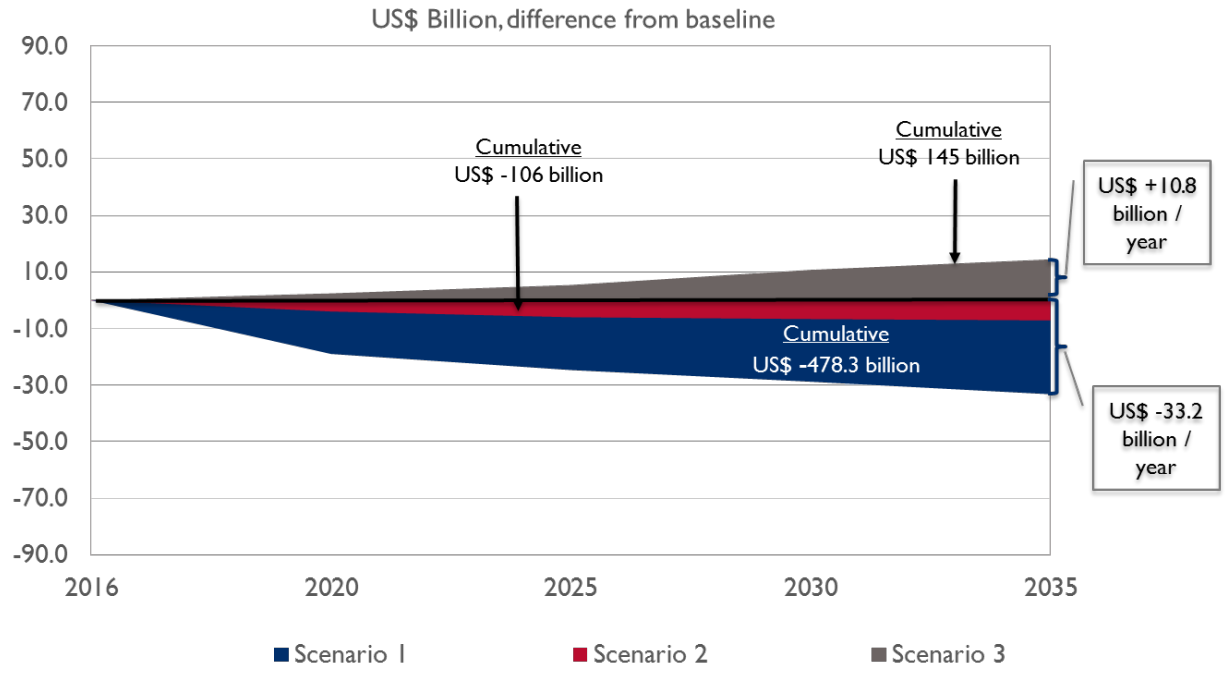
A dollar received today is nearly universally considered more valuable than if that dollar is received in several years. For this reason, economists and project financial experts apply social discount rates to account for projects which deliver returns sooner rather than later. This report presents undiscounted future values, only because there are a wide variety of social discounting estimates that could be applied.

As an example of the power of discounting future cash flows, referring to Figure 3-3 for sub- Saharan Africa, comparing the difference in cumulative tariff revenue benefits received through 2035, undiscounted cash flow suggests that Scenario 3 is 27 percent less than Scenario 1. If a discount rate of five percent is applied to the cash flow, the difference between scenarios increase to 42 percent, since Scenario 3 cash flows are received later than in Scenario 1. This provides further incentive for countries to implement the TFA as rapidly as possible to obtain maximum benefits.

3.2. BORDER FEE PROCEEDS

As mentioned above, border fees include Customs charges, as well as other costs required for Customs compliance. Border fees are imposed on goods as they are both imported and exported, at the average initial rates shown in **TABLE 2-1**. Scenarios 1 is the most ambitious, where border fees are assumed to fall by between 10 and 14 percent. In Scenario 2, border fees fall by half the amount stipulated in Scenario 1. In Scenario 3, border fee rates do not change in any of the regional groups.

FIGURE 3-4: BORDER FEE PROCEEDS 2016-2035, SCENARIOS 1-3 (US$ BILLIONS, DIFFERENCE FROM BASELINE)



Source: Authors' calculations.

Border fee "rates" fall under Scenarios 1 and 2, therefore, the dollar value of border fee proceeds also falls, as depicted in **FIGURE 3-4**. In Scenario 1, where border fees are assumed to be reduced by the largest amount, border fee proceeds are *reduced* by US$ 33.2 billion annually.

A decline in border fee proceeds is not inevitable. We project that sub-Saharan Africa will post an increase in border fee proceeds despite the decline in the average border fees per shipment.[27] **TABLE 3-1** illustrates how this result arises: changes in border fee proceeds are divided into the part due to the decline in the border fee rates and the part resulting from the change in trade volume. In developing sub-Saharan Africa, border fee proceeds rise even if border fee rates decline; this is because of increases in trade volumes and values; a lower rate applied on a higher value can yield a higher outcome. In

[27] We note that GATT Article VIII limits customs fees to the cost of services. Customs fees are not a GATT-consistent means of collecting general tax revenue. The TFA maintains this requirement.

Scenario 2, several regions experience a rise in border fee proceeds, as average border fee "rates" are only half of what they are under Scenario 1, but trade is greater.

Finally, in Scenario 3, all regions experience a rise in border fee proceeds since the average border fee remains unchanged and increased trade therefore results in higher proceeds from border fees.

TABLE 3-1: BORDER FEE PROCEEDS CHANGES RESULTING FROM INCREASED TRADE AND DECREASED BORDER FEE RATES IN 2035 (US$ MILLIONS, DIFFERENCE FROM BASELINE)

	Scenario 1		Scenario 2		Scenario 3	
	Increased trade	Border fee rate	Increased trade	Border fee rate	Increased trade	Border fee rate
Developed	2,239	-6,540	2,228	-3,276	2,152	0
DEVELOPING						
Europe and Central Asia	1,242	-4,632	1,254	-2,343	995	0
East Asia-Pacific	2,890	-21,092	2,570	-10,482	1,960	0
Latin America	1,970	-6,275	1,930	-3,131	1,485	0
Middle East and N. Africa	984	-5,075	969	-2,536	750	0
South Asia	4,287	-4,648	4,599	-2,344	3,563	0
Sub-Saharan Africa	4,176	-1,975	4,453	-995	3,174	0
LEAST DEVELOPED						
East Asia-Pacific	51	-150	51	-75	28	0
South Asia	98	-467	90	-234	51	0
Sub-Saharan Africa	679	-969	680	-484	329	0

Source: Authors' calculations.

BOX 3 –CASE STUDIES IN ASIA AND AFRICA

While averages can help with understanding general patterns, case studies illustrate where countries deviate from averages. The ImpactECON Global Supply Chain model and database recognize the specific effects of trade and production and integration into global supply chains for each country in the baseline.

Vietnam: Approximately two-thirds of Vietnam's exports and imports are manufactures. These manufactures are projected to gain from improved Customs clearance times. Per the Doing Business Data for 2011, it took four days to clear Customs in Vietnam for imports and exports. Border fees are estimated at approximately 0.4 percent for imports and exports. Thus, Vietnam's annual border fee proceeds are projected to decline by as much as US$130 million annually by 2035 under Scenario 1 and its annual tariff revenues are projected to grow by US$ 1.7 billion annually by 2035.

Tanzania: Primary agriculture and services make up over 40 percent of Tanzania's exports and imports, sectors that do not benefit significantly from the TFA. Tanzania requires five days to import and four days to export through Customs. Border fees are estimated at 1.9 percent for imports and 1.5 percent for exports. Tanzania's annual border fee proceeds are projected to decline by as much as US$ 153 million annually by 2035—more than in Vietnam, a country five times its size in GDP. Tanzania starts from a higher level of border fees. The country's annual tariff revenues are projected to grow by US$ 218 million under Scenario 1.

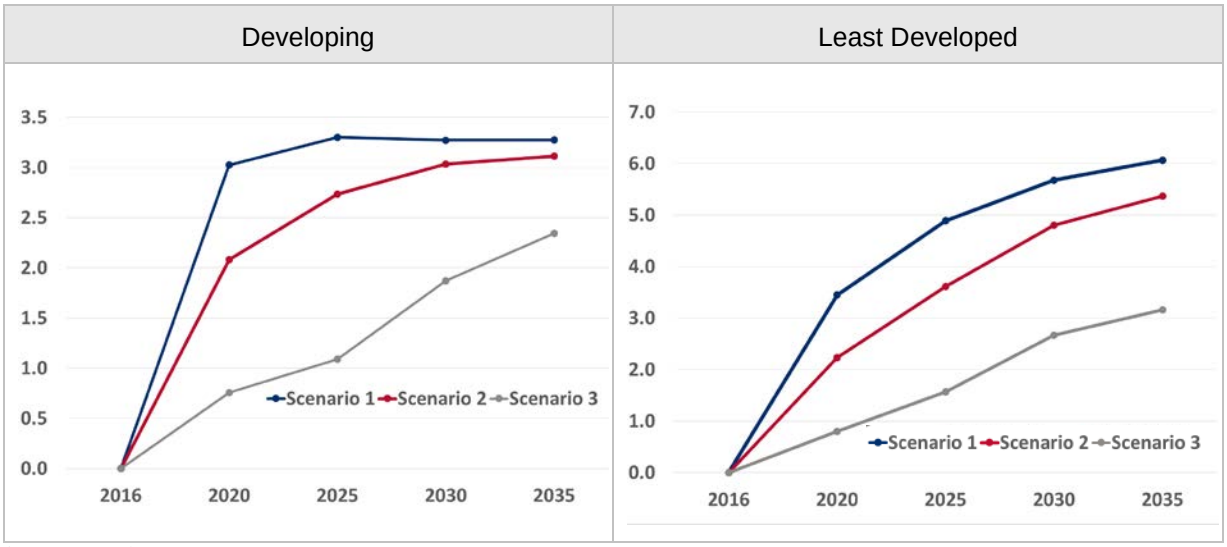
3.3. GROWTH AND TRADE

In the previous section, it was found that TFA implementation is expected to increase tariff revenues. It was concluded that the rise in tariff revenues was a result of a rise in trade volumes. In this section, we turn to the increase in trade and examine the impact of the TFA on trade, real GDP, and investment. The impact of the TFA on global supply chain integration is also presented since it is an element for the sustainability of future trade-led growth.

3.3.1. TRADE

Developing countries experience rapid trade growth through 2020 in Scenarios 1 and 2 (**FIGURE 3-6**), where the times to clear customs are assumed to adjust by the same total amounts (**TABLE 2-2**), although border fee rates are reduced by different total amounts. In the case of Scenario 1, developing country exports are projected to be three percent higher, annually, by 2020, than they would be in the absence of TFA implementation. When the implementation of the TFA is delayed, as in Scenario 2, developing countries achieve two-thirds of the growth in trade compared to Scenario 1 (two percent) by 2020. By 2035, both Scenario 1 and 2 result in trade that is approximately three percent greater than it would have been in the absence of TFA. Scenario 3, conservative implementation of the TFA, results in much lower growth in trade over the 2016-2025 period, about one-third of Scenario 1 growth by 2035.

FIGURE 3-5: EXPORT GROWTH 2016-2035, SCENARIOS 1-3 (PERCENT CHANGE FROM BASELINE)



Source: Authors' calculations.

Among developing countries, sub-Saharan Africa and South Asia are projected to increase their exports by more than double the average for all developing countries. Sub-Saharan Africa has the greatest growth rate in trade, by 2035 reaching trade growth of between 13.6 and 23.6 percent under any of the TFA implementation scenarios as compared to the baseline. This growth is due in part to sub-Saharan Africa's substantial Customs delays, and those of their trading partners; these delays lead to relatively large gains from reducing the time to clear Customs in the sub-Saharan Africa region. LDC exports also grow substantially as a result of significant decreases in Customs delays that, to varying degrees, all TFA implementation scenarios would yield.

TABLE 3-3: EXPORT GROWTH 2035, SCENARIOS 1-3 (PERCENT CHANGE FROM BASELINE)

	Scenario 1	Scenario 2	Scenario 3
Developed	2.3	2.2	2.2
Developing	3.3	3.2	2.3
Europe and Central Asia	1.8	1.7	1.3
East Asia-Pacific	1.6	1.4	1.1
Latin America	4.9	4.5	3.0
Middle East and North Africa	1.7	1.6	1.2
South Asia	7.2	7.7	6.0
Sub-Saharan Africa	23.9	22.9	13.6
Least Developed	4.7	4.1	2.1
East Asia-Pacific	3.5	3.2	1.8
South Asia	2.1	1.8	1.0
Sub-Saharan Africa	7.3	6.2	3.0

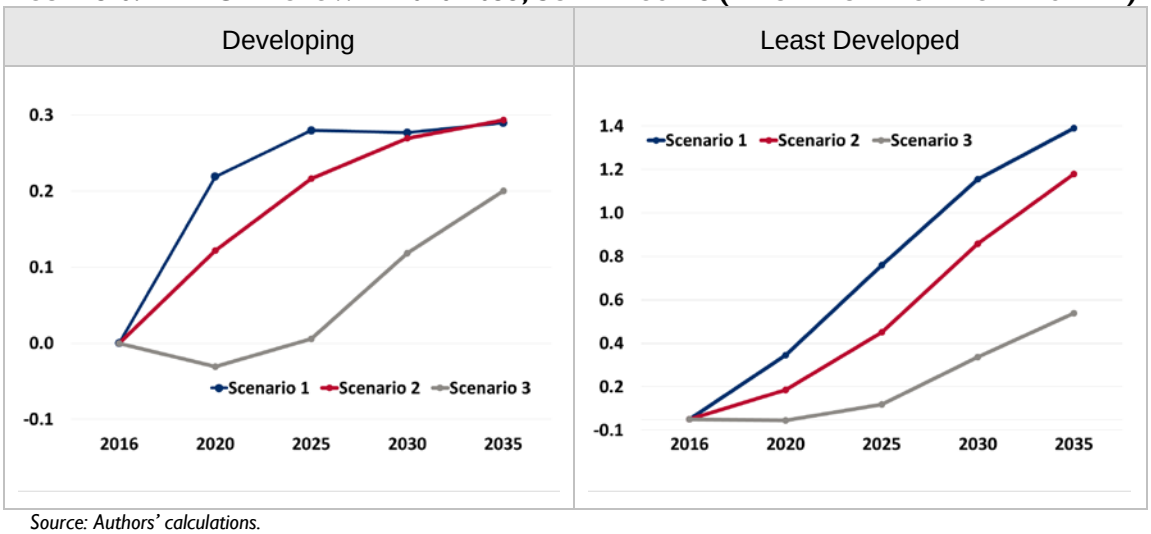
Source: Authors' calculations.

3.3.2. GDP AND INVESTMENT

Increased trade generally leads to more efficient allocation of resources resulting in GDP growth. While trade can be an engine for growth, it occurs in combination with other factors, most notably, investment. In this section, GDP growth and changes in investment as influenced by the TFA are considered.

As with the projected growth in trade, the TFA increases GDP in the developing and least developed income groups in all three scenarios as compared to the non-TFA baseline (**FIGURE 3-7**). Developing countries' GDP growth increases at an accelerating rate, with the differential reaching nearly three tenths of one percent by 2035 under Scenarios 1 and 2. LDCs' GDP growth attributable to the TFA is higher than for non-LDC developing countries, also accelerating over the period, reaching 1.4 percent above baseline GDP growth by 2035 in Scenario 1, with slightly smaller gains under the other scenarios.

FIGURE 3-6: REAL GDP GROWTH 2016-2035, SCENARIOS 1-3 (PERCENT CHANGE FROM BASELINE)



Source: Authors' calculations.

Scenario 3 GDP growth is significantly lower for both developing and least developed countries than is the case under Scenarios 1 and 2. For developing countries, with the delayed and partial implementation of the TFA assumed in this scenario, GDP declines slightly in 2020 before returning to growth. By 2035, under Scenario 3, developing country GDP growth is only two thirds of what it is under the other scenarios; for LDCs, the gap is even greater: Scenario 3 results in 2035 GDP growth rates of just 40 percent what they would be under the other scenarios. Delaying and only partially implementing the TFA appears to have a greater impact on GDP growth than on export growth, when figures 3-6 and 3-7 are compared. The reason for this somewhat surprising result is the relationship between trade and investment, explored further below. Countries and regions that both increase trade and attract investment are well placed to gain the most from the TFA.

TABLE 3-3 shows a relatively wide range of annual GDP growth by 2035 (as compared to what it would have been without TFA implementation) across regions. While developing sub-Saharan Africa does well, with GDP growth nearly five percent greater in Scenario 1 than baseline growth, developing East Asia-Pacific and Middle East-North Africa regions are projected to incur little or slightly negative growth attributable to the global implementation of the TFA. East Asia has efficient Customs procedures and low time delays relative to other regions, and so the benefits they receive from Customs reforms are modest; other regions have more catching up to do. In the Middle East-North Africa, a high proportion of exports are of coal, oil and gas (70 percent of total exports), which do not benefit from rapid Customs clearance procedures since they are transported by pipelines and bulk carriers in contrast to containerized cargo, which is subject to storage, inspection and classification.[28] These regions have overall lower gains in Customs clearance times.

TABLE 3-2: REAL GDP GROWTH 2035, BY REGION, SCENARIOS 1-3 (PERCENT CHANGE FROM BASELINE)

	Scenario 1	Scenario 2	Scenario 3
Developed	0.05	0.05	0.07
Developing	0.29	0.29	0.20
Europe and Central Asia	0.20	0.20	0.12
East Asia-Pacific	-0.11	-0.16	-0.15
Latin America	0.31	0.30	0.19
Middle East and North Africa	-0.32	-0.32	-0.24
South Asia	1.05	1.32	1.27
Sub-Saharan Africa	4.97	4.73	2.50
Least Developed	1.34	1.13	0.49
East Asia-Pacific	0.47	0.45	0.24
South Asia	0.41	0.34	0.18
Sub-Saharan Africa	2.50	2.08	0.85

Source: Authors' calculations.

[28] Research on the TFA's effects on customs clearance have focused on containerized, ro-ro and break bulk cargo. Estimates, therefore, are not provided of the TFA's potential to impact the time to clear pipeline and bulk cargo shipments, which often require unique terminals and storage facilities.

TABLE 3-4 shows the projected change in investment due to the TFA. As mentioned, investment is projected to modestly shift from regions that already have efficient Customs (East Asia and the Middle East) to regions that can make the biggest reforms and reductions in Customs clearance times. Sub-Saharan Africa realizes significant gains in investment due to the TFA, all other things held constant. These investment gains augment capital stocks and improve future growth. The longer a country delays implementing the TFA, the less global investment they receive and the more investment increases in countries that have relatively shorter Customs delays.

TABLE 3-3: INVESTMENT GROWTH 2035, BY REGION, SCENARIOS 1-3 (PERCENT CHANGE FROM BASELINE)

	Scenario 1	Scenario 2	Scenario 3
Developed	0.03	0.03	-0.04
Developing	0.30	0.27	0.27
Europe and Central Asia	0.20	0.02	-0.01
East Asia-Pacific	-0.53	-0.72	-0.67
Latin America and Caribbean	0.17	0.26	0.52
Middle East and North Africa	-0.68	-0.75	-0.65
South Asia	0.30	1.04	2.41
Sub-Saharan Africa	18.03	18.42	11.98
Least Developed	3.70	3.66	1.76
East Asia-Pacific	1.03	1.31	0.81
South Asia	1.57	1.51	0.90
Sub-Saharan Africa	6.74	6.50	2.89

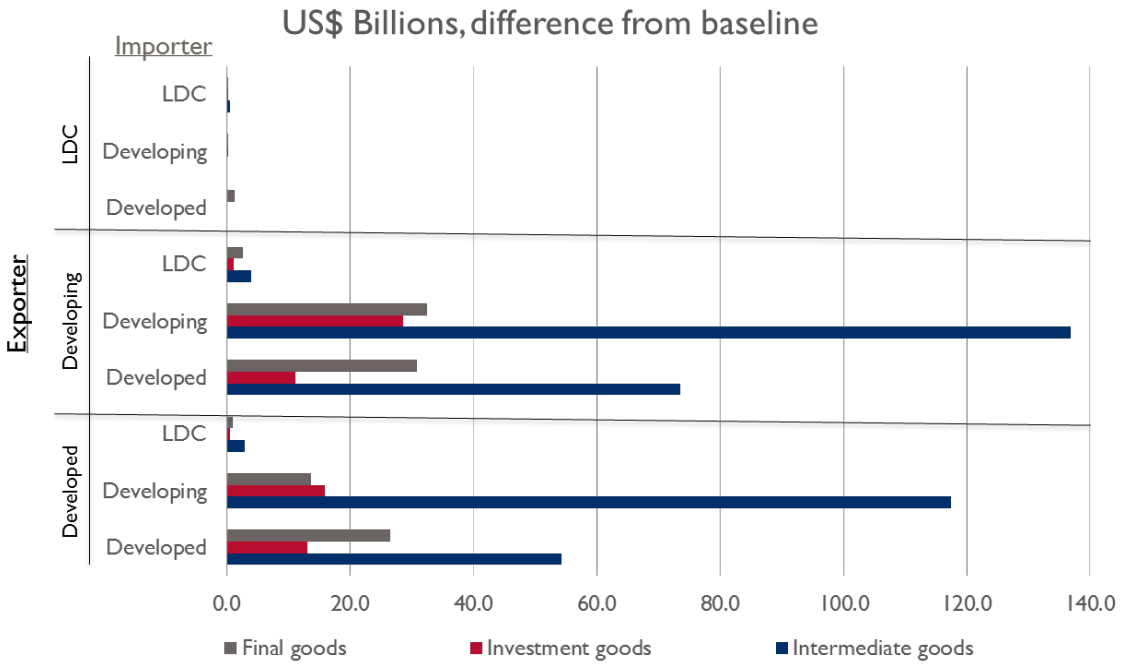
Source: Authors' calculations.

The importance of investment in achieving the TFA's long-term growth benefits highlights the need for developing and least developed economies to be open to foreign investment. Foreign investment is likely to be an important factor in ensuring enhanced trade and improving their producers' and workers' participation in global supply chains.

3.3.3. GLOBAL SUPPLY CHAIN INTEGRATION

FIGURE 3-8 illustrates the changes in bilateral trade flows by type of good (final and business intermediates) due to the TFA. The growth in business intermediate trade is evident, underscoring the importance of efficient supply chains to international trade and the underpinning of economic growth. Trade in intermediates grows the most between developing countries, increasing by nearly US$140 billion annually above baseline by 2035. This is followed by developed country exports of business intermediates to developing countries of approximately US$ 120 billion annually by 2035. The least developed countries also see their imports of business intermediates increase, but the amounts reflect the initially low values traded in these products by LDCs.

FIGURE 3-7: TRADE IN BUSINESS INTERMEDIATES AND FINAL GOODS 2035, SCENARIO 1 (US$ BILLIONS, DIFFERENCE FROM BASELINE)



Source: Authors' calculations

Perhaps one of the more revealing aspects of global supply chains in **FIGURE 3-8** is the low value of exports from LDCs. Least developed countries have a relatively low share of global trade in the initial database of global trade and it is challenging for these countries to grow significantly from those low values. In fact, when the values in **FIGURE 3-8** are calculated in percent changes, the least developed countries experience the greatest growth in all types of trade, including business intermediates, underscoring the importance of the TFA. However, LDCs initially face greater challenges in their own business enabling environments, stability, investment attractiveness, and familiarity with target export markets. These may need to be addressed in broader economic growth/export promotion support initiatives that are beyond the scope of this paper. Suffice it to say that the TFA alone is not likely to lift these countries to the level of other developing countries in terms of GDP or export growth or supply chain integration.

4. Conclusions

The TFA is an agreement that focuses on improving Customs and border clearance processes, making them more efficient; it does not lower tariffs in the way that many trade agreements do. Tariff revenues, an important source of government funds for many developing countries, are projected to increase under the TFA by US$ 60 to US$ 80 billion annually by 2035.

Border fees, here used as a substitute for Customs charges, might drop under TFA implementation, but could well increase; nothing in the TFA specifies the elimination or reduction in the fees and charges currently being assessed at the border. However, we have modeled a possible drop in border fees using assumptions that assume border fees will drop by the average decrease in trade costs projected by the OECD. Our assumption is that such border fees will be reduced by 10 percent for developed countries and 14 percent for developing and least developed countries.

Our model shows that border fee proceeds will drop by less than half the increase in projected tariff revenues under the assumptions we have outlined. Under other modeling scenarios, where border fees do not drop, or drop less substantially than our ambitious scenario, many regions break-even or see a rise in border fee proceeds due to the increased volume of trade, which counters the reduction in border fee "rates".

In addition to the GDP growth and trade gains accruing from TFA implementation, investment – an important determinant of long-term growth – is also positively affected by the TFA. The agreement is also expected to further the integration of developing countries into global supply chains, boosting the value of business intermediates in international trade.

In terms of GDP, investment, and trade growth, we find no rationale for countries to delay and only partially implement the TFA as we have modelled in our Scenario 3. This is found to reduce economic growth, investment, and trade growth as compared to ambitious implementation (Scenario 1) or moderate implementation, with delays and lower border fee rate reductions (Scenario 2).

Developing countries seeking to maximize the benefits of the TFA should consider lowering barriers to foreign investment and rapidly implementing the TFA articles to the extent possible.

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Appendix

TABLE A-1-1: TARIFF REVENUE AS A SHARE OF REAL GDP IN INITIAL DATA AND WITH AGGRESSIVE IMPLEMENTATION OF TFA SCENARIO 1-3 (PERCENT)

				Cumulative differences in 2035		
Country	Country code	Source and year of initial share[a]	Initial share %	Scenario 1: aggressive % point	Scenario 2: moderate % point	Scenario 3: limited % point
DEVELOPING						
EAST ASIA PACIFIC						
Brunei Darussalam	BRN	GTAP	1.18	0.03	0.02	0.02
China	CHN	IMF 2010	0.63	0.01	0.01	0.01
Hong Kong SAR, China	HKG	IMF 2008	0.07	0.00	0.00	0.00
Indonesia	IDN	IMF 2011	0.36	0.01	0.01	0.01
Korea, Rep.	KOR	IMF 2010	0.87	0.02	0.02	0.01
Mongolia	MNG	IMF 2011	2.48	0.05	0.05	0.04
Malaysia	MYS	IMF 2011	0.25	0.01	0.01	0.00
Philippines	PHL	IMF 2011	2.99	0.06	0.06	0.05
Singapore	SGP	GTAP	0.00	0.00	0.00	0.00
Thailand	THA	IMF 2011	1.02	0.02	0.02	0.02
Vietnam	VNM	GTAP	5.25	0.23	0.23	0.20
EUROPE AND CENTRAL ASIA						
Andorra	AND	GTAP xer	0.44	0.01	0.01	0.01
Albania	ALB	GTAP	0.52	0.01	0.01	0.01
Armenia	ARM	IMF 2011	1.14	0.03	0.02	0.02
Azerbaijan	AZE	IMF 2011	0.44	0.01	0.01	0.01
Bosnia and Herzegovina	BIH	IMF 2008	0.00	0.00	0.00	0.00
Belarus	BLR	IMF 2011	4.48	0.10	0.09	0.08
Faeroe Islands	FRO	GTAP xer	0.44	0.01	0.01	0.01
Georgia	GEO	IMF 2011	0.37	0.01	0.01	0.01
GIB Gibraltar	GIB	GTAP xer	0.44	0.01	0.01	0.01
Isle of Man	IMN	GTAP xer	0.44	0.01	0.01	0.01
Kazakhstan	KAZ	GTAP	1.23	0.03	0.02	0.02
Kyrgyz Republic	KGZ	IMF 2011	3.30	0.07	0.06	0.06

Monaco	MCO	GTAP xer	0.44	0.01	0.01	0.01
Moldova	MDA	IMF 2011	1.52	0.03	0.03	0.03
Macedonia, FYR	MKD	IMF 2011	0.88	0.02	0.02	0.02
Montenegro	MNE	GTAP xer	0.44	0.01	0.01	0.01
Romania	ROU	IMF 2011	0.02	0.00	0.00	0.00
Russian Federation	RUS	IMF 2011	1.53	0.03	0.03	0.03
San Marino	SMR	IMF 2008	0.30	0.01	0.01	0.01
Serbia	SRB	IMF 2011	1.05	0.02	0.02	0.02
Tajikistan	TJK	GTAP	2.01	0.04	0.04	0.04
Turkmenistan	TKM	GTAP xsu	2.01	0.04	0.04	0.04
Turkey	TUR	IMF 2011	0.41	0.01	0.01	0.01
Ukraine	UKR	IMF 2011	1.00	0.02	0.02	0.02
Uzbekistan	UZB	GTAP xsu	2.01	0.04	0.04	0.04
LATIN AMERICA						
Argentina	ARG	GTAP	0.74	0.03	0.03	0.03
Belize	BLZ	IMF 1995	6.39	0.29	0.29	0.24
Bermuda	BMU	GTAP xna	14.16	0.65	0.64	0.54
Bolivia	BOL	GTAP	0.98	0.05	0.04	0.04
Brazil	BRA	IMF 2011	0.71	0.03	0.03	0.03
Chile	CHL	IMF 2011	0.26	0.01	0.01	0.01
Colombia	COL	IMF 2011	0.71	0.03	0.03	0.03
Costa Rica	CRI	IMF 2011	0.76	0.03	0.03	0.03
Dominican Republic	DOM	IMF 2010	0.95	0.04	0.04	0.04
Ecuador	ECU	GTAP	1.24	0.06	0.06	0.05
El Salvador	SLV	IMF 2011	0.78	0.01	0.01	0.01
Greenland	GRL	GTAP xna	14.16	0.65	0.64	0.54
Guatemala	GTM	IMF 2011	0.62	0.03	0.03	0.02
Guyana	GUY	GTAP xsm	3.09	0.14	0.14	0.12
Honduras	HND	IMF 2011	0.88	0.04	0.04	0.03
Jamaica	JAM	IMF 2011	1.97	0.09	0.09	0.07
Mexico	MEX	GTAP	0.47	0.02	0.02	0.02
Nicaragua	NIC	IMF 2011	0.83	0.04	0.04	0.03
Panama	PAN	GTAP	8.71	0.40	0.39	0.33
Peru	PER	IMF 2011	0.32	0.01	0.01	0.01
Paraguay	PRY	IMF 2011	1.56	0.07	0.07	0.06
Suriname	SUR	IMF 2011	2.19	0.10	0.10	0.08
Trinidad and Tobago	TTO	IMF 2009	1.57	0.07	0.07	0.06
Uruguay	URY	IMF 2011	1.26	0.06	0.06	0.05
Venezuela, RB	VEN	GTAP	1.39	0.06	0.06	0.05

MIDDLE EAST AND NORTH AFRICA						
United Arab Emirates	ARE	GTAP	2.11	0.05	0.05	0.04
Bahrain	BHR	IMF 2010	1.05	0.03	0.03	0.02
Algeria	DZA	IMF 2010	1.74	0.04	0.04	0.03
Egypt, Arab Rep.	EGY	IMF 2010	1.12	0.03	0.03	0.02
Iran, Islamic Rep.	IRN	IMF 2008	1.67	0.04	0.04	0.03
Israel	ISR	IMF 2011	0.27	0.01	0.01	0.00
Jordan	JOR	IMF 2011	1.33	0.03	0.03	0.02
Kuwait	KWT	GTAP	0.53	0.01	0.01	0.01
Libya	LBY	GTAP xnf	1.90	0.05	0.05	0.03
Morocco	MAR	IMF 2011	1.10	0.03	0.03	0.02
Oman	OMN	IMF 2011	0.96	0.02	0.02	0.02
Qatar	QAT	IMF 2009	1.13	0.03	0.03	0.02
Saudi Arabia	SAU	GTAP	0.84	0.02	0.02	0.02
Tunisia	TUN	IMF 2011	2.04	0.05	0.05	0.04
SOUTH ASIA						
India	IND	IMF 2011	2.14	0.28	0.28	0.21
Sri Lanka	LKA	IMF 2011	3.00	0.39	0.40	0.30
Pakistan	PAK	GTAP	2.37	0.31	0.31	0.24
SUB-SAHARAN AFRICA						
Botswana	BWA	IMF 2011	13.26	3.97	4.19	3.14
Cote d'Ivoire	CIV	IMF 2011	5.60	1.68	1.77	1.32
Cameroon	CMR	GTAP	3.05	0.91	0.96	0.72
Ghana	GHA	IMF 2010	4.66	1.40	1.46	1.12
Kenya	KEN	IMF 2011	1.39	0.42	0.44	0.33
Mauritius	MUS	IMF 2011	0.47	0.14	0.15	0.11
Namibia	NAM	IMF 2010	5.70	1.71	1.80	1.35
Nigeria	NGA	GTAP	1.54	0.46	0.49	0.36
South Africa	ZAF	IMF 2011	1.16	0.35	0.37	0.27
Zimbabwe	ZWE	GTAP	9.72	2.92	3.07	-12.08
LEAST DEVELOPED COUNTRIES						
EAST ASIA PACIFIC						
Cambodia	KHM	IMF 2011	2.24	0.09	0.09	0.06
Lao PDR	LAO	IMF 2011	1.57	0.06	0.06	0.04
Myanmar	MMR	IMF 2004	0.20	0.01	0.01	0.01
Timor-Leste	TLS	GTAP xse	0.87	0.03	0.03	0.02

SOUTH ASIA						
Bangladesh	BGD	IMF 2010	3.03	0.08	0.07	0.05
Nepal	NPL	IMF 2011	2.99	0.08	0.07	0.05
SUB-SAHARAN AFRICA						
Benin	BEN	IMF 2011	4.42	0.41	0.43	0.26
Burkina Faso	BFA	IMF 2011	2.92	0.27	0.28	0.17
Central African Republic	CAF	IMF 2011	3.92	0.36	0.38	0.23
Congo, Rep.	COG	IMF 2009	1.59	0.15	0.16	0.09
Ethiopia	ETH	IMF 2010	5.56	0.51	0.54	0.32
Gabon	GAB	GTAP xcf	3.20	0.30	0.31	0.19
Guinea	GIN	GTAP	7.46	0.69	0.73	0.43
Equatorial Guinea	GNQ	IMF 2008	0.13	0.01	0.01	0.01
Madagascar	MDG	IMF 2010	5.47	0.51	0.53	0.32
Mozambique	MOZ	IMF 2011	1.79	0.17	0.17	0.10
Malawi	MWI	GTAP	2.50	0.23	0.24	0.15
Rwanda	RWA	IMF 2011	1.44	0.13	0.14	0.08
Senegal	SEN	IMF 2011	2.86	0.27	0.28	0.17
Sao Tome and Principe	STP	IMF 2011	4.08	0.38	0.40	0.24
Chad	TCD	GTAP xcf	3.20	0.30	0.31	0.19
Tanzania	TZA	IMF 2011	1.95	0.05	0.05	0.03
Togo	TGO	IMF 2011	4.34	0.40	0.42	0.25
Uganda	UGA	IMF 2011	1.32	0.12	0.13	0.08
Zambia	ZMB	IMF 2010	2.99	0.28	0.29	0.17

a. Source of initial shares of tariff revenues to real GDP.
IMF Government Financial Statistics, downloaded November, 2016. Year provided is 2011 or closest year available.
GTAP 2011 is GTAP v9.1 Data Base (base year 2011). Where an aggregate region is used the GTAP aggregated region label is provided, otherwise the data is for the country specified.

XER-Rest of Europe; XCF-Rest of EFTA; XSE-Rest of South East Asia; Rest of North Africa; XSM-Rest of South America; XNA-Rest of North America; XSU-Rest of Former Soviet Union;

Source: Author's calculations.