Tariff Cuts, Uncertainty Reduction, and the Force of Many: The Impact of Plurilateral Agreements*

Lasha Chochua †   Irene Iodice‡

February 10, 2025

Abstract

This paper explores the broader benefits of inclusive trade agreements beyond tariff reductions. Using the Phase II expansion of the Information Technology Agreement (ITA)—a plurilateral trade pact covering 12% of global trade— we identify three channels through which trade liberalization operates—tariff reductions, the elimination of bound tariffs, and the plurilateral effect arising from enhanced trade policy coordination—and analyze their impacts through a gravity model framework. Our analysis shows that liberalized products experienced a significant 4–6% increase in market access. Specifically, a 10% reduction in Most-Favored Nation (MFN) tariffs led to a 3.5% gain, while an equivalent reduction in bound tariffs added 1.6%, reflecting reduced trade policy uncertainty. Additionally, the plurilateral effect amplified these benefits, with products liberalized by more countries achieving larger gains in market access. These findings underscore the critical importance of extensive multilateral participation in fully realizing and amplifying the benefits of trade liberalization.

Keywords: Non-discriminatory trade policies, MFN tariff elimination, World Trade Organization, Information Technology Agreement, Trade policy certainty

JEL Classification: F13, F14, F15, L63

*We are grateful to Maria Pthaskina, Gerald Willmann, Andrew Bernard, Emanuel Ornelas, James Lake, Lars Nilsson, Fedora Teti, and participants of Melbourne Empirical Trade Conference 2024, Kiel-Aarhus 2023 Workshop and ETSG 2023.

†International School of Economics at Tbilisi State University. E-mail: lasha.chochua@iset.ge.

‡Bielefeld University & CESifo Research Network member. E-mail: irene.iodice@uni-bielefeld.de.

1 Introduction

Since the establishment of the General Agreement on Tariffs and Trade (GATT), trade liberalization has unfolded in various forms: broad, multi-issue liberalization through non-discriminatory multilateral negotiations; narrower liberalization under preferential trade agreements; and issue-specific liberalization via plurilateral agreements. Although the first two forms have been extensively explored in the literature, issue-specific liberalization remains relatively underexamined, despite its potential importance in addressing the challenges facing the World Trade Organization (WTO) (Bagwell et al., 2016). Plurilateral agreements are characterized by their non-discriminatory framework, focused scope on specific policy domains, and, in some cases, open membership. Moreover, the reduction of cross-issue linkages avoids the exchange of commitments across different areas. These distinctive features not only facilitate a more precise evaluation of the impacts of non-discriminatory liberalization but also provide the opportunity to investigate the additional mechanisms underpinning plurilateral agreements.

This paper examines the impact of targeted trade liberalization through plurilateral agreements, with a particular focus on tariff reductions, the mitigation of trade policy uncertainty, and the role of coordinated trade policy. Our analysis centers on the Phase II expansion of the Information Technology Agreement (ITA), which encompasses approximately 12% of global trade.[1] We assess the effects of non-discriminatory trade policy changes through three key channels: (1) MFN tariff reductions, (2) the gradual phasing out of "water" in tariffs—where "water" refers to the overhang between bound tariffs (maximum allowable rates) and applied MFN tariffs—reducing the policy space for future tariff increases, and (3) the "plurilateral effect," which reflects changes in market access arising not just from tariff reductions or the elimination of bound tariffs, but from the collective and coordinated liberalization efforts under the plurilateral framework of the ITA.

The ITA exemplifies the principles and potential of plurilateral agreements, making it an ideal case for examining their broader implications. Specifically, the 2015 Phase II expansion, which covered a diverse range of high-tech products such as computers, telecommunications equipment, and semiconductors, provides a unique setting to evaluate the outcomes of plurilateral trade liberalization. The ITA's open membership characteristics and its "critical mass" requirement address strategic behavior challenges that often hinder broader WTO liberalization efforts. Moreover, several

[1] See ITA Symposium: 25 Years of the Information Technology Agreement.

aspects of this expansion allow it to be treated as a quasi-experiment. First, the WTO successfully coordinated member countries to agree on a comprehensive list of products, minimizing the influence of individual trade policy preferences. Second, liberalization was implemented through the phased reduction of bound tariffs over four years, with limited exceptions. Bound tariffs, the legally binding "maximum tariff rates" a WTO member commits not to exceed, restrict the flexibility countries have in adjusting their trade policies. By reducing these maximum rates, the agreement significantly curtailed trade policy uncertainty, with the phased, linear reductions providing exogenous variation. Additionally, the agreement specified a list of Harmonized System (HS) codes (Attachment A) and included textual descriptions for a smaller subset of products (Attachment B) that were not fully harmonized. This setup allows us to exploit variation in the number of liberalizing countries, enabling an investigation into whether the magnitude of the plurilateral effect is influenced by the degree of coordinated trade policy across participating countries.

Under World Trade Organization (WTO) rules, member countries commit to bound tariff rates, which are the maximum tariffs they agree not to exceed. If a country imposes tariffs above these bound rates without proper justification, it is considered a violation of WTO commitments. In such cases, the affected country can initiate a dispute through the WTO's Dispute Settlement Mechanism (DSM). This process involves consultations, and if unresolved, the establishment of a panel to adjudicate the dispute. If the panel rules in favor of the complainant and the offending country does not comply with the ruling, the complainant may be authorized to impose retaliatory measures.

Our study unfolds in four steps. First, we explore the historical and institutional features of the ITA, focusing on the characteristics of the Phase II expansion that inform our identification strategy. We highlight the broader trade trends for ITA-covered products, demonstrating their economic significance, and select a set of comparable products to serve as a control group. In the second stage, we outline the empirical methodology used to disentangle the various factors influencing tariff liberalization under the ITA Phase II. We employ a two-stage estimation approach to measure the impact of ITA membership on product-specific market access conditions, accounting for its non-discriminatory nature, which affects a country's attractiveness as an importer across all sourcing nations. At this point, we distinguish between the different liberalization channels—tariff reductions, changes in trade policy uncertainty from altered tariff bounds, and the residual "plurilateral effect." In the third stage, we present our empirical findings, supported by robustness checks. Finally, in the fourth stage, we delve deeper into the "plurilateral effect" to examine its specific drivers.

Our findings highlight the significant impact of the ITA Phase II expansion on market access for liberalized products. Using a difference-in-differences (DiD) methodology, we identify a 4% to 6% increase in market access for treated goods relative to control products following the 2016 implementation of the expansion, with no evidence of confounding pre-existing trends. This substantial improvement is driven in part by a 3.5% rise in market access associated with a 10% reduction in applied MFN tariffs and a 1.6% gain resulting from a 10% decrease in bound MFN tariffs, illustrating the market's positive response to diminished trade policy uncertainty. Beyond these tariff-driven effects, the coordinated plurilateral liberalization efforts amplified these gains, highlighting the additional benefits of collective trade policy initiatives.

Our analysis of the "plurilateral effect" demonstrates that collective liberalization significantly enhances market access gains. Specifically, we observe that as more countries liberalize a product, market access improves proportionally, underscoring the importance of broad participation. Robustness checks, including comparisons between products listed in Attachments A and B of the ITA, reveal no evidence of selection bias. This confirms that the plurilateral effect arises from the coordinated liberalization process rather than intrinsic differences between products. These findings are further corroborated by additional analyses, providing compelling evidence that the ITA's multilateral liberalization has had a substantial positive impact on global trade.

Our paper contributes to four key areas of literature. First, we quantify the effects of non-discriminatory trade policy changes. While reductions in applied MFN tariffs have been among the most impactful trade policy changes since the mid-20th century, previous studies have often neglected to take into account multilateral resistance when estimating their trade effects (Anderson and Van Wincoop, 2003). There are, however, exceptions, such as Caliendo et al. (2015) and Heid et al. (2021), who estimate the substantial effects of MFN tariff reductions on trade. For instance, Caliendo et al. (2015) found that the MFN tariff reductions from the Uruguay Round explain 90% of subsequent trade gains. Furthermore, Larch et al. (2019) examine the impact of GATT/WTO membership on international trade using structural gravity modeling, overcoming previous methodological gaps by including intra-national trade flows. They find that GATT/WTO membership boosts international trade relative to domestic sales by 72% and increases trade between members by 171%. Additionally, membership facilitates trade with non-members, growing by 88%. Although GATT was more effective in fostering bilateral trade among members, WTO had broader impacts, particularly in promoting trade with non-members. We argue that examining domain-specific liberalization, such as that of the ITA, offers a better case study to identify the effects of tariff cuts that result from product-specific rather than complex liberalization schemes, which can bring about cross-linkage effects that are more challenging to disentangle.

We also contribute to the literature on the effects of WTO membership on trade policy certainty. It has been common in previous empirical studies of the impact of WTO membership on trade to use a simple dummy representing WTO membership, which combines the impacts of reducing/eliminating tariffs with the effects of greater certainty in trade policy. In spite of the difficulties associated with finding significant WTO effects in the early research (Rose (2004)), subsequent studies have discovered such effects for a limited number of members (Subramanian and Wei (2007); Eicher and Henn (2011)). By examining the trade impacts of WTO membership in a more structured manner, we distinguish between the effects of reducing and eliminating MFN tariffs in isolation from those associated with enhanced trade policy certainty, when MFN tariff reductions are the result of a collaborative liberalization effort.

Our paper also contributes to the expanding literature on trade policy uncertainty (TPU) and its impact on international trade. Previous research, such as Handley and Limao (2015), has demonstrated that TPU can significantly hinder market entry and investment, particularly in sectors with high sunk costs, due to the "option value of waiting"—where firms delay investments in anticipation of potential unfavorable changes in trade policy. As further discussed by Handley and Limão (2017), TPU is especially relevant in contexts where tariff bounds are still in place, creating uncertainty about possible future tariff increases. Our study extends this literature by examining how the phased reduction of bound tariffs in the ITA's Phase II expansion helps to mitigate TPU, thereby enhancing market access.[2] Specifically, we quantify the impact of reducing bound tariffs, which decreases uncertainty surrounding future trade policy changes and enables firms to expand their export markets.

Finally, our paper contributes to a limited body of literature focused on the Information Technology Agreement. Previous econometric analyses of trade impacts focused on the first phase of the ITA, with Mann and Liu (2009) being one of the earliest studies available. In a more recent paper, Gnutzmann-Mkrtchyan and Henn (2018) uncovered a non-linearity in the impact of tariff changes: not only is reducing tariffs beneficial, but removing them entirely leads to even greater gains in trade. Essentially, the commitment to durable tariff elimination, achieved through WTO

[2]For a comprehensive review of the literature on trade policy uncertainty, see Handley and Limão (2022).

bindings, contributes to more effective import and export facilitation than equivalent unilateral reforms.

We extend the analysis of Gnutzmann-Mkrtchyan and Henn (2018) in two key ways. First, we examine the recent Phase II expansion of the ITA, which, to our knowledge, has not been studied in the literature. Unlike the initial phase led by a few active WTO members, Phase II featured a longer, more inclusive negotiation process. This inclusivity may explain why Gnutzmann-Mkrtchyan and Henn (2018) found significant effects only for smaller economies, whereas our estimates are significant for the average country.

Second, we leverage the staging matrices signed by participating countries to measure the annual phasing out of bound tariffs, which generally followed a standard four-year linear reduction schedule. This provides us with exogenous variation in bound tariffs, enabling us to identify the effects of reduced trade policy uncertainty and to isolate an additional component we term the "plurilateral effect." This effect is not directly tied to tariff reductions but is linked to ITA membership, potentially capturing the benefits of large-scale policy coordination, the increased difficulty of policy reversal, and the enhanced collective bargaining power of Phase II participants.

The paper is structured as follows: Section 2 explores the historical and institutional context of the ITA and its phase II expansion. Section 3 addresses data collection and presents stylized facts. In Section 4, we outline our identification strategy and its formulation. Section 5 presents our results and Section 6 concludes.

2 Institutional Background

The Information Technology Agreement is a plurilateral agreement that extends most-favored-nation (MFN) treatment to all members of the WTO, irrespective of their direct participation. Its implementation occurred across two phases: ITA Phase I and ITA Phase II. Through these liberalizations, member states committed to reducing their bound MFN tariff rates to zero for a broad range of IT products, establishing a zero-MFN tariff regime. Since its establishment in 1996 with 43 initial WTO members, the ITA has witnessed sustained success, with its membership growing to 82 countries by 2020. Notably, key players from the electronics industry are actively engaged in this cooperation. Furthermore, global exports of ITA Phase I products have experienced a nearly fourfold increase since 1996, reaching a substantial $2 trillion in 2020, accounting for over 10% of the world's total exports.[3]

The expansion into ITA Phase II, however, proved to be a complex and lengthy process. While negotiations started in 1997, immediately after the implementation of ITA Phase I, they stalled by 1998 due to disagreements over the addition of new products to the existing list. It was not until May 2012 that progress resumed when six ITA members – Canada, Japan, South Korea, Singapore, Chinese Taipei, and the United States – jointly submitted a "Concept Paper for Expanding the ITA" to the ITA Committee. We will refer to this group of countries as "active members". By mid-2012, a preliminary combined list had been developed, encompassing around 357 items defined at the 6-digit Harmonized System (HS6) level. In June 2013, a revised ITA expansion list was shared, but negotiations were subsequently suspended in July due to persisting disagreements.[4]

Afterward, it took 17 rounds of negotiations and the intervention of WTO Director-General Roberto Azevêdo to achieve substantial progress by 2015. In December 2015, WTO members finally signed the Phase II expansion. Ultimately, the majority of ITA Phase I members, 50 out of the 82, opted to join this expansion, with India being the only major player that chose not to participate. The final list comprised a reduced set of 201 products, which garnered broader consensus among the participants.

This unique feature of the ITA Phase II expansion mitigates concerns regarding endogeneity. First, the involved parties could not anticipate when the final implementation would occur. Second, the involvement of the WTO Directorate was focused on identifying a set of goods over which there was broad consensus, reducing concerns over individual countries' endogenous preferences for specific products. Third, the negotiating countries decided not to include provisions for special and differential treatment or exceptions to the final product coverage. Instead, they implemented a three-year staged reduction process with four equal annual reductions, referred to as the "standard" staging approach.[5] For this reason, the staging reductions, which will define our measure of uncertainty, can be considered exogenous to individual government preferences.

[3]See ITA Symposium: 25 Years of the Information Technology Agreement

[4]A number of products such as LCD panels and machine tools were debated during this period, which was further complicated by the ongoing "TV impasse."

[5]A few exceptions, encompassing around 5% or product-country pairs have been granted a longer staging phase, consisting of 7 years. Among the beneficiaries, Albania, Philippines and Malesya. While the period granted is longer, the reduction should be implemented with linear cuts over the window.

3 Data and Stylized Facts

We compiled a dataset spanning 2012 to 2019, encompassing product-level trade flows, tariffs, schedules for the Information Technology Agreement (ITA) Phase II expansion, and variables typically used in gravity models. This period covers the endorsement of the ITA expansion in December 2015 and its implementation in July 2016. The expansion schedules mandated the elimination of tariffs over a four-year period, by 2020, with few exceptions. However, we excluded 2020 from the analysis to avoid the disruptive impact of the COVID-19 pandemic on international trade flows, which is not the focus of this particular study.

To examine the role of tariff liberalization and uncertainty reduction, we utilize four tariff categories: the preferential ad valorem duty, the MFN ad valorem tariff, the bound MFN tariffs and the yearly phasing out of bound tariffs (which are all ad valorem) as agreed upon within the ITA. The tariff data, sourced from the WTO Integrated Data Base (IDB), are calculated using tariff line information.[6] The expansion schedules are extracted from WTO documentation, including schedules and staging matrices reviewed and approved by ITA expansion participants at the tariff line level. The dataset construction involved converting tariff vintages and accounting for tariff line granularity discrepancies between staging matrices and MFN tariffs. The ITA membership data is obtained from the WTO website. Trade data, WTO membership details, and gravity-related variables are obtained from CEPII, specifically using BACI for trade data and the gravity database as described in the work by Conte et al. (2022).

We derive the covered ITA products by consolidating Attachment A (191 HS6 subheadings, 50 partially covered items) and Attachment B (10 product descriptions mapped to tariff lines by countries). Even within Attachment A, some exceptions existed at a more granular level than tariff lines, which we tracked to control for partial liberalization cases, i.e., cases where the products have not been fully liberalized in all the subheadings. However, note that full liberalization represents the majority, with more than 80% of product lines being fully liberalized.

To properly identify the effects of the ITA expansion, we require a control group of products. An ideal control group comprises similar products that could have been included in the ITA Phase II expansion. We utilize the list of HS6 products proposed for a possible Phase III expansion by the Information Technology and Innovation Foundation, a non-profit think tank, in collaboration with diverse industrial groups (See Ezell and Long (2023)). This list of 251 HS2017 6-digit product lines provides

[6] Time series IDs: HS_A_0015, HS_A_0070, and HS_A_0025.

a natural control group. Specifically, we employ this list of goods to disentangle the effects of liberalization from country-specific trends in the IT industry. To avoid capturing earlier partial liberalization, we ensure this list excludes products covered under previous phases' and Attachments B.

3.1 Trends and facts about ITA Phase II Expansion

This subsection offers some descriptive observations on the effects of the 2016 expansion of the ITA. By examining import patterns and tariff policies, we aim to provide an initial understanding of how the expansion influenced trade flows. The focus is on observing the differences between ITA members and non-members in terms of import trajectories, as well as the role of tariff reductions and the phased elimination of bound tariffs. These preliminary observations highlight key trends and provide insights into the potential impact of trade liberalization on market access.

Figure 1 (panel a) depicts the import trajectory for treated and control products among ITA members (upper panel) and non-ITA countries (lower panel) from 2012 to 2019. For ITA members, imports of both product categories exhibited significant growth after the 2016 ITA expansion, with treated products displaying a notably faster rate. The pre-2016 parallel trends suggest a causal relationship between ITA expansion and enhanced imports of liberalized goods. Interestingly, non-ITA countries also experienced substantial growth in imports of ITA expansion products post-2016, outpacing their control group. This unexpected trend implies potential indirect benefits from non-discriminatory liberalization, possibly due to increased international competitiveness enhancing exporters' productivity.

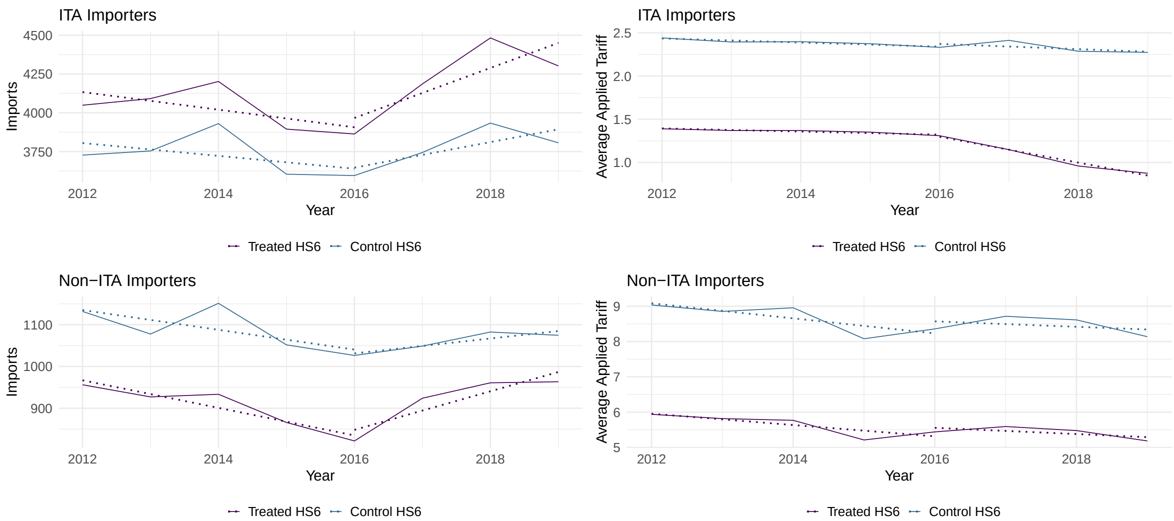
Panel (b) of Figure 1 confirms the liberalization dynamics by illustrating the evolution of MFN tariffs. ITA participants implemented significant, linear decreases in tariffs on covered products post-2016. In contrast, non-ITA members maintained parallel tariff trajectories for both treated and control goods throughout the study period, with only a marginal decrease observed after 2017.

A critical aspect of ITA liberalization, beyond MFN applied tariff reductions, is the gradual mitigation of tariff uncertainty. Signatory nations committed to a staged reduction of bound MFN tariffs to zero through four equal decrements. This process is particularly significant as Non-Zero MFN Bound tariffs introduce uncertainty for traders, allowing potential increases in applied tariffs up to the bound rates.

The ITA agreement's imposition of a time-constrained, linear decrease in bound rates generated largely exogenous variation in the MFN Bound Tariff. This variation

Figure 1: Evolution of Import Flows and Tariffs around ITA Phase II Expansion

(a) Imports, Average Trade Inflows. (b) Liberalisation, Average Applied Tariff.



Notes: Imports are in thousands of Dollars. Applied tariffs are the minimum between applied MFN tariffs and preferential tariffs.

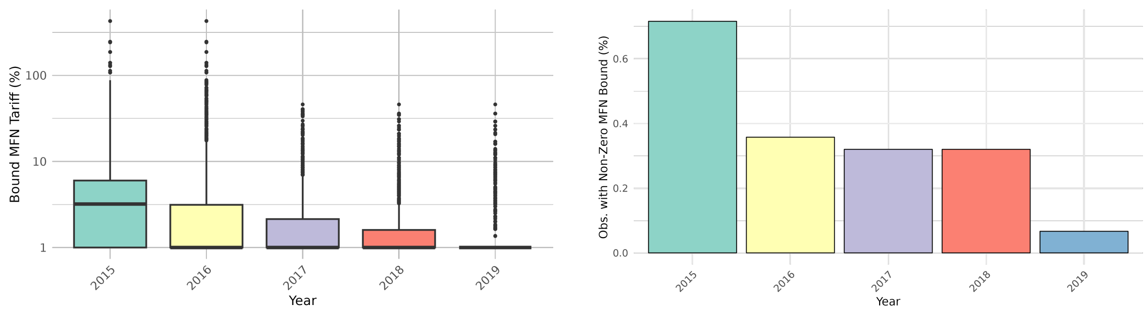
facilitates the tracking of trade policy uncertainty reductions over time. Figure 2 (panels a and b) illustrates this evolution, focusing on products liberalized under the ITA expansion from 2015 to 2019.

Panel (a) of Figure 2 depicts the evolution of MFN bound tariffs. The 2015 box-plot reveals substantial pre-ITA bound tariffs, with a median bound MFN Tariff of approximately 5% and an interquartile range (IQR) of 1 to 8 percentage points. Outliers indicate exceptionally high bound tariffs for some products. Following the ITA expansion, the median decreases substantially and the IQR narrows, indicating a reduction in the variability of the MFN bound rates. By 2019, bound tariffs are virtually eliminated, with both median and IQR approaching zero.

Complementing this analysis, Panel (b) of Figure 2 quantifies the proportion of ITA-liberalized products subject to Non-Zero MFN bound tariffs over time. In 2015, approximately 70% of ITA products faced positive MFN bound tariffs. This proportion dropped significantly to around 40% in 2016, the first year of ITA Expansion, as some countries accelerated liberalization by immediately zeroing MFN bound tariffs. From 2016 to 2018, the prevalence of Non-Zero MFN bound tariffs remained relatively stable. By 2019, coinciding with the end of the four-year staging period, the proportion of products facing positive MFN bound tariffs had declined to approximately 6%. The persistence of Non-Zero MFN bound tariffs beyond 2019 is due to exceptions

Figure 2: Uncertainty Reduction over ITA Expansion II Phase

(a) Evolution of MFN Bound. (b) Prevalence of Non-Zero MFN-Bound.



Notes: Only those HS 6-digit codes that do not contain exclusions are included.

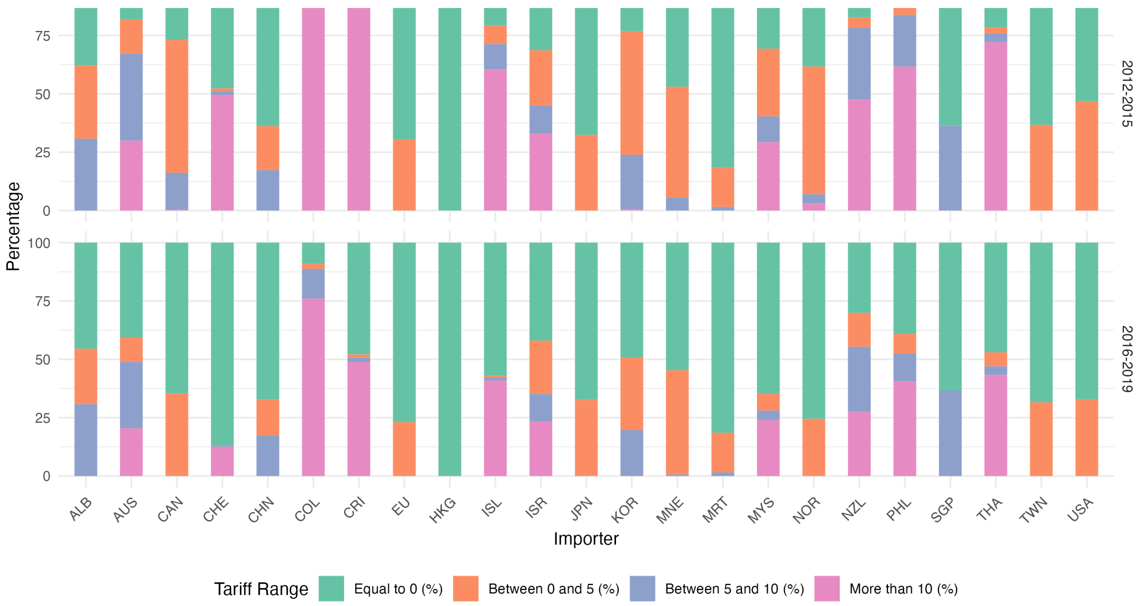
in the staging process. Specifically, certain country-product pairs were granted an extended seven-year staging period, allowing full liberalization by 2022. To avoid bias from factors associated with these exceptions, we exclude these observations from our analysis.

Furthermore, the next figure illustrates the distribution of water tariffs by country and period, comparing the pre-ITA period (2012–2015) with the post-ITA Expansion period (2016–2019). Water tariffs, defined as the gap between MFN bound tariffs and applied MFN tariffs, are categorized into four ranges: equal to 0%, between 0% and 5%, between 5% and 10%, and more than 10%. The bars represent the proportion of water tariffs for each country within these ranges, providing insight into the extent of trade policy uncertainty.

In the 2012–2015 period, many countries exhibit significant water tariffs, as seen in the presence of substantial proportions in non-zero categories. This suggests a considerable gap between bound and applied tariffs, contributing to uncertainty in trade policy. While countries like the EU and the USA show high proportions of zero water tariffs, indicating stable trade policies, others, such as Thailand and the Philippines, display higher proportions in the non-zero ranges, reflecting greater unpredictability.

The 2016–2019 period shows a general reduction in water tariffs across all countries, accompanied by an increase in the proportion of zero water tariffs. Moreover, the presence of non-zero water tariffs reflects the linear reduction of existing bound tariffs over the four-year period. This trend aligns with the ITA Expansion efforts, which aimed to reduce the gap between bound and applied tariffs by nullifying bound tariffs. The comparison across periods emphasizes the crucial role of variation in water tariffs, as it enables the estimation of the effects of reductions in trade policy uncertainty.

Figure 3: Distribution of Water Tariffs by Country and Period



4 Conceptual Framework

We consider trade flows between partners to be governed by a four-dimensional gravity equation:

$$x_{ijkt} = \frac{x_{jkt}}{P_{jkt}^{1-\sigma}} \cdot \frac{y_{ikt}}{\Pi_{ikt}^{1-\sigma}} \cdot \tau_{ijkt}^{1-\sigma} \cdot \frac{1}{y_{kt}}. \tag{1}$$

In this formulation, the variables are denoted by the subscript t, which indicates specific years. The variable x_{ijkt} represents the imports of good k from country i by country j, while y_{ikt} denotes the overall production of good k within country i. Furthermore, x_{jkt} indicates the total expenditure by country i on good k, and y_{kt} represents the worldwide production of good k. The variable τ_{ijkt} corresponds to the bilateral trade costs between the trade partners involved. The term $(1-\sigma)$ represents the elasticity of substitution between varieties originating from distinct exporters, with $\sigma > 1$. To streamline the analysis and considering the focus on comparable IT products, we assume that σ is the same across goods. Finally, $P_{jkt} = \sum_i (\frac{\tau_{ijkt}}{\Pi_{ikt}})^{(1-\sigma)} \frac{y_{ikt}}{y_{kt}}$ and $\Pi_{ikt} = \sum_j (\frac{\tau_{ijkt}}{P_{jkt}})^{(1-\sigma)} \frac{x_{jkt}}{y_{kt}}$ represent indicators of inward and outward multilateral resistances.

To model bilateral trade costs, we use the iceberg cost specification, where tariffs are multiplicatively incorporated, magnifying the impacts of additional trade costs. Applying the exponential transformation to the multiplicative version of the trade cost yields the equivalent functional representation for bilateral trade costs.

$$\tau_{ijkt} = (1 + t_{ijkt}^{\text{Applied}}) \cdot e^{\psi \cdot I_{ijt} + \kappa_{ijk}} = e^{\ln(1+t_{ijkt}^{\text{Applied}}) + \psi \cdot I_{ijt} + \kappa_{ijk}}, \tag{2}$$

where $t_{ijkt}^{\text{Applied}}$ represents the bilateral applied tariffs at the product level. Specifically, it takes the value of preferential tariffs where applicable between country pairs, and in the absence of such preferential tariffs, the value of the applied MFN tariffs. The vector I_{ijt} encompasses a list of gravity regressors that vary across importer, exporter, and time dimensions. Relevant variables of interest are whether both partners are members of the WTO or if they share a preferential agreement. The term κ_{ijk} in equation 2 captures factors such as a common language or a colonial tie between the countries, but also factors that change across products within trade-partner pairs, such as cultural components of consumption preferences that do not vary over time.

In the framework of structural gravity models, Π_{ikt} and P_{jkt} are indicators of multilateral resistance. More precisely, Π_{ikt} captures the level of competition encountered by exporter i in the world market and represents the notion of outward multilateral resistance, or "outward openness." Conversely, P_{jkt} characterizes the concept of inward multilateral resistance, quantifying the weighted average trade barriers in country j and representing j's ease of market access. This latter is a key variable in our setting because it reflects all the factors that make an importer market more accessible to all trade partners, such as a reduction in non-discriminatory trade barriers, which are the focus of our work.

In the context of the ITA agreement, we model inward multilateral resistance as depending on three components that determine the general level of trade barriers:

$$P_{jkt} = \exp(\alpha_1 \text{Tariffs}_{jkt} + \alpha_2 \text{TPU}_{jkt} + \alpha_3 \text{TPC}_{jkt}) \cdot \mu_{jkt} \tag{3}$$

where Tariffs_{jkt} represents the real tariff costs faced by exporters in market k, as captured by the applied MFN tariffs. The second term, TPU_{jkt} refers to the effect of Trade Policy Uncertainty, capturing the extent of unpredictability of trade policies in that specific market, while TPC_{jkt} represents Trade Policy Coordination, which reduces volatility across countries and promotes a more stable trade environment. Finally, the term μ_{jkt} accounts for other market-specific factors independent of trade policy.

Multilateral resistance intensifies as applied MFN tariffs increase, indicating a direct relationship between higher tariff levels and greater trade barriers. This effect is compounded by elevated trade policy uncertainty and a lack of international policy coordination. Instability in trade policy disrupts economic agents' expectations, thereby amplifying multilateral resistance. Moreover, insufficient coordination among countries exacerbates these effects, reinforcing trade frictions and diminishing the potential benefits of trade liberalization.

In the next section, based on our conceptual framework, we develop our empirical strategy to quantify the effects of the various channels through which the ITA Phase II expansion impacted importer market access.

5 Empirical Strategy

Our goal is to evaluate the impacts of non-discriminatory trade liberalization resulting from the ITA Phase II expansion and identify the driving factors. To capture these effects, we employ a two-stage estimation approach guided by the conceptual approach presented in Section 4.[7] In the first stage, we estimate the following specification:

$$x_{ijkt} = \exp(\alpha_{ikt} + \alpha_{jkt} + \alpha_{ijk} + (1-\sigma)\ln\big(1 + t^{\text{Applied}}_{ijkt}\big) + \psi \cdot I_{ijt}) \cdot \varepsilon_{ijkt}. \tag{4}$$

Equation 4 is the result of combining equations 1 and 2, and it involves expressing some of the terms using three fixed effects: importer-product-time fixed effects, exporter-product-time fixed effects, and importer-exporter-product fixed effects. To further elaborate on the equivalence of Equation 4 and the combined version of Equations 1 and 2, note that α_{jkt} absorbs the $\frac{x_{jkt}}{P_{jkt}^{1-\sigma}}$ term from Equation 1, α_{ikt} absorbs the $\frac{y_{ikt}}{\Pi_{ikt}^{1-\sigma}}$ term, and the importer-exporter-product fixed effects, α_{ijk}, absorb the $(1-\sigma)\kappa_{ijk}$ term. Estimating factors that are time invariant across country pairs within products using fixed effects consents a more accurate way to measure additional bilateral trade costs compared to traditional gravity variables like distance or language (e.g., Baldwin and Taglioni (2007); Agnosteva et al. (2019); Egger and Nigai (2015)). Additionally, the term $\frac{1}{y_{kt}}$ is captured by the importer and exporter-product-time fixed effects, which will be accounted for by the product-time fixed effect in the second stage.

We estimate Equation 4 using Poisson Pseudo Maximum Likelihood (PPML), following the method proposed by Silva and Tenreyro (2006). In the first stage of estimation, our primary focus is on determining the fixed effects associated with importer-product-time interactions, denoted as α_{jkt}. These fixed effects are essential as they capture non-discriminatory barriers, such as changes in MFN tariffs, while controlling

[7] For similar approach see Anderson and Yotov (2016), Gnutzmann-Mkrtchyan and Henn (2018), Heid et al. (2021).

for the influence of preferential tariffs.

Since fixed effects are identified only up to a constant, their levels are inherently indeterminate without additional normalization. To resolve this, we introduce an adjustment factor that anchors the fixed effects to a consistent reference point, ensuring a meaningful and interpretable solution to the system of multiplicative residuals (MRs).

Specifically, we normalize using the product with the largest estimated market access, which is laptops in the U.S., a product that has not been liberalized by the U.S. (not included in Appendix A). This reference point remains unchanged over time, providing a consistent benchmark for the estimation of the α_{jkt} terms across all periods.

Next, within the framework of ITA, we aim to identify the following channels:

$$P_{jkt} = \exp\left(\gamma_1 \ln(1 + t_{jkt}^{\text{MFN}}) + \gamma_2 |\ln(1 + \Delta t_{jkt}^{BND})| + \gamma_3 ITA_{jkt}\right) \cdot \mu_{jkt} \tag{5}$$

where t_{jkt}^{MFN} represents the MFN import tariff at time t, while t_{jkt}^{BND} refers to the MFN Bound import tariff. The variable

$$\text{ITA}_{jkt} = \mathbb{1}\{\text{if product } k \text{ is treated, country } i \text{ is an ITA member, and } t > 2015\},$$

is a dummy variable identifying the treatment of the Phase II Expansion under ITA.

The first term in Equation 5 corresponds to the first term in Equation 3 and represents the direct impact of tariff costs on market access.

The second term captures the impact of uncertainty reduction in trade policy. As tariff bounds, which are agreed upon by WTO members, are fixed and not subject to renegotiation, this variable is equal to zero for the control group. In contrast, ITA members commit to zero-bound tariffs permanently through a staged reduction in bound rates, introducing a variability starting from 2016, reflecting the linear progression toward zero-bound tariffs.

The interpretation of the third component stems from the residual impact of the ITA's direct effects through applied and bound MFN tariff reductions. This represents the additional market access benefits arising not from unilateral tariff cuts by individual countries, but from reductions applied uniformly across all member nations, which we refer to as the "plurilateral effect." Membership in a plurilateral agreement like the ITA offers substantial advantages, particularly in terms of enhanced market access and coordinated trade policies.

As discussed earlier, the "plurilateral effect" ensures that the improvements in market access, resulting from collective MFN and bound tariff reductions, are shared among all members, rather than being confined to individual initiatives. This collective approach not only amplifies the bargaining power of member countries in global trade negotiations but also fosters a more integrated and cohesive trading environment. Moreover, ITA membership facilitates the exchange of best practices and resources, further strengthening the capacity of member nations to implement and fully leverage the agreement's benefits.

Finally, as noted early α_{jkt} absorbs $\frac{x_{jkt}}{P_{jkt}^{1-\sigma}}$ in the first stage, implying that

$$\ln \alpha_{jkt} = \ln x_{jkt} - (1-\sigma)\ln P_{jkt} \tag{6}$$

$\hat{\alpha}_{jkt}$ is the estimate of $\ln \alpha_{jkt}$ from the first-stage regression. Plugging Equation 5 in Equation 6 results in the second-stage regression:

$$\hat{\alpha}_{jkt} = \delta_{jt} + \delta_{jk} + \delta_{kt} + \beta_1 \ln(1 + t_{jkt}^{\text{MFN}}) + \beta_2 |\ln(1 + \Delta t_{jkt}^{BND})| + \beta_3 \tag{7}$$

$$+ \text{ITA}_{jkt} + \delta X_{jkt} + \zeta_{jkt} \tag{8}$$

where the term X_{jkt} is the vector of controls and $\beta_j = (1-\sigma)\gamma_j$ for $j \in \{1, 2, 3\}$.

We include three set of fixed effects δ_{jt}, δ_{jk}, and δ_{kt}. The δ_{jt} fixed effects control for time-varying importer-specific variations, such as business cycles and other similar macroeconomic variables. The δ_{kt} fixed effects account for global product-specific changes over time, like shifts in demand or product life cycles. Finally, δ_{jk} fixed effects capture time-invariant characteristics unique to specific importer-product pairs, including factors like expenditure patterns and specialization.

Importantly, all of these fixed effects can be estimated: δ_{jt} because the same importer has both treated and untreated goods; δ_{kt} since the same product is imported by both ITA and non-ITA members; and δ_{jk} due to the time variation in ITA status.

The identification strategy of model 7 involves comparing market access across similar HS6 products purchased by the same importing country, under similar expenditure profiles, except for the coverage of ITA.

Our focus in this model is on the coefficients β_1, β_2, and β_3. The coefficient β_1 measures the influence of MFN tariff reductions on importers' market access. Based on the structural gravity model presented above, we expect this coefficient to be negative, as it essentially measures the import demand elasticity in relation to changes in applied MFN tariffs. It is important to note that we account for the impacts of preferential tariff reductions and PTA commitments in the first stage when deriving our dependent variable $\hat{\alpha}_{jkt}$.

Next, β_2 captures the impact of the reduction in trade policy uncertainty on the dependent variable $\hat{\alpha}_{jkt}$. By conditioning on the MFN tariff applied, the term $|\ln(1 + \Delta t_{jkt}^{BND})|$ reflects this process, with a larger change indicating a greater reduction in the tariff "water" (tariff overhang). We use log changes rather than changes in the log to avoid disproportionately weighting reductions in smaller percentage values. Without this adjustment, the same percentage point reductions would carry more weight for smaller values, thereby mechanically increasing the impact of reductions in the later stages of the liberalization scheme. As a result, β_2 measures the sensitivity of $\hat{\alpha}_{jkt}$ to these reductions, where larger changes in bound tariffs (in percentage points) signify stronger decreases in uncertainty and a corresponding positive effect on the dependent variable.

β_3 captures the supplementary advantages that go beyond simple tariff cuts and uncertainty reduction, arising from the collective market access benefits under the ITA agreement. As mentioned, this coefficient represents what we term the "plurilateral effect," which reflects the additional market access gained not from unilateral tariff reductions by individual countries, but from the coordinated and uniform reductions applied across all ITA members. As a result, we expect β_3 to be positive. The plurilateral nature of the ITA strengthens market integration, enhances bargaining power in global trade negotiations, and promotes a more cohesive trading environment. Additionally, ITA membership facilitates knowledge exchange and resource-sharing, further amplifying the benefits of coordinated policy efforts.

Finally, although we include an extensive list of fixed effects, we also control for a vector of variables to ensure cleaner estimates of our coefficients of interest.

First, Equation 6 shows that changes in our dependent variable can result from changes in importer-product expenditures over time, which are independent of the ITA Phase II expansion. To control for this possibility, we include yearly country-product exports in the regression as a proxy for expenditures.

Second, previous literature has identified additional gains beyond tariff reductions when MFN rates are completely eliminated. By including a dummy variable in the regression, which takes the value of 1 if the MFN tariff is zero, we control for these additional effects. This argument is largely based on the fact that for goods with zero MFN tariffs, customs practices result in lower customs clearance costs due to reduced inspection frequency and scrutiny, and therefore increased trade flows (See Freund and Pierola (2015), Gnutzmann-Mkrtchyan and Henn (2018)).

Having presented our empirical strategy, we now turn to the results of our analysis. In the following section, we present and discuss the findings, highlighting the effects of ITA Phase II expansion on market access and the broader implications for trade policy.

6 Results

In this section, we present the results of the estimations. Initially, we offer a preliminary analysis of market excess using a simple difference-in-differences (DiD) event study approach. Subsequently, we explore a detailed analysis of the drivers of the ITA phase II expansion.

6.1 Evolution of Market Access

As indicated in Section 4, the first-stage estimation provides us with the estimates of the importer-product-time fixed effects. The term $\hat{\alpha}_{jkt}$ is particularly relevant as it encapsulates all factors associated with multilateral liberalization. These estimates are obtained by estimating high-dimensional fixed effects through PPML, selecting one reference country-product pair; consequently, all fixed effects are estimated relative to this reference country-product pair. This implies that $\hat{\alpha}_{jkt}$ cannot be used in isolation as an estimate of Equation 6, but its variability carries economic significance.

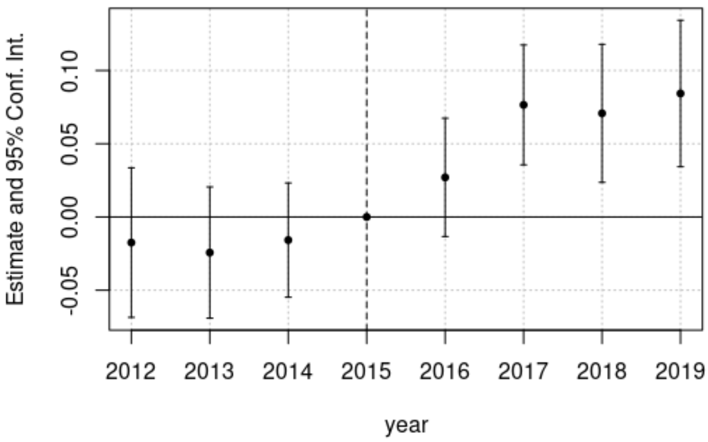
In particular, we compare the evolution of market access over time for fully liberalized versus non-treated goods. We estimate the following DiD dynamic specification:

$$\hat{\alpha}_{jkt} = \delta_{jk} + \delta_{kt} + \sum_{n}^{N} \beta_n \mathbf{1}\{event_t = n\} \times \mathbf{1}\{treat_{jk}\} + \mathbf{X}_{jpt} + \epsilon_{jkt} \tag{9}$$

where n indexes the years around the ITA Phase II expansion, with $n = -3, \ldots, 4$, covering the years from 2012 to 2019. $\mathbf{X}_{jt}$ represent all country-time variables included in framework, including GDP as a proxy of output and total export of a coutry in a specific product that controls for product-specific expenditure dynamics. The year 2015, one year before the enforcement of the Agreement, serves as the reference year against which subsequent effects are measured, i.e. $\mathbf{1}\{event_t = -1\} = 0$, as is standard in the literature (Freyaldenhoven et al., 2019). The term $\mathbf{1}\{treat_{jk}\}$ represents the treatment in this context, with "treated" products being those liberalized under the agreement, and untreated ones consisting of the control group. We cluster the standard errors at the treatment group level, i.e. the importer-treatment-year group level.

Figure 4 graphically displays the point estimates with 95% confidence intervals, quantifying uncertainty for each period before and after treatment. The point esti-

Figure 4: Market Access Evolution: Liberalized Under ITA vs. Control Goods



mates represent the average mean differences between the treated and control groups.

Prior to 2015, the overlapping confidence intervals with the zero axis support the parallel trend assumption, indicating no statistically significant mean differences in outcomes between treated and non-treated goods before the ITA Phase II expansion.

In the post-treatment years, the mean differences in outcomes are positive and statistically significant. Specifically, the average impact of the ITA ranged from a 6% to 8% increase in market access. In 2016, the treatment year, the effect is positive at approximately 3% but not statistically significant, consistent with the fact that the liberalization was only partially implemented during that year (from July).

The estimates suggest that the trade liberalization measures enacted through the ITA Phase II expansion are associated with improved market access for the liberalized products. The empirical support for the lack of pre-existing trends before the reference year further reinforces the validity of the difference-in-differences (DiD) methodology in discerning the causal impact of the treatment during the studied period. The substantial increase observed in 2016 indicates that the enforcement of the expansion itself played a significant role in enhancing import access, notwithstanding the scheduled tariff reductions over an extended period. In the subsequent section, we aim to disentangle this effect by examining the various drivers at play, namely long-term and short-term uncertainty, as well as the impact of tariff reductions themselves.

6.2 The drivers of ITA effect

Table 1 presents the regression results from estimating equation 7 in the second stage. The dependent variable, a proxy for market access, is regressed on several explanatory variables and controls to evaluate and quantify the different channels involved in the ITA liberalization process.

First, model (1) focuses solely on the evaluation of the effects of MFN tariff reduction. The coefficient on this variable is highly significant, indicating that a 10% tariff reduction increases market access (in dollars) by 3.5%. This result aligns with established economic theory regarding the inverse relationship between tariff rates and market accessibility. Lower tariffs contribute to higher market access by decreasing import costs.

To investigate the uncertainty channel, Model (2) incorporates the the (log) difference between two consecutive years in the ITA scheduled bound tariff, serving as a proxy for the reduction in trade policy uncertainty. Indeed, under the ITA Phase II expansion, signatory countries agreed to gradually reduce their bound MFN tariffs to zero over four years, with reductions occurring in four equal annual steps. This implies that larger variations represent a greater scope for reducing uncertainty. Our estimation results indicate that market participants reacted positively to these reductions in uncertainty. More specifically, a 10% bound tariff reduction increases market access (in dollars) by 1.6%.

Introducing the ITA dummy in Model (3) captures the benefits of ITA participation beyond tariff reductions, with the MFN tariff variable controlling for tariff effects and . The positive and significant coefficient on the ITA dummy suggests ITA participation enhances market access by reducing long-term trade policy uncertainty. Joining the ITA Phase II expansion represents a commitment to indefinitely zero-bound MFN tariffs, significantly decreasing the probability of policy reversal. Furthermore, the WTO dispute settlement mechanism provides an additional safeguard by ensuring tariffs cannot be reintroduced. Notably, in Model (3), the coefficient on applied MFN tariffs remains nearly constant after including the ITA dummy, suggesting that the ITA's selection of items was not influenced by pre-commitment tariff levels.

Model (4) and Model (5) adds two controls to the regression: a dummy variable for zero MFN tariffs ($\mathbf{1}\{t_{jkt}^{\text{MFN}} = 0\}$) and the logarithm of country exports at the product level ($\ln(\text{Export}_{jkt})$) as a proxy of expenditure.

The inclusion of the first control is supported by previous literature. However, it should be noted that, unlike Gnutzmann-Mkrtchyan and Henn (2018), we do not find any significant results for the zero MFN tariff dummy. There are two possible explanations for these differing findings. First, by not accounting for the value of the MFN-Bound tariff in the staging schedules, Gnutzmann-Mkrtchyan and Henn (2018) may have confounded cases of uncertainty reduction in the zero MFN dummy.

Second, with respect to the 20 years since Phase I's implementation in 1996, the role of reduced administrative costs associated with less frequent (rigorous) inspections for goods subject to zero MFN tariffs may have diminished.

The second control variable accounts for any variability related to import expenditure at the importer-product level that is not captured by the fixed effects included in the regression, thus ending up in the error term. This might be a concern if import expenditure dynamics were also related to how countries selected the list of products to be treated. As we argued previously, we do not consider this a serious concern given the inclusive nature of the negotiation process. In support of this argument, we observe that our results remain robust to the inclusion of country-product exports.

Overall, the results shows that decrease in MFN tariffs increases market access, as expected. Participation in the ITA significantly enhances market access by reducing long-term trade policy uncertainty. Additionally, including control variables in the regression does not affect the results.

Table 1: Unpacking the Different Channels in the ITA Phase II Expansion

Dependent Variable:	Market Access: $\hat{\alpha}_{jkt}$				
Model:	(1)	(2)	(3)	(4)	(5)
$\ln(1+t^{\text{MFN}}_{jkt})$	-0.3482***	-0.3463***	-0.3385***	-0.3354***	-0.3191***
	(0.0975)	(0.0975)	(0.0973)	(0.0970)	(0.1020)
$\lvert \ln(1+\Delta t^{BND}_{jkt}) \rvert$		0.1645***	0.1359***	0.1364***	0.1359**
		(0.0562)	(0.0526)	(0.0526)	(0.0530)
ITA_{jkt}			0.0194***	0.0192***	0.0190***
			(0.0073)	(0.0073)	(0.0073)
Export_{jkt} (log)				0.0103***	0.0103***
				(0.0007)	(0.0007)
$1\{\text{MFN}=0\}$					0.0041
					(0.0101)
Fixed-effects					
Importer-Time FE	Yes	Yes	Yes	Yes	Yes
Importer-Product FE	Yes	Yes	Yes	Yes	Yes
Product-Time FE	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	438,954	438,936	438,936	438,936	438,936
R^2	0.94313	0.94315	0.94315	0.94321	0.94321
Within R^2	4.47×10^{-5}	5.11×10^{-5}	6.18×10^{-5}	0.00114	0.00114

Notes: The dependent variable is the importer-product-time FE estimated from a the gravity Equation 4. The last column reports a specification estimated on a smaller number of observations, due to the inclusion of the export at the product-importer-time level as a control, which is missing if an importer does not export the good. Clustered standard errors at the treatment-importer-time level in parentheses. Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Table 2: Robustness: Exclusion of Strategic Players

Dependent Variable:		Market Access: $\hat{\alpha}_{ikt}$	
SAMPLE:	w/o US & CHINA	w/o Active Members	w/o INDIA
$\ln(1 + t_{ikt}^{\text{MFN}})$	-0.3484***	-0.3368***	-0.3303***
	(0.0986)	(0.0979)	(0.0978)
$\ln(1 + \Delta t_{ikt}^{BND})$ (abs)	0.1398***	0.1378***	0.1365***
	(0.0529)	(0.0533)	(0.0524)
ITA_{ikt}	0.0200***	0.0243***	0.0203***
	(0.0074)	(0.0075)	(0.0074)
Fixed-effects			
it	Yes	Yes	Yes
ik	Yes	Yes	Yes
kt	Yes	Yes	Yes
Fit statistics			
Observations	433,835	422,252	435,135
R^2	0.94101	0.93801	0.94256
Within R^2	6.46×10^{-5}	6.75×10^{-5}	6.08×10^{-5}

Notes: The dependent variable is the importer-product-time FE estimated from a the gravity Equation 4. Clustered standard errors at the treatment-importer-time level in parentheses. Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

6.3 Robustness Checks

We conduct several robustness checks to enhance the validity of our results. Firstly, we replicate the findings presented in Table 1 while excluding from our sample those players whose trade policy strategy might bias the coefficient on ITA participation. As noted in Section 2, the negotiation process was relatively inclusive, with the final list of ITA products being identified from the set of items with broad consensus. However, as discussed, there were some major players that were particularly eager to push further the ITA agenda, which we identify as the countries that signed the "Concept Paper for Expanding the ITA" in 2012: Canada, Japan, South Korea, Singapore, Chinese Taipei, and the United States. Conversely, India, another major player in the IT industry, decided not to participate in the expansion, despite being a signatory of Phase I.

Tables 2 indicate that our results remain stable across different sample restrictions: when eliminating the US and China, and then further all the 2012 signatories, from the ITA participants; as well as when eliminating India from the control group. The coefficients of interest remain significant and stable across the three estimations. Furthermore, we conducted estimations of all regression equations under different standard error clustering, to account for possible serial correlation in market access. Despite this variation, the results remained consistent and unchanged.

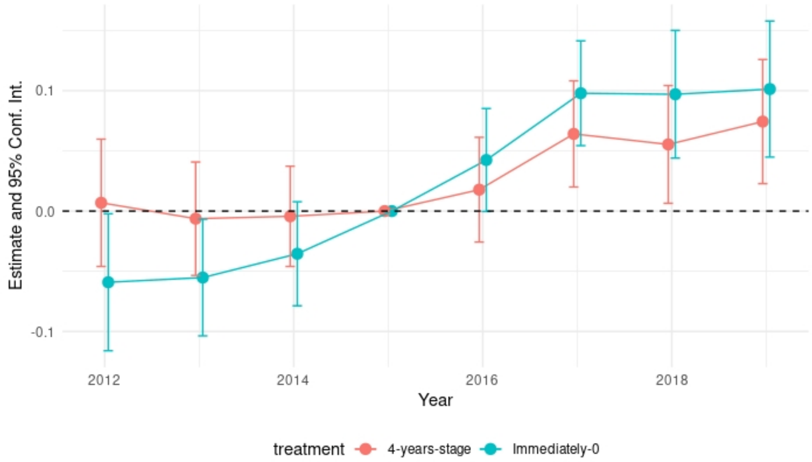


Figure 5: Market Access by Treatment type, 4-years-stage vs Immediately Zero

The robustness checks indicate that our results remain stable across different assumptions and definitions. Specifically, multilateral liberalization under the ITA had a positive effect on market access for participating countries. Beyond the direct impact of tariff reductions, ITA membership generated additional positive effects.

Second, we analyzed market access dynamics by distinguishing between two types of tariff treatment: products subject to a linear 4-year phased MFN Bound tariff reduction and those immediately zeroed in the first year of ITA implementation. Immediate tariff elimination could introduce endogeneity by correlating the size of tariff reductions with product selection based on market access dynamics. Figure 5 demonstrates that the two product groups followed similar trajectories overall. However, products that underwent immediate liberalization tend to have significantly lower initial market access compared to untreated goods. This suggests that countries prioritized rapid liberalization in sectors with less competition, resulting in a more pronounced ITA effect for these products.

7 The force of Many

We investigate whether the "plurilateral effect," identified as a key contributor to the liberalization impact under the ITA, is indeed driven by the collective efforts of multiple countries involved in the liberalization process. The plurilateral effect, as theorized, suggests that the market access gains under a plurilateral agreement are not merely a result of tariff reductions or bound tariff eliminations but are amplified by the synchronized actions of multiple countries liberalizing the same set of products. To rigorously test this hypothesis, we exploit the variation in the number of countries that liberalized products listed in Attachment B of the ITA agreement. This subset of products presents a unique opportunity to isolate and measure the extent to which the plurilateral effect is dependent on the number of participating countries.

Our analysis is presented in Table 3. In Model (1), we begin by assessing whether there is any significant difference in market access outcomes for products in Attachment B compared to those in Attachment A. Attachment A lists the core set of products agreed upon during the ITA negotiations, while Attachment B includes additional products that some countries chose to liberalize. By comparing these two groups, we aim to test for potential selection bias in the types of products included in Attachment B and to verify whether the market access improvements can be attributed to the plurilateral effect rather than inherent differences in the products themselves. The results of Model (1) reveal that there are no structural differences between goods liberalized under Attachment A and Attachment B, indicating that both sets of products are treated similarly in terms of market access. This suggests that the choice of products for liberalization in Attachment B was not driven by selection bias, allowing us to focus on the role of collective liberalization efforts.

In Model (2), we introduce an interaction term between the plurilateral effect and the number of liberalizing countries. This allows us to test whether the market access gains associated with the plurilateral effect are influenced by the number of countries committing to liberalization. The results of Model (2) demonstrate a positive and significant relationship between the number of participating countries and the magnitude of the plurilateral effect. Specifically, the more countries that liberalized a given product under the ITA, the greater the observed market access improvements. This finding suggests that the plurilateral effect is not simply a byproduct of individual country actions but is indeed driven by the collective efforts of multiple countries working in concert to reduce trade barriers. The interaction between the plurilateral effect and the number of liberalizing countries confirms that market access gains are amplified when a critical mass of countries participates in the liberalization process.

These findings provide strong empirical evidence supporting the theoretical foundations of plurilateral trade agreements, particularly the importance of achieving a "critical mass" of participating countries to maximize the benefits of liberalization. The results highlight that the impact of the ITA on market access is not solely due to individual country commitments but is significantly enhanced by the coordinated efforts of multiple nations. This underscores the value of plurilateral agreements in global trade liberalization, as they offer a framework in which collective action can generate greater market access benefits than isolated, unilateral efforts.

Table 3: Channels: The role of the "critical mass"

Dependent Variable:	fe_ikt	
Model:	(1)	(2)
Variables		
$\ln(1+t_{ikt}^{\text{MFN}})$	-0.3385***	-0.3388***
	(0.0974)	(0.0974)
$\lvert\Delta \ln(1+t_{ikt}^{BND})\rvert$	0.1359**	0.1381**
	(0.0528)	(0.0539)
ITA_{ikt}	0.0195**	-0.0671
	(0.0083)	(0.0417)
$\text{ITA}_{ikt} \times 1\{\text{Attachment B}\}$	-4.11×10^{-5}	0.0138
	(0.0110)	(0.0136)
$\text{ITA}_{ikt} \times \ln(1\text{+N\_lib\_countries})$		0.0219**
		(0.0102)
Fixed-effects		
it	Yes	Yes
ik	Yes	Yes
kt	Yes	Yes
Fit statistics		
Observations	438,936	438,936
R^2	0.94315	0.94315
Within R^2	6.18×10^{-5}	6.76×10^{-5}

Notes: The dependent variable is the importer-product-time FE estimated from a the gravity Equation 4. Clustered standard errors at the treatment-importer-time level in parentheses. Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

8 Conclusion

This paper analyzed the impact of the Phase II expansion of the Information Technology Agreement on global trade, focusing on tariff reductions, the phasing out of bound tariffs, and the "plurilateral effect" of coordinated liberalization. By treating the ITA Phase II as a quasi-experiment, we isolated the effects of collaborative non-discriminatory trade policy changes on market access for high-tech products.

Our findings indicate that the ITA Phase II expansion significantly improved market access for liberalized products, increasing by 4% to 6% compared to control products after implementation. This improvement is attributed to several factors: a 3.5% increase due to a 10% reduction in Most Favored Nation (MFN) tariffs, a 1.6% increase from a 10% reduction in bound tariffs—which reduced trade policy uncertainty—and additional gains from the plurilateral effect of coordinated liberalization.

The plurilateral effect emerged as a significant amplifier of market access gains, with more participating countries leading to greater improvements. This underscores the importance of achieving a critical mass in plurilateral agreements to maximize trade benefits. By comparing products in different attachments of the ITA, we confirmed that these gains are a direct result of collective liberalization efforts rather than inherent product differences.

Our study contributes to trade literature by quantifying the effects of non-discriminatory trade policy changes, highlighting the impact of WTO membership and reduced trade policy uncertainty, and extending research on the ITA by analyzing the Phase II expansion. The policy implications suggest that plurilateral agreements like the ITA are effective tools for trade liberalization.

Future research could explore the long-term effects of the ITA Phase II on innovation and economic development, the applicability of plurilateral agreements in other sectors, and the role of non-tariff barriers alongside tariff reductions.

In conclusion, the ITA Phase II expansion demonstrates how targeted, non-discriminatory trade liberalization can significantly enhance global market access. Our findings highlight the value of plurilateral agreements as a pragmatic approach to advancing trade liberalization among increasingly complex trade institutions.

References

Agnosteva, D. E., J. E. Anderson, and Y. V. Yotov (2019): "Intra-national trade costs: Assaying regional frictions," *European Economic Review*, 112, 32–50.

Anderson, J. E. and E. Van Wincoop (2003): "Gravity with gravitas: A solution to the border puzzle," *American economic review*, 93, 170–192.

Anderson, J. E. and Y. V. Yotov (2016): "Terms of trade and global efficiency effects of free trade agreements, 1990–2002," *Journal of International Economics*, 99, 279–298.

Bagwell, K., C. P. Bown, and R. W. Staiger (2016): "Is the WTO passé?" *Journal of economic literature*, 54, 1125–1231.

Baldwin, R. and D. Taglioni (2007): "Trade Effects of the Euro: a Comparison of Estimators," *Journal of Economic Integration*, 22, 780–818.

Caliendo, L., R. C. Feenstra, J. Romalis, and A. M. Taylor (2015): "Tariff Reductions, Entry, and Welfare: Theory and Evidence for the Last Two Decades," Working Paper 21768, National Bureau of Economic Research.

Conte, M., P. Cotterlaz, T. Mayer, et al. (2022): *The CEPII gravity database*, CEPII.

Egger, P. H. and S. Nigai (2015): "Structural gravity with dummies only: Constrained ANOVA-type estimation of gravity models," *Journal of International Economics*, 97, 86–99.

Eicher, T. S. and C. Henn (2011): "In search of WTO trade effects: Preferential trade agreements promote trade strongly, but unevenly," *Journal of International Economics*, 83, 137–153.

Ezell, S. and T. Long (2023): "How Expanding the Information Technology Agreement to an "ITA-3" Would Bolster Nations' Economic Growth," Tech. rep., Information Technology and Innovation Foundation.

Freund, C. and M. D. Pierola (2015): "Export Superstars," *The Review of Economics and Statistics*, 97, 1023–1032.

Freyaldenhoven, S., C. Hansen, and J. M. Shapiro (2019): "Pre-event trends in the panel event-study design," *American Economic Review*, 109, 3307–3338.

Gnutzmann-Mkrtchyan, A. and C. Henn (2018): "Peeling away the layers: Impacts of durable tariff elimination," *Journal of International Economics*, 115, 259–276.

Handley, K. and N. Limao (2015): "Trade and investment under policy uncertainty: theory and firm evidence," *American Economic Journal: Economic Policy*, 7, 189–222.

Handley, K. and N. Limão (2017): "Policy uncertainty, trade, and welfare: Theory and evidence for China and the United States," *American Economic Review*, 107, 2731–2783.

Handley, K. and N. Limão (2022): "Trade Policy Uncertainty," *Annual Review of Economics*, 14, 363–395.

Heid, B., M. Larch, and Y. V. Yotov (2021): "Estimating the effects of non-discriminatory trade policies within structural gravity models," *Canadian Journal of Economics/Revue canadienne d'économique*, 54, 376–409.

Larch, M., J.-A. Monteiro, R. Piermartini, and Y. V. Yotov (2019): "On the Effects of GATT/WTO Membership on Trade: They Are Positive and Large After All," Working Paper.

Mann, C. and X. Liu (2009): "The information technology agreement: sui generis or model stepping stone," *Multilateralizing regionalism: Challenges for the global trading system*, 182–216.

Rose, A. K. (2004): "Do We Really Know That the WTO Increases Trade?" *American Economic Review*, 94, 98–114.

Silva, J. M. C. S. and S. Tenreyro (2006): "The Log of Gravity," *The Review of Economics and Statistics*, 88, 641–658.

Subramanian, A. and S.-J. Wei (2007): "The WTO promotes trade, strongly but unevenly," *Journal of International Economics*, 72, 151–175.