

Gnangnon, Sèna Kimm

**Preprint**

## Effect of Aid for Trade flows on the Accession to the World Trade Organization

*Suggested Citation:* Gnangnon, Sèna Kimm (2022) : Effect of Aid for Trade flows on the Accession to the World Trade Organization, ZBW – Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/261331>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# Effect of Aid for Trade flows on the Accession to the World Trade Organization

**Author:** Sèna Kimm GNANGNON<sup>1</sup>

**Manuscript date:** July 2022

## **Abstract**

Existing studies on the determinants of countries' accession to the World Trade Organization (WTO) have neglected the role that Aid for Trade (AfT) flows might have played in states' accession process to the WTO. The present study aims to fill this void in the literature by investigating the effect of AfT flows on the probability of acceding to the WTO. The analysis has used 29 countries (the so-called Article XII Members), with data spanning the period 2002-2019. We postulate that by promoting countries' participation in international trade and hence increasing the contribution of international trade to economic growth and development prospects, AfT flows would increase applicants' probability of joining the WTO. The empirical analysis has provided supported for this hypothesis and shown a positive effect of AfT flows on applicants' probability of joining the WTO. This finding applies to total AfT flows as well as to the three components of the latter, namely AfT interventions for economic infrastructure, AfT interventions for productive capacities, and AfT interventions related to trade policy and regulation.

**Keywords:** Aid for Trade; Article XII Members; Accession to the WTO.

**JEL Classification:** F13; F14.

## ***DISCLAIMER***

This is a working paper, which represents the personal opinions of individual staff members and is not meant to represent the position or opinions of the WTO or its Members, nor the official position of any staff members. Any errors or omissions are the fault of the author. The author declares no competing interests.

---

<sup>1</sup> World Trade Organization (WTO). E-mail for correspondence: [kgnangnon@yahoo.fr](mailto:kgnangnon@yahoo.fr)

## 1. Introduction

Do Aid for Trade (AfT) flows facilitate the accession of beneficiary states to the World Trade Organization (WTO)? The present study addresses this question, which has received little attention in the relevant literature. In fact, the role of development aid and, let alone that of AfT flows as an enabler of states' accession to the WTO has not been investigated in the literature. The existing studies have explored the effect of political and institutional factors (such as the political regime) and macroeconomic factors (such as the market size and wealth, and the trade dependence level) on the duration of the accession process to the WTO (e.g., Copelovitch and Ohls, 2012; Davis and Wilf, 2017; Jones, 2009; Jones and Gai, 2013; Moser and Rose, 2012; Wong and Yu, 2015) or the probability of acceding to the WTO (e.g., Tang and Wei, 2009).

The benefits of membership in the World Trade Organization (WTO) have been largely highlighted in the literature<sup>2</sup>. Braga and Cattaneo (2009) have pointed out that among the multiple benefits of the accession to the WTO are the fall in trade costs negotiations, the participation in rule-making concerning international trade policies, the access to an impartial and binding dispute settlement mechanism, the improvement of business climate for domestic producers and foreign investors, and the anchor for domestic regulatory and administrative reforms.

As a matter of fact, multilateral trade agreements have the effects of locking-in country members' trade policy (by limiting the possibility of raising arbitrarily trade barriers) through their commitments to reducing and binding tariff rates on products, and to limiting the recourse to non-tariff barriers to regulate trade. These contribute to ensuring the stability and predictability of the trading system (e.g., Chowdhury et al., 2021; Jakubik and Piermartini, 2019; Koopman et al., 2020; Maggi, 1999; Mansfield and Reinhart, 2008). In addition, the WTO dispute settlement mechanism contributes to preserving the security and predictability of the multilateral trading system by ensuring a fair competition in the market, and allowing aggrieved parties to protect their rights to foreign markets access, and secure their negotiated gains from trade liberalization (e.g., Balding, 2010; Jones, 2009; Shin and Ahn, 2019).

The literature has demonstrated that the membership in the WTO contributes to improving member states' domestic economic policies and governance (e.g., Aaronson and Abouharb, 2014; Basu, 2008; Drabek and Bacchetta, 2004) and encourages the establishment or improvement of trade-related institutions (e.g., Basu, 2008; Basu et al., 2008; Brotto et al., 2021). It also helps stabilize trading partners' expectations, and lower trade volatilities (e.g., Chowdhury et al., 2021; Maggi, 1999; Mansfield and Reinhardt, 2008) including by preventing trade wars (e.g., Bekkers and

---

<sup>2</sup> See for example the literature survey provided by Anderson (2016) and Koopman et al. (2020) on the matter.

Schroeter, 2020; Hoekman, 2020) and reducing the volatility of prices for both import and export countries (e.g., Cao and Flach, 2015). It significantly enhances countries' participation in international trade (e.g., Chang and Lee, 2011; Chemutai and Escaith, 2017; Dutt, 2020; Dutt et al., 2013; Eicher and Henn, 2011; Felbermayr and Kohler, 2010; Herz and Wagner, 2011; Kohl and Trojanowska, 2015; Larch et al. 2019; Subramanian and Wei, 2007; Tomz et al. 2007). The WTO also contributes to fostering economic growth and welfare in its member states and in the global economy (e.g., Brotto et al., 2021; Cling et al., 2009; Fan et al., 2021; Koopman et al., 2020; Tang and Wei, 2009) and reducing unemployment (Onwachukwu and Okagbue, 2019). It helps mobilize greater domestic public revenue (e.g., Drabek and Bacchetta, 2004), notably by enhancing the mobilization of consumption tax revenue which more than compensate for the public revenue losses due to trade liberalization (Buettnner and Madzharova, 2018).

WTO Members support the accession of developing countries to the WTO through the provision of AfT flows to applicant states, i.e., states that apply for the accession to the WTO. In essence, AfT flows are financial resources (that are part of the so-called official development assistance) secured to assist developing countries and least developed countries among them in their effort to better integrate into the global trading system<sup>3</sup>.

On the one hand, numerous studies have demonstrated that by reducing trade costs (e.g., Busse et al., 2012; OECD/WTO, 2015; Cali and te Velde, 2011; Maruta, 2019; Tadesse et al., 2019, 2021; Vijil and Wagner, 2012) and strengthening productive capacities in recipient countries, AfT flows have enhanced recipient countries' participation in international trade<sup>4</sup>. AfT flows have exerted a positive effect on exports (e.g., Cali and te Velde, 2011; Hoekman and Shingal, 2020; OECD/WTO, 2015; Vijil and Wagner, 2012; Wang and Xu, 2018) and imports (e.g., Hühne et al., 2014). Some works have also shown that AfT interventions have helped beneficiary countries promote trade policy liberalization (e.g., Gnanngnon, 2018), foster export product diversification (e.g., Gnanngnon, 2019a,b; Kim, 2019), encourage import product diversification (e.g., Gnanngnon, 2021a; Ly-My et al., 2021) and services export diversification (e.g., Gnanngnon, 2021b), and promote economic growth (Naito, 2016).

On the other hand, virtually all studies on the determinants of accession to the WTO have underlined that countries' level of dependence on international trade plays is critical for their motivation to seek for WTO membership (e.g., Copelovitch and Ohls, 2012; Davis and Wilf, 2017;

---

<sup>3</sup> The AfT Initiative was launched by WTO Members at the 2005 Hong Kong Ministerial Conference to "help developing countries, particularly LDCs build the supply-side capacity and trade-related infrastructure that they need to assist them to implement and benefit from WTO Agreements and more broadly to expand their trade" (WTO, 2005: paragraph 57).

<sup>4</sup> See Benziane et al. (2022) for a literature survey on the effects of AfT on recipient countries' economies.

Jones, 2009; Moser and Rose, 2012; Tang and Wei, 2009; Wong and Yu, 2015). For example, Mansfield et al. (2002) have postulated that states with a high degree of trade openness would be eager to accede to the GATT/WTO with a view to expanding their access to foreign markets and further improving their participation in international trade. Nevertheless, as these countries will have to negotiate agreements on a larger variety of commodities and services with existing WTO Members, they may experience a long duration of accession to the GATT/WTO. In the same vein, Copelovitch and Ohls (2012) have obtained empirically that countries with a high trade dependence are more likely than less trade dependent countries to seek earlier GATT/WTO membership. Davis and Wilf (2017) have put forth that countries with low levels of trade dependency may also be motivated to seek early GATT/WTO membership with a view to improving their participation in international trade, and hence, their trade shares.

Against this backdrop, we postulate the following hypothesis.

**Hypothesis 1:** In light of the above-mentioned benefits of the membership in the WTO, and given the potential of AfT to enhance countries' participation in international trade, as well as the benefits of the latter in terms of economic growth and development, states (not yet members of the Organization) that receive higher AfT flows would be motivated to seek early accession to the WTO. This assumption applies to both less trade dependent states and high trade dependent states because for both categories of states, high AfT flows would likely boost their trade flows (exports and imports), enhance their economic growth and development prospects (e.g., Atkin and Donaldson, 2022; Naito, 2016; Singh, 2010). As a consequence, they would be incentivized to seek for early WTO membership, with a view to further enhancing their participation in international trade.

Since 1995, the process of accession to the WTO has been governed by Article XII of the Marrakesh Agreement establishing the WTO. Article XII<sup>5</sup> concerns the accession of states or customs territory to the WTO, and provides that "*Any State or separate customs territory possessing full autonomy in the conduct of its external commercial relations and of the other matters provided for in this Agreement and the Multilateral Trade Agreements may accede to this Agreement, on terms to be agreed between it and the WTO. Such accession shall apply to this Agreement and the Multilateral Trade Agreements annexed thereto*" (see Article XII.1). The process of accession to the WTO<sup>6</sup> follows an uneven road of laborious negotiations (e.g., Lanoszka, 2001: p590). Compared with the requirements for joining the General Agreement on Tariffs and Trade (GATT), the procedures for acceding to the WTO are more

---

<sup>5</sup> Further information on Article XII is available online at: [https://www.wto.org/english/docs\\_e/legal\\_e/04-wto.pdf](https://www.wto.org/english/docs_e/legal_e/04-wto.pdf) and [https://www.wto.org/english/thewto\\_e/acc\\_e/acces\\_e.htm](https://www.wto.org/english/thewto_e/acc_e/acces_e.htm)

<sup>6</sup> See for example Kavass (2007) for a discussion on the procedure, requirements and costs of accession to the WTO.

rigorous and involve significant domestic reforms, largely due to the increased scope and coverage of the WTO agreements (e.g., Brotto et al., 2021; Drabek and Bacchetta, 2004; Michalopoulos, 1998). Members that joined the WTO after its inception in 1995 (i.e., those that underwent the WTO accession through Article XII of the Marrakesh Agreement establishing the WTO) are referred to as Article XII Members of the WTO. Since 1995, 36 countries joined the WTO<sup>7</sup>. As of May 2022, there were 164 Members and 25 Observers of the WTO<sup>8</sup>.

The empirical analysis covers 29 Article XII Members over the period from 2002 to 2019. Using primarily the random-effects panel logit model and the Amemiya's (1978) generalized least squares (AGLS) technique, the analysis has shown that total AfT flows have increased the probability of applicants to join the WTO. This reflects positive and significant effects of all three major components of total AfT flows, namely AfT flows for the build-up of economic infrastructure, AfT flows for productive capacities, and AfT flows related to trade policy and regulation.

The remaining part of the paper contains five sections. Section 2 presents the model and the econometric estimator used to test empirically hypothesis 1. Section 3 interprets empirical results, and Sections 4 and 5 deepen the analysis. Section 6 concludes.

## 2. Empirical analysis

To investigate empirically the effect of AfT flows on the probability of applicants' accession to the WTO, we draw from previous studies on the macroeconomic and political determinants of accession to the WTO, including those factors that affect the duration of accession to the WTO (e.g., Copelovitch and Ohls, 2012; Davis and Wilf, 2017; Jones, 2009; Jones and Gai, 2013; Moser and Rose, 2012; Wong and Yu, 2015), in particular the factors underpinning the probability of acceding to the WTO (e.g., Tang and Wei, 2009).

We postulate a model specification where the dependent variable is a dummy variable that captures the year of accession to the WTO. The main regressor of interest is the AfT indicator. We follow the definition by the Organization of Economic Cooperation and Development (OECD) (see OECD/WTO, 2011) that has provided for the items of total official development assistance that could be included in the category of AfT. Total AfT flows include AfT flows

---

<sup>7</sup> The current status of WTO accessions could be found online at: [https://www.wto.org/english/thewto\\_e/acc\\_e/acc\\_status\\_e.htm](https://www.wto.org/english/thewto_e/acc_e/acc_status_e.htm); This list of states that have acceded to the WTO since 1995, and other documents related to the accession process are available online at: [https://www.wto.org/english/thewto\\_e/acc\\_e/completeacc\\_e.htm](https://www.wto.org/english/thewto_e/acc_e/completeacc_e.htm)

<sup>8</sup> The relevant information is accessible online at: [https://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/org6\\_e.htm](https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm); [https://www.wto.org/english/thewto\\_e/acc\\_e/acc\\_e.htm](https://www.wto.org/english/thewto_e/acc_e/acc_e.htm)

allocated for the build-up of economic infrastructure, AfT flows for strengthening productive capacities, and AfT flows related to trade policy and regulation (Appendix 2 provides more details on the sectoral coverage of each AfT item). It ensues that in the analysis, we will consider not only total AfT flows (as the main regressor) but also its three major components. This will help uncover not only the effect of total AfT flows on the probability of acceding to the WTO, but also how each of its components, introduced once in the model, affects this probability.

Control variables are derived from the above-mentioned literature and include applicants' market (economic) size and wealth (e.g., Copelovitch and Ohls, 2012; Davis and Wilf, 2017; Jones, 2009; Moser and Rose, 2012; Wong and Yu, 2015), their economic growth (e.g., Wong and Yu, 2015) and their institutional and governance quality (e.g., Feng, 2003; Jones and Gai, 2013; Mansfield et al., 2002).

The international trade literature has established that countries' market size and wealth are critical determinants of their participation in international trade. Applicants with larger market size are likely to be strong demanders for foreign goods, and would be welcomed as new WTO Members by existing WTO members given the potential of the newcomers to foster global trade (e.g., Wong and Yu, 2015). Copelovitch and Ohls (2012: p95) have argued that relatively developed applicants could join sooner the WTO because of their likely greater bureaucratic capacity to implement WTO requirements and navigate the regime's dispute settlement process, or because they can gain more from future trade liberalization and a seat at the institutional table. In this scenario, we can expect that the probability of joining the WTO would be higher for wealthier applicants (measured by their high real GDP per capita) than for relatively less developed applicants. However, if developed states realize that they have gained more in terms of economic growth and development when remaining outside the multilateral trading system, they may be less incentivized to join sooner the WTO, and delay their accession to the organization compared to relatively less developed members. In this case, less developed countries would experience a higher probability of joining the WTO than relatively wealthier applicants.

As for the effect of economic growth on the accession to the WTO, applicants that experience low economic growth rate performance may be strongly incentivized to apply for WTO membership, in view of the potential of the participation in international trade to promote economic growth and development (e.g., Singh, 2010). According to Mattli (1999), countries are more likely to form and expand their international cooperative agreements when economies are in the downturns in the business cycles. As a result, we can expect that lower economic growth rates would be associated with a higher probability of applicants to join the WTO. Meanwhile, it is also possible that countries that enjoy a high economic growth performance would be very welcomed

by existing WTO Members (e.g., Wong and Yu, 2015) as their high economic growth performance could translate into a higher demand for foreign products. As a result, one may expect that an improvement in economic growth performance would increase the applicant's probability of joining the WTO.

Regarding the effect of the institutional and governance quality on the probability of accession to the WTO, the literature has put forth that democratic regimes are more inclined to quickly join the GATT/WTO. This is because democratic states can use the accession to the WTO as an instrument to avoid the distrust of their voters (Mansfield et al., 2002). In addition, it is easier for countries with democratic regimes to join the WTO because their relatively fair, free and competitive domestic market will be well accepted by existing GATT/WTO Members (e.g., Wong and Yu, 2015). On the other hand, the existence of strong interest groups in both democratic and non-democratic regimes can prevent or delay the accession to the WTO (e.g., Feng, 2003). Many studies have provided empirical evidence that democracy encourages states to join the WTO (e.g., Copelovitch and Ohls, 2012; Davis and Wilf, 2017; Wong and Yu, 2015). Jones and Gai (2013) have shown that government effectiveness<sup>9</sup> plays a strong positive role in the duration of countries' accession process to the WTO (i.e., it reduces such a duration). However, one can envisage that countries with weak institutions and governance may be willing to join the WTO so as to strengthen the quality of their institutions and governance insofar as joining the WTO can foster incumbents' quality of economic policies, allow establishing new trade-related institutions or improving existing ones (e.g., Aaronson and Abouharb, 2014; Basu, 2008; Basu et al., 2008; Brotto et al., 2021). Overall, it is difficult to anticipate the direction of the effect of the institutional and governance quality on the probability of accession to the WTO. Therefore, the direction of the effect of the institutional and governance quality on the probability of accession to the WTO is to be determined empirically.

The model specification estimated takes the following form:

$$WTO_{it} = \beta_0 + \beta_1 \text{Log}(AfT)_{it-1} + \beta_2 \text{Log}(GDPC)_{it-1} + \beta_3 \text{Log}(GDP)_{it-1} + \beta_4 \text{GROWTH}_{it-1} + \beta_5 \text{INST}_{it-1} + \mu_i + \sigma_{it} \quad (1)$$

---

<sup>9</sup> The indicator of government effectiveness that is one of the governance indicators developed by the World Bank (Kaufman et al., 2010). It reflects the perceptions of the quality of public services, the quality of the civil service and the degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.



$i$  and  $t$  stand for the subscripts related respectively to a country and a year. The panel dataset used is unbalanced and contains 29 Article XII WTO Members, with data spanning the period from 2002 to 2019. Appendix 1 provides the list of these 29 countries. The panel dataset has been constructed using the data available. The coefficients  $\beta_0$  to  $\beta_5$  are to be estimated.  $\mu_i$  represent time invariant unobserved specific characteristics of each country in the panel dataset.  $\sigma_{it}$  is an error-term.

The dependent variable "WTO" is a dummy variable that takes the value of 1 from the first year a country acceded to the WTO until 2019 (the last year of the panel dataset), and 0, otherwise. Especially, for states that joined the WTO before or in 2002, the dummy "WTO" takes the value of 1 for all years from 2002 to 2019.

The variable "AfT" is the indicator of AfT flows and represents the real gross AfT disbursement amount (expressed in constant 2019 prices, US Dollar) that accrues to a country in a specific year. As indicated above, it can be total AfT flows ("AfTTOT") or one of its three main categories, namely AfT flows for economic infrastructure ("AfTINFRA"), AfT flows for productive capacities ("AfTPROD") and AfT flows allocated for trade policy and regulation ("AfTPOL").

The variables "GDPC" and "GDP" are respectively the real per capita income (constant 2010 US\$) (a proxy for countries' wealth) and the real GDP (constant 2010 US\$) (a proxy for countries' market size). The variables "AfT", "GDPC" and "GDP" have been transformed using the natural logarithm, as they have high skewed distributions.

The variables "GROWTH" and "INST" stand respectively for the annual economic growth rate (constant 2010 US\$) and the indicator of the institutional and governance quality.

All regressors in model (1) have been considered with a one-year lag in order to mitigate the possible endogeneity problem that could arise from the bi-directional causality between the dependent variable and each of these regressors.

Appendix 2 provides a detailed description of the variables used in the analysis. Appendix 3a reports the standard descriptive statistics (minimum, maximum, standard deviation and mean) on variables used in the analysis, and Appendix 3b displays the pairwise correlation among these variables.

Before discussing the econometric approach adopted to estimate model (1), we find useful to present the development pattern of AfT indicators over the full sample. Figure 1 shows the evolution of the four AfT indicators over the full sample. Figure 2 depicts how the share of each AfT component in total AfT flows evolves over time. Figure 1 shows that over the full sample, total AfT flows increased from US\$ 89.9 million in 2002 to US\$ 281.39 million in 2012, and then

steadily declined to reach US\$ 243.18 million in 2019. AfT flows for economic infrastructure exhibited a similar pattern, but remained always higher than AfT flows for productive capacities. AfT flows for economic infrastructure amounted to US\$ 154.45 million in 2019 against US\$ 54.23 million in 2002. AfT flows for productive capacities increased from US\$ 39.15 million in 2002 to US\$ 106.10 million in 2011, and steadily fell to US\$ 85.22 million in 2019. AfT flows related to trade policy and regulation are far lower than the two other categories of total AfT flows, and significantly fluctuated over the period under analysis (in contrast with the two other categories of total AfT flows). AfT flows related to trade policy and regulation increased from US\$ 1.345 million in 2002 to US\$ 8.56 million in 2012, and then exhibited a downward trend to reach US\$ 3.67 million in 2019.

*[Insert Figure 1, here]*

*[Insert Figure 2, here]*

We observe in Figure 2 that before 2008 (i.e., from 2002 to 2008), the share of AfT flows for productive capacities in total AfT flows was higher than the share of AfT flows for economic infrastructure in total AfT flows. However, since 2008, the pattern reversed, and the two shares moved in opposite directions. In particular, the share of AfT flows for economic infrastructure in total AfT flows exhibited an upward trend from 2008 to 2018, while the share of AfT flows for productive capacities in total AfT flows shown a downward trend over the same period. In 2002, AfT flows for productive capacities represented 58.26% of total AfT flows (against 44.28% for the share of AfT flows for economic infrastructure in total AfT flows), while in 2019, it represented 41.23%, against 57.42% for the share of AfT flows for productive capacities in total AfT flows. Again, here we observe significant fluctuations of the share of AfT flows for trade policy and regulation in total AfT flows, which reached its peak (4.29% of total AfT flows) in 2012, but from then declined to 1.41% in 2019.

Model (1) can be estimated using the random-effects logit estimator or the fixed-effects logit estimator. Yet, the fixed-effects logit model could be estimated using the conditional maximum likelihood where the unobserved time-invariant countries' fixed effects are conditioned out of the likelihood function (Chamberlain, 1980, 1984). However, this approach has the drawback of dropping (in the panel dataset) all countries for which there is no variation in the dependent variable. In our case, the fixed effects logit model would lead to the drop of 13 countries from the full sample, thereby significantly reducing the number of observations in the regressions. As a result, the standard errors from the estimations would likely be larger, given that we are working with a panel dataset of a relatively short time span (i.e., 17 years). Moreover, it is difficult to estimate partial effects on the response probabilities. Against this background, our primary estimator is the

random-effects logit estimator. However, we also present outcomes based on the fixed-effects logit model for the sake of comparison.

The outcomes of the estimation of model (1) using the random-effects logit estimator are reported in Table 1, and the estimates obtained from estimating the fixed-effects logit model are displayed in Table 2.

### 3. Interpretation of empirical estimates

Before interpreting the estimates reported in Tables 1 and 2, we find useful to recall the basics for the interpretation of outcomes generated by a logistic regression. Assuming that we have the following equation:  $\text{logit}(P) = a + bX$  (2).

The variable "P" is a dummy variable indicating the probability of "success" (which, in the present analysis, is the probability of joining the WTO) or the probability of a presence of a given outcome. The variable X is the predictor of "P", and  $b$  is the related coefficient that will be estimated. The expression " $\text{logit}(P)$ " is nothing else than a shortcut for  $\log(P/1-P)$ , where " $\log$ " is the natural logarithm, and "P" is, as defined above, the probability of "success". In our case,  $P = \text{Probability}\{WTO = 1\}$ , i.e., the probability for a given applicant country that wishes to join the WTO to successfully join the Institution.

The fact that  $\text{logit}(P)$  is equal to  $\log(P/1-P)$  means that  $\text{logit}(P) = \log(P\{WTO=1\}/P\{WTO=0\})$ , as  $P\{WTO=0\} = 1 - P\{WTO=1\}$ . The expression  $\log(P\{WTO=1\}/P\{WTO=0\})$  is termed the "log-odds ratio". In other words, the odd-ratio denoted "ODD" is the ratio of P to (1 - P), i.e.,  $ODD = P/1-P$ . It indicates the ratio of the probability of a positive outcome (i.e., the probability of "success" or joining the WTO) to the probability of a negative outcome (i.e., the probability of "failure" or not joining the WTO). A simple interpretation of the estimated coefficient of equation (2) is that a 1 unit increase in X will lead to an increase in the log-odds ratio of success to failure by the coefficient  $b$ .

Let us now interpret the estimate associated with the variable "GROWTH" in column [1] of Table 1. We have not started with the regressors in model (1) that are expressed in terms of natural logarithm (such as AfT variables) because the application of the natural logarithm to these variables slightly changes the way of interpreting their coefficients.

In our sample, the unconditional probability of joining the WTO by all applicants is 0.724. This is obtained as the share of the number of observations for which the dummy "WTO" takes the value of 1 (which is 378) to the number of total observations in the full sample (i.e., 522). This implies that the Odds (WTO) is 0.724.

***[Insert Table 1, here]***

In column [1] of Table 1, the coefficient of the variable "GROWTH" is negative and significant at the 1% level, and amounts to -0.201. Hence, on average over the full sample, the odds of joining the WTO conditional on an improvement in economic growth decreases by 0.8179 time [= exponential (-0.201)]. As  $ODD = P/(1-P)$ , we can deduce that  $P = ODD/(1+ODD)$ . It follows that the estimated probability of joining the WTO by an applicant (in the full sample) is 0.372 [=  $(0.8179*0.724)/(1+(0.8179*0.724))$ ]. We conclude that an increase in the economic growth rate by a 1 percentage point leads to a fall in the probability of joining the WTO by 37.2%. This outcome may reflect the fact that countries that experience an improvement in their economic growth performance are less inclined to join early the WTO than countries that face with weak economic growth performance.

We now turn to the interpretation of the coefficient of the AfT variables in Table 1. We note from column [1] of this Table that the coefficient of [Log(AfT<sup>TOT</sup>)] (taken with a one-year lag) is positive, significant at the 1% level, and amounts to 1.211. This clearly suggests that AfT interventions in countries that have applied for acceding to the WTO exert a significant positive impact on their probability of successfully joining the institution. Let us now look at the magnitude of the effect of total AfT flows on the probability of joining the WTO. We obtain that an increase in total AfT flows by 1 per cent leads to an increase in "Log(AfT<sup>TOT</sup>)" by log(1.01), i.e., 0.01. As a result, the odds (for applicants) of joining the WTO (conditional on an increase in total AfT flows by 1 per cent) rises by 1.012 time [= exponential (1.211\*0.01)]. It ensues that the estimated probability for applicants to join the WTO further to an increase in total AfT flows by 1 per cent amounts to 0.423 [=  $(1.012*0.724)/(1+(1.012*0.724))$ ]. Hence, increasing total AfT flows by 1 per cent leads to an increase in the probability of joining the WTO by 42.3 per cent. This finding clearly supports hypothesis 1.

We observe in columns [2] and [3] of Table 1 that AfT interventions for economic infrastructure and for productive capacities are positively and significantly (at the 1% level) associated with the probability of joining the WTO. These outcomes also support hypothesis 1. The coefficients of the variables capturing AfT for economic infrastructure, and AfT for productive capacities are respectively 0.693 and 0.845. Thus, in terms of magnitude of these impacts, we first note that the odds (for applicants) of joining the WTO (conditional on an increase in AfT flows for economic infrastructure by 1 per cent) rises by 1.007 time [= exponential (0.693 \*0.01)]. As a result, the estimated probability for applicants to join the WTO further to an increase in AfT flows for economic infrastructure by 1 per cent is 0.422 [=  $(1.007*0.724)/(1+(1.007*0.724))$ ]. We

conclude that an increase in AfT flows for economic infrastructure by 1 per cent leads to an increase in the probability of joining the WTO by 42.2 per cent.

As for the effect of AfT flows for productive capacities on the probability of joining the WTO, we obtain that the odds of joining the WTO (conditional on an increase in AfT flows for productive capacities by 1 per cent) rises by 1.0085 time [= exponential (0.845\*0.01)]. The estimated probability for applicants to join the WTO further to an increase in total AfT flows by 1 per cent is, therefore, 0.422 [= (1.0085\*0.724)/(1+(1.0085\*0.724))]. Thus, the probability of joining the WTO increases by 42.2 per cent further to a rise in AfT flows for productive capacities by 1 per cent.

It appears from this analysis that the magnitudes of the effect of the two major components of total AfT flows (namely AfT for economic infrastructure and AfT for productive capacities) on the probability of states to join the WTO are quite similar to that of total AfT flows. Incidentally, we obtain that at the conventional significance levels, there is no significant effect of AfT related to trade policy and regulation on the probability of joining the WTO.

Regarding the other control variables (with the exception of economic growth), we find that at the 1% level, an increase in both countries' market size and wealth leads to a higher probability of joining the WTO (see results in columns [1] to [4] of Table 1). Taking up results in column [1] of the Table, we obtain, in terms of the magnitude, that an improvement in countries' wealth (i.e., their real GDP per capita) by 1 per cent results in an increase in the probability of joining the WTO by 43.2 per cent. Likewise, an increase in countries' market size by 1 per cent is associated with an increase the probability of joining the WTO by 43.4 per cent.

Across the four columns of Table 1, the institutional quality does not appear to always affect significantly (at the conventional significance levels) the probability of joining the WTO. For example, results in column [1] of the Table indicate that the coefficient of the variable "INST" is yet negative, but significant only at the 10% level.

***[Insert Table 2, here]***

Taking up outcomes reported in Table 2, we observe that the number of countries in the regressions drops from the value of 29 in Table 1 to the value of 16 in Table 2 (44.8% of observations are therefore dropped from regressions). As noted above, this raises concerns about the reliability of estimates based on the fixed-effects logit model (the latter disregards the between-country variation of variables and considers only the within country variation of variables). Thus, outcomes in Table 2 should be taken with a significant degree of caution. In spite of this, we nevertheless find useful to interpret these outcomes. We observe that while at the 5% level, total AfT exert a positive and significant effect on the probability of joining the WTO, this positive effect

is essentially driven by the positive and significant effect (also at the 5% level) of AfT flows for productive capacity on this probability. In fact, neither AfT interventions for economic infrastructure, nor AfT interventions related to trade policy and regulation influence significantly the probability of joining the WTO. Concerning control variables, the estimates are not always consistent with those in Table 1. For example, countries' wealth appears to be negatively and significantly associated with the probability of joining the WTO, whereas we found the reverse in Table 1. Yet, outcomes concerning the effect of the market size and economic growth are consistent with those in Table 1, but here, the institutional quality always influences negatively and significantly the probability of joining the WTO (this is not fully consistent with outcomes concerning the same variable in Table 1).

#### 4. Taking into account the effect of the AfT Initiative

The launch of the Aid for Trade initiative at the 2005 Hong Kong Ministerial Conference has led to an increase in AfT flows in favour of developing countries (e.g., Gnangnon, 2019c). Therefore, one may expect that the launch of AfT initiative in 2006 might have affected the influence of AfT flows on the probability of joining the WTO. Therefore, we re-estimate specifications of model (1) - including with each AfT variable - that contain the dummy "AfTINIT", which takes the value of 1 for period from 2006 to 2019, and 0, from 2002 to 2005. The results of the estimation of these different variants of model (1) using the random-effects logit estimator, are reported in Table 3.

*[Insert Table 3, here]*

It appears from this Table that at the conventional significance levels, the AfT initiative has led to an increase in the probability of joining the WTO (the coefficient of "AfTINIT" is positive and significant at the 10% level in columns [1], [2] and [4], and at the 5% level in column [3]). Interestingly, we obtain concerning our key variables of interest, namely AfT variables, that estimates have slightly changed compared to those in Table 1. Using the same approach for interpreting outcomes in Table 1, we obtain for the variable capturing total AfT flows that the odds (for applicants) of joining the WTO (conditional on an increase in total AfT flows by 1 per cent) rises by 1.01098 time [= exponential (1.092\*0.01)]. As a result, the estimated probability for applicants to join the WTO further to an increase in total AfT flows by 1 per cent amounts to 0.4226 [= (1.01098 \*0.724)/(1+(1.01098 \*0.724))]. This signifies that increasing total AfT flows by 1 per cent is associated with the increase in the probability of joining the WTO by 42.26 per cent

(i.e., approximately 42.3 per cent), magnitude which is similar to the one obtained based on outcomes in Table 1.

While the coefficients of the variables "AfTINFRA" and "AfTPROD" were significant at the 1% level in Table 1, they are now significant at the 5% level. At the 5% level, the computed magnitude of the effect AfT related to economic infrastructure and AfT for productive capacities on the probability of joining the WTO amounts respectively to 0.4213 and 0.4217. These magnitudes of the effects are closed to the ones obtained above on the basis of outcomes reported in Table 1. Like in Table 1, we obtain no significant effect (at the 10% level) of AfT related to trade policy and regulation on the probability of joining the WTO. Overall, controlling for the shock (i.e., the launch of the AfT initiative) that yet affects AfT, but also the probability of joining the WTO, does not significantly alter quantitatively or qualitatively the computed effects of total AfT inflows (including AfT for economic infrastructure and AfT for productive capacities) on the probability of joining the WTO.

Regarding control variables, we find that estimates associated with the real GDP and the economic growth are quite similar to the ones in Table 1. However, in contrast with the findings in Table 1 wherein the real per capita income is positively and significantly (at the 1% level) associated with the probability of joining the WTO, we obtain in Table 3 the real per capita income does not exert a significant effect (at the 10% level) on the probability of joining the WTO in columns [1], [2] and [4]. Outcomes in column [3] of Table 3 show a positive and significant effect of the real per capita income (at the 1% level) on the probability of joining the WTO.

## 5. Addressing the endogeneity of AfT flows

In the single equation postulated above (see model (1)), we assumed that AfT flows influence the probability of joining the WTO with a one-year lag. This assumption allowed uncovering the effect of AfT flows in year  $t-1$  on the probability of becoming a member of the WTO in year  $t$ . However, there is no reason to exclude the situation where AfT flows provided to in year  $t$  to an applicant, in particular an Observer<sup>10</sup> country, would accelerate this country's process of joining the WTO in the same year. Thus, while AfT flows are expected to increase the probability of joining the WTO, it is also conceivable that donors would supply higher AfT flows to countries that are willing to join the WTO, and making efforts to genuinely achieve this objective. In this context, the

---

<sup>10</sup> The observer status can be granted to international intergovernmental organizations, and to countries that are in the process of acceding to the World Trade Organisation (WTO). The observer status allows the government of the acceding country to the WTO to follow discussions therein on matters of direct interest to them in the WTO, and to prepare and initiate negotiations for accession to the WTO Agreement. Further information could be found online at: [https://www.wto.org/english/thewto\\_e/acc\\_e/cbt\\_course\\_e/c4s2p2\\_e.htm](https://www.wto.org/english/thewto_e/acc_e/cbt_course_e/c4s2p2_e.htm)

amounts of AfT that accrue to a given acceder to the WTO, and the probability of joining the WTO are determined simultaneously. To address the potential endogeneity that could arise from the bi-directional causality between AfT flows and the probability of joining the WTO, we consider a system of two equations, the first one allowing estimating the effect of AfT flows on the probability of WTO membership, and the second one, allowing uncovering the effect of the WTO membership on AfT flows.

The system of equations contains the following models (2) and (3).

$$WTO_{it} = \alpha_0 + \alpha_1 \text{Log}(AfT)_{it} + \alpha_2 AfTINIT_t + \alpha_3 \text{Log}(GDPC)_{it} + \alpha_4 \text{Log}(GDP)_{it} + \alpha_5 GROWTH_{it} + \alpha_6 INST_{it} + \varepsilon_{it} \quad (2)$$

$$\text{Log}(AfT)_{it} = \gamma_0 + \gamma_1 WTO_{it} + \gamma_2 AfTINIT_t + \gamma_3 \text{Log}(GDPC)_{it} + \gamma_4 \text{Log}(GDPC)_{it}^2 + \gamma_5 \text{Log}(NonAfT)_{it} + \gamma_6 GROWTH_{it} + \gamma_7 RENT_{it} + \gamma_8 \text{Log}(POP)_{it} + \gamma_9 Trend + \omega_{it} \quad (3)$$

$i$  and  $t$  are as defined above. The panel dataset is also as defined above.  $\alpha_0$  to  $\alpha_6$ , and  $\gamma_0$  to  $\gamma_9$  are coefficients that will be estimated.  $\varepsilon_{it}$  and  $\omega_{it}$  are error-terms.

Model (2) is a slight modification of model (1), i.e., model (1) to which we add the dummy variable capturing the AfT Initiative, and where all variables have been introduced in year  $t$ .

Model (3) is derived from previous works on the macroeconomic determinants of AfT flows (e.g., Lee et al., 2015; Gnangnon, 2017; 2019c,d; 2021c, 2022), in particular the recent work on the effect of WTO membership on AfT flows (Lee et al., 2015), and on the effect of the duration of WTO membership on AfT flows (Gnangnon, 2022).

We include the following variables on the recipient-countries' side in model (2): the dummy "WTO"; the real per capita income and its squared term to capture the non-linear relationship between countries' development level and the amounts of AfT they received; NonAfT flows (i.e., other development aid flows than AfT flows); the economic growth rate; the dependence on natural resource rents, the population size and a time trend to capture global common shocks affecting the amounts of AfT received by countries.

Concerning the expected theoretical effects of variables in model (2), we take cue from the work by Lee et al. (2015), and expect that the WTO membership exerts a positive effect on AfT flows. Lee et al. (2015) have uncovered that WTO developing members received 24.1 per cent more AfT dollar than non-WTO developing members. In the same vein, Gnangnon (2022) has found that as their WTO membership duration increases, countries receive larger amounts of AfT



flows, in particular when they further liberalize their trade regimes, and enjoy a greater participation in international trade. Likewise, following Gnanon (2019c), we expect a positive effect of the AfT Initiative on AfT flows. Given that the present study is not about the effect of the WTO membership on AfT flows, and for the sake of brevity, we refer the readers to Lee et al. (2015) and Gnanon (2022) for the discussion on the theoretical effects of the other control variables contained in model (2).

Given that the variable "WTO" is a latent variable, and "AfT" is a continuous variable, we account for the simultaneity bias by relying on the two-stage probit least squares (2SPLS) estimation method suggested by Maddala (1983) for simultaneous equations models where one of the endogenous (i.e., dependent) variables is continuous (this is the case for the variable "AfT" in the present study) and the other endogenous variable is dichotomous (here, this is the variable "WTO"). This involves a two-stage estimation technique, where in the first stage, instruments are created for each of the endogenous variables. In the second stage, these instruments are used as substitutes for their endogenous counterparts in the structural equations. Practically, the first stage of the estimation process involves regressing the endogenous variables (each of the endogenous variable) on all exogenous variables, and obtaining the predicted values of each of these two endogenous variables. In the second stage, the predicted (fitted) values of the endogenous variables are used as instruments (in replacement of the original endogenous variables) in order to complete the estimation (see Keshk, 2003). Model (2) (i.e., with AfT flows as the dependent variable) is estimated using the ordinary least squares (OLS) estimator, and model (1) is estimated using the probit estimator. The Maddala (1983)'s 2SPLS procedure is akin to the Amemiya's (1978) generalized least squares (AGLS) (or generalized two-stage probit) estimator used to estimate simultaneous equations with endogenous regressors in linear probability models and probit models (where one dependent variable is a latent variable, and the other is a continuous variable). Newey (1987) has shown that the AGLS estimator is asymptotically equivalent to the minimum  $\chi^2$  estimation procedure. Additionally, in overidentified systems, this estimator is more efficient than the two-stage least square instrumental variable estimators<sup>11</sup>.

We apply Maddala (1983)'s 2SPLS procedure in the present analysis to estimate different the system of equations (2) and (3). In particular, this system is estimated where the variable "AfT" is measured by total AfT, and by each of its three major components. The outcomes of these different estimations are provided in Table 4.

*[Insert Table 4, here]*

---

<sup>11</sup> Londregan and Poole (1990) have provided details on the AGLS estimation procedure.

Taking up estimates reported in the upper part of Table 4, we note from all columns that the four indicators of AfT flows influence positively and significantly (at the 1% level) the probability of joining the WTO. The estimate associated with total AfT, AfT for economic infrastructure, AfT for productive capacities, and AfT related to trade policy and regulation are respectively 0.820; 0.753; 0.756 and 0.556. Following the procedure used above for interpreting estimates, we first obtain for the effect of total AfT flows that the odds (for applicants) of joining the WTO (conditional on an increase in total AfT flows by 1 per cent) rises by 1.0082 time [= exponential  $(0.820 \times 0.01)$ ]. As a result, increasing total AfT flows by 1 per cent leads to an increase in the probability of joining the WTO by 42.2 per cent<sup>12</sup>. Likewise, a rise in AfT flows for economic infrastructure by 1 per cent is associated with an increase in the probability of joining the WTO by 42.2 per cent<sup>13</sup>. An increase in AfT flows for productive capacities by 1 per cent is associated with an increase in the probability of joining the WTO by 42.2 per cent<sup>14</sup>. Finally, a rise in AfT flows related to trade policy and regulation by 1 per cent is associated with an increase in the probability of joining the WTO by 42.13 per cent<sup>15</sup>.

All these findings are consistent with previous ones (including those in Tables 1 and 3), with the exception that the coefficient of the indicator of AfT related to trade policy and regulation was not significant (at the conventional significance levels) in previous Tables, but is significant at the 1% level in Table 4 (i.e., when the endogeneity issue is fully addressed). Concerning control variables, we obtain in contrast with previous results, that the probability of joining the WTO increases for countries that improve their institutional and governance quality (the coefficients of the variable "INST" are positive and significant at the 1% level, notably in columns [1], [3] and [4]). The market size and the wealth of acceding countries to the WTO tend to influence positively and significantly the probability of joining the WTO, and an improvement in economic growth performance reduces the probability of joining the WTO. There is no significant effect of the AfT initiative on the probability of joining the WTO.

---

<sup>12</sup> The estimated probability for applicants to join the WTO further to an increase in total AfT flows by 1 per cent amounts to 0.422 [=  $(1.0082 \times 0.724) / (1 + (1.0082 \times 0.724))$ ].

<sup>13</sup> The applicants' odds for joining the WTO (conditional on an increase in AfT flows for economic infrastructure by 1 per cent) rises by 1.00756 time [= exponential  $(0.753 \times 0.01)$ ]. It follows that the estimated probability for applicants to join the WTO further to an increase in AfT flows for economic infrastructure by 1 per cent amounts to 0.4218 [=  $(1.00756 \times 0.724) / (1 + (1.00756 \times 0.724))$ ].

<sup>14</sup> The applicants' odds for joining the WTO (conditional on an increase in AfT flows for productive capacities by 1 per cent) rises by 1.00759 time [= exponential  $(0.756 \times 0.01)$ ]. Thus, the estimated probability for applicants to join the WTO further to an increase in AfT flows for productive capacities by 1 per cent amounts to 0.4218 [=  $(1.00759 \times 0.724) / (1 + (1.00759 \times 0.724))$ ].

<sup>15</sup> The applicants' odds for joining the WTO (conditional on an increase in AfT flows related to trade policy and regulation by 1 per cent) rises by 1.00558 time [= exponential  $(0.556 \times 0.01)$ ]. It follows that the estimated probability for applicants to join the WTO further to an increase in AfT flows related to trade policy and regulation by 1 per cent amounts to 0.4213 [=  $(1.00558 \times 0.724) / (1 + (1.00558 \times 0.724))$ ].

Regarding results reported at the lower part of Table 4, we find that for the 29 Article XII member states considered in the analysis, the WTO membership has been associated (at least at the 5% level) with higher total AfT flows, including higher AfT flows for economic infrastructure. However, we obtain no significant effect (at the 10% level) of the membership in the WTO on AfT flows for productive capacities. At the same time, the 5% level, the membership in the WTO leads to lower amounts of AfT related to trade policy and regulation. This surprising outcome may reflect differentiated effects across countries in the full sample. Consistent with the findings of Gnangnon (2019c), we also obtain at the 1% level, that the AfT Initiative has led to an increase in total AfT flows, including AfT flows for economic infrastructure, and AfT flows related to trade policy and regulation in Article XII member states. However, there is no significant effect of the AfT initiative on AfT flows for productive capacities in these member states. On another note, we find at the 1% level that there exists a non-linear relationship between the real per capita income and AfT flows (especially for results in columns [1], [3] and [4]). A rise in NonAfT flows is positively and significantly associated with AfT flows in all columns of Table 4. While higher economic growth tends to be positively and significantly associated with AfT flows (see in particular columns [1] to [3]) (see also Gnangnon, 2022), the effect of countries' dependence on natural resource rents on AfT flows depends on the type of AfT flows considered, although it is negative and significant at the 5% level on total AfT flows (see also Gnangnon, 2022). At the 5% level, the population size exerts a positive and significant effect on AfT flows for productive capacities and on AfT flows related to trade policy and regulation.

## 6. Conclusion

This paper has examined the effect of AfT flows on the probability of acceding to the WTO by countries that apply for WTO membership. It has used a panel dataset of 29 states over the period from 2002 to 2019. The empirical analysis has established that total AfT flows have increased the probability of joining the WTO by 42.2 per cent. This applies to all components of total AfT flows, namely AfT interventions for economic infrastructure, AfT interventions for strengthening productive capacities and AfT interventions related to trade policy and regulation.

The present analysis has contributed to the extent literature on the determinants of accession to the WTO by underlying the critical role of AfT flows for countries' accession to the WTO. These findings are important for the international trade community as they underscore that the supply of greater AfT flows to applicants for WTO membership would have a significant positive impact on the likelihood of joining the institution.

## References

- Aaronson, S., and Abouharb, M. (2014). Does the WTO help member states improve governance? *World Trade Review*, 13(3), 547-582.
- Anderson, K. (2016). Contributions of the GATT/WTO to Global Economic Welfare: Empirical Evidence. *Journal of Economic Surveys*, 30(1), 56-92.
- Amemiya T. (1978). The Estimation of a Simultaneous Equation Generalized Probit Model. *Econometrica*, 46(5), 1193-1205.
- Atkin, D., and Donaldson, D. (2022). 'Chapter 1 - The role of trade in economic development', In: *Handbook of International Economics*, Volume 5, 1-59. Editor(s): Gita Gopinath, Elhanan Helpman, Kenneth Rogoff.
- Balding, C. (2010). Joining the World Trade Organization: What is the Impact? *Review of International Economics*, 18(1), 193-206.
- Basu, S. R. (2008). Does WTO accession Affect Domestic Economic Policies and Institutions? HEI Working Paper No: 03/2008. The Graduate Institute of International Studies, Geneva, Switzerland.
- Basu, S.R., Ognitvsev, V., and Shirotori, M. (2008). Building Trade-Relating Institutions and WTO Accession. Policy issues in international trade and commodities Study series No. 41. United Nations Conference on Trade and Development (UNCTAD), Geneva.
- Bekkers, E., and Schroeter, S. (2020). An economic analysis of the US-China trade conflict. WTO Staff Working Paper ERSD-2020-04. World Trade Organization, Geneva, Switzerland.
- Benziane, Y., Law, S.H., Rosland, A. and Abd Rahman, M.D. (2022). Aid for trade initiative 16 years on: lessons learnt from the empirical literature and recommendations for future directions. *Journal of International Trade Law and Policy*, 21(2), 79-104.
- Braga, C.A. P., and Cattaneo, O. (eds) (2009) *The WTO and Accession Countries* (2 volumes). London: Edward Elgar.
- Brotto, A., Jakubik, A., and Piermartini, R. (2021). WTO Accession and Growth: Tang and Wei Redux. WTO Staff Working Paper ERSD-2021-1. World Trade Organization, Geneva, Switzerland.
- Buettner, T., and Madzharova, B. (2018). WTO membership and the shift to consumption taxes. *World Development*, 108, 197-218.
- Busse, M., Hoekstra, R. and Königer, J. (2012). The impact of aid for trade facilitation on the costs of trading. *Kyklos*, 65(2), 143-163.
- Cali, M., and te Velde, D. (2011). Does aid for trade really improve trade performance? *World Development*, 39(5), 725-740.

Cao, V.T.H., and Flach, L. (2015). The Effect of GATT/WTO on Export and Import Price Volatility. *The World Economy*, 38(12), 2049-2079.

Chamberlain, G. (1980). Analysis of Covariance with Qualitative Data. *Review of Economic Studies*, 47(1), 225-238.

Chamberlain, G. (1984). 'Panel Data', in Z. Griliches and M. D. Intriligator (eds), *Handbook of Econometrics Vol 2*. (Amsterdam: North Holland), 1247-348.

Chang, P. L., and Lee, M. J. (2011). The WTO trade effect. *Journal of International Economics*, 85(1), 53-71.

Chemutai, V., and Escaith, H. (2017). Measuring World Trade Organization (WTO) Accession Commitments and their Economic Effects. *Journal of International Commerce, Economics and Policy*, 08(02), 1750007.

Chowdhury, A., Liu, X., Wang, M., and Wong, M. (2021). The Role of Multilateralism of the WTO in International Trade Stability. *World Trade Review*, 20(5), 668-689.

Cling, J-P., Marouani, M.A., Razafindrakoto, M., Robilliard, A-S., and Roubaud, F. (2009). The distributive impact of Vietnam's accession to the WTO. *Économie internationale*, 118(2), 43-71.

Copelovitch, M.S., and Ohls, D. (2012). Trade, institutions, and the timing of GATT/WTO accession in post-colonial states. *Review of International Organizations*, 7, 81-107.

Davis, C.L., and Wilf, M. (2017). Joining the Club: Accession to the GATT/WTO. *The Journal of Politics*, 79(3), 964-978.

Drabek, Z., and Bacchetta, M. (2004). Tracing the Effects of WTO Accession on Policymaking in Sovereign States: Preliminary Lessons from the Recent Experience of Transition Countries. *The World Economy*, 27(7), 1083-1125.

Dutt, P. (2020). The WTO is not passé. *European Economic Review*, 128, 103507.

Dutt, P., Mihov, I., and Van Zandt, T. (2013). The effect of WTO on the extensive and the intensive margins of trade. *Journal of International Economics*, 91(2), 204-219.

Eicher, T. S., and Henn, C. (2011). In search of WTO trade effects: Preferential trade agreements promote trade strongly, but unevenly *Journal of International Economics*, 83(2), 137-153.

Fan, H., Gao, X., and Zhang, L. (2021). How China's accession to the WTO affects global welfare? *China Economic Review*, 69, 101688.

Felbermayr, G., and Kohler, W. (2010). Does WTO Membership Make a Difference at the Extensive Margin of World Trade?. In: Drabek, Z. (eds) *Is the World Trade Organization Attractive Enough for Emerging Economies?*. Palgrave Macmillan, London.

Feng, Yi (2003). *Democracy, Governance, and Economic Performance: Theory and Evidence*. Cambridge, MA: MIT Press (2003).

Gnangnon, S.K. (2017). Multilateral Trade Liberalisation, Export Share in the International Trade Market and Aid for Trade. *Journal of International Commerce, Economics and Policy*, 8(3), 1750014 [35 pages].

Gnangnon, S. K. (2018). Aid for trade and trade policy in recipient countries. *The International Trade Journal* 32(5): 439-464.

Gnangnon, S.K. (2019a). Aid for trade and export diversification in recipient-countries. *The World Economy*, 42(2), 396-418.

Gnangnon, S.K. (2019b). Does the Impact of Aid for Trade on Export Product Diversification depend on Structural economic policies in Recipient-Countries? *Economic Issues*, 24(Part 1), 59-87.

Gnangnon, S.K. (2019c). Has the WTO's Aid for Trade Initiative Delivered on Its Promise of Greater Mobilization of Development Aid in Favor of the Trade Sector in Developing Countries? *The International Trade Journal*, 33(6), 519-541.

Gnangnon, S.K. (2019d). Trade-related Government Expenditure and Aid for Trade in Recipient-Countries. *Economic Issues*, 24(2), 1-20.

Gnangnon, S.K. (2021a). Aid for Trade and Import Product Diversification: To What Extent Does Export Product Diversification Matter? *Economic Issues*, 26(Part 2), 1-38.

Gnangnon, S.K. (2021b). Aid for Trade and services export diversification in recipient countries. *Australian Economic Papers*, 60(2), 189-225.

Gnangnon, S.K. (2021c). Do Donors provide higher Aid for Trade flows to Recipient-Countries that Diversify Export Products or Is It the Other Way Around? *Arthaniti: Journal of Economic Theory and Practice*, <https://doi.org/10.1177/09767479211036657>

Gnangnon, S.K. (2022). Duration of the Membership in the World Trade Organization and Aid for Trade Flows. *EconStor Preprints* 260562, ZBW - Leibniz Information Centre for Economics. Available online at: <http://hdl.handle.net/10419/260562>

Herz, B., and Wagner, M. (2011). The “Real” Impact of GATT/WTO-A Generalized Approach. *World Economy*, 34(6), 1014-1041.

Hoekman, B. (2020). Trade Wars and the World Trade Organization: Causes, Consequences, and Change. *Asian Economic Policy Review*, 15(1), 98-114.

Hoekman, B., and Shingal, A. (2020). Aid for trade and international transactions in goods and services. *Review of International Economics*, 28(2), 320-340.

Hühne, P., Meyer, B., and Nunnenkamp, P. (2014). Who Benefits from Aid for Trade? Comparing the Effects on Recipient versus Donor Exports. *Journal of Development Studies*, 50(9), 1275-1288.

Jakubik, A., and Piermartini, R. (2019). How WTO commitments tame uncertainty. In *WTO Staff Working Papers ERSD-2019-06*, World Trade Organization (WTO), Geneva, Switzerland.

Jones, K. (2009). The political economy of WTO accession: The unfinished business of universal membership. *World Trade Review*, 8(2), 279-314.

Jones, K., and Gai, Y. (2013). Joining the WTO: Why Does It Take So Long? *Open Economies Review*, 24(4), 695-716.

Kaufmann, D, Kraay, A. and Mastruzzi, M. (2010). The Worldwide Governance Indicators Methodology and Analytical Issues. World Bank Policy Research N° 5430 (WPS5430). The World Bank, Washington, D.C.

Kavass, I.I. (2007). WTO Accession: Procedure, Requirements and Costs. *Journal of World Trade*, 41(3), 453-474.

Keshk, O.M.G. (2003). CDSIMEQ: A program to implement two-stage probit least squares. *Stata Journal*, 3(2), 157-167.

Kim, Y.R. (2019). Does aid for trade diversify the export structure of recipient countries? *The World Economy*, 42(9), 2684-2722.

Kohl, T., and Trojanowska, S. (2015). Heterogeneous trade agreements, WTO membership and international trade: an analysis using matching econometrics. *Applied Economics*, 47(33), 3499-3509.

Koopman, R., Hancock, J., Piermartini, R., and Bekkers, E. (2020). The Value of the WTO. *Journal of Policy Modeling*, 42(4), 829-849.

Lanoszka, A. (2001). The World Trade Organization Accession Process Negotiating Participation in a Globalizing Economy. *Journal of World Trade*, 35(4), 575-602.

Larch, M., Monteiro, J.-A., Piermartini, R., and Yotov, Y. V. (2019). On the effects of GATT/WTO membership on trade: They are positive and large after all. In *WTO Staff Working Papers ERSD-2019-09*, World Trade Organization (WTO), Switzerland.

Lee, H. L., Park, D., and Shin, M. (2015). Do Developing-country WTO Members Receive More Aid for Trade (AfT)? *The World Economy*, 38(9), 1462-1485.

Londregan J., and Poole, K. (1990). Poverty, the Coup Trap, and the Seizure of Executive Power. *World Politics*, 42, 151-183.

Ly-My, D., Lee, H-H., and Park, D. (2021). Does aid for trade promote import diversification? *The World Economy*, 44(6), 1740-1769.

Maddala, G.S. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge University Press, Cambridge.

Maggi, G. (1999). The Role of Multilateral Institutions in International Trade Cooperation. *American Economic Review*, 89(1), 190-214.

Mansfield, E. D., and Reinhardt, E. (2008). International institutions and the volatility of international trade. *International Organization*, 62(4), 621-652.

- Mansfield, E., Milner, H.V., and Rosendorff, B.P. (2002). Why Democracies Cooperate More: Electoral Control and International Trade Agreements. *International Organizations*, 56, 477-513.
- Maruta, A. A. (2019). Trade aid, institutional quality, and trade. *Journal of Economics and Business*, 103, 25-37.
- Mattli, W. (1999). *The Logic of Regional Integration: Europe and Beyond*, Cambridge University Press.
- Michalopoulos, C. (1988). WTO Accession for Countries in Transition. World Bank Policy Research Working Paper 1934, Development Research Group, pp. 1-24. The World Bank, Washington, D.C.
- Michalopoulos, C. (2002). *Developing countries in the WTO*. New York: Palgrave Macmillan.
- Moser, C., and Rose, A.K. (2012). Why Do Trade Negotiations Take So Long? *Journal of Economic Integration*, 27(2), 280-290.
- Naito, T. (2016). Aid for Trade and Global Growth. *Review of International Economics*, 24(5), 1178-1201.
- Newey, W. (1987). Efficient Estimation of Limited Dependent Variable models with Endogenous Explanatory Variables, *Journal of Econometrics*, 36, 231-250.
- OECD/WTO (2011), *Aid for Trade at a Glance 2011: Showing Results*, WTO, Geneva/OECD Publishing, Paris, <https://doi.org/10.1787/9789264117471-en>
- OECD/WTO (2015), *Aid for Trade at a Glance 2015: Reducing Trade Costs for Inclusive, Sustainable Growth*. WTO, Geneva/OECD Publishing, Paris. [https://doi.org/10.1787/aid\\_glance-2015-en](https://doi.org/10.1787/aid_glance-2015-en)
- Onwachukwu, C.H., and Okagbue, E.F. (2019). Unemployment effect of WTO ascension: Evidence from a natural experiment. *International Economics*, 159, 48-55.
- Shin, W., and Ahn, D. (2019). Trade Gains from Legal Rulings in the WTO Dispute Settlement System. *World Trade Review*, 18(1), 1-31.
- Singh, T. (2010). Does International Trade Cause Economic Growth? A Survey. *The World Economy*, 33(11), 1517-1564.
- Subramanian, A. and Wei, S.-J. (2007). The WTO Promotes Trade, Strongly but Unevenly. *Journal of International Economics*, 72, 151-175.
- Tadesse, B., Shukralla, E., and Fayissa, B. (2019). Institutional quality and the effectiveness of aid for trade, *Applied Economics*, 51(39), 4233-4254.
- Tadesse, B., Fayissa, B., and Shukralla, E. (2021). Infrastructure, Trade Costs, and Aid for Trade: The Imperatives for African Economies. *Journal of African Development*, 22(1), 38-77.



Tang, M.-K., and Wei, S.-J. (2009). The value of making commitments externally: Evidence from WTO accessions. *Journal of International Economics*, 78(2), 216-229.

Tomz, M., Goldstein, J. L., and Rivers, D. (2007). Do We Really Know that the WTO Increases Trade? Comment. *American Economic Review*, 97(5), 2005-2018.

Vijil, M. and Wagner, L. (2012). Does Aid for Trade Enhance Export Performance? Investigating on the Infrastructure Channel. *World Economy*, 35(7), 838-868.

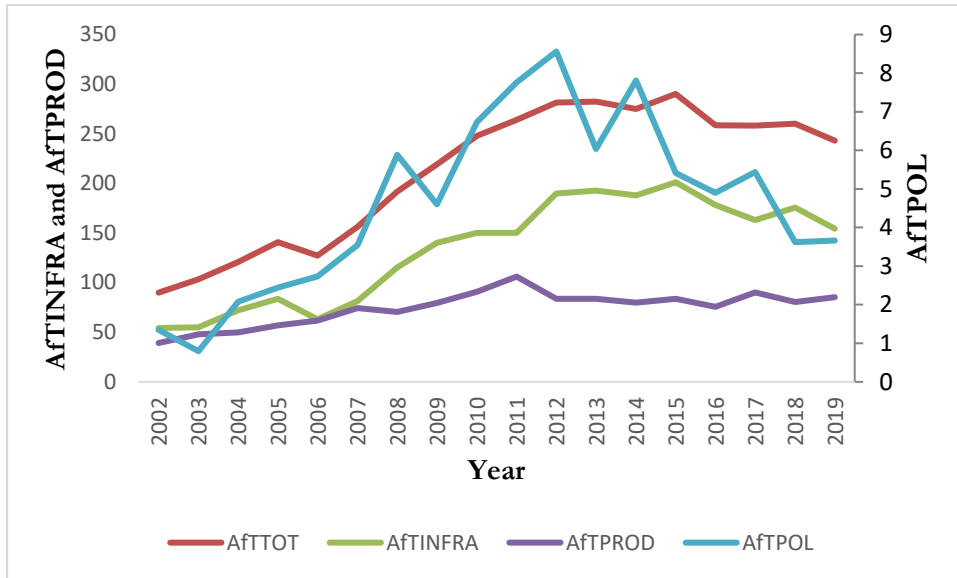
Wang, Z., and Xu, M. (2018). Aid for trade and the quality of exports. *Applied Economics Letters*, 25(10), 668-673.

Wong, K., and Yu, M. (2015). Democracy and Accession to GATT/WTO. *Review of Development Economics*, 19(4), 843-859.

WTO (World Trade Organization) (2005). Ministerial Declaration on Doha Work Programme. Adopted on 18 December 2005 at the Sixth Session of Trade Ministers Conference (document, WT/MIN(05)/DEC). Hong Kong, China, December 13-18.

## FIGURE

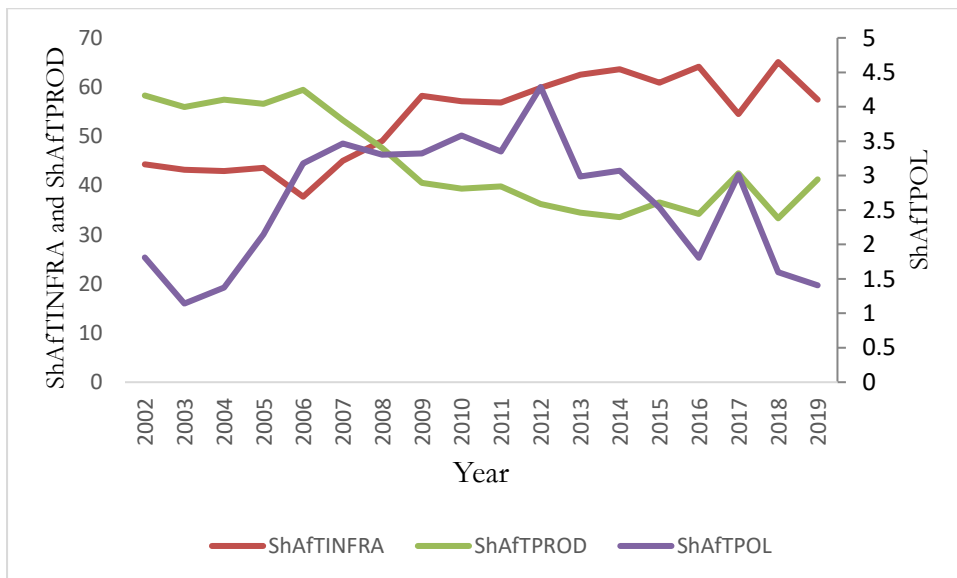
**Figure 1:** Evolution of AfT flows over time, and the full sample



Source: Author

Note: "AftTOT" is the total AfT flows. "AftINFRA" represents AfT flows allocated for the build-up of economic infrastructure; "AftPROD" is the AfT flows for strengthening productive capacities; "AftPOL" is the AfT flows related to trade policy and regulation. All AfT indicators are expressed in millions US\$, constant 2019 prices.

**Figure 2:** Evolution of the share of the components of total AfT flows over time and the full sample



Source: Author

Note: "ShAftINFRA" represents the share (%) of AfT flows for economic infrastructure in total AfT flows; "ShAftPROD" is the share (%) of AfT flows for productive capacities in total AfT flows; "ShAftPOL" is the share (%) of AfT flows related to trade policy and regulation in total AfT flows. Note that all AfT indicators are expressed in millions US\$, constant 2019 prices.

## TABLES and APPENDICES

**Table 1:** Results from the random effects panel logit model on the effect of AfT flows on the probability of accession to the WTO under Article XII\_Over the full sample

Variables	WTO	WTO	WTO	WTO
	(1)	(2)	(3)	(4)
$[\text{Log}(\text{AfTTOT})]_{t-1}$	1.211*** (0.338)			
$[\text{Log}(\text{AfTINFRA})]_{t-1}$		0.693*** (0.213)		
$[\text{Log}(\text{AfTPROD})]_{t-1}$			0.845*** (0.273)	
$[\text{Log}(\text{AfTPOL})]_{t-1}$				0.203 (0.172)
$[\text{Log}(\text{GDPC})]_{t-1}$	4.889*** (1.596)	4.220*** (1.540)	5.704*** (1.149)	4.287*** (0.938)
$[\text{Log}(\text{GDP})]_{t-1}$	5.659*** (1.023)	5.651*** (1.028)	5.738*** (0.795)	5.128*** (0.479)
$\text{GROWTH}_{t-1}$	-0.201*** (0.0596)	-0.194*** (0.0554)	-0.211*** (0.0556)	-0.210*** (0.0605)
$\text{INST}_{t-1}$	-1.162* (0.705)	-0.993 (0.661)	-1.810*** (0.605)	-0.938 (0.688)
Constant	-181.6*** (18.77)	-166.8*** (18.54)	-183.6*** (16.98)	-144.6*** (11.00)
Observations - Countries	457 - 29	452 - 29	457 - 29	417 - 29
LR Chi2	136.27 (0.000)	144.37 (0.000)	118.35 (0.000)	112.30 (0.000)
Log likelihood	-128.722	-129.737	-133.068	-122.279

*Note: \*p-value<0.1; \*\*p-value<0.05; \*\*\*p-value<0.01. Robust Standard Errors are in parenthesis.*

**Table 2:** Results from the conditional fixed-effects logit model on the effect of AfT flows on the probability of accession to the WTO under Article XII\_Over the full sample

Variables	WTO	WTO	WTO	WTO
	(1)	(2)	(3)	(4)
[Log(AfTTOT)] <sub>t-1</sub>	2.011** (0.931)			
[Log(AfTINFRA)] <sub>t-1</sub>		0.755 (0.478)		
[Log(AfTPROD)] <sub>t-1</sub>			2.168** (0.969)	
[Log(AfTPOL)] <sub>t-1</sub>				0.377 (0.282)
[Log(GDPC)] <sub>t-1</sub>	-55.18*** (13.95)	-52.82*** (13.22)	-60.88*** (14.88)	-54.65*** (14.30)
[Log(GDP)] <sub>t-1</sub>	87.02*** (21.27)	81.86*** (19.38)	88.15*** (21.49)	80.67*** (20.59)
GROWTH <sub>t-1</sub>	-0.236** (0.108)	-0.192** (0.0958)	-0.249** (0.106)	-0.176* (0.0927)
INST <sub>t-1</sub>	-4.710** (2.320)	-4.354** (2.120)	-6.740** (2.747)	-4.573** (2.237)
Observations - Countries	252 - 16	248 - 16	252 - 16	193 - 14
LR Chi2	201.72 (0.0000)	194.49 (0.0000)	202.42 (0.0000)	161.81 (0.0000)
Log-likelihood	-16.579913	-18.228741	-16.22909	-18.165942

Note: \**p*-value<0.1; \*\**p*-value<0.05; \*\*\**p*-value<0.01. Robust Standard Errors are in parenthesis.

**Table 3:** Results from the random effects panel logit model on the effect of AfT flows on the probability of accession to the WTO under Article XII\_Over the full sample

Variables	WTO (1)	WTO (2)	WTO (3)	WTO (4)
$[\text{Log}(\text{AfTTOT})]_{t-1}$	1.092*** (0.351)			
$[\text{Log}(\text{AfTINFRA})]_{t-1}$		0.544** (0.222)		
$[\text{Log}(\text{AfTPROD})]_{t-1}$			0.730** (0.305)	
$[\text{Log}(\text{AfTPOL})]_{t-1}$				0.163 (0.176)
AfTINIT	2.463* (1.409)	2.747* (1.412)	3.142** (1.310)	2.229* (1.324)
$[\text{Log}(\text{GDPC})]_{t-1}$	3.670 (2.335)	3.165 (2.201)	4.452*** (1.306)	1.498 (1.727)
$[\text{Log}(\text{GDP})]_{t-1}$	4.994*** (1.513)	4.912*** (1.604)	5.015*** (0.687)	5.048*** (0.708)
GROWTH <sub>t-1</sub>	-0.196*** (0.0599)	-0.201*** (0.0588)	-0.219*** (0.0609)	-0.201*** (0.0621)
INST <sub>t-1</sub>	-0.830 (0.779)	-0.783 (0.717)	-1.575** (0.654)	-0.423 (0.761)
Constant	-156.5*** (23.71)	-141.3*** (26.50)	-158.0*** (15.76)	-122.0*** (9.519)
Observations - Countries	457 - 29	452 - 29	457 - 29	417 - 29
LR Chi2	135.64 (0.0000)	141.57 (0.0000)	119.44 (0.0000)	114.61 (0.0000)
Log likelihood	-126.53931	-126.8114	-128.79342	-120.82614

Note: \* $p$ -value<0.1; \*\* $p$ -value<0.05; \*\*\* $p$ -value<0.01. Robust Standard Errors are in parenthesis.

**Table 4:** Results from the AGLS estimator on the effect of AfT flows on the probability of accession to the WTO under Article XII\_Over the full sample

	<b>Dependent variable</b>			
	<b>WTO</b>	<b>WTO</b>	<b>WTO</b>	<b>WTO</b>
	(1)	(2)	(3)	(4)
Log(AfTTOT)	0.820*** (0.118)			
Log(AfTINFRA)		0.753*** (0.118)		
Log(AfTPROD)			0.756*** (0.108)	
Log(AfTPOL)				0.556*** (0.116)
AfTINIT	-0.112 (0.203)	-0.399* (0.236)	-0.241 (0.178)	-0.263 (0.250)
Log(GDPC)	0.4785** (0.200)	0.8736*** (0.2545)	0.2267 (0.176)	-0.021 (0.176)
Log(GDP)	0.1606** (0.0779)	0.0347 (0.0917)	0.2457*** (0.072)	0.193*** (0.084)
GROWTH	-0.065*** (0.0177)	-0.046*** (0.0169)	-0.086*** (0.0188)	-0.059*** (0.019)
INST	0.4573*** (0.11)	0.226* (0.122)	0.592*** (0.106)	0.666*** (0.111)
Constant	-20.67*** (2.528)	-19.104*** (2.451)	-18.821*** (2.291)	-10.028*** (1.600)
Observations - Countries	481 - 29	476 - 29	481 - 29	440 - 29
First Stage Pseudo-R <sup>2</sup>	0.321	0.305	0.32	0.239
LR Chi2	184.05 (0.0000)	171.39 (0.0000)	183.47 (0.0000)	119.07 (0.0000)
Log likelihood	-194.42135	-195.33578	-194.71154	-190.06323

	<b>Dependent variable</b>			
	<b>Log(AfTTOT)</b>	<b>Log(AfTINFRA)</b>	<b>Log(AfTPROD)</b>	<b>Log(AfTPOL)</b>
	(1)	(2)	(3)	(4)
WTO	0.202** (0.084)	0.781*** (0.127)	-0.122 (0.092)	-0.417** (0.187)
AfTINIT	0.53*** (0.139)	1.028*** (0.203)	0.179 (0.152)	0.958*** (0.2966)
Log(GDPC)	2.806*** (0.746)	0.850 (1.106)	4.775*** (0.815)	8.016*** (1.583)
[Log(GDPC)] <sup>2</sup>	-0.204*** (0.045)	-0.12* (0.067)	-0.314*** (0.0496)	-0.503*** (0.0966)
Log(NonAfT)	0.604*** (0.059)	0.587*** (0.086)	0.482*** (0.065)	0.633*** (0.121)
GROWTH	0.044*** (0.008)	0.038*** (0.012)	0.063*** (0.009)	0.03 (0.018)
RENT	-0.010** (0.005)	0.029*** (0.0076)	-0.038*** (0.006)	-0.0205* (0.011)
Log(POP)	0.074* (0.043)	-0.120* (0.066)	0.281*** (0.047)	0.433*** (0.0916)

TREND	0.022 (0.018)	-0.039 (0.027)	0.053*** (0.020)	0.0944** (0.04)
Constant	-49.169 (39.167)	85.992 (58.047)	-121.426*** (42.775)	-226.864*** (84.985)
Observations - Countries	481 - 29	476 - 29	481 - 29	440 - 29
Adjusted R <sup>2</sup>	0.75	0.675	0.6970	0.454
Fisher statistic (P-value)	160.74 (0.000)	110.34 (0.000)	123.70 (0.000)	41.60 (0.000)

*Note: \*p-value<0.1; \*\*p-value<0.05; \*\*\*p-value<0.01. Robust Standard Errors are in parenthesis.*

**Appendix 1:** List of the 29 Article XII Members used in the analysis (states that have joined the WTO since 1995, under Article XII of the Marrakesh Agreement establishing the WTO)

No.	Article XII Members	Year of accession
1	Afghanistan	2016
2	Albania	2000
3	Armenia	2003
4	Cabo Verde	2008
5	Cambodia	2004
6	China	2001
7	Croatia	2000
8	Ecuador	1996
9	Georgia	2000
10	Jordan	2000
11	Kazakhstan	2015
12	Kyrgyz Republic	1998
13	Lao PDR	2013
14	Liberia	2016
15	Moldova	2001
16	Mongolia	1997
17	Montenegro	2012
18	Nepal	2004
19	North Macedonia	2003
20	Oman	2000
21	Panama	1997
22	Samoa	2012
23	Saudi Arabia	2005
24	Seychelles	2015
25	Tajikistan	2013
26	Ukraine	2008
27	Vanuatu	2012
28	Viet Nam	2007
29	Yemen	2014



## Appendix 2: Definition and Source of variables

Variables	Definition	Source
AfTTOT, AfTINFRA, AfTPROD, AfTPOL	<p>"AfTTOT" is the total real gross disbursements of total Aid for Trade.</p> <p>"AfTINFRA" is the real gross disbursements of Aid for Trade allocated to the buildup of economic infrastructure. "AfTPROD" is the real gross disbursements of Aid for Trade for building productive capacities.</p> <p>"AfTPOL" is the real gross disbursements of Aid allocated for trade policies and regulation. All four AfT variables are expressed in constant prices 2019, US Dollar.</p>	<p>Author's calculation based on data extracted from the OECD statistical database on development, in particular the OECD/DAC-CRS (Organization for Economic Cooperation and Development/Donor Assistance Committee)-Credit Reporting System (CRS). Aid for Trade data cover the following three main categories (the CRS Codes are in brackets):</p> <p>Aid for Trade for Economic Infrastructure ("AfTINFRA"), which includes transport and storage (210), communications (220), and energy generation and supply (230);</p> <p>Aid for Trade for Building Productive Capacity ("AfTPROD"), which includes banking and financial services (240), business and other services (250), agriculture (311), forestry (312), fishing (313), industry (321), mineral resources and mining (322), and tourism (332); and</p> <p>Aid for Trade policy and regulations ("AfTPOL"), which includes trade policy and regulations and trade-related adjustment (331).</p>
NonAfT	This is the measure of the development aid allocated to other sectors in the economy than the trade sector. It has been computed as the difference between the gross disbursements of total ODA and the gross disbursements of total Aid for Trade (both being expressed in constant prices 2019, US Dollar).	Author's calculation based on data extracting from the OECD/DAC-CRS database.
GDP	This is the proxy for countries' market size. It is measured by their real Gross Domestic Product (constant 2010 US\$).	World Development Indicators (WDI) of the World Bank.
GDPC	This is the proxy for countries' wealth. It is measured by their real per capita Gross Domestic Product (constant 2010 US\$).	WDI
GROWTH	Growth rate of the real GDP per capita (constant 2010 US\$), annual percentage	WDI
RENT	Total natural resources rents (% of GDP)	WDI

POP	This is the measure of the total Population	WDI
INST	<p>This is the variable capturing the institutional quality. It has been computed by extracting the first principal component (based on factor analysis) of the following six indicators of governance. These indicators are respectively: political stability and absence of violence/terrorism; regulatory quality; rule of law; government effectiveness; voice and accountability, and corruption.</p> <p>Higher values of the index "INST" are associated with better governance and institutional quality, while lower values reflect worse governance and institutional quality.</p>	<p>Data on the components of "INST" variables has been extracted from World Bank Governance Indicators developed by Kaufmann et al. (2010) and updated recently. See online at: <a href="https://info.worldbank.org/governance/wgi/">https://info.worldbank.org/governance/wgi/</a></p>

**Appendix 3a:** Descriptive statistics on variables used in the analysis

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
WTO	457	0.742	0.438	0	1
AfTTOT	453	218	382	0.0534	2790
AfTINFRA	450	138	276	0.0085	2320
AfTPROD	453	76.6	126	0.0084	940
AfTPOL	428	4.903	8.532	0.0026	60.2
NonAfT	453	578000000.000	889000000.000	5276398.000	7530000000.000
GDPC	456	4216.164	4175.756	333.217	19832.660
GDP	456	288000	1390000	498	11500000
GROWTH	456	4.715	4.684	-30.145	21.391
INST	457	-0.946	1.366	-4.833	1.617
RENT	457	6.7667	10.835	0.0093	55.523
POP	457	61900000.000	253000000.000	82475.000	1400000000.000

*Note: The variables "AfTTOT", "AfTINFRA", "AfTPROD", "AfTPOL" and "GDP" are expressed in millions of US dollar.*

**Appendix 3b:** Pairwise correlation statistics among variables used in model (1)

	WTO	AfT*TOT	AfT*INFRA	AfT*PROD	AfT*POL	GDPC	GDP	GROWTH	INST
WTO	1.0000								
AfT*TOT	0.0156	1.0000							
AfT*INFRA	0.0450	0.9720*	1.0000						
AfT*PROD	-0.0607	0.8720*	0.7326*	1.0000					
AfT*POL	-0.0427	0.6316*	0.5226*	0.7091*	1.0000				
GDPC	0.0839*	-0.2757*	-0.2415*	-0.2918*	-0.2485*	1.0000			
GDP	0.1090*	0.1255*	0.0989*	0.1624*	0.0201	0.0896*	1.0000		
GROWTH	-0.0839*	0.1425*	0.0983*	0.2132*	0.0623	-0.0633	0.1409*	1.0000	
INST	0.2129*	-0.3112*	-0.2449*	-0.3948*	-0.3046*	0.5214*	-0.0185	-0.0432	1.0000

*Note: \*p-value<0.1.*