WTO Membership and the Shift to Consumption Taxes

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February 2018

Abstract

This paper explores tax policy effects and revenue implications of joining the World Trade Organization (WTO) and its predecessor, the General Agreement on Tariffs and Trade (GATT). It documents that countries joining GATT/WTO after 1990 have implemented tariff-cum-tax reforms, lowering tariff rates and raising consumption tax rates, in particular through reform or introduction of a value added tax (VAT). Employing a panel of 97 developing and transitional countries, 31 of which joined GATT/WTO between 1990 and 2011, using robust difference-in-difference specifications as well as the synthetic-control method, we find a statistically and economically significant decline in revenues from import duties. This supports concerns about revenue losses, but also corroborates the efficacy of the late Uruguay GATT and the WTO trade regimes in promoting free trade among new members. Regarding consumption taxes, we find robust evidence that revenue substitution was successful, since revenue losses from import duties were more than compensated for by enhanced revenues from consumption taxes. With regard to the timing of the revenue effects, our results show that revenue losses in import duties mostly take place at the time of membership or later. Changes in consumption taxation, however, exhibit pre-membership effects, as revenues are increased, and VAT is adopted, often a few years ahead of losses in import duties. No such effects are found before the start of the accession negotiations, indicating that consumption tax reforms are initiated once a country is on the road to GATT/WTO membership.

Key Words: Trade liberalization; Tax reform; Value added tax; GATT; WTO; Anticipation effects; Synthetic control method

JEL Classification: F13; H2

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1 Introduction

Sixty years after it was first introduced in France, the value-added tax (VAT) is currently administered in more than 150 countries and contributes substantially to financing the public sector in many countries (*e.g.*, Tait, 1986; Bird and Gendron, 2007). The reasons behind its proliferation and the precise timing of its adoption have not been analyzed extensively. While the efficiency properties and the revenue potential of the VAT have been widely acknowledged (*e.g.*, Keen, 2006 and IFS and Mirrlees, 2011), the VAT's role in replacing lost tariff revenues as a result of trade liberalization has received limited attention in the economic literature.

After various attempts to foster trade liberalization, by 1990 there was a growing consensus among supranational organizations on the importance of combining tariff reform with appropriate fiscal policies to offset revenue losses stemming from tariff reductions (*e.g.*, Linn and Wetzel, 1990; Mitra, 1992). The prevailing concern was that failure to take into account the interdependence of public finances and trade policy could reverse the global trend of declining protectionism, especially in the context of developing countries.[1]

The general recommendation of international institutions such as the International Monetary Fund (IMF) and the World Bank (WB) has been to compensate for the revenue implications of lower tariffs with a concomitant movement towards a broad-based VAT. Besides its revenue potential, the VAT is consistent with the rules of the General Agreement on Tariffs and Trade (GATT) and

[1] In the mid-1980s, for example, the sustainability of trade reforms in Argentina, Turkey, Morocco, Thailand, the Philippines, Zambia and several other countries was compromised by unsound fiscal practices, in some cases leading to subsequent tariff increases (Mitra, 1992, Rodrik, 1992).

its successor, the World Trade Organization (WTO).[2] The theoretical rationale for the substitution of import duties with VAT is presented in Hatzipanayotou *et al.* (1994) and Keen and Ligthart (2002). A stream of theoretical literature, however, highlights that the presence of a large informal sector, common in developing countries, could compromise revenue substitution, and, under certain conditions, revenue neutral reforms could entail welfare losses *e.g.*, Emran and Stiglitz, 2005).

The concern that compensation of lost import duties through VAT would be difficult and would ultimately require higher taxes and consumer prices is not just of theoretical relevance. For successful participation and integration into a free trade regime, it is essential that countries maintain economic and political stability, for which the protection of government revenues is an important precondition. This holds in particular for least developed countries (LDCs) pursuing trade liberalization policies in various forms, and especially through accession to the WTO. The empirical assessment of the effectiveness of the tariff-cum-tax reform recommendation is therefore an important undertaking.

Despite the importance of the issue, there is scant empirical evidence on countries' actual experiences with replacing tariff revenues by consumption taxes and VAT, in particular. In one of the few papers on the subject, Khattry and Rao (2002) test whether total tax revenues are affected by the ratio of international trade taxes to the volume of total trade. This approach has the advantage of using a comprehensive continuous indicator – an implicit tariff or tax rate – that reflects the current state of trade liberalization.[3] Baunsgaard and Keen (2010) use a similar approach and focus on the relationship between total tax collections and tariff revenues in order to estimate the

[2]The VAT is consistent with the GATT/WTO rules since it does not discriminate between imports and domestically produced consumption goods. Further, since the credit mechanism compensates for taxes paid on inputs, the tax system does not distort the choice between domestic and foreign inputs (Tait, 1986; Schenk and Oldman, 2007).

[3]For a summary of measures of liberalization used in the literature, see for example Greenway *et al.* (2002).

degree of recovery of lost tariff revenues. While results differ with respect to the extent to which revenue substitution took place, a common finding of these papers is that least developed countries face difficulties in recouping revenue losses.

This paper employs a new approach to assessing the role of consumption taxes as a substitute for import duties: Instead of using a tariff-based measure of trade liberalization, it explores revenue effects by focusing on major multilateral trade liberalization events. This approach allows us to explicitly distinguish between trade liberalization policies and their revenue consequences, which is important given the theoretical concerns about revenue implications of general equilibrium effects. More specifically, we study revenue developments before and after countries become members of the GATT and the WTO. Our analysis focuses on revenues from import duties and consumption taxes in 97 countries. Since official statistics on revenues from import duties often include consumption taxes collected at the border, we need to ensure that revenues from consumption taxes collected at the border are counted as consumption taxes, and that revenues from import duties only incorporate tariff revenues. This issue prevented us from using standard databases and necessitated the collection of the revenue data mostly from IMF Statistical Appendices and national statistical offices.[4]

The paper makes three contributions to the literature. First, it shows that GATT/WTO membership is associated with substantial revenue losses from import duties. Some previous studies have indicated that the relationship between GATT/WTO membership and trade liberalization is weak (*e.g.*, Rose, 2004; 2010).[5] This conforms with evidence that before the Uruguay Round

[4] Prichard (2016) discusses in detail the various limitations of cross-country government revenue statistics data and the implications for the robustness of findings in various research contexts.

[5] Tomz *et al.* (2005) point out, however, that stronger effects are found if non-member participants of GATT are taken into account.

of negotiations initiated in 1986, low income GATT contracting parties undertook only minimal steps towards increasing access to their markets (*e.g.*, Finger *et al.*, 1996). Focusing on the more recent period when the trade regime evolved into the WTO, employing a panel of 97 developing and transitional countries, using robust difference-in-difference specifications as well as the synthetic-control method, we find a statistically and economically significant inverse relationship between GATT/WTO membership and import duties, even after controlling for contemporaneous unilateral and regional trade liberalization policies. This result supports the concerns about revenue losses, but also corroborates the efficacy of the late Uruguay GATT and the WTO trade regimes in promoting free trade among new members.

A second contribution of the paper is to explore how consumption tax revenue responds to GATT/-WTO membership, and, given the revenue losses from import duties, whether total revenue increased or declined. The results document a large increase in revenues from consumption taxes. Quantitatively, the estimates indicate that countries joining the GATT/WTO, including least developed countries, have successfully replaced import duties with consumption taxes. This finding supports the view that trade-liberalization in the form of the recommended tariff-cum-tax reforms ensures stable revenues.

A third contribution is to document differences in the timing between revenue losses from import duties and revenue gains from consumption tax reforms. The existing literature implicitly assumes that tax reforms follow the development of tariff revenues with the typical presumption that these reforms become effective at about the same time or after revenue losses are realized. Yet far-reaching trade agreements, especially multilateral agreements, often involve intense negotiations. In the course of negotiations, governments obtain an understanding of the scale and scope of the

reforms required of them as a prerequisite for membership. Therefore, they might anticipate the revenue losses associated with these reforms and act on their expectations. Ignoring such ex-ante adjustments could lead to biased estimates of policy effects.[6] Since least developed countries often tend to raise a significant share of revenues from import duties, trade liberalization might put their public finances at considerable risk. Hence, these countries could be particularly eager to undertake consumption tax reforms in advance of entering a trade agreement. This could explain why empirical studies find relatively weak revenue substitution effects for low-income countries. While we find that cuts in tariffs mostly take place at the time of membership or later, changes in consumption taxation exhibit pre-membership effects, as revenues are increased, and VAT is adopted, often some years ahead of the losses in import duties. However, no effects are found before the start of the accession negotiations. This suggests that consumption tax reforms and VAT adoption are initiated when a country is on the road to GATT/WTO membership.

The paper proceeds as follows. The next section provides an overview of major developments in tariff policy based on the timing of countries' membership into GATT/WTO. It also provides descriptive evidence on the tariff-cum-tax reforms implemented by members joining GATT/WTO and shows that many countries adopted VAT in response to (anticipated) losses in import duties. The subsequent parts of the paper explore the revenue implications of these reforms. More specifically, Section 3 discusses the methodology of the analysis of revenue effects. The data are described in Section 4. Section 5 reports the empirical results for the effect of GATT/WTO membership on revenues from import duties. Section 6 focuses on the effects on consumption tax revenues. Section 7 explores the revenue substitution of import duties by consumption taxes. Section 8 concludes.

[6] See Malani and Reif (2015) for a discussion of biases arising from anticipation effects in the context of tort reform.

2 Trade Liberalization and Consumption Tax Reform

Starting in the mid-1980s and especially in the early 1990s, numerous developing and transitional countries undertook various trade liberalizing measures as part of unilateral initiatives, in order to become more attractive for FDI (*e.g.*, Gastanaga, Nugent, and Pashamova, 1998), or as part of IMF/WB loan conditionalities.[7] Trade liberalization was also promoted by bilateral and/or multilateral agreements. Frequently implemented policies were the tariffication, phase out or total elimination of quantitative restrictions and other non-tariff restrictions such as import licensing and prohibition lists. The period was also characterized by the simplification of tariff regimes, generally in terms of reducing the level and range of tariff rates (*e.g.*, UNCTAD 1991, 1993).

Despite the unprecedented scale of trade liberalization, doubts existed over the credibility and sustainability of these reforms, especially in countries where their enactment occurred as part of IMF/WB adjustment programmes with unclear level of government commitment. Rodrik (1992) points out that many countries in the 1980s pursued liberalization polices in the context of either a political regime change, or periods of deep and prolonged macroeconomic instability, which raised concerns over reversibility due to political developments or new economic circumstances. In contrast, by joining organizations like the GATT and later the WTO, governments can not only institutionalize open trade measures but also send a strong signal to businesses and consumers regarding the durability and credibility of reforms. As membership in GATT/WTO reduced their ability to

[7] Unilateral trade-related liberalization measures were a typical component of IMF/WB conditionalities for the release of funds under the Structural Adjustment Facility (SAF), later replaced by the Poverty Reduction and Growth Facility (PRGF) (Saner and Guilherme, 2007, and Clements *et al.*, 2002). For empirical evidence on the stimulating impact of IMF programs on VAT implementation and revenues, see Keen and Lockwood (2010) and Crivelli and Gupta (2016).

resort to protectionist measures in future by making reform reversal costly, joining GATT/WTO enabled countries to commit to trade liberalization, especially after 1990.

As a consequence of agreements reached in the Uruguay Round of Negotiations (1986-1994),[8] membership in the WTO required every participating government to file a Schedule of Concessions and Commitments annexed under GATT 1994 as well as a Schedule of Commitments under GATS.[9] This was a significant change compared with earlier years: Out of 128 GATT contracting parties, 40 had no Schedule of Concessions in 1986.[10] Most countries joining GATT between 1990 and 1994 submitted Schedules at the time of membership. Article II: 7 makes Schedules an integral part of GATT and as such, concessions recorded in them carry international legal obligations, with commitments being effectively irreversible (Bhala, 2008).

Direct WTO accession under Article XII of the Marrakesh Agreement is much more demanding than accession under the three original GATT procedures, which comprise of acceptance of Protocol of Provisional Application, Article XXXIII, or succession to contracting party status under Article XXVI:5(c) (Jones, 2009, Pauwelyn, 2005). WTO accession is more formal and legalistic, requires compliance with a broad spectrum of WTO Agreements and involves detailed obligations pertaining

[8]The WTO was established in 1994 in Marrakesh after the conclusion of the Uruguay Round of negotiations and entered into force on January 1st, 1995. It is an intergovernmental organization with currently 162 members accounting for more than 96% of world trade. WTO replaced and expanded on its predecessor, the GATT. Originally, GATT involved negotiations and agreements on trade in goods. The WTO additionally covers multilateral trade relations in services, intellectual property rights, and international investments through the General Agreement on Trade in Services (GATS) and the Agreement on Trade Related Aspects of Intellectual Property Rights. The extension of the scope of issues regulated by the WTO means that the organization not only commits its members to trade liberalization, but also exercises increasing influence on domestic policy (Malhorta, 2003).

[9]A Schedule of Concessions is a document containing an item-by-item list of product categories/services followed by the bound tariffs negotiated on that product/service. The Schedule, therefore, records the maximum rates a member country can possibly apply to a particular product/service. As new concessions and reductions are negotiated in subsequent trade rounds, members' Schedules are updated accordingly (Bhala, 2008). According to the WTO's Secretariat, "the Schedules bind the actions of member governments with the same force as the Agreement; they represent, in some respects, its 'cash value' "(World Trade Organization, 2009).

[10]The information on pre-Uruguay Schedules of Concessions is sourced from the WTO's website: https://www.wto.org/

to multiple aspects of trade. To avoid the considerably higher price of direct WTO admission, 38 countries hastened to join GATT during the Uruguay Round of Negotiations, thus gaining automatic WTO entry as legacy members. Of these, 25 countries acceded under Article XXVI:5(c) as former colonies or component territories, and 13, mostly Latin American states, under Article XXXIII. Tang and Wei (2009) point out that countries invoking Article XXVI:5(c) were subject to considerably less policy reform commitments than non-Article XXVI:5(c) members.

The more exacting entry procedure, and in general, the difference in the trade regime under pre-1990 GATT and under post-1990 GATT and WTO is evident from basic tariff statistics provided by the WTO. Column (2) in Table 1 summarizes the bound rates, *i.e.* the maximum rate of tariffs negotiated under GATT/WTO. Countries that entered the WTO directly (direct WTO members), on average bind their tariffs at considerably lower levels than members that were also GATT contracting parties. In addition, the binding coverage for the WTO members based on the sample of countries used in this paper is almost 100%, whereas it is 84% and 67% for the 1990-1994 GATT and pre-1990 GATT entrants, respectively (see Section 4 and Table A-7 for details on the sample of countries). The third column reports the average of the MFN Applied Tariff, *i.e.* the normal non-discriminatory tariff charged on imports, after GATT/WTO membership, or after 1995 for the pre-1990 GATT parties and non-members. Note that for all three groups, the average MFN Applied Tariff is below the bound tariff. Given this "tariff overhang", former GATT parties have substantially higher flexibility and manoeuvrability in adjusting tariffs compared to direct WTO members.[11] The lowest applied rates are found for the countries that joined more recently. The combined effects of multilateral, unilateral and regional trade liberalization policies are reflected in the development of the average MFN applied rate in the member countries of the GATT/WTO

[11] See Beshkar *et al.* (2015) for an analysis of the factors affecting the tariff overhang.

Table 1: TARIFF RATES AND COVERAGE BY TIMING OF MEMBERSHIP

	(1) Binding Coverage	(2) Simple Average Bound Tariff	(3) Simple Average MFN Applied Tariff
Direct WTO Members	99.97	15.09	7.39
	(.100)	(5.33)	(4.60)
GATT 1990-1994 Parties	83.58	51.19	10.95
	(29.17)	(19.80)	(5.44)
Pre-1990 GATT Parties	66.57	49.98	11.87
	(37.15)	(35.50)	(6.79)
Non-WTO Members	–	–	16.26
			(8.93)

Notes: Binding coverage is the share of Harmonized System six-digit subheadings, which contain at least one bound tariff line. GATT 1990-1994 contracting parties join the GATT between 1990 and 1994. Pre-1990 GATT parties join the GATT before 1990. The majority of countries in both groups become original WTO members in 1995. Non-WTO members are countries which were not members of the WTO in 2011. The MFN applied tariffs are averaged from 1995 to 2011 for non-members and pre-1990 GATT contracting parties; for direct WTO members (GATT 1990-1994), the relevant period is from the year of membership into WTO (GATT) to 2011. The binding coverage and average bound tariffs reflect the information in the current Schedules of Concession. For sources of data, refer to Table A-5.

over time as shown in Figure A-4 in the Appendix. Starting from 27% in 1990, tariff rates vary in a narrow range of 5 to 10% from 2005 onwards.

With their flexibility to adjust import duties to current and future revenue needs curtailed, many developing and transition countries embarked on reforms of the tax system. The concern over revenue substitution is palpable, for example, in the initial cycles of Questions and Replies after a WTO acceding country circulates its Memorandum on Foreign Trade, especially if the country's revenue structure is heavily dependent on import duties.[12]

[12]Some examples of questions/comments posed to accession countries by existing WTO members are presented below. [Vietnam]: "We also hope that VAT will alleviate pressures to have recourse to trade taxes, particularly in view of the fact that [...]Vietnam will assume as a future WTO member [...]there will be no trade taxes other than customs duties at rates not exceeding Vietnam's bound rates of duty [...]" (*e.g.*, WT/ACC/VNM/3, Question 93). [Tonga]: "How does the Government of Tonga intend to offset revenue losses that may result from lower customs duty rates?/ Given the importance trade taxes have come to assume in government revenue, what plans does Tonga have for diversifying the revenue base?" (WT/ACC/TON/4, Questions 28, 42) [Vanuatu]: "Does the Government plan to reduce to eliminate existing tariffs? If yes, what measures are planned to make up for the revenue foregone by the reduction and/or complete removal of import duties?" (WT/ACC/VUT/4, Question 16).

While different options for tax amendments accompanying trade liberalization exist, reforms involving VAT seem to be an obvious choice, since VAT is a promising substitute for tariffs. The tax base of the VAT overlaps with import duties because domestic consumption of imported commodities is part of the VAT tax base. Consequently, the IMF and other institutions recommended a strategy of tariff-cum-tax reform. This strategy involves the replacement of import duties by VAT at a rate that leaves consumer prices constant, in order to mitigate undesirable distributional effects (*e.g.*, IMF, 2005). The economic literature has emphasized that in a small open economy with a competitive production sector, a reduction in tariffs accompanied by a point-for-point rise in consumption taxes, so that consumer prices remain unchanged, strictly increases welfare and tax revenues as shown by Hatzipanayotou *et al.* (1994) and Keen and Ligthart (2002). Kim and Kose (2014) explore revenue neutral trade liberalization policies in a dynamic general equilibrium model and find large welfare gains, in particular, if losses from import duties are financed with consumption taxes.

One issue discussed in the literature, which is of particular importance for developing countries, is the role of the informal sector. Emran and Stiglitz (2003) argue that substitution of tariff revenue by VAT might be difficult, if a large part of total production originates in the informal economy. If tariffs are reduced, the degree of substitutability between the informal and the formal sectors may aggravate the decline in revenues from tariffs to such an extent that total revenue decreases with a price-neutral tax reform. More specifically, a fall in tariffs could result in an expansion of the informal sector. Competing imports would decline and, hence, revenue from tariffs would decline further.[13] A balanced budget reform might, therefore, entail higher tax rates and, consequently, welfare losses (Emran and Stiglitz, 2005).

[13] As noted by Baunsgaard and Keen (2010), however, a comprehensive analysis of the revenue implications would have to take account also of the VAT charged on imports that are used as inputs in the informal economy.

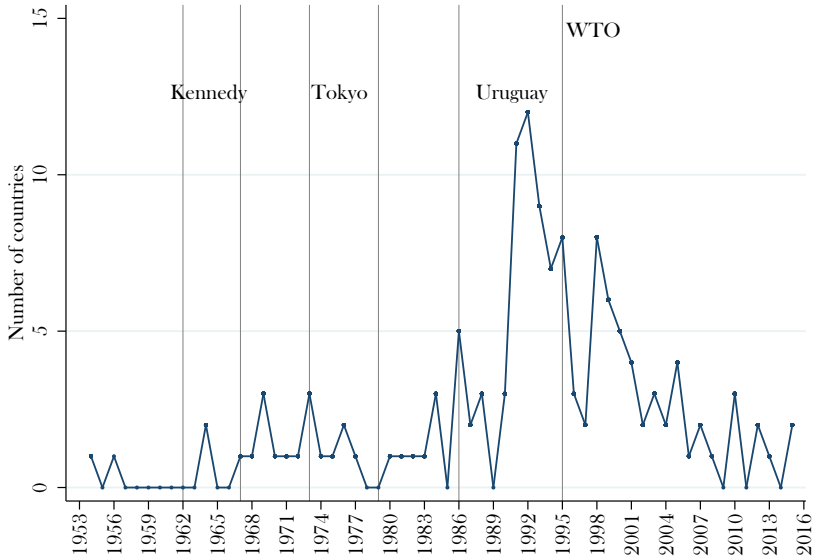
The effects of a shift from tariffs to a VAT on administration and compliance costs are not addressed in the theoretical literature, even though they are a major consideration (Keen and Ligthart, 2002). A widely held, although not uncontroversial view is that compared with tariffs, it is more challenging to administer and enforce a VAT system (Keen, 2009). On the one hand, VAT compliance could be particularly challenging in a context of a large and possibly expanding informal sector as it hinders the "self-reporting" property of the VAT (Pomeranz, 2015). On the other hand, the cost of administration and the exposure to non-compliance are also matters of VAT design (Cnossen, 2015). Keen and Mansour (2010) note that strengthening VAT administration might have positive spillover effects on other taxes.

At any rate, following the tariff-cum-tax reform policy recommendation, many countries, that had no VAT in place already, introduced VAT. Figure 1 displays the number of countries introducing VAT over time.[14] For VAT adoption by region/continent, see Figure A-5 in the Appendix. The figure highlights time periods where the intensity of VAT implementation differs: The early GATT period, the Uruguay Round preceding the WTO, and the WTO period. The Uruguay Round, in particular, which marked a move towards extensive trade liberalization, is characterized by a notable wave of VAT adoption, with a further wave observed during the WTO period. As of 2011, only fourteen out of the 97 countries considered in this paper do not have a fully-fledged VAT, nine of which are also not WTO members (Table A-7 in Appendix).

Figure 2 depicts VAT introduction relative to WTO entry for the countries in our dataset (irrespec-

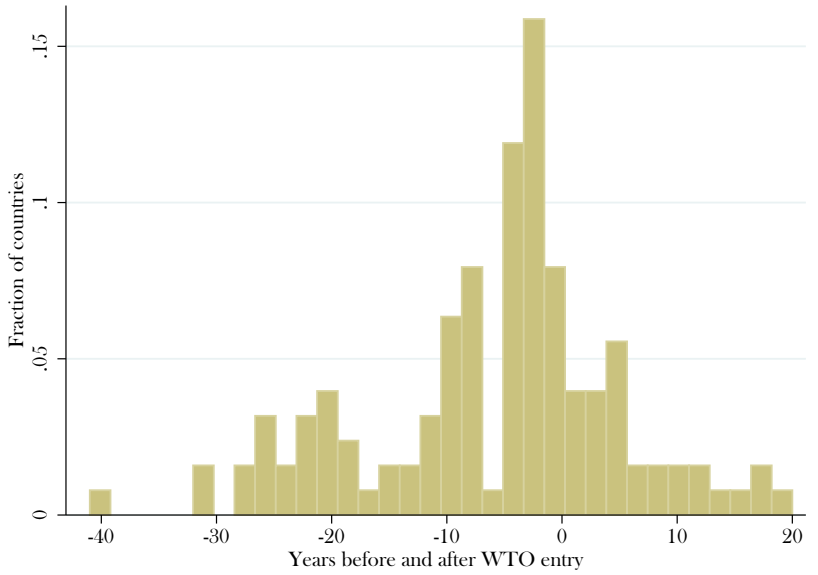
[14]While for many countries the date of VAT implementation is clear-cut, for others matters are more complicated. Such examples are the cases of Pakistan and Jordan, for instance, that started administering VAT in 1990 and 1994, respectively, but only extended the tax to services and retailers in 1998 (Pakistan) and 2001 (Jordan). In general we consider the date of a fully-fledged VAT to be the relevant point of implementation. Similarly, countries in which VAT excludes services and other activities, like Egypt, are not classified as having VAT but as having a sales tax.

Figure 1: VAT INTRODUCTION (1954-2016)



Notes: The figure shows the number of countries introducing VAT in a given year, based on information for 137 countries, which include the 97 countries covered in this paper. The beginning and the end of the Kennedy, Tokyo and Uruguay GATT negotiation rounds are marked with reference lines. For cumulative VAT adoption disaggregated by continent, refer to Figure A-5 in the Appendix.

Figure 2: VAT INTRODUCTION VIS-A-VIS WTO MEMBERSHIP



Note: The figure shows the difference between the year of VAT introduction and the year of WTO membership based on 126 countries. For example, a difference of -2 means that a country introduced VAT two years prior to entering the WTO.

tive of previous GATT membership). The figure clearly shows that VAT was mainly instituted in a window of -5 to 5 years around the date of accession. In fact, a large fraction of WTO applicants introduced VAT some years before the date of membership during their entry negotiations.[15] This may reflect anticipatory reforms in expectation of future declines in revenues from import duties as noted above.

3 Methodology

The empirical analysis below explores the revenue performance of the tariff-cum-tax reforms described in the previous section. More specifically, we analyze whether and to what extent revenue losses from import duties have been encountered by accession countries, and if so, whether these losses have been compensated for by increased VAT tax revenues, involving the introduction of a VAT or adjustments in an existing VAT. Eventually, provided that reforms were successful, gains in VAT would cover losses in tariff revenues and stabilize total revenues, or yield a total revenue increase. Yet, given the concerns raised in the literature, we might find that the net effect is negative, *i.e.* the sum of revenues from import duties and VAT decreases.

In order to test for revenue substitution, the literature (*e.g.*, Khattry and Rao, 2002 and Baunsgaard and Keen, 2010) has focused on the empirical relationship between total tax revenue and revenue

[15] We observed other patterns of VAT introduction in the data, unrelated to GATT/WTO membership, which shed light on the countries in the tails of the VAT introduction distribution relative to WTO membership shown in Figure 2. First, with a single exception, all post-Soviet republics introduce VAT one to two years after the disintegration of the USSR. Second, together with Western Europe, Latin American countries are amongst the earliest VAT adopters as shown in Figure A-5. According to Tanzi (2000), the trigger towards more effective indirect taxation in Latin America was the 1980s debt crisis, followed by strong inflationary pressures in the 90s, and a political class favourable to reducing import and export taxes and replacing lost revenue with domestic taxes on consumption. At the other end of the spectrum, the oil rich Middle Eastern countries introduce VAT much later. A similar pattern is observed for small island economies, which are frequently dependent on foreign aid, or are tax havens.

from import duties. As noted above, a strong point of this approach is its use of a comprehensive continuous indicator of trade liberalization, but a drawback is that revenues from tariffs are not simply determined by the government, but are also affected by consumption and trade. Hence, the measure of trade-liberalization might capture second-round effects of trade-liberalization, which are featured in the theoretical literature (*e.g.*, Emran and Stiglitz, 2005). Moreover, since revenues from tariffs and taxes are likely subject to similar shocks, using tariff revenue as a measure of trade liberalization raises econometric issues.[16]

Rather than relying on changes in tariff revenues as an indicator of trade liberalization policies, we consider GATT and WTO entry as liberalization episodes. Formally, we study revenue developments of both import duties (T^{IMP}) and consumption taxes (T^{CON}) before and after countries become members of GATT and WTO and provide estimates of the system

$$T_{i,t}^{IMP} = a_{0,i} + a_1 I(TA)_{i,t} + x'_{i,t} a_2 + a_{3,t} + \epsilon_{i,t}, \quad (1)$$

$$T_{i,t}^{CON} = b_{0,i} + b_1 I(TA)_{i,t} + x'_{i,t} b_2 + b_{3,t} + \eta_{i,t}, \quad (2)$$

where $a_{0,i}, b_{0,i}$ are country-fixed effects, $a_{3,t}, b_{3,t}$ are time-fixed effects, $x'_{i,t}$ is a vector of control variables capturing other determinants of revenues. $\epsilon_{i,t}$ and $\eta_{i,t}$ are random disturbances. $I\,(TA)$ is a binary indicator reflecting all periods during which the multilateral trade agreement (TA) is binding: For all years when the trade policy is subject to the agreement's rules the indicator has value one, $I\,(TA)_{i,t} = 1$, and is zero otherwise.

The coefficient on $I(TA)$ in equation (1), a_1, reveals by how much revenues from import duties have declined or increased relative to the pre-accession period. Given the weak trade liberalization

[16] Baunsgaard and Keen (2010) utilize lagged tariff revenues as instrumental variables.

effects of GATT/WTO found in the previous literature, we might find that the coefficient a_1 is not statistically different from zero. As noted above, however, major adjustments in enforcement, improved discipline and the specific spell out of commitments through Schedules of Concessions during the Uruguay Round as well as the creation of the WTO itself should have strengthened the link between GATT/WTO membership and trade liberalization. If current tariffs violate general requirements of this trade agreement, such as the Most-Favored-Nation principle, if tariffs are above the agreed bound rates, or if specific concessions are made in order to reach an agreement and to comply with its terms, the corresponding adjustments in tariffs should lead to a decline in tariff revenue. Accordingly, in line with the decline in average applied MFN rates, we expect to find that $a_1 < 0$, indicating revenue losses from import duties. Provided that membership exerts a downward effect on import duties that prompts consumption tax reforms such as VAT introduction, tax base broadening, or tax rate increases, the sign of b_1 should be positive, $b_1 > 0$. Estimation of equations (1) and (2) yields a point-estimate of the total revenue effect $a_1 + b_1$.

OLS estimation of equations (1) and (2) which treats $\epsilon_{i,t}$ and $\eta_{i,t}$ as random, yields differences-in-differences (DID) estimates of the treatment effects of GATT/WTO membership on revenues from import duties and VAT as outcome variables. Unbiased estimates of treatment effects can be obtained if certain assumptions hold. A key requirement is that the variation in GATT/WTO accession is independent of potential outcomes. Given the concerns about revenue substitution, the decision to join GATT/WTO could be adversely affected by the need to substitute a large amount of revenues from import duties. Also the administrative burden associated with implementing a VAT and ensuring compliance might be particularly large for small countries and countries with a large informal sector.[17] Though the DID estimation removes the influence of all time-constant

[17] Another source of heterogeneity is countries' current account position, as the border-tax adjustment associated

confounding factors, time-varying determinants of revenues from import duties or VAT could be related to benefits and costs of revenue substitution and could, therefore, confound the treatment effect. In DID estimation confoundedness of treatment is typically ruled out by the common trend assumption,[18] which requires in our case, that revenues from import duties and VAT are subject to common trends in treated and non-treated countries.

One way to reduce the restrictiveness of the common trend assumption is to include controls that capture potentially important determinants of revenues. This includes GDP per capita, the share of imports in GDP and also the share of agriculture, which may capture also differences in the size of the informal sector. A further source of variation that might invalidate the common-trend assumption are policy changes that affect revenues. Examples might be customs unions or regional trade agreements but also aid programs. If these policies are correlated with tax reforms, their omission might result in biased estimates of the effects on consumption tax revenues. In particular, countries that take part in certain IMF programs are required to pursue trade liberalization policies as well as tax reforms as part of lending conditionality (see footnote 7 above). To take this into account, our analysis explicitly controls for the presence of customs unions, regional trade agreements as well as participation in IMF programs. We further explore the potentially confounding effect of general economic reforms captured by privatization efforts.

Controlling for all possibly confounding time-varying determinants of revenues from import duties and VAT, however, is not possible and adding controls raises further challenges as these variables need to be exogenous. Given these limitations, the analysis below also provides estimates obtained by using the synthetic control method (SCM) pioneered by Abadie and Gardeazabal (2003) and

with the introduction of a VAT, will tend to benefit countries with a deficit (see Amiti, 2017).

[18] For the relationship between unconfoundedness and common-trend assumption see Lechner (2011).

later applied in Abadie *et al.* (2010) and (2015), for example. The SCM approach has been used in the comparative analysis of policies using aggregate data, where unobservable characteristics exert time-varying effects. SCM provides consistent estimates of a_1 and b_1 even if there are different trends in $\epsilon_{i,t}$ and $\eta_{i,t}$ among subgroups of the population.[19]

Another advantage of the method is that the exogeneity of control variables with respect to treatment does not matter, since only the pre-treatment period is used to produce the synthetic control. For the analysis of GATT/WTO membership, we define a pool of countries ("donors") for every accession. It comprises countries, which did not join GATT/WTO during the observation period. Among this pool of countries, we construct a weighted average of observations to produce a counterfactual series, *i.e.* a synthetic control. The weights are chosen so as to minimize the difference between the pre-intervention characteristics of the treated and non-treated observations. The SCM estimator is then the difference between the post-intervention values of the treated country and the synthetic control. Details on the implementation of the SCM are provided in the Appendix.

In contrast to Abadie *et al.* (2010), we observe not just a single treated unit (a state) but multiple treated units. In other words, for each country joining GATT/WTO, we obtain separate estimates of the treatment effects. Therefore, we report average treatment effects using weighted averages of the estimates

$$\widehat{a}_1 = \sum_{j=1}^{n} \widehat{a}_{1,j} v_j, \quad \text{and} \quad \widehat{b}_1 = \sum_{j=1}^{n} \widehat{b}_{1,j} w_j. \tag{3}$$

Following Acemoglu *et al.* (2016) and Osikominu *et al.* (2017), the weights v_j, w_j correspond to

[19] Formally, this approach generalizes equations (1) and (2) by assuming that the residuals follow $\varepsilon_{i,t} = \lambda_t \mu_i + \phi_{i,t}$ and $\eta_{i,t} = \kappa_t \nu_i + \varphi_{i,t}$, where $\phi_{i,t}$, $\varphi_{i,t}$ are random shocks for each individual country, λ_t, κ_t are common shocks, and μ_i, ν_i are country-specific parameters.

the inverse prediction errors for revenues from import duties and consumption taxes in the pre-membership period.[20] Thus, a higher weight is assigned if the pre-treatment outcome is more accurately captured by the procedure.

One requirement that needs to hold for both DID and SCM estimates is that the treatment has no effect on the pre-treatment population. In our case, this implies that GATT/WTO membership exerts no effects on revenues before membership. Whether this assumption holds, can be explored by an analysis of the timing of effects in the DID estimations, *i.e.* by incorporating leading and lagged terms of $I\left(TA\right)_{i,t}$ in equations (1) and (2). Of particular importance is the issue, whether some tariff reforms have already been implemented before accession. From a theoretical perspective, such pre-accession reforms are not part of an effective negotiation strategy as they would undermine the bargaining power of the applicant (*e.g.*, Bond *et al.*, 2003). The current level of import duties is not only an important bargaining chip for countries negotiating the terms of their accession: Since negotiations can last many years, it is reasonable for a country to stick to its preferred revenue structure as long as the accession is still in a negotiation stage and benefits of membership are absent. Pre-membership effects could, however, indicate reverse causation. Negotiations might speed up for instance, if import duties have already declined, so that expected losses from trade liberalization are reduced. If the ultimate decision to alter tariffs is postponed, as new members enjoy phase-in periods or special adjustment provisions, lagged membership effects could also be present.[21]

[20] Formally

$$v_j = \frac{RMSPE\left(\widehat{T}^{IMP}\right)_j^{-1}}{\sum_{j=1}^{n} RMSPE\left(\widehat{T}^{IMP}\right)_j^{-1}},\ w_j = \frac{RMSPE\left(\widehat{T}^{VAT}\right)_j^{-1}}{\sum_{j=1}^{n} RMSPE\left(\widehat{T}^{VAT}\right)_j^{-1}},$$

where $RMSPE\left(T^{IMP}\right)_j$, $RMSPE\left(T^{VAT}\right)_j$, are the root mean squared prediction errors for import duties or consumption taxes in country j in the pre-treatment period, respectively.

[21] The so called General System of Preferences allows developed countries to offer non-reciprocal preferential treat-

Similarly, consumption tax revenues might display lagged responses and pre-membership effects. For instance, governments might postpone VAT reform in an attempt to conceal the cost of reaching a trade agreement. From Figure 2 we would expect that tax reforms are initiated around or before the time of membership. In particular, if substantial revenue losses are expected, tax reforms might be implemented before membership becomes effective and tariff commitments enter implementation phase. While countries joining GATT/WTO do not have full control over the timing of membership, one could argue that, in the presence of concerns about revenue substitution, candidates may delay negotiations until the success of a consumption tax reform can be evaluated. In this case, pre-membership effects could be indicative of reverse causation.

To test for lagged responses and pre-membership effects, we extend specifications (1) and (2) to include leads and lags of $I(TA)$ following Autor (2003) and Malani and Reif (2015). Formally,

$$T_{i,t}^{IMP} = a_{0,i} + \sum_{s=-q}^{p} \alpha_{t-s} \overline{I(TA)}_{i,t-s} + a_1 I(TA)_{i,t-q} + x'_{i,t} a_2 + a_{3,t} + \omega_{i,t}, \quad p \geq 1. \tag{4}$$

$$T_{i,t}^{CON} = b_{0,i} + \sum_{s=-q}^{p} \beta_{t-s} \overline{I(TA)}_{i,t-s} + b_1 I(TA)_{i,t-q} + x'_{i,t} b_2 + b_{3,t} + \eta_{i,t}, \quad q \geq 1. \tag{5}$$

Both specifications allow GATT/WTO accession to exert different effects in the first years of membership and to exert an effect even before membership starts. The subscripts of the variables indicate the respective period, so that $I(TA)_{i,t-q}$ denotes q-th lag of the membership variable. Hence a_1 and b_1 capture the long-term effect of membership that shows up q-periods after actual entry until the end of the observation period. The upper-bar variables $\overline{I(TA)}$ are used to measure temporal effects of GATT/WTO membership. $\overline{I(TA)}_{i,t}$, for instance, has a value of one in the

ment to exports from their developing trade partners. Further, special exceptions are given from certain obligations due to balance of payments issues and infant industry protection in developing countries.

accession year, but is zero in all other years. One period ahead of accession, *i.e.* one period before entry, $\overline{I(TA)}_{i,t+1} = 1$. Conversely, $\overline{I(TA)}_{i,t-1} = 1$ one period after accession, *i.e.* in the year after the accession year. For $q, p = 1$, the year before GATT/WTO membership shows an effect if $\alpha_{t+1} \neq 0$ or $\beta_{t+1} \neq 0$. The year of membership is allowed to be associated with a different effect than in the long-run, as α_t may differ from a_1 and β_t may differ from b_1. If $\alpha_t = a_1$, $\beta_t = b_1$, and $\alpha_{t+1} = 0$, $\beta_{t+1} = 0$, we obtain the basic specifications (1) and (2). A negative α_{t+1} would be evidence of pre-membership effects, suggesting that import duties start declining before GATT/WTO accession. A positive β_{t+1} would indicate that consumption taxes are rising before entry. By setting $q, p > 1$ further periods before and after accession can be included in the test.

To identify a period when revenue losses from import duties may be expected although not yet realized, we provide results from an alternative specification for consumption taxes which sets the membership variable to one, $I(TA) = 1$, at the start of negotiations about WTO accession instead of the time of entry. More precisely, we refer to the date of submission of a Memorandum. It is only after a country submits this detailed summary of its foreign trade regime that final negotiations with existing WTO members can begin. The Memorandum includes a description of laws, legal acts, import licensing procedures, customs valuation, list of foreign trade agreements and other supporting information. Without this collection of information on the table, which represents a considerable investment of resources by the candidate, the Working Party, established whenever there is a new request for accession, cannot prepare its Report and negotiations cannot move forward.[22,23] If we find significant effects for consumption taxes in the periods before a Memorandum

[22] More information on the accession process can be found here: https://www.wto.org/english/thewto_e/acc_e/cbt_course_e/c4s1p1_e.htm

[23] Jones (2009) also points out that many candidate countries are not aware of the nature of the scope of the required reforms until the final negotiations begin.

submission, however, the pre-membership effects are perhaps not driven by anticipation but are rather indicative of reverse causation: countries would first reform consumption taxes and then start to negotiate about WTO accession conditional on the revenue performance.

Although the basic specification has treated the parameters of interest a_1 and b_1 as constant, for various reasons, they might differ over time. One reason is institutional change. As discussed above, accession into the WTO is expected to be associated with a higher level of commitments and hence may exert a stronger downward effect on import duties than GATT accession. As this would increase the need for revenue substitution, the effect of WTO membership might also be stronger on VAT revenues. The testable empirical implication is that the parameters of interest are larger (in absolute terms) during the WTO period than before.

Another potential reason for time varying parameters is the existence of learning effects in regard to both new applicants and existing WTO members. Applicants' performance in implementing appropriate tax reforms might be influenced by the experience of countries that have already acceded.[24] Working party members that have participated in numerous accession negotiations can learn over time to extract larger concessions from new applicants. Larger concessions might also be driven by the increasing participation of existing WTO members in the working parties for new accession countries (see Figure A-6 in the Appendix). Countries' enhanced knowledge of how to successfully transition towards VAT combined with a growing number of working parties with continuously improving negotiation skills would imply larger declines in import duties, but also larger gains in VAT revenue for more recent members. Apart from testing for time varying parameters, the empirical analysis explores the heterogeneity of treatment effects by interaction

[24] Moore (2014) notes that in Anglophone Africa, VAT introduction created a common challenge and that tax administrations learned from comparative experiences.

terms with the number of Working Party members.

4 Data

The data used to analyze the revenue implications of GATT/WTO entry covers 97 countries over the period 1990-2011. As of 2011 this includes 72 WTO members and 25 non-members. The data captures existing contracting parties of GATT in 1990. It also contains countries joining GATT during the last stages of the Uruguay Round, and countries that acceded to the WTO directly. High-income industrialized countries that implemented trade liberalization and general consumption taxes early on as well as oil-rich Middle Eastern countries that have a rather specific revenue structure are not included in our analysis. Several current WTO members and a handful of non-members are left out mainly because in the data sources, it proved impossible to obtain separate figures for general consumption tax revenue and/or revenues from import duties for these countries. For others the figures are unreliable, or missing. We removed several years surrounding the transitions of the centrally planned European economies towards free markets.[25]

The data consists of information on general consumption taxes, collected domestically and at the border, import duties, the share of imports and agriculture in GDP, as well as GDP per capita. See Table 2 for basic descriptive statistics, and Table A-6 in the Appendix for descriptive statistics by continent. Import duties do not include other duties or charges discriminating against imports such as stamp duties, development tax, *etc.* Consumption taxes exclude excises and other indirect taxes whenever possible, with very few exceptions when these could not be separated. When collecting

[25]The problem of obtaining reliable data for countries in transition is also noted in Baunsgaard and Keen (2010) as well as in the Government Revenue Dataset from the International Centre for Tax and Development.

the data, we made sure that there is no overlap between the revenue variables and that import duties only incorporate tariff revenue, while consumption taxes collected at the border are counted together with domestic consumption taxes.[26] The definitions of all variables and their sources are listed in Table A-5 in the Appendix.

Table 2: DESCRIPTIVE STATISTICS

	Mean	SE	Min	Max	N
Import duties per GDP	2.50	3.13	0	35.05	1,842
Consumption taxes per GDP	5.06	2.72	0.10	16.13	1,808
Agric. prod. per GDP	17.29	13.82	.037	65.97	2,107
Imports per GDP	48.15	24.99	6.47	211.92	2,130
GDP per capita	5,926	9,672	113	61,662	2,117

Notes: The table depicts summary statistics: mean, standard error, minimum and maximum value, as well as number of observations.

41 countries in the data became GATT contracting parties before 1990, when the panel begins. For them $I(GATT/WTO)$ equals 1 for the whole duration of the panel. 17 countries entered GATT in the period 1990-1994. These were Uruguay Round participants, who submitted and gained approval for their GATT and GATS schedules before 1 January 1995. 14 countries were not GATT contracting parties before 1995. They acceded directly into the WTO.[27] For these countries, $I(GATT/WTO)$ coincides with the date of WTO entry. It is these 31 (=17+14) countries in the data that provide the identifying variation in membership. The remaining 25 countries are non-members, current WTO observers, or former observers who joined the WTO after 2011, which is the last year in the panel.[28] See Table A-7 in the Appendix for details on years of GATT/WTO entry.

Since the 31 accession countries captured in the data are only a subset of all 58 countries joining

[26]This issue prevented us from using standard databases such as IMF's Government Finance Statistics and necessitated the collection of the revenue data mostly from IMF Statistical Appendices and national statistical offices.

[27] For the 14 countries that joined WTO directly the number of working parties (NWP) varies between 16 and 43 with a median of 21.

[28]WTO observers must initiate accession negotiations within five years of obtaining an observer status.

GATT/WTO during the time period under consideration, Table A-4 in the Appendix provides some statistics that shed light on the representativity of the estimation sample. It shows that in terms of geography, all five world regions are represented in the sample countries. However, the regional shares differ, in particular, the sample under-represents Asia, which reflects the exclusion of various Middle Eastern countries. In terms of GDP per capita and population size, the two groups of countries show similar median values, whereas differences in the mean are attributable to outliers.[29] When it comes to VAT adoption, the sample countries show a higher propensity to introduce VAT: In a time window of +5/-5 years of GATT/WTO entry, 68% of sample countries introduced VAT compared to 43% in the population. This is not surprising, however, as some of them already had a VAT in place before entry (see footnote 13).

The general development of revenues from import duties and consumption taxes from 1990 to 2011 for the new WTO members, the 1990-1994 GATT signatories, the pre-1990 GATT contracting parties and the non-members is depicted in Figures A-1 and A-2 in the Appendix. They show that in 2011 new WTO members report the lowest revenues from import duties among all countries. Non-members collect the highest amount of import duties in percent of GDP in 2011. At the end of the observation period, consumption tax revenues are highest among the new WTO members and the 1990-1994 GATT signatories.

[29] In terms of GDP per-capita, outliers are Liechtenstein, the United Arab Emirates, and Qatar; in terms of population size, another outlier is China.

5 WTO Accession and Revenues from Import Duties

Table 3 reports the effect of GATT/WTO membership on the revenues from import duties following equation (1). To avoid possible random-group effects, inference is based on standard errors clustered at the level of countries as suggested by Bertrand *et al.* (2004). Column (1) starts out with a basic differences-in-differences estimation including only country- and year-fixed effects, while Column (2) adds some basic control variables. The negative coefficient of $I(_{GATT/WTO})$ points to a decline in tariff revenue after entry into GATT/WTO. The point estimate of this effect translates into considerable revenue losses amounting to about 0.73 % of GDP.

While the magnitude of the membership effect enables us to see how large the revenue losses are, its statistical significance is of interest in itself. The time span of the data, 1990-2011, covers a period when the GATT had already evolved from a system with weak rules and lack of effective enforcement to high legalization and discipline, strict enforcement and high demand for participation and political input (Pauwelyn, 2005). These developments should have resulted in downward adjustments in tariff revenues. The significantly negative estimated effect of late-Uruguay GATT/WTO membership on import duties is in accordance with this hypothesis.[30]

To check for robustness, alternative specifications have been tested. As mentioned above, our focus on GATT/WTO leaves out the effects of other trade liberalization reforms. This might introduce a downward bias to the estimated revenue shortfall in equation (1) as countries joining the WTO may already exhibit lower revenues from import duties. The specification in Column (3)

[30]The sample period can also explain why our results differ from Rose (2004), who, in an analysis of trade policies over an earlier period, 1950-1998, finds GATT/WTO membership to be associated neither with trade liberalization, nor with significant declines in import duties.

Table 3: IMPORT DUTIES: CONTEMPORANEOUS, PRE- AND POST-GATT/WTO ENTRY EFFECTS

	(1)	(2)	(3)	(4)	(5)	(6)
$I(GATT/WTO)$	-0.62**	-0.73**	-1.00***			
	(0.29)	(0.30)	(0.35)			
$I(GATT/WTO) \times I(\text{IMF})$			0.60			
			(.453)			
$I(CU)$			.195			
			(.206)			
$I(RTA)$			-.436**			
			(.217)			
$\overline{I(GATT/WTO)}_{t+2}$					0.13	0.16
					(0.34)	(0.41)
$\overline{I(GATT/WTO)}_{t+1}$				-0.20	-0.16	-0.14
				(0.25)	(0.34)	(0.36)
$\overline{I(GATT/WTO)}_{t}$				-0.40	-0.36	-0.29
				(0.25)	(0.33)	(0.43)
$\overline{I(GATT/WTO)}_{t-1}$						-0.32
						(0.38)
$I(GATT/WTO)_{t-1}$				-0.81**	-0.77*	
				(0.36)	(0.42)	
$I(GATT/WTO)_{t-2}$						-0.81*
						(0.46)
logGDPp.c.		0.64	0.55	0.62	0.59	0.52
		(0.51)	(0.50)	(0.57)	(0.61)	(0.56)
Agric.		-0.02	-0.02	-0.01	-0.01	-0.01
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Imp.		0.00	0.00	-0.00	-0.00	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	3.60***	-1.02	-0.29	-0.64	-0.54	0.16
	(0.23)	(4.03)	(3.95)	(4.47)	(4.73)	(4.37)
Observ.	1,842	1,842	1,842	1,709	1,627	1,563
Countries	97	97	97	97	97	97

Notes: The dependent variable is revenue from import duties in percent of GDP. The sample refers to 1990-2011. *Agric.* and *Imp.* are the values of agriculture and imports in percent of GDP. *logGDPp.c.* is the logarithm of per capita GDP. All columns include country- and year-fixed effects. $\overline{I(GATT/WTO)}_{t+s}$ equals one in the sth year prior to GATT/WTO membership, and $\overline{I(GATT/WTO)}_{t-s}$ equals one in the sth year after entry. $I(GATT/WTO)_{t-j}$ equals one for all years starting after the j-th year of membership. Standard errors are clustered by country in all specifications. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

includes indicators for the membership in regional trade agreements, $I(RTA)$, and for membership in customs unions, $I(CU)$. As trade liberalization reforms may already be implemented unilaterally due to trade related conditionalities of IMF programs, we also add an interaction term between the membership variable and an indicator variable $I(IMF)$. The latter captures those 29 countries in our sample that have received funds from the IMF under the Poverty Reduction and Growth Facility.[31] Column (3) reports results when including all indicators jointly. While the interaction term is not significant, membership in other free-trade agreements is associated with significantly lower revenues from import duties. The GATT/WTO membership effect turns out to be slightly stronger for non IMF-program-participants than the baseline estimate in Column (2). This lends credence to the view that among countries bound by IMF conditionality some trade liberalization measures may have already been implemented, mitigating the revenue loss from WTO accession.[32] The outcomes of several other robustness checks are described in the Appendix.

As discussed above, due to institutional change and possible learning effects, the effect of GATT/WTO may vary over time. One issue is whether the higher strictness of the trade regime under the WTO manifests in stronger revenue effects in the WTO period. As reported in Table A-1 in the Appendix, an interaction term for the 14 countries in our sample that joined the WTO directly shows no significant effect, indicating that the magnitude of the membership effect does not vary between

[31] Saner and Guilherme (2007) point out that 80% of countries participating in 56 programmes under SAF/PRGF have been imposed a trade reform measure with a binding mode of conditionality concerning the disbursement arrangements of the IMF. In the early 1990s, trade policy reform accounted for 30% of the conditions in the World Bank adjustment lending. Sub-Saharan Africa, in particular, is subjected to extensive and comprehensive trade liberalization reforms concerning tariffs, non-tariff barriers and customs administration. These countries are listed in bold in Table A-7 (see Appendix) and comprise of both accession and non-accession countries.

[32] It is also possible that WTO membership triggers not only trade reform, but also other economic reforms that have revenue implications for consumption taxes. Using the World Bank's Private Participation in Infrastructure Database as well as the Privatization Barometer Database, we constructed an index of annual privatization efforts for our sample of countries. Controlling for privatization does not change the effect WTO membership has on consumption taxes (results available upon request).

the subgroups of direct WTO and 1990-1994 GATT members. We interpret this as evidence of the stricter trade regime already prevailing at the end of the Uruguay Round before the transition from the GATT to the WTO.[33]

As a result of learning effects and the growing number of WTO members participating in accession working parties, concessions made for WTO membership might also be increasing over time. Although an interaction with dummies for accession after 2000 as well as an interaction with a linear time trend in the accession year point to larger revenue losses in later years, coefficients are not statistically significant, even if we allow for region-specific time effects. To test more specifically for time-varying effects due to the increased participation in working parties we used an interaction with the number of participation countries in working parties (see Figure A-6). For import duties, a positive effect is found pointing to lower concessions if the number of working parties increases.

Using the extended specification (4), Table 3 sheds light on whether import duties start diminishing before the respective WTO membership dates. Depending on the specification, $I(_{GATT/WTO})_{t-1}$, or $I(_{GATT/WTO})_{t-2}$ measure the long-run effect of GATT/WTO membership on import duties one and two years after entry, respectively, while anticipation effects are captured by $\overline{I(_{GATT/WTO})}_{t+2}$ and $\overline{I(_{GATT/WTO})}_{t+1}$. The coefficients on $\overline{I(_{GATT/WTO})}_{t}$ and $\overline{I(_{GATT/WTO})}_{t-1}$ demonstrate if and how the short-term effect differs from the long-term effect. In Column (4) we check for pre-membership effects one year before entry and allow for lagged responses by including separate indicators for the first and all other years of membership.[34] In Column (5) we add an indicator for the period two years before entry. None of the leads are statistically significant demonstrating that import duties do not decrease before membership. One explanation could be that countries are unwilling

[33] An interaction distinguishing between Article XXXIII and XXVI:5(c) entrants also yielded no significant effect.

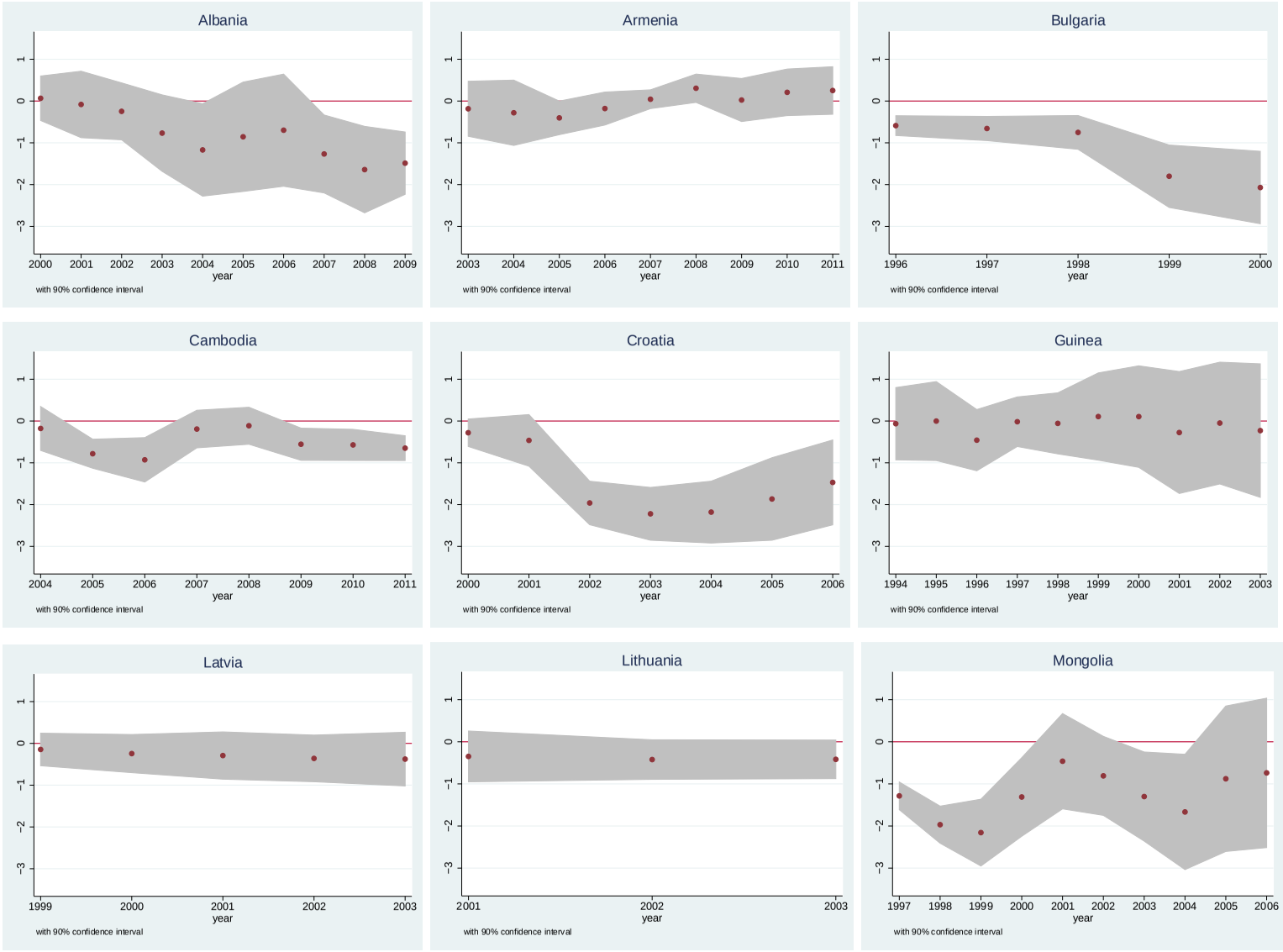
[34] The within year variation is suppressed when testing for anticipation and lagged responses of membership.

to implement concessions during the trade negotiations, as this would undermine their bargaining position as discussed above. In fact, the effect of the lagged accession dummy in Columns (3) and (4) in combination with the insignificance of the first year of membership suggests that import duties decline after membership, which is in line with delays or pre-agreed implementation periods. This view is confirmed in Column (6) where we add a further post-entry indicator for the second year after the date of entry: Membership takes two years to show a significant effect.

To assess the effects of GATT/WTO entry under the more general assumption that unobserved country characteristics give rise to differential trends, we employ the synthetic control method for a subset of nine countries, for which this method could be implemented. With the exception of Guinea, all of these countries joined the WTO directly. While detailed predictions for accession countries and their counterfactual outcomes are shown in the Appendix, Figure 3 plots the treatment effects. Confidence bands are based on "placebo" estimations generated on the false assumption of GATT/WTO accession in each of the countries that serve as potential controls ("donors"), *i.e.* those countries that did not join GATT/WTO in the observation period and only serve as a reference point.

For seven countries the revenue development is below that of the synthetic control during GATT/WTO membership pointing to a clear effect of membership – in five countries the estimated treatment effect of membership is significantly negative (Albania, Bulgaria, Cambodia, Croatia, Mongolia). For two countries (Armenia, Guinea) no clear difference is found. No country shows a significant positive effect.

Figure 3: IMPORT DUTIES (% GDP): TREATMENT EFFECTS (SCM)



Note: The figures depict the treatment effect on import duties (dots) by year and a confidence band obtained from "placebo" estimations for the control-group countries.

Based on the empirical estimates for the mean GATT/WTO membership effect (see Table A-2 in the Appendix), the average treatment effect weighted with the inverse of the root mean squared prediction error (see equation (3)), is

$$\widehat{a}_1 = -0.384.$$

This implies that import duties decline after GATT/WTO membership by more than a third percentage point of GDP. Though this decline is smaller than that indicated by the results in Table 3, it should be noted that some of the countries included in the analysis also report relatively low levels of import duties before membership.[35]

6 WTO Accession and Revenues from Consumption Taxes

Having established that revenues from import duties decline significantly with GATT/WTO membership, this section turns to the effects on consumption tax revenues. Table 4 displays basic results for the effect of GATT/WTO membership on consumption tax revenues using specification (2). The regression in Column (1) includes only the membership dummy, and Column (2) uses the same control variables as the basic specification for import duties above. The estimates reveal a significant increase in consumption tax receipts after GATT/WTO membership. With controls for GDP per capita and the shares of agriculture and imports, the results indicate a revenue gain amounting to about 1.24% of GDP.

Column (3) employs control variables for the membership in regional trade agreements and customs

[35] The average import duty revenue of the countries joining GATT/WTO in the pre-membership period is only 1.84% of GDP, whilst the total sample average is 3.31% of GDP in the period 1990-1993 (see Table A-6).

Table 4: CONSUMPTION TAXES: GATT/WTO ENTRY AND MEMORANDUM EFFECTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I($GATT/WTO$)	1.17**	1.24**	1.40*					
	(0.51)	(0.50)	(0.73)					
I($GATT/WTO$)× I(IMF)			-.384					
			(.889)					
$I(CU)$			-.383					
			(.244)					
$I(RTA)$			.242					
			(240)					
$\overline{I(GATT/WTO)}_{t+3}$							-0.10	-0.06
							(0.56)	(0.41)
$\overline{I(GATT/WTO)}_{t+2}$						-0.05	-0.14	-0.14
						(0.51)	(0.61)	(0.34)
$\overline{I(GATT/WTO)}_{t+1}$				1.11**	0.67	0.61	0.50	0.96
				(0.51)	(0.44)	(0.52)	(0.59)	(0.80)
$\overline{I(GATT/WTO)}_{t}$				1.51**	0.83**	0.75*	0.63	0.83
				(0.65)	(0.36)	(0.42)	(0.49)	(0.67)
$I(GATT/WTO)_{t-1}$				1.42**	1.39***	1.27**	1.10*	1.75**
				(0.61)	(0.51)	(0.54)	(0.59)	(0.69)
logGDPp.c.		-1.21	1.14	-1.34*	-1.00	-0.97	-0.90	-0.66
		(0.74)	(0.71)	(0.72)	(0.62)	(0.61)	(0.60)	(0.70)
Agric.		-0.04**	-0.04*	-0.05**	-0.04**	-0.04**	-0.03*	-0.03
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Imp.		0.01*	0.01*	0.01*	0.01	0.01	0.01	0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Const.	3.11***	12.5**	11.87**	13.4**	10.8**	10.5**	10.0**	7.68
	(0.44)	(5.75)	(5.51)	(5.48)	(4.82)	(4.78)	(4.69)	(5.37)
Observ.	1,760	1,760	1,760	1,684	1,684	1,603	1,521	1,231
Countries	96	96	96	96	96	96	96	79

Notes: The dependent variable is revenue from consumption taxes in percent of GDP. The sample refers to 1990-2011. *Agric.* and *Imp.* are the values of agriculture and imports in percent of GDP. *logGDP* is the logarithm of per capita GDP. All columns include country- and year-fixed effects. In specifications (1)-(4), $I(GATT/WTO)$ refers to the date of entry into GATT/WTO. In these specifications, $\overline{I(GATT/WTO)}_{t+s}$ equals one in the sth year prior to GATT/WTO membership, and $I(GATT/WTO)_{t-1}$ equals one for all years starting after the first year of GATT/WTO membership. In specifications (5)-(8), $I(GATT/WTO)$ refers to the date when a Memorandum on the foreign trade regime is submitted to the WTO. Standard errors are clustered by country in all specifications. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

unions. It also includes an interaction term for participation in the IMF's PRGF program, since participating countries may have undertaken policies of trade liberalization as well as tax reforms as part of IMF conditionality. While the basic effect of GATT/WTO membership on consumption tax revenues increases, the interaction term as well as the indicators for other trade agreements and customs unions are not significant. Further robustness checks are discussed in the Appendix.

Due to learnings effects, but also as an indirect effect of likely more stringent concessions at the point of WTO entry, the GATT/WTO membership effect on consumption tax revenues may vary over time. In fact, as reported in the Appendix (see Table A-1), allowing for a differential impact of GATT and WTO entry produces a larger effect of WTO entry, but the difference is not statistically significant. The interactions of the GATT/WTO membership variable with a dummy for accession after 2000 and with a linear trend in the year of accession are found to exert positive effects, but they are also insignificant. Further explorations using interactions with the number of working party members did not yield significant results, either.

To explore the timing of effects, we report results using specification (5), which includes leads and lags of the membership dummy. The results are depicted in Table 4. Column (4) adds one lead and one lag and shows that a year ahead, membership has a significant effect. The coefficient of a specification with a second lead term is also significant, but not reported. The pre-membership effects could possibly reflect a forward looking tax policy that institutes reforms before the revenue consequences of GATT/WTO membership affect the budget. An alternative explanation is one of reverse causation, where countries pursue GATT/WTO accession only after a successful consumption tax reform.

To distinguish anticipation from reverse causation, we consider consumption tax developments before and after the start of WTO negotiations. More specifically, in order to identify a period when revenue losses from import duties are expected but not yet realized, we use the date of Memorandum submission. 14 countries in our sample acceded to the WTO under Article XII of the Marrakesh Agreement with its more complicated entry procedures, and submitted a Memorandum. For these countries we change the GATT/WTO indicator by replacing the date of WTO entry with the date of Memorandum submission. Results are presented in Columns (5) to (8) of Table 4. Column (5) includes one lead and one lag of the year of the Memorandum submission (membership year for the GATT parties). Columns (6) and (7) add further leads. In all three specifications the lead terms are not statistically different from zero, indicating that consumption taxes do not respond before the date of Memorandum submission (GATT membership). This suggests that pre-membership effects are not driven by reverse causation, but rather indicate that consumption tax reforms are initiated when a country is firmly on the road to WTO membership.

Note that the estimations yield stronger long-run responses of consumption taxes when differences in timing are taken into account. Compared to an increase of revenues by 1.24% of GDP in Column (2), Column (4) reports a point estimate for the long-term effect of 1.42% of GDP and Column (5) reports an estimate of 1.39%. Unlike the WTO accession protocols, the entry procedure for the 17 countries joining GATT between 1990 and 1994 was not standardized and was less involved. For them, therefore, it is hard to pinpoint a date before entry resembling the date of Memorandum submission. For this reason, Column (8) excludes these countries. In this specification, the lead variables remain statistically insignificant. At the same time, however, the effect of the Memorandum submission increases in size and the long-run effect is estimated to be 1.75%.

To explore the effect of GATT/WTO membership on consumption tax revenues in a setting that allows for country-specific trends, we employ the SCM, as above. Given the presence of anticipation effects with regard to membership, the analysis focuses on the date of Memorandum submission instead on the date of entry. Since Memorandum submission is observed only for a subset of countries, we are able to obtain results for only six countries (Albania, Cambodia, Cape Verde, Jordan, Tonga and Vietnam).

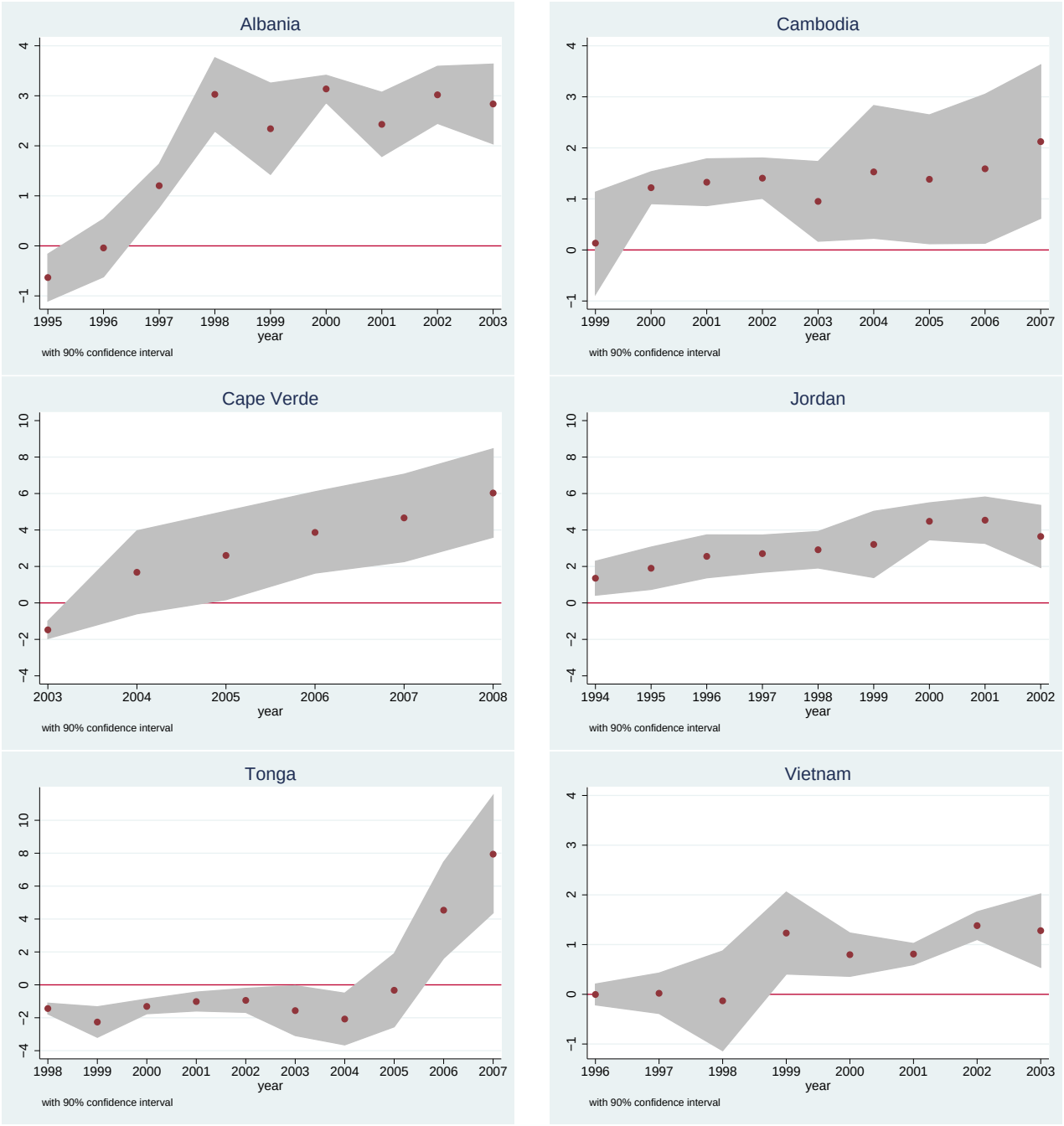
While detailed predictions for accession countries and their counterfactual outcomes are shown in the Appendix, Figure 4 plots the treatment effects. For all countries the revenue development is above that of the synthetic control after the Memorandum submission pointing to a positive treatment effect. Confidence bands are based on "placebo" estimations generated on the false assumption of a Memorandum submission in each of the countries that serve as potential controls ("donors"), *i.e.* those countries that did not join GATT/WTO or issued a Memorandum in the observation period and only serve as a reference point. According to the confidence bands, the estimated effects are all significantly different from zero at a level of 90%.

Based on the empirical estimates for the mean WTO memorandum effect (see Table A-3), the average treatment effect weighted with the inverse of the root mean squared prediction error, see equation (3), is

$$\widehat{b}_1 = 0.622.$$

This indicates that consumption tax revenues increased by more than half a percentage point of GDP.

Figure 4: CONSUMPTION TAXES (% GDP): TREATMENT EFFECTS (SCM)



Note: The figures depict the treatment effect on consumption tax revenues for the respective country (dots) by year and a confidence band obtained from "placebo" estimations for the control-group countries.

7 Total Revenue Effect and Revenue Substitution

The revenue developments of import duties and consumption taxes over periods of GATT/WTO accession suggest that revenue substitution has been successful in general. More specifically, the estimates of the effect of GATT/WTO membership in specifications (1) and (2) indicate that the decline in import duties captured by the parameter $a_1 < 0$ is smaller than the increase of consumption taxes $b_1 > 0$ such that $b_1 + a_1 > 0$. Adding the point estimates of losses from import duties obtained in the basic specification in Column (2) of Table 3 for $\widehat{a}_1$ and of the basic effect on consumption taxes, $\widehat{b}_1$, in Column (2) of Table 4, we obtain $0.51(= 1.24 - 0.73)$, which points to an increase of total revenues by about half a percentage point of GDP. Given the presence of anticipation effects in consumption taxes, the revenue gain might actually be larger. Using the point estimate for gains in consumption taxes $\widehat{b}_1$, in Column (5) of Table 4 we obtain $0.66(= 1.39 - 0.73)$, *i.e.* an increase of total revenues by two thirds of a percentage point of GDP.

Also the SCM estimates point to a revenue gain. Taking the average GATT/WTO membership effect on import duties and the average Memorandum effect on consumption taxes, the point prediction for the total revenue effect is 0.24% of GDP $(= 0.62 - 0.38)$. For two countries we can also compare the SCM results for import duties and consumption taxes directly. Accordingly, in Albania, import duties fell by about 0.5% whereas consumption taxes increased by 1.4% of GDP. The implied total revenue effect is 0.9% of GDP. In Cambodia, import duties are found to decline by 0.3% and revenues from consumption taxes increased by 0.7% suggesting that total revenue increased by 0.4% of GDP.

An alternative way to assess the revenue implications is to focus on the implied fraction of revenues recovered (Baunsgaard and Keen, 2010). It can be computed by relating the gain in consumption tax revenues to the loss in import duties, $\widehat{\theta} = -\frac{\widehat{b}_1}{\widehat{a}_1}$. Whenever this ratio is larger (smaller) than unity, (not) all revenue losses from import duties are recovered through consumption taxes. Since the total revenue effect is positive, the estimates suggest that the fraction of revenues recovered is larger than unity, indicating that every dollar of lost import duties is more than compensated for with consumption taxes. The fraction of revenues recovered implied by the specifications in Columns (2) of Tables 3 and 4 is 1.7; taking account of anticipation effects in revenues from consumption taxes, the effect is 1.9.

A point estimate of the fraction of revenues recovered implied by the SCM analysis is obtained by relating the average effect on consumption taxes, $\widehat{b}_1 = 0.62$ to the average loss from import duties $\widehat{a}_1 = -0.38$. Accordingly, the implied estimate for the substitution effect, $\widehat{\theta} = -\frac{\widehat{b}_1}{\widehat{a}_1}$, is 1.6. This is quite similar to the results obtained in the regression analysis. A similar effect is found for Cambodia. Albania shows an even larger substitution effect.

8 Conclusions

This paper analyzes empirically the fiscal implications of trade liberalization policies. In particular, it considers the role of consumption taxes in recovering revenue losses from import duties. This question is especially pertinent to poor and least developed countries considering trade liberalization policies within the framework of the WTO. In contrast to the existing literature, which addresses revenue substitution by analyzing the correlation between revenue sources, the paper

considers GATT/WTO entry as a liberalization episode and explores its revenue consequences for import duties and consumption taxes separately. We argue and document that entry into the late-Uruguay GATT or its successor, the WTO, is associated with tariff-cum-tax reforms. More specifically, countries joining the GATT/WTO followed a policy of replacing import duties by VAT. Using a large panel of developing and transitional countries for the period 1990-2011, the paper investigates how revenues from import duties and consumption taxes evolve over the course of accession negotiations and GATT/WTO entry.

Employing difference-in-difference regressions as well as the synthetic control method, the results reveal a negative relationship between GATT/WTO membership and import duties. The estimates suggest that losses amount to about 0.4% to 0.8% of WTO members' GDP, on average. Revenue from consumption taxes increases significantly around GATT/WTO accession. Depending on the method employed, the estimates found point to an average increase of consumption tax revenues by 0.6% to 1.4% of GDP. Thus, our findings indicate that countries joining the GATT/WTO have successfully substituted import duties with consumption taxes. Given successful revenue replacement, and in light of the theoretical literature, tariff-cum-tax reforms involving consumption taxes have the potential to cause welfare gains. It should be noted however, that the estimates are identified by the changing revenues of countries joining the GATT/WTO. Hence, our analysis is silent on the question of whether tariff-cum-tax reform would be equally successful in countries that have not entered the WTO.

Our results further demonstrate that the timing of revenue losses from import duties and revenue gains from consumption tax reform is not simultaneous. In particular, cuts in tariffs mostly occur at the time of GATT/WTO entry or later, but not earlier. The full membership effect shows up

after two years. Consumption tax revenue increases as well as VAT adoption typically occur before membership. Nevertheless, no consumption tax effects are found before the date a Memorandum on the foreign trade regime is submitted to the WTO, which marks the beginning of proper accession negotiations. This suggests that the pre-membership effects are not indicative of reverse causation, but rather reflect the anticipation of revenue losses as countries on the road to WTO membership aim to ensure continuous funding of the budget.

In the presence of such anticipation effects, the contemporaneous relationship between total tax revenues and revenues from tariffs captures only a part of revenue substitution. As concerns about revenue losses are of particular importance for those countries where import duties make up a larger share of public funds, this could explain why the previous literature has found weaker substitution effects for least developed countries.

Heterogeneous revenue effects are found, however, with regard to the participation in IMF/WB programs for structural adjustment, poverty reduction and growth. Revenue losses from import duties tend to be larger and consumption tax revenue show a stronger increase in countries that have not participated in these programs. Since unilateral trade liberalization measures as well as tax reforms are typical components of IMF/WB conditionalities for the release of funds, this may reflect a lower need for revenue substitution in these countries upon GATT/WTO accession.

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WTO Membership and the Shift to Consumption Taxes

February 2018

Appendix

Table of Annexes

A Revenue Developments

Figure A-1 shows the development of import duties scaled by GDP for new WTO members, 1990-1994 GATT signatories, pre-1990 GATT contracting parties and non-members. There is a pronounced decline in import duties, with the strongest reduction observed for new WTO members and 1990-1994 GATT parties. While in 1990 the new WTO members and the 1990-1994 GATT signatories collected the highest revenues from import duties, in 2011 they report the lowest figures among all countries. Predictably, non-members collect the highest amount of import duties in percent of GDP, although some decline is observed since 2008. Figure A-2 displays trends in consumption tax revenue for identical country groups. All countries experience revenue growth. At the end of the observation period, consumption tax revenues are highest among the new WTO members.

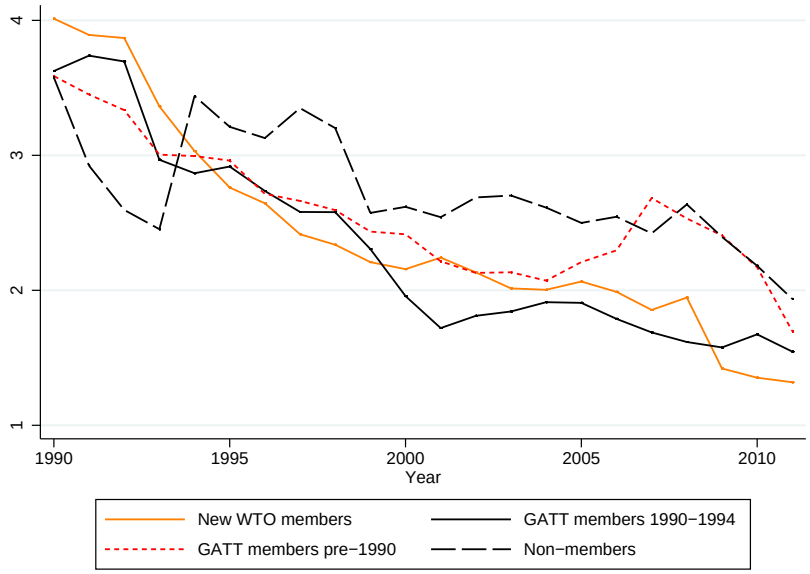
B Policy Developments

Figure A-3 reports GATT/WTO entry by continent using an extended sample of 159 countries that includes the estimation sample.

Figure A-4 shows the average MFN applied tariff rate for the sample countries.

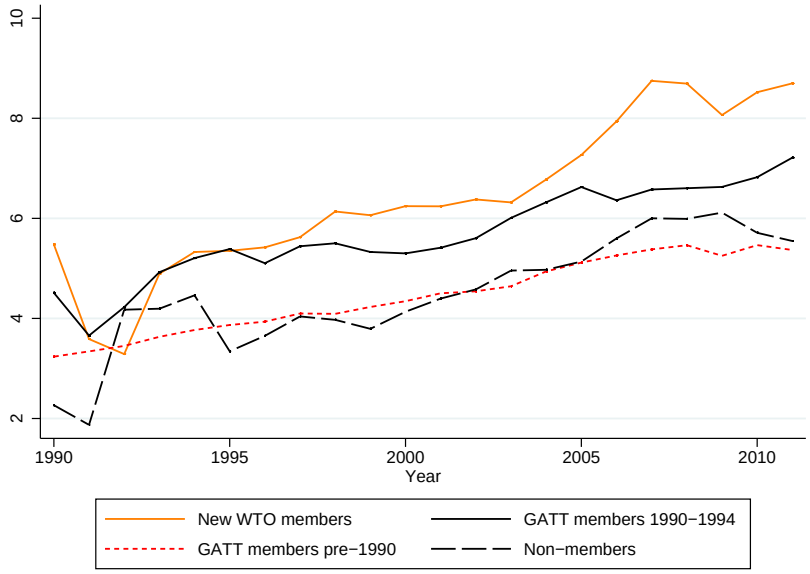
Figure A-5 reports VAT introduction by geographic region using an extended sample of 137 countries that includes the estimation sample.

Figure A-1: IMPORT DUTIES (%GDP) 1990-2011



Note: The figure depicts the evolution of import duties in percent of GDP from 1990 to 2011 for four separate country groups: New WTO members, 1990-1994 GATT signatories, pre-1990 GATT contracting parties and non-members.

Figure A-2: CONSUMPTION TAX REVENUES (%GDP) 1990-2011



Note: The figure depicts the evolution of consumption taxes in percent of GDP from 1990 to 2011 for four separate country groups: New WTO members, 1990-1994 GATT signatories, pre-1990 GATT contracting parties and non-members.

Figure A-6 depicts the average number of Working Party Members for countries that join the WTO in a given year.

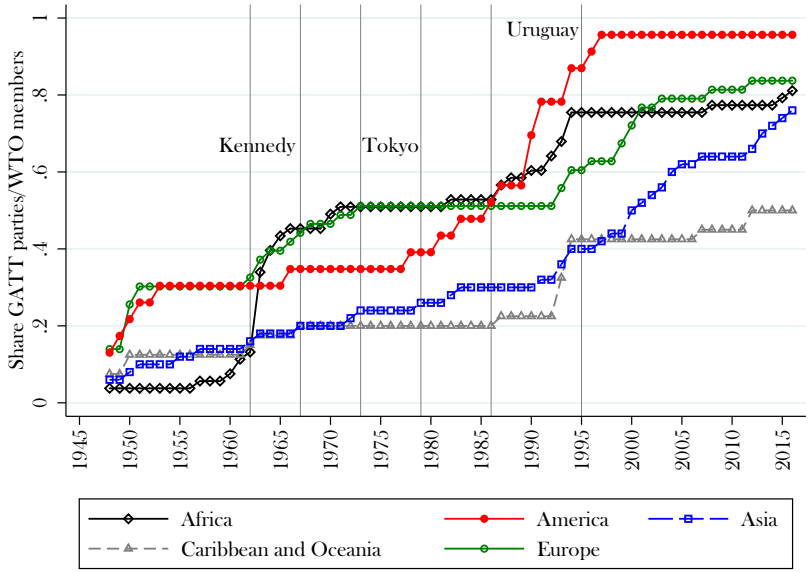
C Robustness Checks

Table A-1 provides various robustness checks for the Differences-in-Differences estimates.

Import Duties

Not reported in the table are further specifications which confirm the robustness of the basic effect of GATT/WTO on import duties. This includes the insertion of total tax revenue as an indicator of the size of the public sector. While the indicator is found to be significant, its inclusion does not affect the estimate of the revenue shortfall associated with GATT/WTO accession. Thus, the effect is not likely driven by changes in the size of the government. A potential problem may arise with regard to non-members of GATT/WTO that serve as a control group in the regressions. Given that some of them started accession negotiations during the observation period, it is possible that adjustments are already under way, which may introduce a downward bias in our setting. Nine of these countries (the Russian Federation, Montenegro, Samoa, Vanuatu, Laos, Tajikistan, Yemen, the Seychelles and Kazakhstan) in fact joined the WTO after 2011, which is the last year in our dataset. However, as noted above, lowering import duties before accession would not constitute an effective negotiation strategy. If import duties in these countries nevertheless declined in the later years of their entry negotiations, the basic estimate would underestimate the effect of membership. Results remain very similar to the baseline estimate, when these countries are removed from the

Figure A-3: GATT/WTO ENTRY BY REGION/CONTINENT 1948-2016

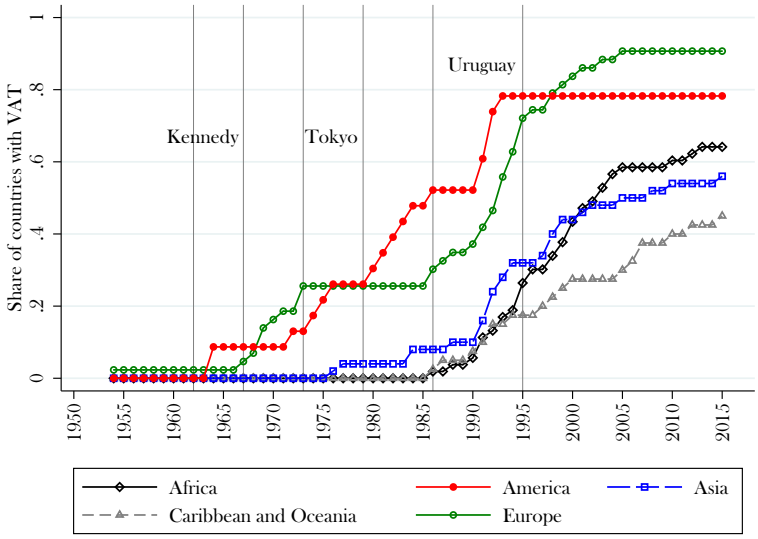


Note: The figure is based on the GATT/WTO membership years of 159 countries divided into five geographic regions. The shares are obtained by scaling the number of GATT/WTO members per region per year with the total number of countries in a given region.

Figure A-4: AVERAGE MFN APPLIED TARIFF RATE

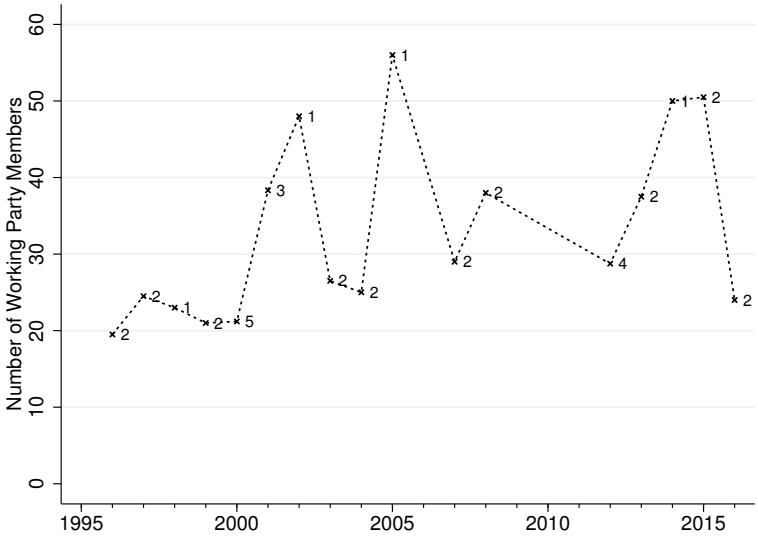
Notes: Based on countries in the sample (Table A-7) excluding countries, which in 2011 are still not WTO members. The year 1995 is highlighted to mark the switch from GATT to WTO in 1995.

Figure A-5: VAT INTRODUCTION BY REGION/CONTINENT 1954-2016



Note: The figure is based on the VAT introduction years of 137 countries divided into five geographic regions. The shares are obtained by scaling the number of countries with a VAT per region per year with the total number of countries in a given region.

Figure A-6: PARTICIPATION IN WORKING PARTIES



Notes: The figure shows the mean number of working party members for all acceding countries joining the WTO in a given year. At each observation, the figure also reports the number of countries joining in the respective year. Authors' calculations using accession data from www.wto.org.

sample. We also included an interaction term between GATT/WTO membership and the status as a least developed country, $I(_{LDC})$, to allow for heterogeneous effects between more and less developed countries. The small and insignificant effect found indicates that import duties decreased as much in LDCs as in the other countries joining GATT/WTO.

Consumption Taxes

Other specifications testing the robustness of the results in Table 4 are described below, but not reported. An interaction with the LDC status of country proved insignificant. Hence, we cannot reject the hypotheses that, like other countries, least developed countries successfully increase consumption tax revenue and, thus, counterbalance the losses from import duties associated with GATT/WTO membership. The GATT/WTO effect on consumption tax revenues also proved robust against exclusion of the nine countries joining the WTO after 2011 from the set of non-treated observations, as possible adjustments may already have occurred during the observation period. Results are unchanged indicating that this concern is not supported. We also tested whether the revenue increase reflects a change in the revenue structure or is associated with an expansion of the public sector by including a control variable for the size of the public sector. The latter might result from the higher efficiency of a tax system that relies more heavily on VAT (Keen and Lockwood, 2010). The point estimate for the membership effect, however, is not affected when total revenues enter the regression.

Table A-1: HETEROGENEOUS EFFECTS OF GATT/WTO MEMBERSHIP

	Import Duties					Consumption Taxes				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$I(GATT/WTO)$	-0.75*	-0.75*	-0.79**	-0.97**	-0.99**	0.62	0.62	0.51	0.51	0.45
	(0.43)*	(0.43)	(0.38)	(0.41)	(0.49)	(0.66)	(0.66)	(0.65)	(0.67)	(0.63)
$I(GATT/WTO) \times I$(New)	0.03	0.67			-1.39	1.03	-0.04			3.16
	(0.59)	(0.51)			(1.04)	(0.99)	(1.13)			(2.10)
$I(GATT/WTO) \times I(2000)$		-0.88					1.49			
		(0.56)					(1.22)			
$I(GATT/WTO) \times$ Time			0.01	0.02				0.09	0.11	
			(0.03)	(0.03)				(0.08)	(0.07)	
$I(GATT/WTO) \times NWP$					1.51***					-1.48
					(0.57)					(1.41)
log $GDPp.c.$	0.63	0.62	0.62	0.70	0.60	-1.41*	-1.39*	-1.35*	-0.66	-0.63
	(0.50)	(0.50)	(0.50)	(0.58)	(0.56)	(0.78)	(0.75)	(0.77)	(0.78)	(0.73)
Agric.	-0.02	-0.02	-0.02	-0.02	-0.02	-0.04**	-0.04**	-0.04**	-0.04**	-0.04**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Imp.	0.00	0.00	0.00	0.00	0.00	0.01*	0.01*	0.01*	0.02**	0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Const.	-0.97	-0.84	-0.90	-1.04	-0.20	14.38**	14.10**	13.90**	8.09	7.81
	(3.93)	(3.96)	(3.95)	(4.66)	(4.51)	(6.17)	(5.91)	(6.10)	(6.39)	(6.04)
Observ.	1,842	1,842	1,842	1,842	1,842	1,760	1,760	1,760	1,760	1,760
Countries	97	97	97	97	97	96	96	96	96	96
Region specific time effects	no	no	no	yes	yes	no	no	no	yes	yes

Notes: The dependent variable is revenue from import duties in percent of GDP in Cols. 1-5 and consumption tax revenue in percent of GDP in Cols. 6-10. The sample pertains to 1990-2011. $I\,(GATT/WTO) = 1$ if a country is member of GATT/WTO using the entry date to GATT for previous GATT contracting parties and the WTO entry date for direct WTO members. I(New) $= 1$ if a country is directly joining the WTO. $I(2000) = 1$ for countries acceding after 2000, $Time$ denotes a linear trend in the accession year. NWP is the number of working party members for accession countries scaled by the median of 21. Note that this variable is only reported for 14 countries directly joining WTO. The marginal effect, therefore, captures I(New). *Agric.* and *Imp.* are the values of agriculture and imports in percent of GDP. log$GDPp.c.$ is the logarithm of per capita GDP. Country- and year-fixed effects are included in all specifications. In Columns 4 and 5 as well as 9 and 10, region-specific time effects are included distinguishing common trends for Africa, America, Asia, Europe and Caribbean and Oceania. Standard errors are clustered by country in all specifications. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

D Synthetic Control Method Estimation

In order to implement the SCM, for every country acceding to the GATT/WTO, we define a pool of countries ("donors"), which did not join the organization during the observation period. Among this pool of countries, we construct a weighted average of observations to produce a counterfactual series, *i.e.* a synthetic control. The weights are chosen so as to minimize the difference between the pre-intervention characteristics of the treated and non-treated observations. The SCM estimator is then the difference between the post-intervention values of the treated country and the synthetic control. In order to implement the SCM estimator, we employ STATA's *synth* command.

With SCM estimates, there is no straightforward test for the significance of the GATT/WTO membership effect. Therefore, we follow Abadie *et al.* (2010), and run a set of counterfactual or "placebo" estimations, in which the membership is falsely assigned successively to each country in the set of countries out of which the synthetic control is formed. Comparing these results with the analysis of actual GATT/WTO accessions allows us to assess whether our findings differ from or are within the range of a set of random results. More specifically, we use the empirical distribution of the membership effect in the 1st, 2nd, 3rd, *etc.* year after entry predicted for the "placebo" treatments, to obtain standard errors for the counterfactual effect in each of these years. These standard errors are then used to compute a confidence band around the predicted treatment effect of GATT/WTO membership. We report 90% confidence bands based on the assumption of a standard t-distribution.

Comparison between treated observations (members) and non-treated observations (non-members)

requires a full set of non-missing data for treated as well as for non-treated countries. For this reason, we could implement the approach only for a limited number of countries. Countries that joined GATT/WTO before 1994 are not analyzed, since the observation period to produce a synthetic control would be too short in these cases. To enlarge the set of observations in the group of non-treated countries, we include countries that became members later, *i.e.* in a period that is beyond the time window used to assess the membership effect. This does not work, however, for those countries that acceded to the WTO close to the end of the observation period. As a result, we focus only on nine treated countries when studying the effect of GATT/WTO on import duties. Given the presence of anticipation effects with regard to actual membership, the analysis of consumption tax revenues focuses on the date of Memorandum submission instead on the date of entry. Since the latter is observed only for a subset of countries, we are able to obtain results only for six countries.[36]

In all cases, we basically employ the same set of variables to determine the weights, *i.e.* the basic determinants of import duties and consumption taxes as in the above DID regressions. To capture further differences, we include a dummy for participation in the IMF's SAF and PRGF programs, if there is sufficient variation in the set of "donors". Note that due to the use of fixed-effects, this indicator is not included in the regression analysis. As suggested by Abadie *et al.* (2010), we include the average value of the outcomes (revenues from import duties or consumption taxes) in the pre-membership period. If the pre-membership period is longer, we add import duties or consumption taxes in the last year before entry in order to improve the fit.

[36]We also dropped countries for which the SCM procedure yielded a single comparison unit. As pointed out by Abadie *et al.* (2015), a single untreated unit rarely provides a good fit of the pre-membership path.

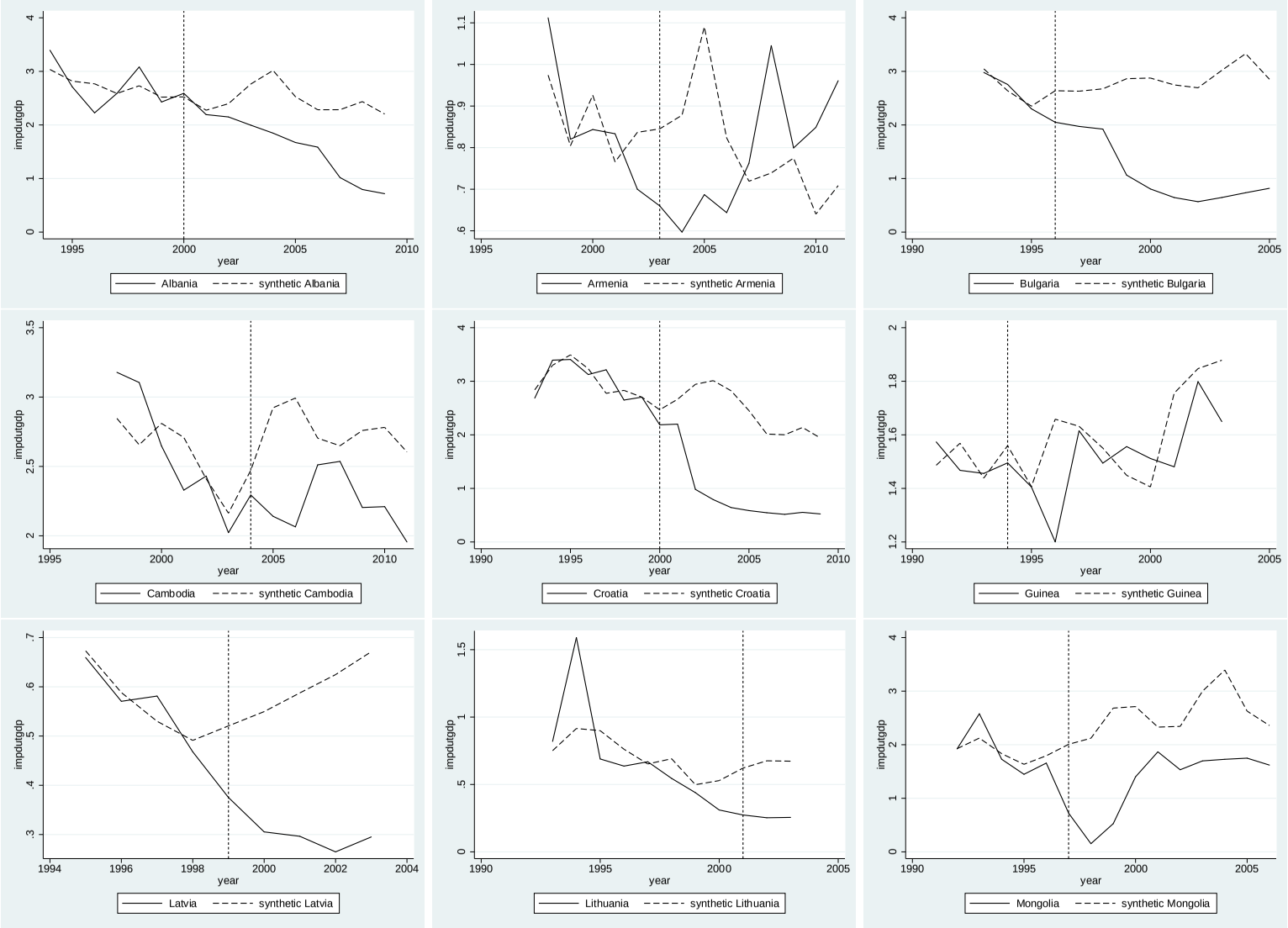
E SCM Estimates for Import Duties

Table A-2 provides means of outcomes for the respective country and its synthetic control pre- and post GATT/WTO Membership as well as the root mean squared prediction error. Figure A-7 reports the predictions and the counterfactual outcomes for the nine countries, for which a synthetic control was constructed.

F SCM Estimates for Consumption Taxes

For consumption taxes, reliable predictions for counterfactual outcomes could only be produced for six countries. As explained above, we take account of anticipation effects and focus on the date of Memorandum submission rather than the WTO entry. Table A-3 provides means of outcomes for the respective country and its synthetic control pre- and post Memorandum submission as well as the root mean squared prediction error. The outcomes are plotted against the counterfactual outcomes in Figure A-8.

Figure A-7: IMPORT DUTIES (% GDP): TREATED COUNTRIES VS. SYNTHETIC COUNTERPARTS



Notes: The figures show actual developments in import duties in percent of GDP, depicted by a solid line, versus the evolution of import duties in the respective synthetic control (dashed line), using SCM (Abadie *et al.*, 2015). Vertical lines indicate the date of GATT/WTO membership.

Table A-2: ACTUAL AND PREDICTED OUTCOME MEANS: IMPORT DUTIES

	Albania		**Armenia**		**Bulgaria**	
	Actual	Synth. Control	Treatment	Synth. Control	Treatment	Synth. Control
ImpdutGDP (post)	2.062	2.573	0.808	0.823	1.981	2.715
ImpdutGDP (pre)	2.738	2.743	0.862	0.861	2.858	2.842
Av. treatment effect		-0.511		-0.015		-0.733
RMSPE		0.308		0.099		0.084
	Cambodia		**Croatia**		**Guinea**	
	Actual	Synth. Control	Treatment	Synth. Control	Treatment	Synth. Control
ImpdutGDP (post)	2.402	2.678	2.080	2.825	1.516	1.587
ImpdutGDP (pre)	2.619	2.599	3.025	3.025	1.499	1.498
Av. treatment effect		-0.275		-0.745		-0.718
RMSPE		0.289		0.199		0.078
	Latvia		**Lithuania**		**Mongolia**	
	Actual	Synth. Control	Treatment	Synth. Control	Treatment	Synth. Control
ImpdutGDP (post)	0.424	0.582	0.589	0.697	1.489	2.326
ImpdutGDP (pre)	0.570	0.571	0.712	0.712	1.867	1.862
Av. treatment effect		-0.158		-0.108		-0.837
RMSPE		0.030		0.272		0.232

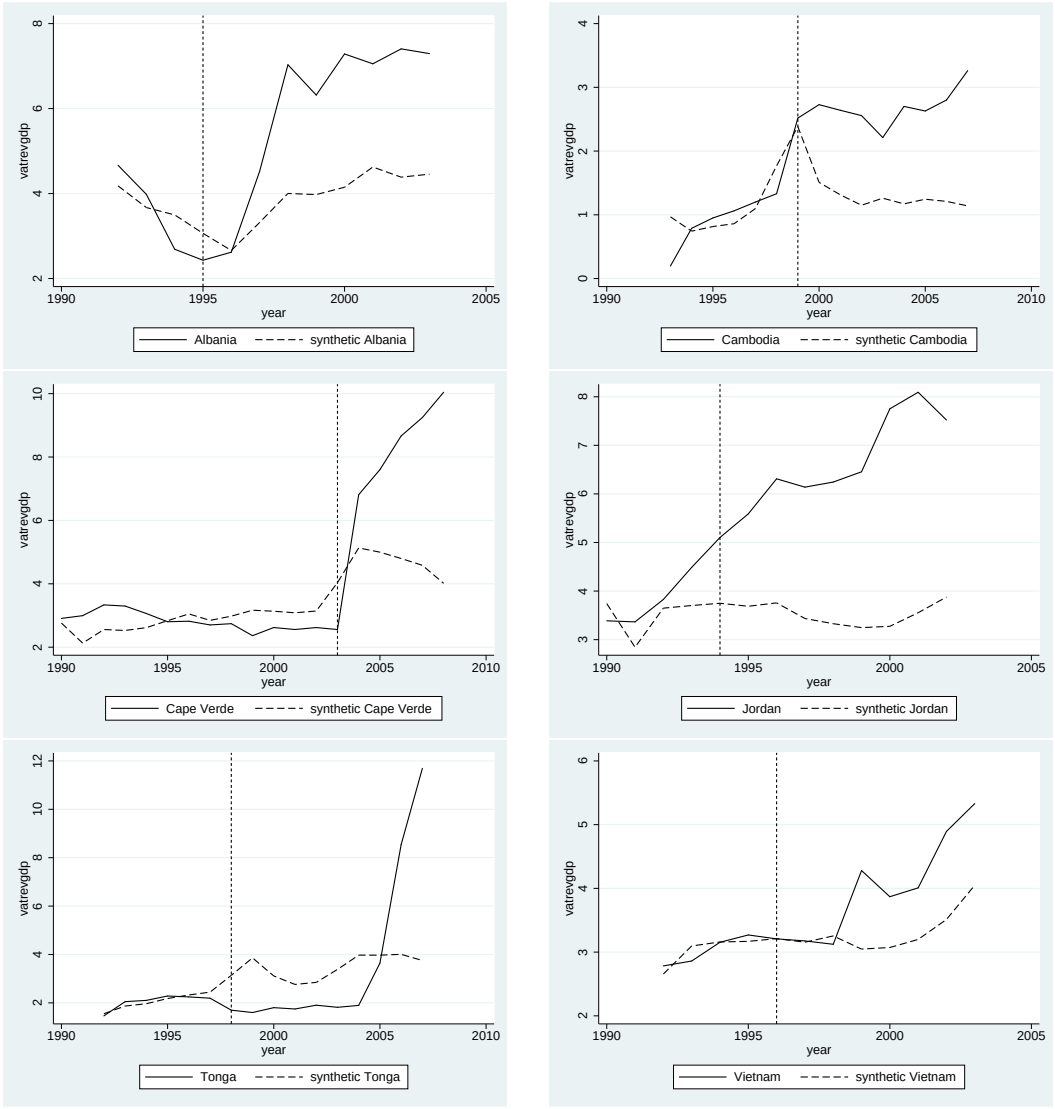
Notes: The table provides results of estimates obtained using SCM. It reports average pre- and post membership values for import duties as a share of GDP for the country joining GATT/WTO and its synthetic counterpart. The treatment effect reports the post membership difference in this outcome variable. RMSPE reports the root mean square prediction error.

Table A-3: ACTUAL AND PREDICTED OUTCOME MEANS: CONSUMPTION TAXES

	Albania		**Cambodia**		**Cape Verde**	
Actual	Synth. Control	Treatment	Synth. Control	Treatment	Synth. Control	
ConstaxGDP (post)	5.274	3.832	1.972	1.243	4.303	3.389
ConstaxGDP (pre)	3.779	3.783	0.922	1.042	2.833	2.833
Av. treatment effect	1.442		0.729		0.914	
RMSPE	0.573		0.378		0.538	
	Jordan		**Tonga**		**Vietnam**	
Actual	Synth. Control	Treatment	Synth. Control	Treatment	Synth. Control	
ConstaxGDP (post)	5.714	3.527	3.043	2.947	3.916	3.505
ConstaxGDP (pre)	3.767	3.485	2.057	2.056	3.017	3.016
Av. treatment effect	2.187		0.096		0.411	
RMSPE	0.511		0.153		0.112	

Notes: The table provides results of estimates obtained using SCM. It provides average pre- and post membership values for consumption taxes as a share of GDP for the country joining GATT/WTO and its synthetic counterpart. The treatment effect reports the post membership difference in this outcome variable. RMSPE reports the root mean square prediction error.

Figure A-8: CONSUMPTION TAXES (% GDP): TREATED COUNTRIES VS. SYNTHETIC COUNTERPARTS



Notes: The figures show actual developments in consumption tax revenues in percent of GDP, depicted by a solid line, versus the evolution of consumption taxes in the respective synthetic control (dashed line), using SCM (Abadie *et al.*, 2015). Vertical lines indicate the date of WTO membership.

G Data

Table A-4 provides some descriptive statistics for GATT/WTO accession countries included in the analysis relative to the population of all countries joining GATT/WTO in the period under consideration.

Table A-5 provides variables definitions and sources.

Table A-6 provides summary statistics disaggregated by region and time period.

Table A-7 provides information on the countries in the estimation sample.

Table A-4: GATT/WTO ACCESSION: SAMPLE VS. POPULATION

	Sample countries joining GATT/WTO after 1989		All countries joining GATT/WTO after1989	
	Mean	Median	Mean	Median
GDP per capita	3,984	2,518	7,619	2,682
Population	9,243,867	4,357,347	29,920,864	3,588,318
Share countries adopting VAT ±5 years around WTO entry	0.68		0.43	
Geographic representation				
Africa	12.9		17.3	
America	12.9		15.5	
Asia	16.1		29.3	
Caribbean and Oceania	25.8		15.5	
Europe	35.3		22.4	

Notes: The sample countries joining GATT/WTO after 1989 and until 2011 are thirty one and are listed in Table A-7. All countries joining GATT/WTO after 1989 up to 2011 contain in addition the following twenty seven countries: Middle East (Bahrain, Oman, Qatar, Saudi Arabia, United Arab Emirates), CIS (Moldova, Georgia, Kyrgyz Republic), America (Bolivia, Costa Rica, Ecuador, Honduras, Panama), Africa (Angola, Djibouti, Guinea-Bissau, Namibia, Swaziland, Tunisia), China, Chinese Taipei, and Macau, Liechtenstein, Nepal, Macedonia, Brunei Darussalam, and Saint Lucia. GDP per capita is in constant 2005 USD.

Table A-5: VARIABLES' DEFINITIONS AND SOURCES

$Constax$	General consumption tax revenue collected domestically and at the border. It reflects collections from the indirect tax structure prevalent in a given country before VAT introduction, *e.g.* retail sales tax, turnover tax (if any), and is VAT revenue thereafter. Source: IMF Statistical Appendices and Recent Development Reports accessed through IMF eLibrary, National Statistical Offices and Central Banks, Ministries of Finance, IMF Government Finance Statistics, OECD, Eurostat.
$Impdut$	Revenue from import duties, excluding indirect tax collected at the border. Source: IMF Statistical Appendices and Recent Development Reports accessed through IMF eLibrary, National Statistical Offices and Central Banks, Ministries of Finance, IMF Government Finance Statistics, OECD, Eurostat.
$Import$	Imports of goods and services. Source: UN National Accounts Main Aggregates Database.
GDP	Gross domestic product at current prices in national currencies. Source: UN National Accounts Main Aggregates Database.
$GDPp.c.$	GDP per capita, (constant 2005 US$). Source: World Bank Development Indicators; UN National Accounts Main Aggregates Database.
$AgricGDP$	Agriculture, value added as a percent of GDP. Source: World Bank Development Indicators; UN National Accounts Main Aggregates Database.
$I(GATT/WTO)$	A dummy variable equal to 1 if a country is a member of GATT/WTO, and 0 otherwise. If a country became a GATT contracting party before becoming a WTO member, the relevant year is the GATT membership year. For example, since Chad became a GATT contracting party in 1963, $I(GATT/WTO)$ equals one for all years Chad appears in the sample, even though the country joined the WTO in 1996. For non-GATT members, $I(GATT/WTO)$ equals one based on the year of WTO membership. For the year of membership, the variable equals the number of days after GATT/WTO membership divided by the total number of days in the year. For example, if a country joined on 29 January 2007, $I(GATT/WTO)$ equals 0.92054 for 2007 and 1 for subsequent years. In section 6 of the paper an alternative indicator is used that refers to the date of Memorandum submission. This indicator is constructed in a similar fashion but the relevant date is the date of Memorandum submission, Source: The World Trade Organisation and authors' calculations.
$I(WTO)$	A dummy variable equal to one from the date a country enters the WTO. For the exact year of membership, the same procedure is applied as in the case of $I(GATT/WTO)$. Source: World Trade Organization and authors' calculations.

Notes: Continued on next page.

Table A-5: VARIABLES' DEFINITIONS AND SOURCES, CONTD.

MFN	Unweighted average of the MFN Applied Rate. Source: World Tariff Profiles (2008-2011). World Bank (WITS database) for earlier years, WTO Tariff Database, IMF E-Library.
$I(CU)$	A dummy variable equal to one from the year in which a country enters a customs union. The variable covers the following custom unions: CARICOM, CEMAC, COMESA, EAEC, ECOWAS, EU, MERCOSUR, and SACU. Source: World Trade Organization Regional Agreements Database.
$I(RTA)$	A dummy variable equal to one from the year in which a country enters a regional trade agreement. The variable covers the following free trade agreements: AFTA, ASEAN-AUS-NZ, CEZ, CIS, EU, EU-CARIFORUM, NAFTA, PAFTA, PICTA, SADC and SAFTA. Source: World Trade Organization Regional Agreements Database.
$I(IMF)$	A dummy variable equal to one for all years in which a country has obtained loans through IMF's Poverty Reduction and Growth Facility. Source: International Monetary Fund.
$I(LDC)$	A dummy variable equal to one if a country is classified as least developed. Source: United Nations.
NWP	The number of working party members for all acceding countries joining the WTO in a given year scaled by the median value of 21. Authors' calculations using accession data from www.wto.org.

Table A-6: DESCRIPTIVE STATISTICS

	1990-1993 Mean	1994-1997 Mean	1998-2001 Mean	2002-2005 Mean	2006-2009 Mean	2010-2011 Mean	N
				Full sample			
T^{IMP}	3.31 (3.49)	2.88 (3.28)	2.39 (2.67)	2.18 (2.52)	2.21 (3.63)	1.80 (2.87)	1842
T^{CON}	3.72 (2.76)	4.41 (2.64)	4.74 (2.35)	5.36 (2.51)	6.18 (2.72)	6.30 (2.59)	1808
$AgricGDP$	21.32 (14.89)	19.75 (14.71)	17.49 (13.49)	15.46 (12.70)	14.23 (12.52)	14.03 (12.35)	2107
$ImportGDP$	44.63 (25.07)	46.82 (25.33)	47.85 (25.47)	48.69 (24.20)	51.40 (24.87)	50.76 (24.18)	2130
$GDPp.c.$	4873 (8150)	5067 (8413)	5637 (9378)	6259 (10110)	7129 (11091)	7213 (11005)	2117
$I(GATT/WTO)$	.457 (.494)	.592 (.490)	.643 (.476)	.691 (.461)	.722 (.445)	.742 (.438)	2134
				Africa			
T^{IMP}	3.93 (4.90)	3.59 (4.88)	3.18 (4.09)	3.16 (3.92)	3.90 (6.50)	3.46 (5.40)	536
T^{CON}	2.61 (1.70)	3.11 (1.76)	3.64 (1.46)	4.55 (1.97)	5.41 (2.05)	5.52 (1.87)	532
$AgricGDP$	28.97 (15.81)	28.08 (15.31)	25.93 (14.58)	23.97 (14.41)	22.77 (15.08)	22.29 (14.87)	660
$ImportGDP$	37.91 (25.16)	40.72 (27.60)	41.68 (29.70)	40.83 (23.75)	44.01 (22.75)	44.60 (22.86)	659
$GDPp.c.$	1422 (2217)	1508 (2331)	1730 (2574)	1978 (2911)	2268 (3400)	2357 (3467)	660
$I(GATT/WTO)$	.653 (.475)	.725 (.447)	.733 (.444)	.733 (.444)	.745 (.435)	.766 (.426)	660
				America			
T^{IMP}	1.58 (.606)	1.95 (1.06)	1.64 (1.04)	1.39 (.841)	1.05 (.645)	.922 (.663)	152
T^{CON}	3.15 (1.44)	4.57 (.941)	4.68 (.854)	5.04 (.904)	5.43 (.990)	5.59 (1.21)	143
$AgricGDP$	11.41 (5.95)	11.61 (5.73)	9.76 (4.64)	8.97 (5.42)	9.93 (5.86)	10.16 (6.37)	154
$ImportGDP$	31.18 (11.73)	32.86 (13.78)	33.52 (10.72)	34.34 (11.36)	37.49 (12.04)	35.99 (12.31)	154
$GDPp.c.$	6135 (8861)	6478 (9401)	7011 (10641)	7442 (11513)	8114 (11936)	8292 (12164)	154
$I(GATT/WTO)$	.717 (.434)	.999 (.003)	1 (0)	1 (0)	1 (0)	1 (0)	154
				Asia			
T^{IMP}	2.75 (2.19)	2.37 (1.78)	1.79 (1.13)	1.60 (.837)	1.50 (.917)	1.29 (.932)	386
T^{CON}	3.34 (2.77)	3.23 (2.26)	3.54 (1.95)	3.96 (2.35)	4.16 (2.52)	4.48 (2.67)	381
$AgricGDP$	25.54 (14.05)	23.38 (14.37)	20.08 (12.50)	16.42 (10.08)	14.64 (9.51)	14.44 (9.74)	452
$ImportGDP$	49.22 (33.13)	53.28 (34.14)	52.10 (32.50)	56.14 (35.82)	55.81 (38.14)	53.59 (36.42)	462
$GDPp.c.$	2248 (3742)	2462 (4630)	2620 (4930)	3068 (5699)	3755 (6654)	4224 (7555)	458
$I(GATT/WTO)$	.285 (.454)	.296 (.458)	.353 (.478)	.429 (.494)	.511 (.502)	.523 (.505)	462
				Caribbean and Oceania			
T^{IMP}	4.28 (2.68)	4.06 (2.35)	3.57 (1.71)	3.33 (1.77)	3.24 (1.89)	2.60 (1.34)	401
T^{CON}	4.25 (2.92)	4.93 (2.71)	5.08 (2.38)	5.64 (2.50)	6.52 (2.39)	6.86 (2.61)	377
$AgricGDP$	16.06 (11.96)	14.22 (11.47)	12.96 (11.08)	12.01 (11.43)	10.85 (10.02)	10.77 (9.85)	416
$ImportGDP$	54.38 (16.02)	53.48 (13.59)	54.59 (14.47)	52.36 (12.90)	55.41 (13.62)	53.77 (13.76)	418
$GDPp.c.$	6310 (6531)	6690 (6790)	7367 (7635)	7911 (8121)	8613 (8620)	8342 (8535)	417
$I(GATT/WTO)$	.334 (.467)	.654 (.474)	.684 (.467)	.684 (.467)	.716 (.450)	.736 (.446)	418
				Europe			
T^{IMP}	2.15 (2.14)	1.41 (1.14)	.842 (.733)	.637 (.602)	.595 (.709)	.471 (.598)	382
T^{CON}	7.57 (3.99)	7.04 (2.36)	7.21 (2.11)	7.85 (1.90)	8.69 (2.18)	8.42 (1.76)	386
$AgricGDP$	13.27 (10.64)	11.01 (10.13)	8.90 (7.12)	7.22 (5.51)	5.70 (4.41)	5.69 (4.55)	425
$ImportGDP$	45.37 (20.70)	47.77 (17.80)	51.26 (17.18)	54.19 (14.16)	58.93 (15.83)	59.22 (15.80)	437
$GDPp.c.$	11699 (13280)	11426 (13375)	12541 (14719)	14049 (15580)	16123 (16892)	16036 (16508)	428
$I(GATT/WTO)$	.367 (.479)	.503 (.500)	.650 (.470)	.800 (.402)	.820 (.382)	.85 (.361)	440

Notes: The table depicts summary statistics for the full sample as well as statistics disaggregated by five major geographic regions: Africa, America, Asia, Europe, and the Caribbean and Oceania. T^{IMP}, T^{CON}, $AgricGDP$, $ImportGDP$ are import duties, consumption taxes, agriculture, and imports, respectively, all expressed in terms of percentage of GDP. $GDPp.c.$ is GDP per capita. $I(GATT/WTO)$ is a dummy variable reflecting the time of membership in GATT/WTO. Standard deviations are in parentheses.

Table A-7: COUNTRIES IN THE SAMPLE

Africa	GATT	VAT	WTO	**Europe**	GATT	VAT	WTO
Algeria‡	–	1992	–	**Albania**	–	1996	2000
Benin (LDC)*	1963	1991	1996	Belarus‡	–	1991	–
Botswana*	1987	2002	1995	Bulgaria	–	1994	1996
Burkina Faso (LDC)*	1963	1993	1995	Croatia	–	1998	2000
Cameroon*	1963	1999	1995	Cyprus*	1963	1992	1995
Cape Verde	–	2004	2008	Czech Republic	1993	1993	1995
CAR (LDC)*	1963	2001	1995	Estonia	–	1991	1999
Chad (LDC)*	1963	2000	1996	Finland	1950	1994	1995
Comoros (LDC)‡	–	–	–	Iceland	1968	1990	1995
Egypt	1970	–	1995	Latvia	–	1995	1999
Equatorial Guinea (LDC)‡	–	2005	–	Lithuania	–	1994	2001
Ethiopia (LDC)‡	–	2003	–	Malta*	1964	1995	1995
Gabon*	1963	1995	1995	Montenegro	–	2003	–
Gambia (LDC)*	1965	–	1996	Poland	1967	1993	1995
Ghana*	1957	1995	1995	Romania	1971	1993	1995
Guinea (LDC)*	1994	1996	1995	Serbia‡	–	2005	–
Kenya (LDC)*	1964	1990	1995	Slovakia	1993	1993	1995
Lesotho (LDC)*	1988	2003	1995	Slovenia	1994	1999	1995
Madagascar (LDC)*	1963	1994	1995	Switzerland	1966	1995	1995
Mali (LDC)*	1993	1991	1995	Ukraine	–	1992	2008
Mauritania (LDC)*	1963	1995	1995				
Mauritius*	1970	1998	1995	**Caribbean and Oceania**			
Mozambique (LDC)*	1992	1999	1995				
S. T. and Principe (LDC)‡	–	–	–	Antigua and Barbuda*	1987	2007	1995
Seychelles	–	–	–	Australia	1948	2000	1995
South Africa	1948	1991	1995	Bahamas‡	–	–	–
Sudan (LDC)‡	–	2000	–	Barbados*	1967	1997	1995
Tanzania (LDC)*	1961	1998	1995	**Dominica***	1993	2006	1995
Uganda (LDC)*	1962	1996	1995	DominicanRepublic	1950	1992	1995
Zambia (LDC)*	1982	1995	1995	Fiji*	1993	1992	1996
				Grenada*	1994	1987	1996
(Eur)Asia				Jamaica*	1963	1991	1995
Armenia	–	1993	2003	Micronesia	–	–	–
Azerbaijan‡	–	1992	–	Palau	–	–	–
Bangladesh (LDC)	1972	1991	1995	Papua New Guinea*	1994	1999	1996
Bhutan (LDC)‡	–	–	–	Saint Kitts and Nevis	1994	2011	1996
Cambodia (LDC)	–	1999	2004	St. V. and the Grenadines	1993	2007	1995
Iran‡	–	2008	–	Samoa	–	1994	–
Jordan	–	2001	2000	**Solomon Islands** (LDC)*	1994	–	1996
Kazakhstan	–	1991	–	Tonga	–	2005	2007
Laos (LDC)	–	2010	–	Trinidad and Tobago*	1962	1990	1995
Lebanon‡	–	2002	–	Vanuatu (LDC)	–	1998	–
Malaysia*	1957	–	1995				
Mongolia	–	1998	1997				
Pakistan	1948	1998	1995	**America**			
Russia	–	1991	–				
Singapore*	1973	1994	1995	Canada	1948	1991	1995
Sri Lanka	1948	1998	1995	El Salvador	1991	1992	1995
Syria‡	–	–	–	Guatemala	1991	1992	1995
Tajikistan	–	1992	–	Paraguay	1994	1992	1995
Thailand	1982	1992	1995	Peru	1951	1991	1995
Vietnam	–	1997	2007	Suriname*	1978	–	1995
Yemen (LDC)	–	–	–	Venezuela	1990	1993	1995

Notes: LDC stands for Least Developed Country following the UN classification. GATT, WTO, and VAT are the respective membership years in GATT and WTO, and the year of VAT introduction, if any. Countries with asterisk acceded to GATT under Article XXVI: 5(c). Countries marked with ‡ are current WTO Observers. Countries in bold received funds from the IMF under the PRGF program. The table conveys VAT implementation information and WTO status as of 2011, which is the last year in our panel. Since then, Gambia and Seychelles introduced VAT in 2013 and Bahamas in 2015; Montenegro, Russia, Samoa and Vanuatu joined the WTO in 2012, Laos and Tajikistan in 2013, Yemen in 2014, and Seychelles and Kazakhstan in 2015.