The Trade Effects of Temporary Trade Barriers Over Their Life Cycle*

David J. Kuenzel

Wesleyan University

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Abstract

Temporary trade barriers (TTBs) in the form of antidumping, countervailing and safeguard duties are the most commonly used policy instruments to counteract surges in imports. Using a theory-consistent structural gravity model, this paper investigates for the first time at the product level (HS 6-digit) how the trade effects of these measures vary over their entire life cycle. Employing a cross-country dataset over the period 1995 to 2023, I find that product-level imports from exporters targeted with TTBs are significantly elevated during the pre-investigation period and remain so during the WTO-required investigation to justify these duties. When imposed, TTB tariffs lower imports on average by 24 percent while final duties are in place, but there are only modest negative effects on imports during the preliminary duty phase. The negative import effects intensify with the duration of the final duties. Average price increases are significant but modest during the final duty phase, indicating a limited effectiveness of TTBs to provide protection in the form of higher profit opportunities for import-competing industries. While focusing on TTBs, the estimates in this paper offer detailed insights on how tariff changes more generally affect the trading behavior and market conditions for domestic and foreign firms.

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*Contact information: Wesleyan University, Department of Economics, 238 Church St, Room 416, Middletown, CT 06459, E-mail: dkuenzel@wesleyan.edu, Tel: +1(860)685-3052. I thank seminar participants at Wesleyan University for their helpful comments and suggestions.

1 Introduction

How effective are large tariff surges in reducing imports? How much do prices rise after these tariff shocks? Do third countries benefit from highly discriminatory tariff policies? The rise in trade tensions during the first and second Trump administrations has created renewed interest in these questions.[1] Whereas recent US tariff actions, including questions about their legality, have received substantial attention by economists and the public alike, countries have been able for a long time under WTO law to temporarily suspend their tariff commitments and increase protection to fend off unfair foreign competition.[2] Specifically, importers can use temporary trade barriers (TTBs) in the form of antidumping (AD), safeguard (SG) and countervailing duties (CVD) to charge higher tariffs on firms and countries that cause injury to domestic industries.[3] When applied, average TTB duties usually exceed regular tariff rates by a multiple – in the sample below, average ad valorem rates of final AD duties register at 49.4% compared to the average statutory tariff of 7%. For top users of these TTBs measures, they can cover more than five percent of their total imports (Figure 1, panel a) and up to 15 percent of imports from popular tariff targets such as China (Figure 1, panel b).

Importantly, TTBs can only be implemented after an WTO-established legal process that intends to limit higher tariffs to exporters and firms who actually cause disruptions for domestic firms and workers. In this paper, I use the resulting rich variation in the product-level (HS 6-digit, around 5,000 products) usage pattern of TTBs across countries over the period 1995 to 2023 to answer the questions posed above. Prior work on the trade effects of TTBs has nearly exclusively examined antidumping duties, often with a focus on specific countries and/or industries and much shorter time periods. Moreover, existing studies usually concentrate on the trade effects after final TTB tariffs are imposed. However, the TTB process is multifaceted, with several steps ranging from an investigation phase followed by a preliminary duty stage and culminating in final TTB tariffs. Apart from the effect of sample selection as many cases do not proceed beyond an investigation or preliminary duties, focusing only on final TTB tariffs misses any impacts of the investigation itself or from preliminary duties. Making use of detailed date information on the various stages of all worldwide TTB cases, I investigate the trade effects of these measures over their entire life cycle.

My main findings are that exports of countries who become subject to TTB cases are on

[1] Fajgelbaum and Khandelwal (2022) summarize the major empirical findings from the recent US trade war.

[2] The GATT Antidumping Code was first established in 1967 followed by a Subsidies Code on countervailing duties in 1979. The WTO agreements in 1994 updated these rules and also added a separate Safeguard Agreement.

[3] Section 2 discusses the nuances of the different TTB processes and reviews the existing literature on the topic.

average around 32% greater compared to those that are not targets of an investigation. Exports of TTB targets remain elevated during the investigation stage and only experience a significant downturn during the preliminary duty phase. However, it takes until final TTB duties are assessed to observe a significant drop of exports by around 24% in affected countries' exports compared to non-targeted exporters. Hence, TTB investigations alone do not work as deterrent and actual locked-in tariff surges are needed to change trade patterns. The negative trade effects from final TTB tariffs are larger the longer they are in place, and I also find evidence of moderate import price increases in response to TTB actions. Moreover, third countries benefit from TTB tariffs as their exports significantly increase, which limits in turn the effectiveness of these tariff hikes for import-competing industries. I find no evidence that either high-income countries, high-activity TTB users or preferential trade agreement membership are driving the results. However, TTB cases targeting China lead to substantially larger drops in trade compared to other exporters.

The paper closest to the idea pursued here is Besedeš and Prusa (2017) who conduct a hazard analysis of US antidumping cases at the product level to determine when export flows are most likely to stop completely. Besedeš and Prusa (2017) specifically introduce the notion of analyzing the effect of US AD measures by phases of cases and find that antidumping actions considerably raise the probability of export stops with the effects being much larger during the investigation and preliminary duty phases than once final duties are imposed. I build on their approach and construct similar phase variables for all TTB cases worldwide. In addition, I introduce a pre-investigation phase to account for potential disparities between exporters prior to the opening of a TTB case. The emphasis by Besedeš and Prusa (2017) on the importance of earlier TTB stages on trade patterns contrasts with my findings. However, their analysis purely focuses on the extensive margin whereas my study considers actual import volumes. Moreover, I analyze the effects of TTBs for all countries that are users of these measures (see Table 1).

This paper introduces several methodological innovations to the TTB literature. The analysis below is the first that uses a theory-consistent product-level gravity framework that I implement using the high-dimensional Poisson pseudo-maximum likelihood (PPML) estimator. The PPML approach can account for the heteroskedastic nature of trade flows and also allows for the inclusion of zero trade flow observations in the analysis. The latter's omission by more traditional log-linear approaches that have been predominantly used in the analysis of the trade effects of antidumping duties is prone to lead to estimation bias (Santos Silva and Tenreyro 2006), which is crucial as nearly half of all trade observations in the sample below are zeros. I also include a fully saturated

set of fixed effects in the estimation as reliably estimating trade effects of policy changes requires a careful accounting for multilateral resistance and potential endogeneity concerns (Anderson and van Wincoop 2003, Baier and Bergstrand 2007, Fally 2015).

More broadly, I contribute to an emerging literature that makes inferences about the impact of different policies on product-level trade using recent advances in gravity PPML estimation. Baniya et al. (2020) employ product-level PPML for the year 2013 to identify small product-level increases in trade for countries participating in China's Belt and Road Initiative. Fontagné et al. (2022) estimate product-level trade elasticities using variation in bilateral tariffs over the 2001 to 2016 period in a panel gravity PPML environment.[4] French and Zylkin (2024) find that the trade creation from free trade agreements is driven by previously least trade products using product-level PPML for a panel of countries. Focusing on non-tariff measures and following similar approaches, Kuenzel (2025) finds that cross-border geographical protections in EU trade agreements raise bilateral EU exports in covered products, whereas Artuso et al. (2026) quantify the trade effects of health and technical standards using product-level structural gravity.

In the next section, I provide a detailed overview of the TTB process and existing findings in the literature on the trade effects of these measures. Section 3 presents the empirical model, and section 4 discusses the TTB and trade data. Section 5 contains the baseline results including discussions of identification concerns and the importance of time dynamics during the different TTB phases. Section 6 considers several extensions of the empirical framework, and section 7 concludes.

2 TTB Process Overview and Existing Literature

2.1 TTB Process Overview

TTBs in the form of antidumping, countervailing and safeguard duties give WTO member countries flexibility to implement additional import protection on specific products, countries and/or firms beyond their WTO-negotiated bound tariff commitments. Antidumping duties counter prices that are below those found in the exporter's home market, countervailing duties address products illegally subsidized by foreign governments, and safeguard tariffs are protecting industries that are seriously injured from import surges. The usage of these TTBs as 'escape valves' from import competition requires, however, that countries follow specific guidelines that are WTO-regulated.[5] Of course,

[4] Focusing on the same sample and context, Tyazhelnikov et al. (2025) propose instead to use a weighted PPML (WPPML) estimator to better account for trade elasticity heterogeneity.

some differences in execution and adherence exist across countries, but the required steps to impose a TTB are in general uniform across WTO members and cases, which allows for a cross-country investigation of the trade effects over the life cycle of TTBs.[6] TTBs are supposed to be as targeted as possible, with WTO members frequently citing products at the HS 8- or HS 10-digit levels, although investigations at the broader HS 2- or HS 4-digit levels are sometimes observed as well. Both AD and CVD investigations follow similar procedures as they usually target specific countries and firms, whereas safeguards apply to most if not all trading partners. Below I describe the exact implementation procedures for these different TTBs.

AD and CVD investigations take a two-pronged approach.[7] After receiving a petition from an interested party, there are two separate investigations.[8] There is an injury investigation that examines if the foreign actions (dumping/subsidies) are causing material injury for a domestic industry or threatening to do so. A second separate investigation considers if the allegation of foreign dumping or subsidies is correct and, if so, what duty would level the playing field for domestic producers with foreign producers. To determine whether a product is subject to dumping depends on whether it is sold below its normal value, either based on its pricing in the country of origin or actual manufacturing cost. Similarly, in the case of a subsidy allegation, the investigation needs to prove that there are financial contributions by a foreign government that confer a benefit to a firm or industry producing the product. The applicable WTO agreements specify that these investigations should be completed within one year after initiation and in no case more than 18 months. However, while the WTO establishes fixed time lines for the different stages of the AD/CVD processes, they are frequently exceeded in practice – section 4.1 discusses detailed summary statistics for the different TTB stages.

Prior to issuing a final decision, governments frequently impose preliminary TTB duties. According to WTO regulations, these preliminary measures should be limited to a period of four and at most six months. For a final TTB duty to be imposed, the injury and antidumping/subsidy investigations need to be fully concluded and the findings of both need to be affirmative. Moreover,

[5] Beshkar and Bond (2017) theoretically motivate the coexistence of tariff caps and TTBs in the WTO. TTBs give countries flexibility in case their tariffs are constrained by a trade agreement. This flexibility allows countries to negotiate lower tariff constraints in trade agreements than they otherwise would.

[6] TTB procedures are frequently contested and enforced through the WTO's dispute settlement mechanism. Almost 30 percent of all issues raised in WTO disputes during 1995-2024 featured TTBs (World Trade Organization 2026a).

[7] A detailed overview of the WTO-required procedures for antidumping and countervailing duties can be found in World Trade Organization (2026b,c), respectively.

[8] Interested parties include domestic firms, labor unions, or trade associations. Governments can also self-initiate TTB investigations.

the affected exporters must have been given the opportunity to respond to the allegations. Crucially, these tariffs should not be excessive and not provide more protection than actually warranted. If final AD/CVD duties are in place, they usually are subject to a sunset review after five years. However, they can be extended indefinitely, with some AD/CVD tariffs having been in place for several decades.

Safeguards are subject to much more rigid regulations than ADs or CVDs due their substantially greater targeting breadth. In general, SG tariffs apply to all exporters except PTA partners and developing countries that account for only small amounts of imports. In contrast to AD and CVD cases, SGs only are subject to an injury investigation. For a SG tariff to be in line with WTO regulations imports need to "have caused or threaten to cause serious injury to the importing Member's domestic industry" (World Trade Organization 2026d). The imposing country also needs to prove that increased imports are the main reason for this serious injury, which makes SGs subject to a much higher burden of proof than AD/CVD measures. From the outset, SG tariffs are only approved for four years and can be extended once for a total period of eight years. Developing country WTO members can extend the duration of a SG measure for two additional years. In the empirical analysis below, I report results (i) with aggregate TTB measures comprised of AD, CVD and SG cases and (ii) broken down for each separate category. Similar to AD/CVD cases, SG investigations can consist of preliminary and final tariff stages.

Most of the existing literature that examines the impact of TTBs on trade focuses either on the investigation initiation date, or more commonly, on the imposition date of the final TTB duty as relevant timing variable. This focus on a singular threshold is problematic as it could conflate anticipation effects of TTB policies with their actual policy impact. For instance, many TTB investigations never result in the imposition of final duties and the duration of TTB duties that are in place can vary drastically. Even if no final TTB duty is in place yet, firms and consumers could already adjust their behavior during the investigation or while preliminary duties have been imposed. Hence, estimating the actual trade impact with a single timing variable is likely to mismeasure the actual effects of TTBs.

To address this timing issue, I divide the life cycle of TTBs into four different phases, which I define as binary variables in the baseline empirical model. First, to account for pre-investigation trends, I define a 'pre-TTB phase' which encompasses the three calendar years prior the initiation of a TTB investigation.[9] Second, I focus on the 'TTB investigation phase,' which starts in the year

[9] As years are the most detailed timing level available for cross-country trade data, I use calendar years to create the

the TTB investigation is officially initiated and ends when a TTB duty is first applied (preliminary or final), or a negative decision is rendered resulting in the termination of the investigation. Any trade effects during the investigation period capture anticipatory impacts of TTB cases without any actual policy changes having taken effect. Third, I account for the 'preliminary duty phase,' which starts during the calendar year when a preliminary TTB duty is first applied and ends with the final investigation determination (affirmative or negative). The fourth phase is the 'final duty phase' and lasts from the year when the final TTB duty is first applied and ends in the year when the final TTB duty runs out or is revoked. Importantly, the preliminary and final duty phases capture actual TTB policy effects instead of anticipatory trade impacts. Section 4.1 offers more details on the exact compilation of the TTB phase variables.

2.2 TTBs and Trade: Existing Literature

To date, the literature on the trade effects of TTBs mostly analyzes antidumping duties as the most often employed escape valve to import surges by WTO members. A large share of studies focuses on the exclusive impact of these measures on the European Union and the United States, often with an emphasis on specific industries. I first review the direct trade effects of TTBs, i.e., the impact on imports from the investigated countries. Trade diversion effects, or indirect impacts on imports from third countries, are discussed thereafter.[10]

Early empirical papers on the subject take a country-specific approach and only consider product-level observations that become subject to an antidumping investigation. They then estimate the impact of ADs using a time series around the investigation year capturing the trade effects a few years prior and a few years after. More specifically, these approaches regress the log of bilateral imports on a binary AD variable or AD duty measure interacted with investigation year dummies (including leads and lags). Usually, there are also attempts to differentiate between cases with different outcomes, e.g., cases with high final AD duties versus low AD duties, cases with and without suspension agreements, or cases with final AD duties versus those with negative AD decisions. One downside of this approach is that it excludes those products and export partners that are not subject to TTBs and could serve as relevant control group. Moreover, the importer-specific focus substantially limits the extent of control variables that can be included in the analysis, which could result in biased estimates.

TTB phase variables.

[10] Blonigen and Prusa (2016) review the determinants and effects of antidumping measures more broadly.

Staiger and Wolak (1994) conduct one of the earliest and most thorough analysis of the trade effects of antidumping duties in the US during 1980-1985 and find that AD tariffs reduce imports at the SIC 4-digit level by around 25 percent, with around half of the reduction driven by investigation effects. Focusing also on the US at the TSUSA 5-digit level for the period 1980-1988, Prusa (1997) finds that AD duties lower imports from affected exporters by around 10 percent for about two years and larger, longer-lasting reductions of up to 50 percent for high-duty cases. Krupp and Pollard (1996) focus specifically on AD duties and their impact on monthly imports of 17 products in the US chemical industry over the 1976-1988 period. Overall, their results are quite mixed with AD duties only having unambiguous negative effects on imports if they were greater than 50 percent.

In contrast to these earlier estimates that rely on OLS regressions with year fixed effects, Prusa (2001) and Carter and Gunning-Trant (2010) employ dynamic panel data models to estimate the impact of US TTB actions. Compared to his earlier study, Prusa (2001) finds substantially larger negative effects of around 50 percent for affected manufacturing products in the first three years after an US AD duty takes effect during the period 1980-1994. Carter and Gunning-Trant (2010) focus on AD and CVD investigations in US agricultural products at the HS 10-digit level from 1980-2005, and estimate that import declines from AD/CVD duties are largest one year after the investigation initiation with 2.3 percent for every 10 percentage point increase in tariffs. When focusing on US AD actions against China at the HS 10-digit level, Lee et al. (2017) report that any negative trade effects are only short-lived and dissipate two years after the AD decision.

Focusing on EU AD duties, Lasagni (2000) finds that imports from affected exporters are subsequently reduced by around 60 percent. Considering 8-digit level EU products between 1985-1990, Konings et al. (2001) detect smaller negative effects of EU AD duties on named countries of about 30 percent. Following a similar approach to Prusa (1997) but in the EU context, Brenton (2001) also estimates substantial negative trade impacts for targeted countries 2-3 years subsequent to AD actions between 1989 and 1994. Other country-specific analysis focusing on the trade impact of AD duties have been conducted for Mexico (Niels 2003), India (Ganguli 2008) and China (Park 2009). Overall, existing country-specific studies that analyze AD duties find negative trade effects in the range of -10 to -75 percent, with Prusa (1997) being at the lower end and Niels (2003) at the upper end. However, these estimates are frequently shown to be highly dependent on the exact timing of investigations, whether and how high of an AD duty is actually applied, if some form of price undertaking has been negotiated, and how long duties are in place.

Over time, improvements in data availability and fewer computing constraints have made it

feasible to use cross-country studies to analyze the trade effects of TTBs. This setting makes it possible to control for country- and product-specific determinants of trade flow responses to TTBs. More recent cross-country studies also include much larger sets of observations and do not limit their approach to a pure time series analysis of the products and exporters subject to AD actions.[11] Egger and Nelson (2011) use a bilateral log-linear gravity model to estimate the aggregate trade effects of antidumping actions between 1960 and 2001 for all available countries and find negative but modest effects on total bilateral imports. Vandenbussche and Zanardi (2010) use a similar approach but provide evidence that there are substantial negative trade impacts for "tough" new users of AD policies during the 1980-2000 period.

Focusing on HS 6-digit trade flows from 2000-2014 for a sample of 28 AD-imposing countries, Sandkamp and Yalcin (2021) find that AD duties affect exports from China much more negatively than trade flows from other nations. Using a log-linear gravity estimation framework, they estimate that Chinese exports fall on average by 55 percent subsequent to the imposition of AD duties, whereas exports from other countries subject to AD tariffs decrease by less than 40 percent. Silberberger et al. (2022) use a similar gravity estimation framework at the HS 4-digit level for the years 1991-2014 but focus on the effects on imports when AD tariffs are revoked. They find that trade flows do not fully recover after AD duties are removed. Sandkamp (2020) uses the 2004 EU enlargement as plausibly exogenous event to estimate the impact of existing AD duties on HS 8-digit imports in new EU member states for a global sample of exporters, concluding that imports fall on average by 74 percent following the imposition of AD duties.

Another strand of the literature explores how TTB actions affect imports from third countries not named in the investigation (trade diversion) and exports from countries subject to AD actions to third countries (trade deflection). There is robust evidence that AD actions tend to increase imports from third countries not named in AD actions, mitigating in turn the effectiveness of reducing imports through AD actions. Examples include Staiger and Wolak (1994), Prusa (1997, 2001), Carter and Gunning-Trant (2010), Lasagni (2000) and Konings et al. (2001); see Blonigen and Prusa (2016) for an extended discussion. Below I provide estimates on the impact of TTBs on imports from varying sets of third-country exporters. Bown and Crowley (2007) are first to show that US AD and SG actions also deflect trade to third markets. They find that in products subject to US

[11] Durling and Prusa (2006) is one of the earliest cross-country studies on the trade effects of AD actions. However, they purely focuses on the hot-rolled steel industry over the 1996-2001 period and find that imports at the HS 6-digit fall by nearly 90 percent during the first year after an AD action.

tariff actions Japanese exports to third countries subsequently increased by 5-7 percent. Other studies showing similar effects in response to US AD actions include Baylis and Perloff (2010) for Mexican tomato exports and Chandra (2016) for Chinese exports. In contrast, Bown and Crowley (2010) find no evidence than China-specific safeguards implemented by the EU and the US after China's WTO accession lead to trade deflection of China's exports.

Despite extensive research, there is a number of issues that the current literature on the trade impacts of TTBs is largely silent on. First, the effects of countervailing duties and safeguards are mostly ignored, and while less frequently used than antidumping measures these policy tools still offer valuable information to identify the trade effects of TTBs. Second, with Besedeš and Prusa (2017) being a notable exception, there is no differentiation between the trade effects over the entire life cycle of TTBs. One reason for the immense range of the estimated trade effects of TTBs could be that these policy instruments are not applied in a uniform fashion. Not all TTB investigations result in additional duties and the length of investigations and actual TTB duty application can vary tremendously between cases. Third, existing studies omit zero trade flow observations due their focus on log-linear regression specifications, which is likely to bias gravity regression estimates. And fourth, reliably estimating trade effects of policy changes requires careful accounting for multilateral resistance and potential endogeneity concerns in a gravity estimation framework, which many early papers in the literature fail to do. This last point requires the inclusion of a wide range of products and countries in the estimation. My empirical framework addresses these points.

3 Empirical Model

To track the trade effects of TTBs over their life cycle, I specify a product-level gravity equation with a fully saturated set of fixed effects:[12]

$$\begin{aligned} ln(M_{ijp,t}) = {} & \alpha_1 PreTTB_{ijp,t} + \alpha_2 TTBInvest_{ijp,t} + \alpha_3 TTBPrelDuty_{ijp,t} \\ & + \alpha_4 TTBFinalDuty_{ijp,t} + \gamma_{ip,t} + \omega_{jp,t} + \phi_{ijp} + \lambda_{ij,t} + e_{ijp,t} \quad , \end{aligned} \tag{1}$$

where $M_{ijp,t}$ are bilateral imports of HS 6-digit product p in country i from country j in year t.[13]

[12] Examples for prior applications of product-level policy analysis in a similar gravity setting include Besedeš et al. (2020) and Kuenzel (2025).

[13] Yotov (2022) emphasizes the benefits of also including domestic trade flows in gravity estimations. Unfortunately, data on domestic trade flows at the HS 6-digit level for a wide range of countries are currently not available.

On the right-hand side of equation (1), the first four terms are binary variables that take the value one when importer i is in the respective stage of a TTB case against exporter j in HS 6-digit product p in year t. $PreTTB_{ijp,t}$ captures the 3-year period preceding the start year of a TTB investigation and $TTBInvest_{ijp,t}$ covers the actual investigation period of TTB cases. $TTBPrelDuty_{ijp,t}$ and $TTBFinalDuty_{ijp,t}$ encompass periods with preliminary or final TTB duties in place, respectively. The α_1 through α_4 parameters in equation (1) then measure the average impact of the different TTB phases on product-level imports from the affected exporters. I also report below estimates when using counts of separate TTB cases during each phase to explore the importance of the intensive TTB margin for trade flows.

The empirical model in equation (1) includes importer-year-HS6 and exporter-year-HS6 fixed effects, $\gamma_{ip,t}$ and $\omega_{jp,t}$, respectively, to account for product-level gravity multilateral resistance (Anderson and van Wincoop 2003). Moreover, I add importer-exporter-product fixed effects, ϕ_{ijp} to control for time-invariant trade costs at that level. This set of fixed effects also helps to account for potential endogeneity concerns of trade policy variables in gravity regressions (Baier and Bergstrand 2007). Lastly, the regression equation adds importer-exporter-year fixed effects to capture trade costs that vary at the importer-exporter level over time, e.g., trade agreements or exchange rates.

Note that when focusing on the impact of a single TTB measure, the α_1 to α_4 estimates in equation (1) are equivalent to triple-difference estimates as long as importer-product-year, exporter-product-year and importer-exporter-product fixed effects are included.[14] When accounting for multiple TTB measures across many importers and exporters, the α_1 to α_4 coefficients capture how trade flows on average compare in products subject to a respective stage of the TTB process versus those products that are not.

Estimating the log-linear model in equation (1) has two drawbacks. It omits zero trade flow observations and cannot account for the heteroskedastic nature of trade flows. To solve these issues, I follow the recommendation of Santos Silva and Tenreyro (2006) and estimate the model using the Poisson Pseudo Maximum Likelihood (PPML) estimator. Another advantage of the PPML estimator is that it permits for comparisons of coefficient estimates between aggregate and product-level gravity applications (French and Zylkin 2024). The full baseline empirical model that

[14] For a further discussion of this point see Besedeš et al. (2020) and Kuenzel (2025). Alternatively, the α coefficients can be interpreted in this case as the difference between the following two difference-in-difference estimators: (1) the change in country j's exports to country i of products subject to the TTB process versus the change in exports for those that are not and (2) the change in country j's exports of the same products to countries that are not targeting them with TTB measures versus the change in country j's exports of products to other countries that are not targeted with TTBs by country i.

I implement below then becomes:

$$M_{ijp,t} = exp\left[\alpha_1 PreTTB_{ijp,t} + \alpha_2 TTBInvest_{ijp,t} + \alpha_3 TTBPrelDuty_{ijp,t}\right] \times exp\left[\alpha_4 TTBFinalDuty_{ijp,t} + \gamma_{ip,t} + \omega_{jp,t} + \phi_{ijp} + \lambda_{ij,t}\right] \times \epsilon_{ijp,t} \quad . \tag{2}$$

A large number of fixed effects poses a substantial computational challenge in PPML regressions. I therefore use the PPML procedure developed by Correia et al. (2020) to estimate equation (2).

The empirical specification in equation (2) is potentially subject to identifications concerns. First, features of certain markets could make it more likely that importers impose TTBs in the first place. For instance, lobbying groups might have more sway over government decisions to impose additional import protection on some products than for others. Similarly, larger import markets could make it more beneficial for domestic producers to seek additional tariff protection. The extensive fixed effects structure, including at the importer-exporter-product level, should alleviate these concerns to a large extent. A second issue related to reverse causality could be that importers are more likely to target the most important exporters of a given product with a TTB. I examine this possibility below and test whether exporters accounting for a larger share of the market prior to the imposition of a TTB experience more pronounced trade effects. In fact, the estimates suggest the opposite. Exporters accounting for greater shares of import markets experience lower trade declines subsequent to TTBs, which eases reverse causality concerns. Lastly, the imposition of TTBs could be correlated with other trade policy decisions. I show below that the estimates remain stable when accounting for bilateral product-level regular tariffs and non-tariff measures.

4 Data

To examine the trade effects of temporary trade barriers, I draw on information from two sources. Data on AD, CVD and SG investigations as well as outcomes come from the World Bank's Temporary Trade Barriers Database (TTBD, Bown et al. 2025). I source product-level bilateral trade data from CEPII's BACI data set (CEPII 2025). I discuss these data in detail below.

4.1 Temporary Trade Barriers

The 2025 version of World Bank's TTBD provides detailed information on the usage of TTBs across countries from the 1980s through the end of 2024. For all initiated AD, CVD and SG investigations, the TTBD contains case-specific data on the time line of the TTB process. Importantly, for the

purposes of this paper, the TTBD specifies for each case (i) which products and countries are targeted, (ii) when investigations start, (iii) when and which decision are made, (iv) the type and level of any duties imposed, and (v) how long any duties are in place. The product-specific information in the TTBD database is very detailed, with many cases often citing the affected products at the HS 8- or HS 10-digit product level. As the finest available cross-country product-specific trade data is at the HS 6-digit level, I aggregate all information from the TTBD to that level. To track products consistently over time, I concord all HS 6-digit codes to the HS1988/92 (H0) nomenclature. Note that while the TTBD information is very detailed, it does not have complete information on all TTB stages for all cases. I therefore rely on various different date variables in the database to construct the four TTB phase variable. I provide evidence below that the results are not materially affected when excluding observations from the sample that are subject to incomplete or missing information in the TTBD.

For each case, I define the start and end date of the different TTB phases at the calendar-year level. The 'pre-TTB' phase are the three calendar years prior to the year the TTB investigation is initiated. For instance, if a TTB investigation is opened in 1998, I consider the years 1995-1997 as the 'pre-TTB' phase.[15] The start of the 'TTB investigation phase' is the year of the initiation of the TTB investigation. I consider the end of the investigation phase as the year when a preliminary TTB duty is first applied, or if the preliminary duty was bypassed, the year when a final duty is first applied. In cases that did not result in the imposition of a duty, I consider the latest date of the following as the end of the investigation phase: preliminary injury decision date, preliminary dumping (AD case) or subsidy (CVD case) decision date, or termination/withdrawal date.

The 'preliminary duty phase' starts in the year when a preliminary TTB duty is first imposed. Alternatively, if this date is not available, I use the later date of either the preliminary injury determination or the preliminary dumping (AD)/subsidy (CVD) decision as long as both decisions are affirmative. Note that in some cases the preliminary duty phase is bypassed entirely and countries immediately impose final duties, which implies an immediate transition from the investigation to the final duty phase. Lastly, the 'final duty phase' starts in the year when a final TTB duty is first applied. The 'final duty phase' ends in the year the TTB duty is revoked or terminated. AD and CVD duties are from the outset imposed for five years but can be extended by five-year periods after sunset review investigations. Time limits on safeguards are substantially stricter, with four

[15] The results below are similar when expanding the 'pre-TTB' phase to five years. These estimates are available upon request.

years being the baseline duration of final duties. For safeguards I therefore impose a 'final duty phase' duration of four years if no specific expiration or revoke date is noted in the TTBD.

In the empirical analysis below, I separately use binary and count TTB phase variables. The former captures the extensive margin effects of TTBs on trade flows whereas the latter can also account for TTB intensity. For the TTB phase count variables I add the number of separate cases that are currently active in a given TTB phase at the importer-exporter-HS6-year level. A case that cites multiple HS 8- or HS 10-digit codes within a HS 6-digit product only counts as one TTB incident. Importantly, the TTB phase definitions do not only capture the heterogeneous effects of TTB cases that go through all four phases. The phase effects also account for the trade impacts of any case that is terminated early, e.g., after the investigation or preliminary duty phase. This approach is preferable to an analysis that only considers cases with final TTB duties as the latter would likely overstate the overall impact of TTBs on trade.

The final sample contains information on 6,693 separate TTB cases, which can be broken down into 5,837 AD, 649 CVD and 207 SG cases, respectively. These cases target in total 12,108 exporters, or on average, 1.81 exporters per case. Each case cites on average 18.6 HS 6-digit products in its investigation, illustrating the substantial breadth of products importers intend to shield from foreign competition through TTBs. The average TTB investigation phase is active for 1.75 calendar years (median: 2 years), with 92.7% completed within two calendar years. 58.9% (3,939) of all cases in the sample are subject at some point to preliminary TTB duties, with a mean duration of 1.5 calendar years (median: 2 years). 98.8% of all preliminary TTB tariffs in the sample are in place for two calendar years or less, with the longest preliminary TTB duty phase lasting seven calendar years.

In contrast, 68.7% (4,596) of all cases in the sample result in final TTB duties. The slightly higher share of final relative to preliminary TTB duties can be explained by the fact that it is not uncommon for TTB cases to bypass the preliminary duty phase entirely. Final TTB duties are also substantially longer in place than their preliminary counterparts. On average, final TTB duties last for 8.4 calendar years (median: 6 years), with 27% in place for 10 calendar years or longer. Not surprisingly, final SG duties experience on average a much shorter duration of 3.4 calendar years compared to final AD and CVD duties with 7.7 and 8.3 calendar years, respectively.

Preliminary and final TTB duties can be divided into three categories: (i) ad valorem tariffs, (ii) specific tariffs and (iii) non-tariff restrictions, including quotas as well as negotiated price undertakings and suspension agreements.[16] For cases with final TTB duty information, 82.4% are

[16] Price undertakings and suspensions agreements involve voluntary commitments by exporters to raise their prices in

subject to ad valorem tariffs, 19.6% include specific tariffs and 7.3% are non-tariff restrictions.[17] In the sample, the average ad valorem tariff rate imposed during the TTB final duty phase is 55.4% for AD cases, 30.9% for CVD cases and 22.9% for SG cases. However, there is substantial variation in the applied final TTB tariffs with many taking on substantially higher values. For instance, 12.2% of AD ad valorem tariff observations in the sample feature final TTB duties of 100% or more with a maximum of 1,823.8%. In general, TTB duties are often substantially greatthan the regular tariffs charged by countries, on top of which they are applied.

4.2 Trade and Additional Controls

I obtain bilateral HS 6-digit trade data in the HS1988/92 (H0) nomenclature from CEPII's BACI data set (CEPII 2025), which is available for the years 1995 to 2023 and therefore demarcates the length of the sample period. I append the CEPII (2025) data with zero trade flows at the importer-exporter-HS6 level observing the condition that at least one of the trading partners in a given year have reported trade flows in the BACI data. The average HS 6-digit import value in the sample is 4.258 million USD. However, about 45 percent of all HS 6-digit products have zero trade flows, highlighting the importance of using the PPML estimator.

Depending on the time frame and country pairs one considers, estimating equation (2) at the HS 6-digit level (about 5,000 products) could easily involve hundreds of millions of observations, which would render the model inestimable for practical purposes, especially in the presence of many fixed effects. I therefore restrict the sample in the empirical analysis to products in HS4-digit/importer sectors with at least one TTB ivestigation over the sample period (1995-2023).[18] There is no restriction on the set of exporters. The final sample contains 15,633,641 observations with 61 importers and 216 exporters. Table 1 shows all importers in the final sample and also provides information if they are considered high-income countries and high-activity TTB users, which are relevant characteristics for the analysis in section 6. I include the European Union as a singly entity

order to stave off actual TTB tariffs. I treat these arrangements as equivalent to TTB duties as they are explicitly implemented to mirror the effects of TTB tariffs on prices and import volumes.

[17] These statistics are based on available duty information at the case/importer/exporter/HS6 level. Countries can impose a combination of different TTB duty categories, implying that the distribution percentages do not add to 100%. Note that the TTB duty data is less complete in the TTBD compared to the different date variables.

[18] Table A1 in Appendix A presents the equivalent of the baseline results in Table 4 with a less limited sample that includes products from HS2-digit/importer sectors with at least one TTB investigation. The estimates are overall very similar, alleviating concerns that the results are driven by sample selection. A major downside of the extended sample is that the estimation takes substantially longer, with the results in Table A1 needing more than two days to compile (about 10 times as long as for the smaller baseline sample).

in the analysis as trade policy decisions are made in unison for all members of the bloc.

The upper half of Table 2 provides summary statistics and definitions when using binary definitions for the TTB phase variables. In the sample, .6% of all observations are subject to an active TTB investigation, .3% are targeted with preliminary TTB tariffs and 1.1% are charged final TTB tariffs. The most frequent investigations are SGs (.4%) as they usually target more exporters followed by ADs (.2%) and CVDs (.02%). However, AD final phase tariffs cover the largest share of observations in the sample (.7%) ahead of SGs (.4%) and CVDs (.08%). AD tariffs are more frequent as they are on average much longer in place than SG duties. The lower half of Table 2 provides the corresponding summary statistics when using TTB phase count variables. As expected, the means of the TTB phase count variables are higher throughout compared to their binary counterparts but the differences are not very substantial.

Table 3 explains the reason for this fact by showing the distribution of separate TTB counts across the different phases. Whereas there are observations in the sample that exhibit up to six separate active TTB investigations for a given importer-exporter-HS6-year combination, these incidences are very rare. In fact, 95% of all positive TTB investigation phase counts show only one active case. A similar pattern emerges for the preliminary TTB duty phase counts. For the TTB final tariff phase we even see incidences of up to 15 concurrent cases with separate duties, but even for this phase around 89% of all incidences are single counts. In the empirical analysis, I nevertheless estimate the baseline specifications using both binary and count TTB phase variables to ensure the consistency of the results across the extensive and intensive TTB margins. Table 4 provides a breakdown of TTB activity by industries in the sample. Metal products are by far the most frequent goods targeted with TTB actions, followed by clothing and chemicals. Manufactures, agricultural products and materials experience significantly fewer TTB activities.

Figure 2 provides four panels with visual evidence on the share of imports in the sample that are subject to TTB activity over time.[19] TTB activity in this case captures if there is any ongoing TTB investigation or if preliminary or final duties are currently assessed. Panel a in Figure 2 shows that the share of imports covered by any kind of TTB activity fluctuated between 5% to 8% across all importers over the sample period. High-income importers exhibit a very similar pattern. It is noticeable that non-high-income imports substantially increased their TTB activity over the sample period, starting with about 2% of their imports in 1995 to above 10% after 2020. This stylized fact is in line with the patterns documented by Prusa (2001) and Bown (2011).

[19] Note that Figure 1 accounts for all imports of countries with TTBs, whereas Figure 2 focuses on in-sample imports.

Panel b in Figure 2 breaks down the import share covered by AD, CVD and SG actions, with AD activity taking the lead throughout. But CVD measures are increasingly becoming more important and in 2023 accounted for nearly half as much of import activity as AD cases. SG measures show less of a trend with the import share hovering close to zero in most years. However, the aggregate data masks substantial underlying heterogeneity in the exposure to TTBs. Panel c in Figure 2 shows the share of countries' imports from China that is subject to TTB activity. One can observe a significant upward trend of TTB measures over time against China by all countries as well as when focusing on the US as sole importer. The latter point is consistent with trends documented in the literature (Bown 2021). Interestingly, when focusing on imports from sources other than China in panel d of Figure 2, there actually is a downward trend in the share of imports covered by TTBs before 2012 and an increase thereafter.

5 Results

In this part, I first present the baseline effects of the empirical model in section 3. In addition, I examine whether reverse causality is a relevant concern in interpreting these results. Lastly, I consider how the trade effects of TTBs evolve depending on the duration of the TTB phases.

5.1 Baseline Estimates

Table 5 presents the baseline estimates of the TTB phase effects on bilateral product-level imports using the specification in equation (2). Note that I cluster standard errors throughout at the importer/exporter/HS 4-digit level to account for potential time series correlation in the error term across HS 4-digit products for a given importer-exporter pair. Specification (1) in Table 5 uses four binary phase variables that take the value one if an importer-exporter-product observation is in the respective phase of either an AD, CVD and/or SG case in a given year. Specifications (2) through (4) focus exclusively on AD, CVD and SG incidences, respectively. Specifications (5) through (8) report results when using instead the actual count of separate cases that exporters face in a given HS 6-digit product and year from a given importer.

The estimates in specification (1) of Table 5 show that the trade effects of TTBs are very heterogeneous across the different phases. Four results stand out. First, products that will be subject to a TTB investigation within the next three years ('PreTTB') exhibit substantially elevated imports compared to products that will not face a TTB investigation anytime soon. Import values are

on average 32.2% ($= (e^{.2795} - 1) \times 100$) greater in products that will soon face an TTB investigation compared to those that are not. Second, imports remain elevated at a similar level during the investigation phase, indicating that the initiation of a TTB case on its own does not remarkably alter trade flows. Both these results are statistically significant at the one percent level. Third, imports decline once preliminary duties are applied. Specifically, countries that are targeted with at least one preliminary TTB duty in a given product experience on average -3.1% ($= (e^{-.0316} - 1) \times 100$) lower exports compared to countries not subject to these tariffs. This estimate is statistically significant at the 10 percent level. Lastly, these negative trade effects are substantially magnified once at least one final TTB duty is applied with an average drop in exports of -23.7% ($= (e^{-.2702} - 1) \times 100$) relative to countries not subject TTB measures in the same product.

A similar pattern of estimates emerges when focusing only on respective AD, CVD and SG cases in columns (2) through (4) in Table 5.[20] These results have several relevant implications. First, importers open TTB cases against countries that export substantially more than their peers who are not targeted. This outcome is in line with the fact that TTB-initiating countries need to show that elevated imports cause either injury (AD/CVD) or serious injury (SG). Second, an investigation by itself without duties imposed does not incentivize targeted countries to lower their exports. And third, when imposed, TTB tariffs lower imports from targeted countries on average substantially below the level of non-targeted countries. If TTB actions are supposed to level the playing field, this result indicates that TTB tariffs are actually more punitive than intended by WTO regulations.[21]

To account for the intensive margin of TTBs on trade, columns (5) through (8) in Table 5 mirror specifications (1) through (4) but replace the four binary phase variables with actual counts of separate active TTB cases in the respective phases. For instance, for observations with active TTB final duties, the mean count of separate cases with TTB tariffs for the same HS 6-digit product is 1.16, with 2 cases at the 90th percentile and a maximum total of 15 separate cases. Overall, the results pattern with the count variables is very similar to the corresponding binary TTB phase specifications. I also examined if potentially missing information in the TTBD database could affect the reliability of the estimates in Table 5. In Table A2 in Appendix A, I re-estimate the baseline results but omit importer-exporter-product level observations if any date information in the TTBD

[20] Whereas it is commonly assumed that safeguard investigations target exporters on an MFN basis, importers frequently exempt countries due to the existence of preferential trade agreements, their development status or low export volumes. Therefore, the estimates in column (4) can still be identified despite the inclusion of importer-product-year fixed effects.

[21] As noted in the introduction, this result is perhaps not surprising given that the average final ad valorem duty in TTB cases in the sample is about seven times higher than the average regular bilateral tariff rate.

are missing for cases at that level. That is, I drop observations that could potentially bias the estimates due to incomplete data. The results in Table A2 show that these concerns are not justified as they are nearly identical to the estimates in Table 5.

Lastly, based on the varying TTB usage pattern across industries (see Table 4), I test in Table A3 in Appendix A to what extent the TTB phase estimates vary by different product types. I obtain these results by interacting all TTB phase variables in equation (2) with six industry dummies based on the classification in Table 4. These estimates show that the overall results are very stable across industries. In all cases, imports are significantly elevated during the pre-TTB phase, remain at a similar level during the investigation phase, decrease during the preliminary duty phase and drop substantially below the level of non-targeted exporters in the final duty phase. The magnitudes of the estimates are throughout very similar for agricultural products, clothing, materials and metals with chemicals and manufactures showing somewhat smaller effects throughout the TTB process.

5.2 TTB Phase Effects and Exporter Size

As discussed at the end of section 3, one potential concern in interpreting the estimated TTB phase effects on trade is reverse causality. Specifically, importers could be more likely to target larger exporters of certain products. I test for this possibility below by introducing interactions of the TTB phase variables with a large exporter indicator ($= LargeExp_{ijp,t}$) which takes the value one if an exporter accounts for more than a certain share of a country's total imports for a given product in a given year.

Columns (1) to (4) in Table 6 below report results for the aggregate binary TTB specification using varying threshold values for this large import share: .025, .05, .1 and .25. A reverse causality issue would imply that larger exporters would experience magnified trade effects in the different TTB phases relative to smaller exporters. However, the estimates show for all TTB phases that the large exporter interactions either are not statistically significant at the 10 percent level or, if there are statistically significant effects, they point in the opposite direction of the baseline non-interacted TTB phase coefficients. Most importantly, when focusing on the 'TTBFinalDuty' phase, the estimates for the non-interacted variables are negative throughout and highly statistically significant, which is line with the baseline results in Table 5. But the coefficients for the large exporter interactions with the 'TTBFinalDuty' variable are positive and significant at the one percent level in all four specifications.[22] This result implies that the negative trade impacts from

[22] Note that the composite of both estimates for the 'TTBFinalDuty' effect for larger exporters is still negative and

final TTB tariffs are on average smaller for larger compared to smaller exporters. Reverse causality issues would suggest the opposite to be true.

Columns (5) to (8) conduct the same exercise with the TTB phase count variables in place of the binary measures. The results pattern for the count specifications is identical to the binary results in the earlier columns. The TTB phase effects for large exporters are again not significantly different or they point into the opposite direction compared to smaller exporters. Hence, the results in Table 6 suggest that reverse causality is not a concern in interpreting the baseline effects in Table 5.

5.3 TTB Phase Estimates by Duration

The baseline estimates in Table 5 treat each year a TTB case is in a given phase as identical. However, it is possible that the trade effects from TTBs might take some time to fully unfold. For instance, a TTB tariff might lower trade flows more in the long run than in the short run due to mitigating factors such as the fulfillment of previously placed orders or the difficulty to find new suppliers on short notice. I therefore include in Table 7 for each TTB phase separate variables capturing the trade effects across the different years TTB cases spend in a given phase. To illustrate this approach, $TTBInvest_{ijp,t} \times Year\ 1$ takes the value one in the binary case if the TTB investigation importer i has opened against exporter j in product p is in its first calendar year in year t. Similarly, $TTBInvest_{ijp,t} \times Year\ 2$ captures if a TTB investigation is in its second year, whereas $TTBInvest_{ijp,t} \times Years\ 3+$ accounts for TTB investigations in their third or later years — note that only 7.3 percent of TTB investigations in the sample last three years or longer.

The preliminary TTB tariff phase is differentiated into two year variables: Year 1 and Years 2+ as only 1.2 percent of TTB cases in the sample feature preliminary TTB tariffs lasting longer than 2 calendar years. Since the baseline duration of TTBs is either four (SG) or five years (CVD/AD), the 'TTBFinalDuty' phase is broken down into 5 separate variables: Year 1, Year 2, Year 3, Year 4, and Years 5+. Lastly, the pre-investigation period is broken down into three years with $PreTTB_{ijp,t} \times Year\ -3$ capturing trade effects three calendar years prior to the year of the TTB investigation initiation, whereas $PreTTB_{ijp,t} \times Year\ -2$ and $PreTTB_{ijp,t} \times Year\ -1$ measure the impact on imports two and one years prior, respectively.

Columns (1) through (4) in Table 7 show results for the year-specific effects using binary TTB phase-year variables. Focusing on the aggregate TTB results in column (1), which combine AD, CVD

significant at the one percent level for all specifications throughout Table 6.

and SG cases, four results emerge. First, the pre-TTB effects are steadily increasing from three years out to one year out of the investigation, starting with 18.2% ($= (e^{.1674} - 1) \times 100$) higher imports originating in target countries relative to non-targeted exporters to 34.1% ($= (e^{.2937} - 1) \times 100$). Recent changes in import patterns could then be a more relevant factor in determining TTB investigations rather than the level of imports alone. Second, whereas in the first year of the investigation phase imports keep increasing, this pattern reverses in later years. That is, long TTB investigations could have a successful signaling effect and start to relieve pressures from imports.

Third, imports decline strongly in the first calendar year preliminary TTB tariffs are in place with a predicted -11.2% ($= (e^{-.1188} - 1) \times 100$) lower level of imports from exporters targeted with preliminary TTBs tariffs relative to non-targeted exporters. While still negative, this effect becomes statistically insignificant for the second and later years of the preliminary TTB phase. And fourth, the year-specific estimates for the 'TTBFinalDuty' phase are steadily becoming more negative from the first year final TTB duties are in place to years five and later. During the first year a final TTB tariff is in place, imports from exporters targeted with these duties are on average -9.2% ($= (e^{-.0966} - 1) \times 100$) lower than from non-targeted exporters. This negative effect continuously magnifies over the time with an estimated drop in imports of -21.2% ($= (e^{-.2378} - 1) \times 100$) in years 5 and later compared to non-targeted exporters.

These observed patterns from specification (1) in Table 7 are similar when separately considering only AD, CVD and SG cases in columns (2) to (4), respectively. One noticeable difference is that the negative effects of final TTBs tariffs in years five and later are substantially greater for CVD and SG cases with -40.7% ($= (e^{-.5222} - 1) \times 100$) and -47.3% ($= (e^{-.6399} - 1) \times 100$), respectively, compared to AD tariffs with an average negative effect on imports of -22.3% ($= (e^{-.2527} - 1) \times 100$). These results are in line with the fact that SG duties apply broadly to all firms in exporting countries while AD tariffs only target specific firms. In addition, CVD cases are more rarely filed, which could imply that if they actually lead to final duties they are much less targeted with broader import protections applied across the board. Panel b in Figure 1 supports this notion. Although there are nearly ten times as many AD cases compared to CVD cases in the sample (5,837 AD vs. 649 CVD), the total import share affected by CVD activity in recent years is just about half of the equivalent measure for AD activity.

Finally, Specifications (5) to (8) in Table 7 replace the binary TTB phase-year variables with their respective TTB phase count equivalents. The results for these count specifications are again in line with the binary estimates in columns (1) through (4). Hence, both the binary and count TTB

phase variables indicate that the trade effects of these measures show distinct heterogeneity based on the duration of the different TTB phases.

6 Extensions

The previous section focused on the life cycle effects of TTBs on trade volumes from exporting countries that are directly targeted by these measures. In this part, I implement four extensions to the baseline empirical model. I first explore if controlling for other trade policy variables affects the prior results and how sensitive imports are to actual TTB tariff rates. Second, I examine the effects of TTB on prices that targeted exporters charge. Third, I consider how TTBs affect exporters that are not directly subject to these policy tools, i.e., possible trade diversion to third countries. And lastly, I test if the trade effects of TTBs exhibit heterogeneity across several groupings that have been suggested in the literature, e.g., by PTA membership, development status, target countries, and TTB usage intensity. As the binary and count regressions in section 4 were closely aligned, I only report below the results for the binary TTB phase specifications. The TTB count estimates are very similar and available upon request.

6.1 Trade Policy Controls and TTB Tariffs

The extensive set of fixed effects employed in Table 5 accounts for many potential confounding determinants of bilateral trade flows. However, there are two important trade policy variables that vary at the importer-exporter-HS6 level over time and could be correlated with TTBs: regular tariffs and non-tariff measures (NTMs). To test the robustness of the baseline results, column (1) in Table 9 accounts for bilateral tariffs and NTMs that importers apply at the product level against exporters. I obtain time-varying bilateral HS 6-digit specific tariff data from the updated MacMap-HS6 database compiled by the International Trade Center and CEPII (CEPII 2012). Counts of bilateral NTM stock data come from Kuenzel and Sharma (forthcoming) who track the number of 16 separate NTM subcategories in force at the product level over time based on information from UNCTAD (2024). When accounting for regular tariffs and NTMs, the TTB phase estimates in column (1) of Table 9 are very similar to the results in specification (1) of Table 5, alleviating concerns of omitted variables bias from other trade policy variables.[23] Moreover, as expected, both tariffs and NTMs

[23] Table A4 in Appendix A shows results when adding regular tariff and NTM stock controls to all specifications in Table 5. The TTB phase estimates in this case are very similar throughout to the baseline results in Table 5. Table A5 provides exact definitions and summary statistics for all additional variables introduced in this part.

have negative trade effects. Note that the sample size in this case shrinks by about 5.3 million observations due to missing tariff and/or NTM data.

To examine how sensitive imports are to actual TTB duty rates, I replace in column (2) of Table 9 the binary preliminary and final TTB phase variables with the actually applied ad valorem tariffs: $ln(1 + PRELtariff_{ijp,t})$ and $ln(1 + FINALtariff_{ijp,t})$. For observations with multiple TTB cases, I use the average ad valorem rate. If ad valorem TTB tariffs are imposed but the actual rate is missing in the TTBD, I drop the observations from the sample. The binary PreTTB and TTBInvest estimates are again similar to the baseline estimates in specification (1) of Table 5. Importantly, both the preliminary and final TTB ad valorem tariff estimates are negative and statistically significant at least at the 10 percent level. The specific results imply that for each 10 percentage point increase in the final TTB tariff imports falls by approximately three percent, with a much smaller effect for preliminary TTB tariffs of around .5 percent.[24]

Specification (3) in Table 9 simultaneously accounts for regular tariffs, NTMs and the ad valorem TTB rates. The estimates for all variables are comparable to columns (1) and (2). As discussed in section 4.1, a significant share of TTB measures are not ad valorem duties but either specific tariffs or some form of NTM, e.g., quotas or suspension agreements. In column (4), I therefore introduce two binary variables that account for specific duties in the preliminary or final TTB duty phase: $PREL\_SD_{ijp,t}$ and $FINAL\_SD_{ijp,t}$. I also control for quotas, suspension agreements and price undertakings during the preliminary and final TTB phases with two additional binary variables: $PREL\_NTM_{ijp,t}$ and $FINAL\_NTM_{ijp,t}$. The estimates for the regular tariff, NTM and the TTB rate variables in specification (4) remain similar to column (3). Of the newly introduced binary variables, only specific duties during the final TTB phase exhibit a negative and significant effect (at the five percent level). Hence, ad valorem TTB tariffs seem to be most effective tool in reducing imports from targeted countries.

6.2 Price Effects

The explicit aim of TTBs is to shield domestic producers from import competition. The baseline results in section 5 show that final TTB duties substantially reduce exports of targeted countries relative to other exporters. However, one important question remaining is whether this reduction in imports also raises import prices to help restore the competitiveness of domestic firms.

[24] The exact drop in imports depends on the actual initial tariff: $\alpha/(1+t) \times 10\%$, where α is the estimated tariff coefficient and t is the initial duty.

To examine the price effects over the TTB life cycle I estimate a log-linear version of equation (2) with the log unit value, $ln(P_{ijp,t})$ as dependent variable:[25]

$$\begin{aligned} ln(P_{ijp,t}) = \beta_1 PreTTB_{ijp,t} + \beta_2 TTBInvest_{ijp,t} + \beta_3 TTBPrelDuty_{ijp,t} \\ + \beta_4 TTBFinalDuty_{ijp,t} + \gamma_{ip,t} + \omega_{jp,t} + \phi_{ijp} + \lambda_{ij,t} + u_{ijp,t} \quad . \end{aligned} \tag{3}$$

Note there is no informational loss in estimating this regression using a log-linear fixed effects model as prices for observations with zero trade flows are not defined.

Table 8 reports the results from estimating equation (3) using the binary TTB phase variables. Column (1) presents estimates for the four phases when using aggregate TTB variables that draw on information from all AD, CVD and SG cases. Three results stand out from this specification. First, in the three years prior to a TTB investigation prices are on average depressed by -3% ($= (e^{-.0303} - 1) \times 100$) for imports from later targeted exporters relative to countries not subject to a TTB investigation. Hence, there are not only greater import volumes from future TTB targets, but these exporters also charge lower prices compared to their competitors. Second, prices start to slightly increase during the investigation phase but are not estimated to be level compared to non-targeted exporters until the preliminary TTB duty phase. And third, once final TTB duties are in place import prices from targeted exporters are on average 4.8% ($= (e^{.0468} - 1) \times 100$) greater than than those from countries not subject to final TTB duties. That is, final TTB duties overshoot their objective of leveling the playing field as they lead to import prices for targeted countries that are higher than those from other markets.

Similar results emerge when purely focusing on AD cases in column (2) and CVD incidences in column (3) of Table 8. Note that both cases the magnitudes of the estimated price effects are slightly larger prior to the initiation of an investigation ($\approx -4\%$) and during the final duty phase ($\approx 5 - 6\%$) compared to the aggregate TTB estimates in column (1). At the same time, price effects for the SG cases in column (4) are statistically insignificant throughout all four phases. One potential reason for this different outcome is that SG measures apply much more broadly to most exporters with the exception of PTA members or developing countries with low trade volumes in the affected products. Hence, estimating the price regression in equation (3) exclusively for SG cases is then more challenging compared to the AD and CVD counterparts as there are substantially fewer relevant non-targeted exporters. Nevertheless, there is substantial evidence that TTBs reverse the

[25] I obtain prices by dividing the respective import values in CEPII (2025) by the reported import quantity information.

trend of too low prices compared to other exporters prior to the TTB investigation once additional tariffs are imposed.

6.3 Trade Diversion

The existing literature has repeatedly established that AD tariffs have positive effects for non-targeted exporters (see section 2). That is, trade is diverted away from exporters targeted with AD cases to exporters not subject to these measures. I re-examine this result in this part. Relative to existing studies on this issue, I make two contributions. First, I investigate potential trade diversion effects across the different phases of all TTBs using a theory-consistent gravity framework that accounts for zero trade flows. Second, I analyze how trade diversion effects differ across various bystander definitions for third-country exporters. For instance, one could define third-country exporters as all countries other than the country currently undergoing a TTB case in a given product. On the other extreme, one could define third-country exporters as only those countries that are not subject to a TTB case in any product by the importer in question.

To estimate the trade diversion effects from TTBs, I use a modified version of the baseline empirical model in equation (2):

$$\begin{aligned} M_{ijp,t} = exp\left[\delta_1 PreTTB_{-jip,t} + \delta_2 TTBInvest_{-jip,t} + \delta_3 TTBPrelDuty_{-jip,t}\right] \\ \times exp\left[\delta_4 TTBFinalDuty_{-jip,t} + \gamma_{ip,t} + \omega_{jp,t} + \phi_{ijp} + \lambda_{ij,t}\right] \times \epsilon_{ijp,t} \quad , \end{aligned} \tag{4}$$

where -j indicates the set of exporters other than the exporter j who is targeted with a TTB measure by country i during year t.

In Table 10, I report the estimation results of equation (4) using several definitions of the exporter set -j. In column (1) of Table 10, I use the most extensive set possible of third-country exporters. Specifically, each of the TTB phase variables takes the value one for all exporters other than country j that is currently subject to the TTB phase in question by importer i in product p in year t. That is, the four TTB phase variables only take the value zero for exporter j. Note that the fixed effects structure then prevents the simultaneous inclusion of the TTB phase variables for exporter j from equation (2) and the TTB phase variables for third-country exporters in equation (4). If both sets of TTB phase variables were included, their sum would be collinear with the importer-year-product fixed effects. Only one set of the TTB phase effects are therefore identifiable at a time. Using this very wide definition of third-country exporters, the estimates for the different TTB phases

are nearly mirror images of the results in column (1) of Table 4. During the pre-investigation and investigation phases third-country exports are significantly depressed relative to countries that are targeted with a TTB, with estimated lower exports of -26.8% ($= (e^{-.3125} - 1) \times 100$) and -25.1% ($= (e^{-.2894} - 1) \times 100$), respectively. In addition, once preliminary and final TTB tariffs are imposed against country j, third-country exporters experience 7.2% ($= (e^{.0692} - 1) \times 100$) to 9.4% ($= (e^{.0894} - 1) \times 100$) higher exports relative to TTB target j.

Specifications (2) to (4) in Table 10 successively narrow the range of third-country exporters. In column (2), I only include third-country exporters in the set -j for each TTB phase if they are currently not a target in the same respective TTB phase in a separate case by importer i in the same product p and year t. Intuitively, if a third-country exporter is subject to a TTB case in the same phase, the estimated effects in column (1) could mismeasure the trade diversion effects from TTBs as some of the third-country exporters might experience themselves depressed trade flows due to TTB actions. The results in column (2) of Table 10 confirm this point. Once final TTB tariffs are imposed against exporter j, third-country exporters that are not subject to final TTB tariffs by importer i in the same product export on average 31% ($= (e^{.2702} - 1) \times 100$) more than countries that are TTB targets. The estimates for the three prior TTB phases in column (2) are comparable in sign and magnitude to specification (1). When further restricting the set of third-country exporters in columns (3) and (4), the trade diversion results for the different TTB phases are similar but somewhat less amplified compared to column (1). In specification (3), the third-country TTB phase variables only take the value one if an exporter currently does not have any active TTB cases in any phase with importer i in product p. Specification (4) goes another step further and only considers third-country exporters in set -j that currently do not have a TTB case with importer i in any phase for any product.

Comparing the results in specifications (2) to (4) with column (1) allows for two conclusions. First, the trade diversion effects due to final TTB tariffs are estimated to be lowest when using the most extensive set of third-country exporters regardless of their own involvement in potential TTB cases with importer i. Controlling for third-country involvement in TTB cases with the same importer increases estimated trade diversion effects. Second, while third-country exporters have depressed trade flows prior and during TTB investigations, this negative effect becomes less in magnitude when focusing on exporters not involved in their own TTB cases with the respective importer. Hence, trade diversion due to TTB cases can be substantial but actual estimates can vary significantly based on the TTB phase and chosen set of third-country exporters.

6.4 TTB Effects Heterogeneity

In this part, I investigate to what extent the TTB effects on trade are driven by specific channels that have been emphasized in the trade policy literature. To start, advanced economies historically were first to broadly adopt TTBs to protect domestic industries, but developing countries have caught up in terms of usage patterns over time (Bown 2008). However, one could reasonably expect that advanced economies have designed more effective TTB laws and processes to lower import competition in sensitive products given their longer experience. In columns (1) and (2) of Table 11, I therefore split the sample into high- and non-high income countries according to the World Bank's income classification during the year 2010. Table 1 indicates the countries classified as high income. I then separately estimate the baseline regression in equation (2) for both samples. The results indicate that the effects throughout all TTB phases are very similar across income groups compared to the baseline estimates in specification (1) of Table 5. In fact, the negative trade effects from final TTB tariffs are slightly magnified in non-high income countries compared to high-income importers. Hence, income status per se is not a relevant driver of the baseline results in Table 5.

Besides income differences, I next consider the extent of TTB activity itself as a proxy for the experience with TTB cases. Specifically, in specifications (3) and (4) in Table 11, I split the sample based on importer TTB activity levels. In column (3), I exclusively include importers that initiated more than a 1,000 TTB investigations over the sample period (counted at the importer-product level). Table 1 indicates the 23 countries that are classified as high-activity TTB users with the remainder being in the low-activity TTB sample in column (4). Three interesting results emerge from the estimates in specification (3) and (4) of Table 11. First, the results pattern across the different TTB phases in both samples is similar to the baseline specification in Table 4, column (1). Second, low-activity TTB users tolerate larger imports in the run-up to TTB investigations than high-activity TTB users. Specifically, in the three years prior to a TTB investigation low-activity TTB users experience 45.7% ($= (e^{.3763} - 1) \times 100$) higher imports from exporters soon to be subject to a TTB investigation compared to 28.9% ($= (e^{.2535} - 1) \times 100$) for high-activity TTB users. Third, once low-activity users implement TTB tariffs, their effects are substantially more trade-restricting than those by high-activity TTB users. Exporters subject to TTB tariffs by low-activity importers experience -31.8% ($= (e^{-.3834} - 1) \times 100$) lower trade than non-targeted countries compared to -23.3% ($= (e^{-.2653} - 1) \times 100$) in high-activity TTB countries. Hence, when more rarely used, TTB tariffs tend to be more trade-restricting.

It has been argued (e.g., Bown 2014, Prusa et al. 2022) that preferential trade agreements (PTAs) reduce the usage of TTB actions against trade agreement partners.[26] I therefore examine in specifications (5) and (6) in Table 11 if common PTA membership differently affects the trade effects during the TTB phases. Specification (5) in Table 11 only includes country pairs without a current PTA, whereas specification (6) focuses on country pairs with a current PTA. I use data from Mario Larch's Regional Trade Agreements Database (Egger and Larch 2008) to identify preferential trading relationships. However, the estimates in column (5) and (6) indicate that the trade effects in all TTB phases are remarkably similar for both PTA partners and non-partners. Hence, preferential trading relationships have no impact on the patterns of TTB trade effects.[27]

Lastly, using a log-linear fixed effects specification, Sandkamp and Yalcin (2021) provide evidence that AD duties affect exports from China more negatively compared to other countries. This finding is particularly relevant as imports from China are targeted at a substantially higher rate than those of other countries (see Figure 1 and Figure 2). In columns (7) and (8), I re-investigate this result. Specifically, I estimate a specification along the lines of equation (2) but I also include interactions of the TTB phase terms with a Chinese exporter dummy:

$$\begin{aligned} M_{ijp,t} = & \, exp\left[\alpha_1 PreTTB_{ijp,t} + \alpha_2 TTBInvest_{ijp,t} + \alpha_3 TTBPrelDuty_{ijp,t} + \alpha_4 TTBFinalDuty_{ijp,t}\right] \\ & \times exp\left[\beta_1 PreTTB_{ijp,t} \times CHN + \beta_2 TTBInvest_{ijp,t} \times CHN + \beta_3 TTBPrelDuty_{ijp,t} \times CHN\right] \\ & \times exp\left[\beta_4 TTBFinalDuty_{ijp,t} \times CHN + \gamma_{ip,t} + \omega_{jp,t} + \phi_{ijp} + \lambda_{ij,t}\right] \times \epsilon_{ijp,t} \quad , \end{aligned} \tag{5}$$

where the composite China-specific effects are then given by the sum of $\alpha_k + \beta_k$ for $k \in \{1, 2, 3, 4\}$.

In column (7) of Table 11, I report the estimates for the non-interacted TTB phase variables, which correspond to the estimated effects of TTBs for non-Chinese exporters. In column (8), I instead show the composite sums of the non-interacted TTB phase variables and the respective interaction terms, which correspond to the China-specific TTB phase effects. Two results emerge. First, in the lead-up to and during the TTB investigation Chinese exports are substantially more elevated compared to other exporters that are targeted with TTB investigations: 73.2% ($= (e^{.5494} - 1) \times 100$) versus 33.9% ($= (e^{.2917} - 1) \times 100$). Second, once final TTB duties are implemented, the drop in trade flows is substantially larger for China compared with other targeted exporters: -43%

[26] Tabakis and Zanardi (2019) provide evidence that PTAs also reduce AD actions against non-members.

[27] In Table A6 in Appendix A, I also examine the robustness of the baseline results when controlling for HS 2-digit specific common WTO and PTA membership effects, respectively. That is, I add to the model in equation (2) both HS2/WTO as well as HS2/PTA interactions. The TTB estimates in that case are nearly identical to Table 5.

$(= (e^{-.5623} - 1) \times 100)$ versus -20.2% $(= (e^{-.2251} - 1) \times 100)$. Hence, using a different empirical approach, I confirm the earlier findings of Sandkamp and Yalcin (2021).

7 Concluding Remarks

In this paper, I use a theoretically-consistent product-level gravity framework to analyze the trade impacts of temporary trade barriers, which include antidumping, safeguard and countervailing duties, for a global sample of countries over the period 1995-2023. In addition to using the longest and most detailed sample to date, I examine for the first time the impact of TTB measures on trade flows over their entire life cycle. I divide the TTB process into four separate phases ranging from a pre-TTB period through the TTB investigation stage and culminating in preliminary and final TTB tariff episodes. The major advantage of this approach is that it highlights how considerably trade responses can vary over the complete duration of the TTB process.

The results show that importers target countries with TTB cases whose exports are on average around a third greater than those of other exporters. Exports from these TTB targets stay elevated during the investigation phase and fall slightly below the average of non-targeted exporters once preliminary TTB duties are applied. Once final TTB duties are in effect, the gap to non-targeted countries significantly widens and exporters subject to these extra tariffs suffer on average close to 25 percent lower trade flows than they otherwise would. Moreover, the negative effects from final TTB duties magnify the longer they stay in place. The TTB phase impacts on imports show similar patterns across AD, CVD and SG cases and are not driven by large exporters. The effects are similar across income groups, TTB activity levels, PTA membership status but are substantially magnified when targeting Chinese exports. I also estimate matching TTB effects on prices and find significant trade diversion to third-country exporters due to TTBs.

The results in this paper have several policy implications. First, there is no deterrence effect from TTB investigations. Unless investigations are long-lasting, TTB probes or announcements on their own do not appear to deter imports. Second, discriminatory tariffs lower imports from targeted exporters but trade diversion to third countries at least partly negate this effect. If a government wants to broadly discourage imports and avoid tariff revenue losses due to trade diversion, then lower and more broadly applied tariffs could be more effective than higher and targeted duties. Lastly, from an efficiency standpoint, TTBs are more damaging the longer they are in place and nearly 30 percent of all final TTB duties last for longer than 10 years. These measures are supposed

to be temporary but are frequently used in practice as quasi-permanent tariff boosts. One potential angle for a WTO-led reform on TTBs could be to generally limit their time span but ease the conditions under which they can be imposed. These changes could lower the frequency of WTO disputes on TTBs and limit long-term damages.

Lastly, the existing detailed case-level data on TTBs offer unique opportunities to study various product- and industry level effects of these measures. For instance, it is often claimed that these tariffs are necessary to create a level playing field and to preserve the competitiveness of domestic industries. Whereas this study shows that imports from TTB targets drop significantly, it is not known to what extent TTBs actually affect industry and firm productivity. Similarly, there is currently no evidence if TTBs can affect employment. These questions are promising areas for future research.

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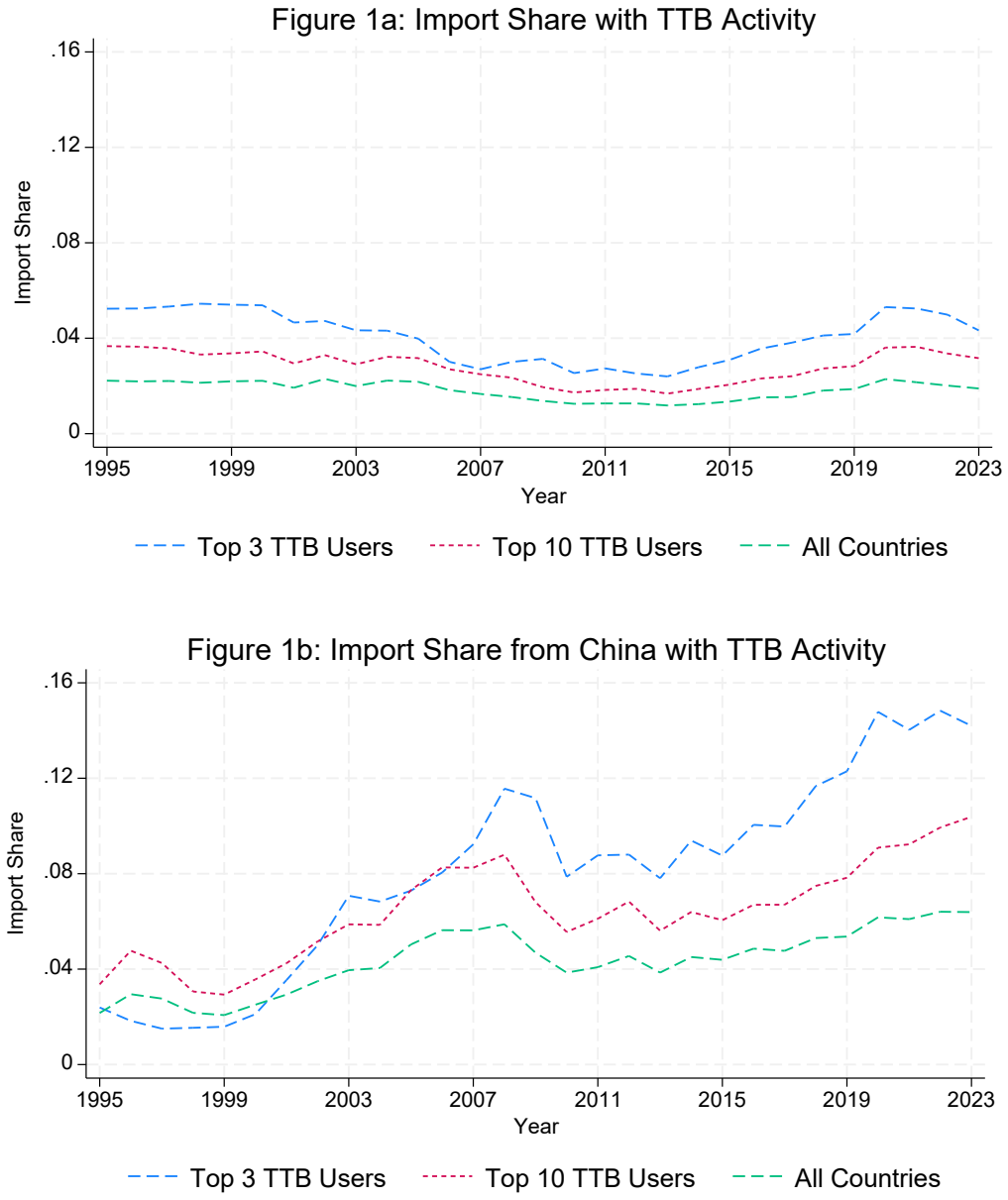
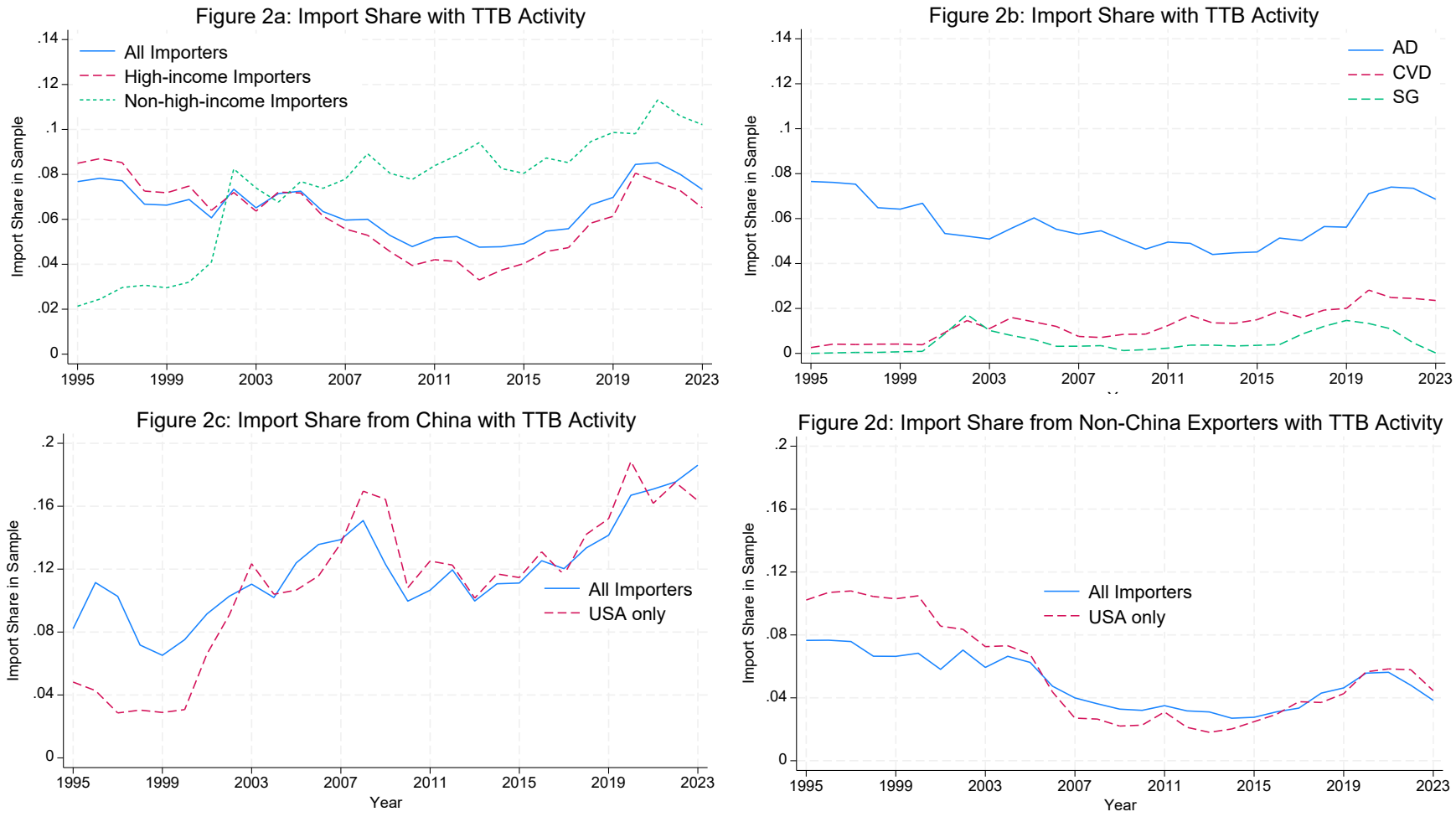
Figure 1: Import Shares with TTB Activity



Notes: Author's calculations based on trade data from CEPII 2025 and TTB information from Bown et al. (2025). The figure provides import shares with TTB activity (investigation phase, preliminary duty phase, final duty phase) based on complete merchandise imports for all TTB using countries. Top 3 TTB users: USA, IND, TUR. Top 10 TTB users: Top 3 + EUN, ARG, MEX, BRA, THA, PER, IDN.

Figure 2: In Sample Import Shares with TTB Activity



Notes: Author's calculations based on trade data from CEPII 2025 and TTB information from Bown et al. (2025). The figure provides in-sample import shares with TTB activity (investigation phase, preliminary duty phase, final duty phase).

Table 1: Total Observations and Temporary Trade Barriers by Country

Country	Obs.	TTB Phase Counts			Country	Obs.	TTB Phase Counts		
		Investigation	Prel. Duty	Final Duty			Investigation	Prel. Duty	Final Duty
Argentina[t]	782,443	2,415	2,171	9,044	Latvia	275	22	15	36
Armenia	106,428	833	132	1,170	Lithuania	42	4	2	2
Australia[h,t]	693,838	1,002	489	2,785	Madagascar	14,756	616	144	314
Bahrain[h,t]	73,504	3,095	16	247	Malaysia	95,652	693	1,127	2,533
Belarus	130,298	387	10	1,210	Mexico	1,323,658	545	504	16,396
Brazil[t]	716,550	1,598	839	4,980	Moldova	4,063	227	113	575
Bulgaria	482	20	7	26	Morocco	78,149	909	1,423	3,361
Canada[h,t]	808,827	2,091	1,536	8,435	New Zealand[h]	95,358	145	20	342
Chile	64,811	698	345	381	Oman[h,t]	75,698	3,247	16	243
China[t]	424,985	2,122	991	4,186	Pakistan	171,371	624	272	1,122
Colombia	347,941	285	393	781	Paraguay	6,689	26	7	13
Costa Rica	29,049	34	7	84	Peru[t]	388,351	1,170	263	3,324
Croatia[h]	1,051	16	5	11	Philippines	73,465	328	307	1,256
Czech Republic[h]	3,997	298	180	445	Poland[h]	10,843	567	839	444
Dom. Republic	21,041	164	113	429	Qatar[h,t]	77,309	3,226	14	239
Ecuador	30,796	335	194	319	Russian Fed.[t]	306,501	4,188	388	1,990
Egypt, Arab Rep.[t]	149,005	1,032	1,001	2,558	Saudi Arabia[h,t]	103,907	4,092	17	301
European Union[h,t]	2,008,339	9,470	7,307	21,415	Slovak Republic[h]	482	50	0	0
Guatemala	4,568	6	3	18	South Africa	512,962	750	748	3,407
Honduras	6,933	16	0	0	Thailand	112,701	913	613	5,041
Hungary[h]	11,655	719	1,017	522	Trinidad & Tob.[h]	32,890	45	30	110
India[t]	1,090,880	14,265	5,475	27,831	Tunisia	596	59	0	0
Indonesia[t]	338,197	3,714	3,033	7,365	Turkey[t]	801,390	4,209	1,499	16,545
Israel[h]	118,101	150	119	140	Ukraine	168,569	890	290	1,598
Jamaica	2,396	14	6	24	United Arab Emir.[h,t]	115,209	4,918	16	336
Japan[h]	62,081	37	15	125	United Kingdom[h]	20,764	0	0	464
Jordan[t]	48,077	1,364	663	2,107	United States[h,t]	2,020,930	13,003	8,142	43,502
Kazakhstan[t]	167,455	1,215	166	1,514	Uruguay	23,463	31	2	38
Korea, Rep.[h]	320,314	629	388	2,111	Venezuela	130,990	629	76	717
Kuwait[h,t]	82,000	3,390	15	265	Vietnam	127,906	760	445	1,948
Kyrgyz Rep.	92,660	779	165	1,157					

Notes: The table presents the number of total observations per importer and counts of separate TTB cases by phase across exporters, years and products. [h] indicates a high-income economy and [t] is considered a high-activity TTB user.

Table 2: Temporary Trade Barriers and Imports – Summary Statistics and Definitions

Variable	Definition	Mean	SD	Min	Max
Imports	Import value in 1,000s of US Dollars	4,258.63	137,154.78	0	73,951,377.45
	Binary TTB Phase Variables				
PreTTB	TTB 3-year lead-in phase ongoing? Yes: 1, No: 0	0.0103	0.1009	0	1
TTBInvest	TTB investigation phase ongoing? Yes: 1, No: 0	0.0060	0.0772	0	1
TTBPrelDuty	Preliminary TTB duty in place? Yes: 1, No: 0	0.0027	0.0514	0	1
TTBFinalDuty	Final TTB duty in place? Yes: 1, No: 0	0.0115	0.1065	0	1
PreAD	AD 3-year lead-in phase ongoing? Yes: 1, No: 0	0.0034	0.0579	0	1
ADInvest	AD investigation phase ongoing? Yes: 1, No: 0	0.0021	0.0460	0	1
ADPrelDuty	Preliminary AD duty in place? Yes: 1, No: 0	0.0010	0.0311	0	1
ADFinalDuty	Final AD duty in place? Yes: 1, No: 0	0.0073	0.0850	0	1
PreCVD	CVD 3-year lead-in phase ongoing? Yes: 1, No: 0	0.0004	0.0212	0	1
CVDInvest	CVD investigation phase ongoing? Yes: 1, No: 0	0.0002	0.0152	0	1
CVDPrelDuty	Preliminary CVD duty in place? Yes: 1, No: 0	0.0001	0.0120	0	1
CVDFinalDuty	Final CVD duty in place? Yes: 1, No: 0	0.0008	0.0278	0	1
PreSG	SG 3-year lead-in phase ongoing? Yes: 1, No: 0	0.0069	0.0830	0	1
SGInvest	SG investigation phase ongoing? Yes: 1, No: 0	0.0039	0.0620	0	1
SGPrelDuty	Preliminary SG duty in place? Yes: 1, No: 0	0.0017	0.0408	0	1
SGFinalDuty	Final SG duty in place? Yes: 1, No: 0	0.0043	0.0651	0	1
	Count TTB Phase Variables				
PreTTB Count	Count of cases with TTB 3-year lead-in phase ongoing	0.0109	0.1107	0	6
TTBInvest Count	Count of cases with TTB investigation phase ongoing	0.0063	0.0845	0	6
TTBPrelDuty Count	Count of cases with preliminary TTB duty in place	0.0028	0.0568	0	6
TTBFinalDuty Count	Count of cases with final TTB duty in place	0.0133	0.1382	0	15
PreAD Count	Count of cases with AD 3-year lead-in phase ongoing	0.0035	0.0606	0	4
ADInvest Count	Count of cases with AD investigation phase ongoing	0.0022	0.0495	0	4
ADPrelDuty Count	Count of cases with preliminary AD duty in place	0.0010	0.0328	0	4
ADFinalDuty Count	Count of cases with final AD duty in place	0.0080	0.0997	0	8
PreCVD Count	Count of cases with CVD 3-year lead-in phase ongoing	0.0005	0.0224	0	3
CVDInvest Count	Count of cases with CVD investigation phase ongoing	0.0002	0.0161	0	3
CVDPrelDuty Count	Count of cases with preliminary CVD duty in place	0.0002	0.0129	0	3
CVDFinalDuty Count	Count of cases with final CVD duty in place	0.0009	0.0377	0	8
PreSG Count	Count of cases with SG 3-year lead-in phase ongoing	0.0070	0.0838	0	2
SGInvest Count	Count of cases with SG investigation phase ongoing	0.0039	0.0625	0	2
SGPrelDuty Count	Count of cases with preliminary SG duty in place	0.0017	0.0409	0	2
SGFinalDuty Count	Count of cases with final SG duty in place	0.0044	0.0675	0	3

Notes: All variables are at the importer-exporter-year-HS6 level. The summary statistics are based on the 15,633,641 observations in the baseline sample.

Table 3: Temporary Trade Barriers Distribution Across Phases

		Count of Active Cases in Sample						
		1	**2**	**3**	**4**	**5**	**6-10**	**11-15**
TTB Phase	**Investigation**	**89,045**	**3,999**	**438**	**126**	**20**	**13**	**0**
	Preliminary Duty	**39,179**	**2,046**	**166**	**53**	**22**	**7**	**0**
	Final Duty	**159,299**	**16,235**	**1,699**	**1,422**	**298**	**443**	**52**
AD Phase	**Investigation**	31,929	963	215	38	0	0	0
	Preliminary Duty	14,674	361	61	12	0	0	0
	Final Duty	105,103	7,017	957	377	213	82	0
CVD Phase	**Investigation**	3,455	129	7	0	0	0	0
	Preliminary Duty	2,167	88	7	0	0	0	0
	Final Duty	10,399	1,312	200	148	47	25	0
SG Phase	**Investigation**	60,088	301	0	0	0	0	0
	Preliminary Duty	26,104	19	0	0	0	0	0
	Final Duty	64,766	1,649	29	0	0	0	0

Notes: All TTB counts are at the importer-exporter-year-HS6 level. The distributions are based on the 15,633,641 observations in the baseline sample.

Table 4: Temporary Trade Barriers Across Industries

TTB Phase	**Count of Observations with Active TTBs in:**					
	Agriculture	**Chemicals**	**Clothing**	**Manufactures**	**Materials**	**Metals**
Investigation	2,758	11,592	12,554	4,390	4,559	57,798
Preliminary Duty	1,835	5,139	6,709	2,802	1,763	23,225
Final Duty	6,828	28,741	37,512	16,004	9,839	80,524

Notes: The table shows the distribution of observations with TTB activity by industry in the baseline sample (out of a total of 15,633,641). Industry definitions: Agriculture HS 1-24, chemicals HS 25-40, clothing HS 41-43/50-67, manufactures HS 84-97, materials HS 26-27/44-49/68-71, metals HS 72-83.

Table 5: Temporary Trade Barriers and Imports – Baseline Estimates

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TTB Measure:	TTB	AD	CVD	SG	TTB	AD	CVD	SG
PreTTB	0.2795***	0.2855***	0.2595***	0.1630***	0.1721***	0.2424***	0.2627***	0.1629***
	(0.0174)	(0.0167)	(0.0296)	(0.0631)	(0.0121)	(0.0158)	(0.0280)	(0.0615)
TTBInvest	0.2847***	0.3009***	0.2933***	0.1143**	0.1878***	0.2425***	0.2957***	0.1313**
	(0.0157)	(0.0163)	(0.0383)	(0.0580)	(0.0144)	(0.0164)	(0.0376)	(0.0618)
TTBPrelDuty	-0.0316*	-0.0308*	0.0046	0.0322	-0.0368**	-0.0322*	-0.0550	0.0109
	(0.0173)	(0.0182)	(0.0435)	(0.0962)	(0.0165)	(0.0186)	(0.0400)	(0.0978)
TTBFinalDuty	-0.2702***	-0.3038***	-0.5249***	-0.2961***	-0.1539***	-0.1822***	-0.2950***	-0.2735***
	(0.0207)	(0.0193)	(0.0563)	(0.0538)	(0.0153)	(0.0167)	(0.0426)	(0.0518)
Observations	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641
Pseudo R2	0.9926	0.9926	0.9926	0.9925	0.9926	0.9926	0.9926	0.9925
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (2). Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 6: Temporary Trade Barriers and Imports – Large Exporters

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TTB Measure:	TTB	TTB	TTB	TTB	TTB	TTB	TTB	TTB
PreTTB	0.0945***	0.0904***	0.1191***	0.1139***	0.0930***	0.0736***	0.1041***	0.0920***
	(0.0339)	(0.0282)	(0.0234)	(0.0152)	(0.0255)	(0.0226)	(0.0176)	(0.0111)
TTBInvest	0.2654***	0.2951***	0.2971***	0.2526***	0.2659***	0.2952***	0.2972***	0.2538***
	(0.0491)	(0.0345)	(0.0258)	(0.0188)	(0.0491)	(0.0345)	(0.0259)	(0.0189)
TTBPrelDuty	-0.0967	-0.1430***	-0.1206***	-0.0303	-0.0967	-0.1427***	-0.1202***	-0.0310
	(0.0690)	(0.0519)	(0.0348)	(0.0237)	(0.0691)	(0.0518)	(0.0348)	(0.0236)
TTBFinalDuty	-0.6423***	-0.5468***	-0.5159***	-0.3540***	-0.6425***	-0.5470***	-0.5157***	-0.3540***
	(0.0473)	(0.0489)	(0.0294)	(0.0230)	(0.0472)	(0.0488)	(0.0294)	(0.0230)
PreTTB × LargeExp	0.0254	0.0317	-0.0022	0.0113	-0.0062	0.0129	-0.0219	-0.0091
	(0.0348)	(0.0296)	(0.0253)	(0.0206)	(0.0263)	(0.0233)	(0.0186)	(0.0138)
TTBInvest × LargeExp	-0.0460	-0.0801**	-0.1063***	-0.0618***	-0.0470	-0.0810**	-0.1070***	-0.0645***
	(0.0480)	(0.0342)	(0.0248)	(0.0198)	(0.0479)	(0.0341)	(0.0248)	(0.0198)
TTBPrelDuty × LargeExp	0.0377	0.0756	0.0803**	-0.0269	0.0394	0.0771	0.0818**	-0.0227
	(0.0682)	(0.0500)	(0.0359)	(0.0280)	(0.0683)	(0.0499)	(0.0359)	(0.0279)
TTBFinalDuty × LargeExp	0.3831***	0.2998***	0.2681***	0.1457***	0.3831***	0.2995***	0.2676***	0.1450***
	(0.0423)	(0.0528)	(0.0315)	(0.0280)	(0.0423)	(0.0527)	(0.0314)	(0.0279)
LargeExp	0.6932***	0.6179***	0.5101***	0.3970***	0.6935***	0.6181***	0.5104***	0.3974***
	(0.0133)	(0.0119)	(0.0104)	(0.0100)	(0.0133)	(0.0119)	(0.0104)	(0.0100)
Observations	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641
Pseudo R2	0.9926	0.9926	0.9925	0.9925	0.9930	0.9930	0.9929	0.9928
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LargeExp import share threshold	.025	.05	.1	.25	.025	.05	.1	.25

Notes: The table presents results from PPML regressions of equation (2) with large exporter interactions for each TTB phase. Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 7: Temporary Trade Barriers and Imports – Phase Duration

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TTB Measure:	TTB	TTB	TTB	TTB	TTB	TTB	TTB	TTB
PreTTB × Year −3	0.1674***	0.1664***	0.1838***	0.3164***	0.1033***	0.1423***	0.1735***	0.3079***
	(0.0161)	(0.0165)	(0.0259)	(0.0705)	(0.0107)	(0.0145)	(0.0244)	(0.0695)
PreTTB × Year −2	0.2079***	0.2146***	0.1772***	0.1633**	0.1242***	0.1835***	0.1659***	0.1640**
	(0.0162)	(0.0167)	(0.0305)	(0.0708)	(0.0122)	(0.0153)	(0.0280)	(0.0692)
PreTTB × Year −1	0.2937***	0.3171***	0.3043***	0.0345	0.1866***	0.2644***	0.2808***	0.0395
	(0.0190)	(0.0193)	(0.0383)	(0.0835)	(0.0146)	(0.0188)	(0.0342)	(0.0823)
TTBInvest × Year 1	0.3524***	0.3606***	0.4169***	0.2725***	0.2408***	0.3137***	0.3864***	0.2741***
	(0.0193)	(0.0194)	(0.0433)	(0.0743)	(0.0164)	(0.0196)	(0.0418)	(0.0760)
TTBInvest × Year 2	0.1647***	0.1929***	0.0351	0.1187	0.0898***	0.1617***	0.0282	0.1602
	(0.0269)	(0.0302)	(0.0728)	(0.1221)	(0.0273)	(0.0293)	(0.0729)	(0.1195)
TTBInvest × Year 3+	0.1703**	0.2307***	0.2720	0.0788	0.0385	0.2025***	0.2567	0.0956
	(0.0699)	(0.0735)	(0.2604)	(0.2737)	(0.0545)	(0.0731)	(0.2605)	(0.2739)
TTBPrelDuty × Year 1	-0.1188***	-0.1203***	-0.1469***	-0.2676**	-0.1052***	-0.1097***	-0.1349***	-0.2590**
	(0.0215)	(0.0229)	(0.0470)	(0.1233)	(0.0205)	(0.0226)	(0.0460)	(0.1188)
TTBPrelDuty × Year 2+	-0.0208	0.0344	-0.2212***	-0.1852	-0.0403	0.0321	-0.2348***	-0.1275
	(0.0305)	(0.0346)	(0.0616)	(0.2035)	(0.0265)	(0.0331)	(0.0595)	(0.1842)
TTBFinalDuty × Year 1	-0.0966***	-0.1309***	-0.0525	0.0164	-0.0590***	-0.1175***	-0.0472	-0.0395
	(0.0237)	(0.0259)	(0.0544)	(0.1148)	(0.0213)	(0.0246)	(0.0529)	(0.0949)
TTBFinalDuty × Year 2	-0.1519***	-0.1638***	-0.2395***	-0.2495***	-0.1325***	-0.1503***	-0.2404***	-0.2460***
	(0.0193)	(0.0208)	(0.0420)	(0.0633)	(0.0146)	(0.0183)	(0.0382)	(0.0632)
TTBFinalDuty × Year 3	-0.1889***	-0.2040***	-0.1955***	-0.3878***	-0.1364***	-0.1839***	-0.1793***	-0.3815***
	(0.0250)	(0.0261)	(0.0487)	(0.0966)	(0.0184)	(0.0228)	(0.0405)	(0.0960)
TTBFinalDuty × Year 4	-0.1778***	-0.2043***	-0.2012***	-0.3895***	-0.1406***	-0.1962***	-0.1928***	-0.3680***
	(0.0223)	(0.0233)	(0.0450)	(0.1080)	(0.0169)	(0.0209)	(0.0405)	(0.1071)
TTBFinalDuty × Year 5+	-0.2378***	-0.2527***	-0.5222***	-0.6399***	-0.1767***	-0.1926***	-0.3924***	-0.6377***
	(0.0246)	(0.0242)	(0.0612)	(0.1885)	(0.0208)	(0.0211)	(0.0645)	(0.1884)
Observations	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641
Pseudo R2	0.9926	0.9926	0.9926	0.9925	0.9926	0.9926	0.9926	0.9925
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (2) with year duration interactions for each TTB phase. Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 8: Temporary Trade Barriers and Imports – Price Effects

Dep. Variable: ln(Price)	**Binary TTB Measures**			
	(1)	(2)	(3)	(4)
TTB Measure:	TTB	AD	CVD	SG
PreTTB	-0.0303***	-0.0362***	-0.0418***	-0.0032
	(0.0063)	(0.0067)	(0.0157)	(0.0173)
TTBInvest	-0.0201***	-0.0219***	-0.0488**	-0.0078
	(0.0076)	(0.0079)	(0.0205)	(0.0260)
TTBPrelDuty	-0.0076	-0.0135	0.0190	0.0250
	(0.0098)	(0.0104)	(0.0233)	(0.0284)
TTBFinalDuty	0.0468***	0.0529***	0.0601***	-0.0110
	(0.0067)	(0.0072)	(0.0196)	(0.0183)
Observations	6,781,681	6,781,681	6,781,681	6,781,681
R2	0.8517	0.8517	0.8517	0.8517
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes

Notes: The table presents results from log-linear regressions of equation (3). Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 9: Temporary Trade Barriers and Imports – Regular and TTB Tariffs

Dep. Variable: Imports	Binary TTB Measures			
	(1)	(2)	(3)	(4)
TTB Measure:	TTB	TTB	TTB	TTB
PreTTB	0.2391***	0.3143***	0.2690***	0.2671***
	(0.0150)	(0.0165)	(0.0151)	(0.0152)
TTBInvest	0.2528***	0.2809***	0.2456***	0.2444***
	(0.0177)	(0.0159)	(0.0172)	(0.0172)
TTBPrelDuty	-0.0512***			
	(0.0172)			
TTBFinalDuty	-0.3098***			
	(0.0219)			
TTBPrelDuty = ln(1+PRELtariff)		-0.0506*	-0.0604**	-0.0617**
		(0.0300)	(0.0308)	(0.0309)
TTBFinalDuty = ln(1+FINALtariff)		-0.3277***	-0.3465***	-0.3378***
		(0.0399)	(0.0396)	(0.0410)
ln(1+tariff)	-1.3143***		-1.2272***	-1.2289***
	(0.2838)		(0.2915)	(0.2914)
NTMcount	-0.0027**		-0.0054***	-0.0053***
	(0.0013)		(0.0017)	(0.0017)
TTBPrelDuty = PREL_SD				0.0676
				(0.1281)
TTBFinalDuty = FINAL_SD				-0.1372**
				(0.0667)
TTBPrelDuty = PREL_NTM				-0.0173
				(0.1284)
TTBFinalDuty = FINAL_NTM				0.0165
				(0.0538)
Observations	10,284,456	15,598,253	10,261,844	10,261,844
Pseudo R2	0.9927	0.9927	0.9928	0.9928
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation ... . Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 10: Temporary Trade Barriers and Imports – Trade Diversion

Dep. Variable: Imports	**Binary/Level TTB Measures**			
	(1)	(2)	(3)	(4)
TTB Measure:	TTB	TTB	TTB	TTB
Third Country Exclusion:	None	Same TTB phase in same HS6	Active TTB case in HS6	Active TTB case in any HS6
PreTTB – Third Country	-0.3125***	-0.2795***	-0.2332***	-0.1517***
	(0.0164)	(0.0174)	(0.0136)	(0.0160)
TTBInvest – Third Country	-0.2894***	-0.2847***	-0.2101***	-0.1567***
	(0.0237)	(0.0157)	(0.0151)	(0.0169)
TTBPrelDuty – Third Country	0.0692***	0.0316*	0.0625***	0.0575***
	(0.0265)	(0.0173)	(0.0172)	(0.0167)
TTBFinalDuty – Third Country	0.0894***	0.2702***	0.2174***	0.1653***
	(0.0262)	(0.0207)	(0.0178)	(0.0216)
Observations	15,633,641	15,633,641	15,633,641	15,633,641
Pseudo R2	0.9926	0.9926	0.9926	0.9925
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (4) with varying TTB third-country exclusions. Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 11: Temporary Trade Barriers and Imports – Effects Heterogeneity

Dep. Variable: Imports	**Binary TTB Measures**							
Sample Split:	Income		TTB Activity		Common PTA		TTB Target	
	High	Non-high	High	Low	No	Yes	Not China	China
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
TTB Measure	TTB	TTB	TTB	TTB	TTB	TTB	TTB	
PreTTB	0.2544***	0.2596***	0.2535***	0.3763***	0.2714***	0.3086***	0.2917***	0.5494***
	(0.0271)	(0.0166)	(0.0197)	(0.0290)	(0.0248)	(0.0251)	(0.0191)	(0.0341)
TTBInvest	0.3184***	0.2293***	0.2789***	0.3563***	0.2799***	0.2882***	0.2636***	0.5601***
	(0.0223)	(0.0189)	(0.0176)	(0.0321)	(0.0217)	(0.0254)	(0.0212)	(0.0310)
TTBPrelDuty	-0.0705***	0.0431*	-0.0427**	-0.0380	-0.0279	-0.0490	-0.0470**	-0.0650**
	(0.0245)	(0.0249)	(0.0189)	(0.0429)	(0.0237)	(0.0355)	(0.0226)	(0.0344)
TTBFinalDuty	-0.2531***	-0.3216***	-0.2653***	-0.3834***	-0.3025***	-0.3051***	-0.2251***	-0.5623***
	(0.0307)	(0.0205)	(0.0235)	(0.0388)	(0.0286)	(0.0327)	(0.0241)	(0.0428)
Observations	5,422,200	6,821,420	10,640,633	2,539,376	8,120,541	4,321,147	15,633,641	
Pseudo R2	0.9952	0.9872	0.9938	0.9913	0.9954	0.9961	0.9926	
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: In columns (1) to (6), the table presents results from PPML regressions of equation (2) using sample breakdowns as described in section 6.3. Columns (7) and (8) present results broken down into non-China and China-specific estimates, respectively, using equation (5). Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Appendix A: Additional Results

Table A1: Temporary Trade Barriers and Imports – Less Restricted Sample

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)	(A7)	(A8)
TTB Measure:	TTB	AD	CVD	SG	TTB	AD	CVD	SG
PreTTB	0.2563***	0.2555***	0.2279***	0.1137*	0.1494***	0.2203***	0.2215***	0.1200**
	(0.0176)	(0.0173)	(0.0302)	(0.0590)	(0.0124)	(0.0157)	(0.0276)	(0.0582)
TTBInvest	0.2430***	0.2537***	0.2236***	0.0508	0.1541***	0.2103***	0.2193***	0.0812
	(0.0158)	(0.0163)	(0.0329)	(0.0548)	(0.0131)	(0.0152)	(0.0323)	(0.0649)
TTBPrelDuty	-0.0401**	-0.0312*	0.0066	0.0228	-0.0322**	-0.0335*	-0.0364	-0.0032
	(0.0170)	(0.0178)	(0.0400)	(0.0870)	(0.0153)	(0.0176)	(0.0372)	(0.0894)
TTBFinalDuty	-0.2324***	-0.2639***	-0.4228***	-0.2480***	-0.1371***	-0.1647***	-0.2536***	-0.2309***
	(0.0191)	(0.0183)	(0.0512)	(0.0573)	(0.0155)	(0.0166)	(0.0401)	(0.0549)
Observations	68,272,841	68,272,841	68,272,841	68,272,841	68,272,841	68,272,841	68,272,841	68,272,841
Pseudo R2	0.9898	0.9898	0.9898	0.9898	0.9898	0.9898	0.9898	0.9898
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (2) but a less restricted sample focusing on HS2-digit/importer sectors with at least one TTB investigation. Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table A2: Temporary Trade Barriers and Imports – Dropping Observations with Missing TTB Information

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)	(A7)	(A8)
TTB Measure:	TTB	AD	CVD	SG	TTB	AD	CVD	SG
PreTTB	0.2522***	0.2799***	0.2834***	0.1647***	0.1621***	0.2333***	0.3054***	0.1646***
	(0.0174)	(0.0200)	(0.0314)	(0.0635)	(0.0121)	(0.0173)	(0.0294)	(0.0619)
TTBInvest	0.2223***	0.2521***	0.2854***	0.1114*	0.1619***	0.2155***	0.3225***	0.1283**
	(0.0208)	(0.0212)	(0.0463)	(0.0583)	(0.0183)	(0.0192)	(0.0450)	(0.0621)
TTBPrelDuty	-0.0035	0.0012	-0.0334	0.0341	-0.0347**	-0.0115	-0.1069***	0.0130
	(0.0194)	(0.0191)	(0.0428)	(0.0964)	(0.0156)	(0.0197)	(0.0370)	(0.0980)
TTBFinalDuty	-0.3056***	-0.3275***	-0.4240***	-0.2923***	-0.1561***	-0.2327***	-0.2103***	-0.2701***
	(0.0220)	(0.0224)	(0.0606)	(0.0540)	(0.0159)	(0.0194)	(0.0384)	(0.0519)
Observations	15,388,986	15,459,039	15,619,926	15,572,746	15,388,986	15,459,039	15,619,926	15,572,746
Pseudo R2	0.9930	0.9930	0.9926	0.9925	0.9930	0.9930	0.9926	0.9925
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (2). Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table A3: Temporary Trade Barriers and Imports – Results by Industry

Dep. Variable: Imports	**Binary TTB Measures**					
Industry:	Agriculture	Chemicals	Clothing	Manufactures	Materials	Metals
	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)
TTB Measure:	TTB	TTB	TTB	TTB	TTB	TTB
PreTTB	0.4850***	0.1934***	0.4056***	0.1460***	0.2936***	0.3685***
	(0.0959)	(0.0233)	(0.0606)	(0.0407)	(0.0455)	(0.0215)
TTBInvest	0.1793***	0.1497***	0.2146***	0.1380***	0.2270***	0.2486***
	(0.0668)	(0.0217)	(0.0393)	(0.0342)	(0.0462)	(0.0171)
TTBPrelDuty	0.0579	-0.0147	-0.0188	0.0391	-0.0660*	-0.1132***
	(0.0825)	(0.0314)	(0.0394)	(0.0356)	(0.0361)	(0.0177)
TTBFinalDuty	-0.2405***	-0.1195***	-0.3174***	-0.0911***	-0.2358***	-0.2317***
	(0.0808)	(0.0329)	(0.0385)	(0.0286)	(0.0311)	(0.0252)

Notes: The table presents results from a single PPML regression of equation (2) with industry dummy interactions for each TTB phase. The reported estimates for each industry correspond to the respective industry-phase interaction coefficient. The estimation accounts for importer-HS6-year, exporter-HS6-year, importer-exporter-HS6 and importer-exporter-year fixed effects. The regression includes 15,633,641 observations and the Pseudo-R2 is 0.9926. Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table A4: Temporary Trade Barriers and Imports – Accounting for Tariffs and NTMs

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)	(A7)	(A8)
TTB Measure:	TTB	AD	CVD	SG	TTB	AD	CVD	SG
PreTTB	0.2391***	0.2447***	0.2451***	-0.0043	0.1441***	0.2085***	0.2228***	0.0032
	(0.0150)	(0.0156)	(0.0277)	(0.0673)	(0.0119)	(0.0150)	(0.0282)	(0.0654)
TTBInvest	0.2528***	0.2679***	0.2651***	0.1331**	0.1642***	0.2335***	0.2422***	0.1594**
	(0.0177)	(0.0185)	(0.0386)	(0.0617)	(0.0157)	(0.0176)	(0.0376)	(0.0674)
TTBPrelDuty	-0.0512***	-0.0385**	-0.0263	-0.2528***	-0.0396**	-0.0449**	-0.0575	-0.2837***
	(0.0172)	(0.0183)	(0.0392)	(0.0930)	(0.0160)	(0.0191)	(0.0358)	(0.0946)
TTBFinalDuty	-0.3098***	-0.3457***	-0.5590***	-0.2556***	-0.1959***	-0.2348***	-0.3702***	-0.2256***
	(0.0219)	(0.0218)	(0.0577)	(0.0654)	(0.0155)	(0.0188)	(0.0414)	(0.0627)
ln(1+tariff)	-1.3143***	-1.3023***	-1.3590***	-1.3561***	-1.3102***	-1.2930***	-1.3530***	-1.3568***
	(0.2838)	(0.2833)	(0.2903)	(0.2923)	(0.2845)	(0.2852)	(0.2891)	(0.2923)
NTMcount	-0.0027**	-0.0025*	-0.0039***	-0.0084***	-0.0020	-0.0034**	-0.0043***	-0.0084***
	(0.0013)	(0.0013)	(0.0013)	(0.0021)	(0.0013)	(0.0013)	(0.0014)	(0.0021)
Observations	10,284,456	10,284,456	10,284,456	10,284,456	10,284,456	10,284,456	10,284,456	10,284,456
Pseudo R2	0.9927	0.9927	0.9927	0.9926	0.9927	0.9927	0.9927	0.9926
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (2). Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table A5: Temporary Trade Barriers and Imports – Additional Summary Statistics and Definitions

Variable	Definition	Mean	SD	Min	Max
ln(1+tariff)	Natural log of one plus ad valorem statutory tariff rate	0.0636	0.0810	0.0000	2.3979
NTMcount	Count of bilateral NTMs	3.9157	22.5090	0	1960
ln(1+PRELtariff)	Natural log of one plus ad valorem preliminary TTB tariff rate	0.0002	0.0146	0.0000	5.9981
ln(1+FINALtariff)	Natural log of one plus ad valorem final TTB tariff rate	0.0031	0.0565	0.0000	3.1039
PREL_SD	Preliminary specific TTB tariff ? Yes: 1, No: 0	0.0005	0.0233	0.0000	2.0000
FINAL_SD	Final specific TTB tariff ? Yes: 1, No: 0	0.0015	0.0412	0.0000	8.0000
PREL_NTM	Preliminary specific TTB NTM ? Yes: 1, No: 0	0.0000	0.0022	0.0000	1.0000
FINAL_NTM	Final specific TTB NTM ? Yes: 1, No: 0	0.0014	0.0405	0.0000	8.0000

Notes: All variables are at the importer-exporter-year-HS6 level. The above summary statistics are for 10,261,844 observations for the sample in Table 9, column (4).

Table A6: Temporary Trade Barriers and Imports – Controlling for HS2-WTO and HS2-PTA Effects

Dep. Variable: Imports	Binary TTB Measures				Count TTB Measures			
	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)	(A7)	(A8)
TTB Measure:	TTB	AD	CVD	SG	TTB	AD	CVD	SG
PreTTB	0.2788***	0.2849***	0.2589***	0.1574**	0.1712***	0.2416***	0.2615***	0.1574**
	(0.0173)	(0.0166)	(0.0295)	(0.0629)	(0.0121)	(0.0157)	(0.0279)	(0.0613)
TTBInvest	0.2848***	0.3008***	0.2937***	0.1182**	0.1874***	0.2420***	0.2957***	0.1351**
	(0.0156)	(0.0162)	(0.0380)	(0.0579)	(0.0143)	(0.0163)	(0.0373)	(0.0616)
TTBPrelDuty	-0.0335*	-0.0320*	0.0041	0.0194	-0.0373**	-0.0327*	-0.0548	-0.0018
	(0.0173)	(0.0182)	(0.0431)	(0.0953)	(0.0164)	(0.0185)	(0.0396)	(0.0969)
TTBFinalDuty	-0.2733***	-0.3062***	-0.5306***	-0.2981***	-0.1563***	-0.1848***	-0.3002***	-0.2754***
	(0.0205)	(0.0191)	(0.0561)	(0.0537)	(0.0152)	(0.0165)	(0.0424)	(0.0517)
Observations	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641	15,633,641
Pseudo R2	0.9926	0.9926	0.9926	0.9925	0.9926	0.9926	0.9926	0.9925
RTA x HS2 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WTO x HS2 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter x HS6 x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x HS6 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer x Exporter x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents results from PPML regressions of equation (2) that also adds HS2-WTO and HS2-PTA fixed effects. The binary WTO and PTA variables take the value one for importer-exporter pairs that are common members of the WTO or a PTA during a given year, respectively. Clustered standard errors at the importer/exporter/4-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.