Shining Light on Regulatory Policies: The Impact of WTO Disputes on Notification Patterns

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May 2, 2023

Abstract

An effective international legal system not only resolves specific disputes but contributes to broader cooperation. This paper shows that WTO disputes support cooperation at a systemic level beyond the parties involved in the dispute. Enforcement actions increase the credibility of the legal system and jurisprudence fills gaps in treaty interpretation, and we expect governments will adjust their behavior toward compliance. We empirically test this argument by analyzing the spillover effects of WTO disputes on cooperation with reporting obligations to uphold policy transparency. Notifications about domestic regulatory changes represent an important type of cooperation that helps governments balance the need to apply standards while avoiding hidden protectionism. We examine original data from the Agreement on Sanitary and Phytosanitary Measures and the Technical Barriers to Trade Agreement that records 78,683 notifications registered with the WTO by 135 countries from 1995 to 2022. Using a difference-in-difference design, we find that countries that participate in the WTO dispute as third parties or have high trade in the affected products are more likely to notify policy changes in the next year. We conclude that WTO disputes incentivize related countries to update their perception of law and improve transparency over policy. The paper offers insights into how the multilateral trade rules govern non-tariff barriers and our findings present evidence that enforcement promotes systemic cooperation with rules.

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1 Introduction

One of the most important accomplishments of the multilateral trade regime goes unnoticed by most international political economy research. Since establishing the Agreement on Technical Barriers to Trade and the Agreement on Sanitary and Phytosanitary Measures, governments have expanded transparency over regulations through routinely announcing their policy changes that impact trade (Scott, 2007; Villarreal, 2018). This process promotes accountability and stability for the conduct of trade. National provisions over quarantines, labeling, and residue levels are set to achieve domestic goals of safety and compatibility, but they can easily nullify the gains from trade liberalization. Achieving market access at the border only matters when traders can navigate the regulations behind the border. This paper looks at how enforcement of WTO rules for standards has built cooperation with the requirements for transparency.

In a self-reporting system, governments must announce their domestic regulations that impact trade. Building on the transparency requirements of the GATT, the WTO further streamlined the process while still relying on governments to provide the information. The trend over time shows an increase in the number of countries and policies notified through the WTO committee process (see Appendix A.2). Yet there is substantial variation among countries and over the years in the level of notifications. For example, Brazil submitted the highest number of notifications of all developing countries. From 1995 to 2022, it submitted 3615 notifications to either Technical Barriers to Trade (TBT) or the Sanitary and Phytosanitary Measures (SPS) committees. Countries like Uganda also increasingly utilized the notifying system to promote regulatory transparency – its annual notifications have grown from less than five per year in the 1990s to more than 200 per year since 2010. What explains the cooperation with transparency obligations in these two agreements?

This question goes to the heart of understanding treaty effectiveness. After a new rule

is established at the international level, its implementation depends upon states internalizing the expectation of compliance and allocating resources to fulfill their commitments. This is an ongoing process to coordinate national policies within the treaty framework and subject domestic policies to international scrutiny. New research on compliance with the regular reporting obligations to the WTO highlights that the behavior of other states in their own reporting behavior and government capacity explain overall compliance rates (Karlas and Parízek, 2020). Our study will move from the regular reporting obligations where states must issue a specific type of annual report to the more discretionary notifications of new policies that are the subject of the SPS and TBT notification system. We view the state's notifying behaviors as an effort to cooperate with the trade regime and increase transparency. When a government underreports domestic regulatory changes, they are acting inconsistently with the regime. The content of the regulatory change notified could promote or restrict trade, but our main focus is the decision to notify.

Adjudication represents a type of monitoring and surveillance to uphold treaty effectiveness. In the decentralized enforcement system of the WTO, members work with their firms and industries to observe policies of trade partners that may be in violation of the rules. Through bringing forward cases, states act as the decentralized enforcement actors. Previous research demonstrates a strong record to improve outcomes on average (e.g. Davis, 2012; Bechtel and Sattler, 2015; Bown and Reynolds, 2015; Shin and Ahn, 2019; Peritz, 2022).[1] These cases also engage other members, who can participate in the legal process as third parties or through the attention of economic stakeholders. Such exposure contributes to understanding the law and its use, which could enhance deterrence and clarify law through precedent. Ideally, each case would expand compliance to make enforcement actions rare. In an important study, Kucik and Pelc (2016) find markets expect compliance spillover, as seen by the response of prices in related markets to a WTO ruling. But formally, rulings do not apply to countries and policies outside of the direct

[1] But see also critical perspective in Chaudoin et al. (2016).

disputing parties. Does adjudication in the WTO more broadly increase cooperation with the rule-based trade order?

We examine the effect of WTO disputes on systemic cooperation in the area of regulatory transparency. One of the primary goals of the trade regime is to promote transparency. For businesses to plan, they need to know about all policies that impact trade, which include both tariffs and behind-the-border regulations. Sharing information about policies can be a critical tool to promote trade alongside the efforts to negotiate market liberalization and counter discriminatory policies. The trade regime mandates that governments announce new or changed regulations that hold implications for trade. The notification process increases certainty about the trading environment and facilitates negotiations to resolve disagreements.

Many WTO disputes challenge regulations that are found to discriminate or unnecessarily restrict trade. Some of these barriers are removed through the dispute resolution process, but an important byproduct is the greater awareness of the rules that govern trade-related regulations. The willingness to comply with rules depends on understanding how they work and believing that others follow and enforce those rules. Participation in WTO disputes can address both dimensions as a way to build trade law capacity and reinforce credibility of the system. In the process of participating in the dispute, governments learn about the rules and credibility of enforcement. This may lead them to adjust policies and increase their engagement with the rules-based trading system. Greater effort to cooperate with the regime would appear in the heightened transparency for notifications of regulatory changes. We hypothesize that those joining WTO proceedings will be more likely to increase their notifications as a form of regime cooperation.

We consider third party participation as a primary means by which the WTO can socialize its membership into more rule-compliant behavior. The adjudication process allows other members who have a trade interest or more general systemic interest in the disputed claims to join as a third party. At the earliest stage, they gain access to the pri-

vate consultations between the complainant and defendant. Later they have the option to express opinions to the panelists and appellate body judges. Several studies examine the reasons for countries to join as a third party and the impact on the likelihood of rulings and the nature of concessions in the dispute. Our interest is the effects of third party status that reach beyond the dispute itself by spreading awareness of the rules. The knowledge gained from third party participation will support greater engagement within the committee process of notifications. In addition, other close observers who have economic stakes in the dispute form de facto participants. We evaluate this secondary dimension of proximity in a case study of the drawn-out dispute between Mexico and the United States over labeling policies for tuna.[2]

We develop our argument about how disputes can support systemic cooperation in section 2, and discuss the challenge to balance regulatory autonomy and trade in section 3. In the next three sections we introduce the data, empirical strategy, and findings. Our empirical analysis examines the effect of WTO disputes on regulatory cooperation in a study of time-series cross-sectional data for 135 countries' notifications to the TBT and SPS committees over the period from 1995 to 2022. Using a difference-in-difference design and panel matching strategy, we match participants in WTO disputes about SPS and TBT measures with similar units to make inferences about how those states close to a dispute as third parties or economic stakeholders change their notification behavior. First, we find that third party participants in a TBT (SPS) dispute increase total TBT (SPS) notifications by 28.5% to 58.8% (31.4% to 59.5%), compared to non-participants. Second, looking at the level of individual disputes, we find third party participants increase their notifications in the related product areas relative to their own pattern of notification prior to the case. Finally, using DSU 381 as an example, we show that tuna-dependent exporters submit 16.6% to 34.5% more TBT notifications after Mexico requested consultations with the US over its policy for labeling "dolphin-safe" tuna. These findings confirm our expectation

[2] "United States — Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products" DSU 381.

that those most closely following enforcement actions will increase their cooperation with the rules.

2 The Broader Impact of Legal Disputes

Theories about cooperation in the trade regime rely upon the logic of reciprocity. Keohane (1984) explains the demand for cooperation in institutions that arises from an expectation of gains over time when states share information, link issues, and follow rules. In his emphasis on *diffuse reciprocity*, Keohane explains that the exchange of benefits occurs at a generalized level rather than in a narrow quid-pro-quo. Bagwell and Staiger (1999) present the logic whereby large states avoid their unilateral incentive to exploit terms-of-trade with unilateral protection through commitments and enforcement in a multilateral regime. The foundation of reciprocity lies in creating a mutual expectation of rule-based behavior through a robust system of enforcement.

The literature on international cooperation has focused largely on the conditions that shape when states can make commitments and how they enforce them. Dispute settlement helps to support credible commitments and mobilize domestic actors (Rosendorff, 2005; Kim, 2008; Davis, 2012; Peritz, 2022). Legalization continues to expand its role in international affairs across issue domains (Alter et al., 2019). Our interest lies in the phase when jurisprudence builds understanding of the law and cooperation with the process of multilateral governance of trade. Systemic cooperation includes changing inconsistent policies and integrating new interpretations in the formulation of rules as well as engaging in dialogue to explain policies and promote transparency. We contend that adjudication changes behavior beyond the specific actors and policies of each dispute by promoting a more general process of systemic cooperation.

In our argument, the systemic role of disputes arises from a deterrent effect and a precedent effect. First, plaintiff activity increases the credibility of enforcement by demonstrating that states will monitor and challenge violations. Second, jurisprudence serves

to interpret and clarify rules. Past cases set expectations about both whether states will initiate cases and how judges will interpret the rules. These two channels promote cooperation by making a stronger focal point to coordinate behavior. As states update their perception of the rules, they are more likely to cooperate.

This mechanism will be strongest for those involved in dispute cases. Participation shapes actors through exposing them to information in each dispute case, which enhances the deterrent and precedent effect. Experience in litigation builds the insider know-how to become a repeat player (Galanter, 1974; Guzman and Simmons, 2002; Davis and Bermeo, 2009). Those in the room also gain leverage over outcomes, which has meant that even third parties may influence the conduct of the dispute (Busch and Reinhardt, 2006; Johns and Pelc, 2014). Expanding the audience can hinder settlements in the specific case, but may spread awareness about the adjudication process and the nature of legal commitments. Shaffer (2021) explains that as a new member to the WTO after its accession in 2001, China adopted a deliberate strategy to use active third party participation as a way to increase its understanding of the system. As dispute participation enhances information, governments come to see themselves as stakeholders in the rules who may be challenged and have the right to challenge others.

The exposure to the case may arise through either legal status as a third party or stakeholder position through related trade interests. All WTO members follow the disputes to the extent they are appraised of a new complaint or vote on final adoption of a ruling in the Dispute Settlement Body. But through legal exposure or trade interests, some members are more likely to closely follow the case. Through this participation, we expect spillover effects from the enforcement actions.

Enforcement triggers a virtuous cycle when disputes lead states to engage proactively within the rule-based order. Heightened confidence in enforcement and improved understanding of the rules support willingness to adjust policies. This leads to our hypothesis that enforcement actions generate more cooperative behavior by other states as a byprod-

uct. In contrast, one could argue that enforcement actions convey information about non-compliance that would reduce cooperation. If complaints about defection induce more free-riding by others, we could see a vicious cycle in which each complaint weakens the system and reduces engagement by other states.

Our research calls for looking beyond dyadic relationships to understand the multilateral system. A key insight by Maggi (1999) lies in the notion that enforcement actions are embedded in the wider audience of the full membership of the WTO. Pelc (2014) explores strategic interaction within disputes that anticipate states adapting to the precedent across a network of relationships. Markets clearly expect such spillover, as shown by stock markets shifting in reaction to WTO rulings (Kucik and Pelc, 2016). Evidence also shows that the impact of WTO membership on trade is best understood through analysis of trade liberalization with all countries as opposed to bilateral trade flows (Allee and Scalera, 2012). The sum of cooperation within a multilateral institution requires attention to how each action carries over to shape behavior more generally.

3 Regulatory Cooperation

An important domain for systemic cooperation is transparency over regulatory policies. Domestic regulations designed for non-trade goals matter because of their potential impact on trade. Measures to protect the safety and health of the public or environment may restrict imports. Product standards and labeling policies may require costly adaptation by firms. In some cases the regulations will be trade promoting, such as when certification allows trade in an agricultural product that would otherwise be prohibited as a threat to spread disease. Standards that establish interoperability can lower production costs and have supported modern supply chains as producers in different locations seamlessly integrate products. The trade revolution of lower transportation from container shipping arose from a simple process of standardization (Villarreal, 2018, p.84). But in other cases, regulatory policies form a substantial barrier to trade. As disguised protection govern-

ments can favor domestic production by arbitrary exclusion of foreign goods defined as dangerous. Even without discriminatory intent, switching costs can give an advantage to domestic producers whose products fit the national standard. Traders need to know the regulatory environment in order to adapt and build into their cost and production planning. Uncertainty about the national variation in regulations is a major impediment to trade.

National regulatory processes, however, are notoriously opaque. The deliberation and adoption of regulations for safety and standardization occur within national agencies far removed from the fora of international trade. Technocrats and scientific panels focus on non-trade goals even as the policies they adopt will impact trade. Public hearings seek input from domestic stakeholders while foreign companies typically have less access and information than domestic companies. The result is an information asymmetry favoring domestic firms over foreign firms and large firms over small ones. Firms with private information about risks and approval processes can manipulate standards to serve their own interests (Perlman, 2020).

The effort to integrate regulations within the global economy has given rise to new forms of transnational governance. The pursuit of efficiency gains from common standards has driven both firms and local authorities to join in the process of setting standards. Rather than creating a multilateral regime, there has been a proliferation of international standard-setting bodies in a decentralized process that includes both private and intergovernmental institutions. Engaging private sector actors and scientific experts, these bodies coordinate to set standards (Buthe and Mattli, 2011). The nature of overlapping rules in domestic and international jurisdiction gives rise to a new interdependence with complex governance requirements and opportunities for new forms of international coordination (Farrell and Newman, 2016; Abbott and Zangl, 2015).

Two problems stand out in the area of regulatory coordination. The standard-setting bodies lack an intergovernmental enforcement mechanism, and there is not any central-

ized information system. These challenges come to the fore within the trade regime, which has had to evolve from coordinating policies at the border to providing constraint on policies behind the border. It does so largely by encouraging governments to base their regulations on international standards, which are set outside of the WTO. The core governance function of the WTO within the regime complex for regulatory policies has been to provide enforcement capacity and to enhance policy transparency.

The trade regime includes transparency as a core goal, which operates in tandem with the call to minimize distortion of trade and harmonize standards. In this context, transparency can be defined as "notification and easy access to information on trade policies" (Plummer and Tafti, 2014, p. 167). Well before the multilateral rules contained any explicit reference to regulation of standards, Article X of the GATT required that members publish "laws, regulations, judicial decisions and administrative rulings of general application" for the sake of providing information relevant to facilitate trade. More direct attention to standards began with the Agreement on Technical Barriers to Trade, which was adopted in 1980 as one of several plurilateral agreements concluded during the Tokyo Round negotiation of the GATT. It included provisions for nondiscrimination and a positive obligation to engage in international standard-setting bodies with a view toward harmonization. In the area of transparency, this agreement began the obligation to have an inquiry point for foreign firms and governments to seek information about regulations and to notify the Secretariat of draft regulations at an early stage of drafting (Villarreal, 2018, p. 107). This process has been further institutionalized in the WTO with committees established as a forum to discuss concerns about regulations.[3]

The two central agreements in the WTO to govern regulatory standards are the updated Technical Barriers to Trade Agreement (TBT) and the Sanitary and Phytosanitary Measures Agreement (SPS). The former focuses on technical regulations and standards for safety and environment while the latter specializes in the subset of such regulations

[3] The establishment of the Trade Policy Review Mechanism in the WTO serves as another core tool to enhance transparency.

that serve food safety and disease prevention. The agreements uphold national autonomy to set standards while reinforcing the principle of non-discrimination. Rules to minimize trade distortion and base measures upon risk analysis and international standards set the parameter for constraints on national regulatory processes, but leave open discretion for deviation. The rules do not require harmonization or define a decision-making process, which allows local authorities their autonomy to set a standard that may be higher than international standards or lower than scientific consensus. This respect for national autonomy leaves the problem of heterogeneity across regulatory systems. Scott (2007, p. 44) refers to the WTO approach to address the lack of accountability of local regulatory authorities through "regulation of regulation" rather than harmonization. In this complex task, transparency is a critical tool.

Participation in the TBT and SPS notification process represents one of the core responsibilities of governments for policy transparency. The notifications conform to a systematic format and are readily available to all members, while including a process for further consultation. In the year 2020, over 3000 new or changed regulations were submitted as a notification to the TBT Committee and over 2000 new or changed regulations were notified to the SPS Committee. In remarks lauding the TBT committee, a USTR official gave the following example "We have used the WTO TBT Committee to effectively communicate with trading partners during the pandemic. For example, we notified a conformity assessment procedure on particulate-filtering respirator masks by our Centers for Disease Control and Prevention (CDC) to ensure all our trading partners were fully informed."[4] Other examples involve emergency provisions taken to address a plant disease outbreak, with the SPS notification not only supporting compliance by exporters but also serving to alert other governments, which may update their own policies to address the same risks.

Transparency plays an important role to promote trade. Although there are few direct

[4] Deputy United State Representative and Chief of Mission (Geneva) Maria Pagan, speech available at USTR website, https://ustr.gov/about-us/policy-offices/press-office/speeches-and-remarks/2022/october/remarks-deputy-united-state-representative-and-chief-mission-geneva-maria-pagan-wto-technical accessed 13 January 2020.

empirical studies, evidence suggests that enhanced transparency will expand trade, and the benefits are greatest for developing countries, where the information asymmetries may be a larger challenge to firms and governments (Plummer and Tafti, 2014). Through lowering the uncertainty about the trade environment, policy transparency helps firms gain access and reduce costs across a wider range of inputs. The importance of transparency is evident in the frequent reference to Article X requirement for notification, which is among the most frequently cited articles in WTO disputes (ibid). Governments also can avoid disputes when transparency promotes early consultation (Karttunen, 2020). Given regulatory diversity and the trade impact of regulations, information about regulations itself is an essential public good within the international trade regime.

The disputes challenging measures as inconsistent with the SPS and TBT agreements reinforce both compliance with the agreements and the mandate for transparency. As governments gain knowledge and confidence in the rules through observation of enforcement actions, we expect they will increase their own effort to cooperate within the system.

The remainder of this paper presents an empirical test of the contrasting expectations for enforcement on cooperation. We are interested in systemic cooperation as rule-oriented behavior by members rather than specific compliance in a dispute. Therefore we focus on the bystanders – those states that are affected either through *legal exposure* or *economic exposure* in a dispute – as distinct from the compliance by the defendant whose policy has been challenged.

4 Data and Measurement

To examine how WTO adjudication changes behavior beyond the specific policies and actors involved in the dispute, we collect comprehensive data on 135 members' notifications to TBT and SPS committees from January 1995 to September 2022. The dataset includes 78,683 notifications reported in the ePing SPS TBT Platform, which is the public

registry of notifications launched jointly by the WTO, UN, and International Trade Centre (ITC). Under the TBT and SPS Agreement, all WTO members are required to notify other members of proposed changes in technical regulations, standards and conformity assessment procedures, and SPS regulations before a measure is finalized for adoption.[5] Under special health-related conditions, emergency measures can also be notified after they come into effect. Due to the self-reporting nature of the notification process, the data is not an exhaustive list of policy changes. Moreover, we are unable to assess whether the policy changes notified represent compliance with WTO rules. Despite these limitations, notifications provide leverage to evaluate the impact of WTO disputes. We interpret each notification as intention to cooperate with the mandate for policy transparency. The notification data offer an opportunity to measure policy adjustment in the wake of WTO disputes.

The dataset includes 47,540 TBT notifications and 31,143 SPS notifications. TBT notifications are classified into six types: regular notifications, addendum, revisions, corrigendum, supplement, and code of good practice. Similarly, SPS notifications include regular notifications, emergency notifications, addendum, revisions, corrigendum, supplements, and recognition of equivalence. For the main analysis, we focus on regular notifications (71.6% of all TBT notifications and 64.4% of SPS) because we are interested in learning whether WTO disputes clarify existing rules and incentivize other countries with relevant trade interests to change their regulatory regimes accordingly. One might expect WTO adjudication also encourages countries to modify or replace pre-existing policies to resolve conflicts with WTO legal requirements. We test this additional hypothesis by replacing the regular notifications with addendum, revisions, and corrigendum and find similar results, which are shown in the Appendix B.4.

The main dependent variable is the number of notifications a state submits to either

[5] Some measures include both SPS and TBT measures (e.g., a labeling policy with both food safety and consumer safety aspects). In these cases, they could be notified under both SPS and TBT committees. See Scott (2007, p. 207). Among the 85 disputes in our data, 23 cases include claims for both SPS and TBT agreements.

the TBT or SPS committee in a calendar year. We take the log of the dependent variable to account for the skewness of the notification data.[6] On average, a member submits 7.9 TBT notifications and 4.3 SPS notifications to the WTO committee. We only include data for the 135 members that have made at least one notification to the SPS and TBT committees between 1995 and 2022, rather than the full group of 164 WTO members. This allows us to focus on countries that have sufficient administrative capacity to utilize the notification system.

In order to examine the indirect impact of WTO disputes on systemic cooperation, we focus on bystander countries that are likely to be aware of the case but are not directly involved as complainants or defendants. The filing of a complaint that includes a legal claim citing either the TBT or SPS agreement acts as information about enforcement of the agreements. We consider *legal exposure* for governments that engage in the adjudication process as a third party in one of these disputes related to a TBT/SPS complaint. We consider *economic exposure* for those governments with a trade profile with product similarity to the disputed goods.

We use three approaches to measure legal exposure. First, we look at the impact on notifications from the initial experience with the adjudication process. Using an indicator variable set to 1 when a member serves as a third party for the first time in a TBT or SPS dispute and 0 otherwise, we test how legal exposure impacts the trend of total notifications. As an alternative, we also evaluate the impact of serving as a third party in any new TBT/SPS disputes raised in a given year (not limiting to the first experience).[7] Third, we offer a more fine-grained analysis at the dispute level in which we can leverage product-level information. With a state-year-dispute unit of observation, we test whether third party states begin to notify more about specific products that are directly affected

[6] If a member does not submit any notification in a year, we treat the logged dependent variable as 0.

[7] In the current iteration, we only use binary measures for the treatment. If a member serves as a third party for more than 1 new TBT/SPS dispute raised in a particular year, the treatment still takes 1.

by the dispute in which they were a third party.[8]

Finally, we employ a different research design to consider the role of economic exposure on notification practices. We focus on a specific dispute, DS381 United States — Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (otherwise known as the "tuna dolphin case"). We select this case because it is a prominent dispute about a specific product that held wider implications for labeling policies and for environmental justification of import restrictions. Prior adjudication between the same parties in the GATT make this a hard case because most governments and industry stakeholders were already well informed about the trade restriction. New legal action in the WTO dispute brought attention to enforcement capacity that had grown stronger with the 1995 establishment of the SPS and TBT committee monitoring and WTO dispute settlement understanding. To evaluate our economic exposure hypothesis, we ask whether the dispute had a differential impact on those members who would have most closely followed the dispute because of economic interests connected to the specific case. We expect that top tuna traders will have more economic exposure in the case, and so we extract all tuna products (measured on the HS 6-digit level) that are directly impacted by this dispute. For each country, we calculate the total annual exports for affected products, weighted by its annual exports (in million US dollars). A country is counted as a top tuna trader if it ranks in the top 10% of all members in terms of weighted tuna product exports in a given year. This measure allows us to capture the greater attention to a case by those with export interests tied to the dispute. The treatment history plots are presented in Appendix A.3.

[8] Specifically, for each dispute, we construct a binary variable that takes 1 if a member serves as a third party in a dispute and 0 otherwise. We then merge this data with product-level notifications and test whether third party states notify more about affected products than they notify about other products.

5 Empirical Strategy to Evaluate Systemic Cooperation

In a cross-national analysis of regulatory cooperation, we analyze the effect of WTO disputes on notifications to the TBT and SPS committees. We exploit state-level variation in the timing of exposure to WTO disputes. Our empirical design involves staggered adoptions (legal exposure by third party participation) and the same unit entering and exiting the treatment multiple times (economic exposure by related trade interests). Recent studies show that the conventional two-way fixed effect models give biased estimates in the case of staggered adoption and multiple entries (De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Imai and Kim, 2021). We employ the matching-augmented difference-in-differences method proposed by Imai et al. (2019) that does not rely on any parametric assumptions and is well-suited for the structure of our data. Using the panel matching method helps to address the concern that countries closely engaged in the disputes either as third parties or related traders would have self-selected into this process through unobserved factors that also shape their cooperation with notifications. By matching identical treatment histories and comparing states that are similar to each other in all but their level of engagement with the dispute, we reduce the possibility that confounders bias our conclusions.

This method involves a two-step procedure. For each treated state, we first select a set of matched control states with identical treatment histories up to L years prior to being affected by a TBT/SPS dispute. Then we construct the weights ($\omega_{it}^{i'}$) using a batch of covariates and lagged outcomes to refine the matched sets. The method assigns a greater weight to a more similar state in the control group and a lower weight to a state with covariates and an outcome history that significantly differs from the third party in our treatment group. For each matched set (M_{it}), we compute the difference-in-difference estimate and then average it across all matched sets to estimate the causal effect. In addition to estimating contemporaneous effects, we also compute the long-lasting effects F

time periods after the treatment assignment. Formally, we apply the following estimator:

$$\hat{\delta}(F,L) = \frac{1}{\sum_{i=1}^{N}\sum_{t=L+1}^{T-F} D_{it}} \sum_{i=1}^{N}\sum_{t=L+1}^{T-F} D_{it} \left\{ (Y_{i,t+F} - Y_{i,t-1}) - \sum_{i' \in M_{it}} \omega_{it}^{i'} \left(Y_{i',t+F} - Y_{i',t-1}\right) \right\} \tag{1}$$

where D_{it} represents the treatment status for state i in year t and Y_{it} indicates the outcome variable. For the main analysis, we estimate the treatment effects for the year exposed to a TBT/SPS case (t+0) and through the four years after the treatment assignment (t+4). We use covariate balance propensity score weighting for refinement by matching on five periods of pre-treatment histories and refine the matched set with lagged outcomes together with a series of covariates. We incorporate GDP per capita from the World Bank database, representing a country's overall economic development. The log-transformed values of imports and exports from WTO merchandise trade data account for trade dependence, which can influence countries' involvement in disputes. Applied tariff rates are included as a proxy for trade policy stances, and UN General Assembly voting reflects foreign policy orientation and international cooperation (Voeten et al., 2009). From the Varieties of democracy dataset, we use V-dem scores to measure the quality of democratic institutions, which could encourage positive engagement with the rule-of-law process in trade monitoring (Coppedge et al., 2021). Furthermore, we include years of WTO membership as an indicator of experience in the international trading system. Lastly, we leverage World Bank's governance effectiveness and regulatory quality variables to represent a country's capacity to implement policies and regulations, impacting their participation in trade disputes and adherence to notification requirements. Incorporating these covariates in the analysis helps to create more balanced treatment and control groups by accounting for potentially confounding factors. In robustness checks, we change the number of lags and apply alternative matching and weighting methods, and incorporate additional co-

variates like the transparency index from Hollyer et al. (2014).[9] This improves the internal validity of our estimates and increases the credibility of our findings.

6 Findings: Dispute Spillover for Notification Filings

6.1 The impact of legal exposure on aggregate notifications

We begin the empirical analyses by applying the DiD estimator to estimate the aggregate effects of legal exposure on notification patterns. Specifically, we compare the notification pattern of a state that experiences its first third party participation in any TBT or SPS dispute to the notification pattern of non-participants. Figure 1 shows the estimated effects of third party participation on members' notifications with 90% confidence intervals. $t = 0$ indicates the first year a member participated as a third party. We measure contemporaneous effect when the complaint is filed with the assumption that governments who eventually join the case have interest from its onset. In most cases, the third party is approved to join consultations within three months of the complaint. We plot the contemporaneous effects at $t = 0$ and the long-lasting effects four years after the initial exposure ($t = 1$ through $t = 4$). In the shaded region, we use $t = -1$ as the reference group and plot the estimated effects before the treatment occurs ($t = -5$ through $t = -2$). We assess the quality matches by examining covariate balance (see Appendix A.5). Most of the covariates are well-balanced, with a standard mean difference between -0.25 to 0.25, except for weighted tariff which has a standard mean difference of more than 0.5 in some pre-treatment periods (t-5 to t-3). We check the parallel trends for matched units before and after the treatment and present the results in Appendix A.4.

[9] The transparency index data is only available up to 2010. To maintain the relevance of our analysis with more recent data, we chose not to include it in the primary assessment. The results are similar if we only the transparency index B.3.

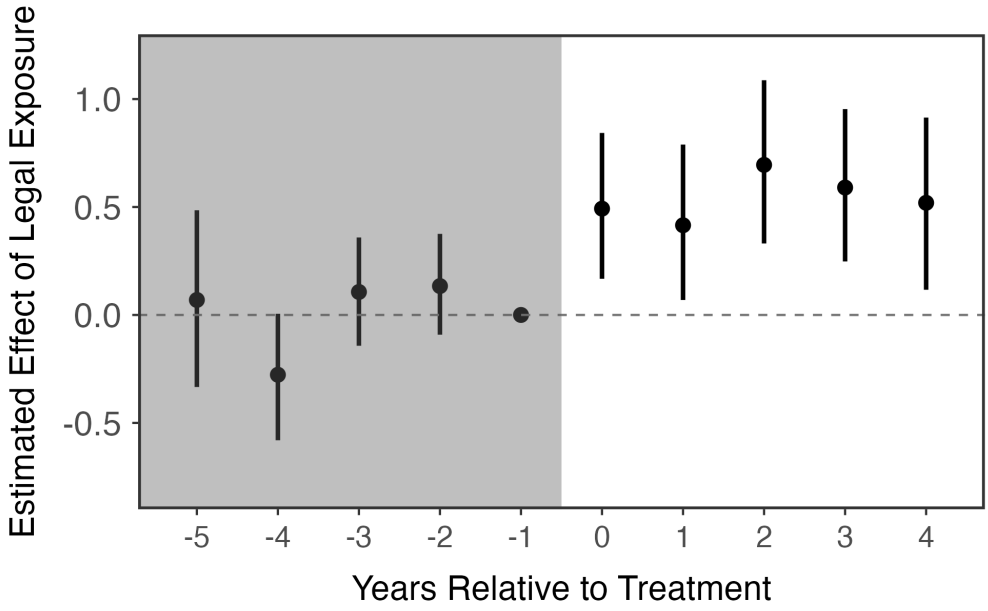

Figure 1: *Effect of legal exposure on members' TBT and SPS notifications (log), 1995-2022.* Difference-in-differences estimates on the effects of third party participation on members' annual notifications (log) are plotted in the unshaded area. Placebo estimates are plotted in the shaded area and $t-1$ is used as the reference period to estimate the effects from $t-5$ to $t-2$. The model uses covariate balance propensity score weighting and estimates 90% confidence intervals with bootstrap.

The results are consistent with our hypothesis that WTO disputes impact the behavior of members beyond the complainant and the respondent by encouraging cooperation by other states that closely follow the case. We find that serving as third party leads to 52.6% to 77.3% increases in notifications relative to non-members. The effects are significant at 90% level four years after the initial exposure to the dispute and gradually attenuate in the following years. The high salience of the case observed as a third party corresponds with an increased level of engagement.

We compare third party participation to serving as complainant and respondent in a TBT/SPS dispute. Selection effects are substantial in the case of the direct participants, which undercuts the likelihood that the dispute would alter their behavior. We expect that the respondents on average have resisted complying with WTO regulatory obligations. Their lower cooperation with SPS/TBT corresponds to targeting their measures in

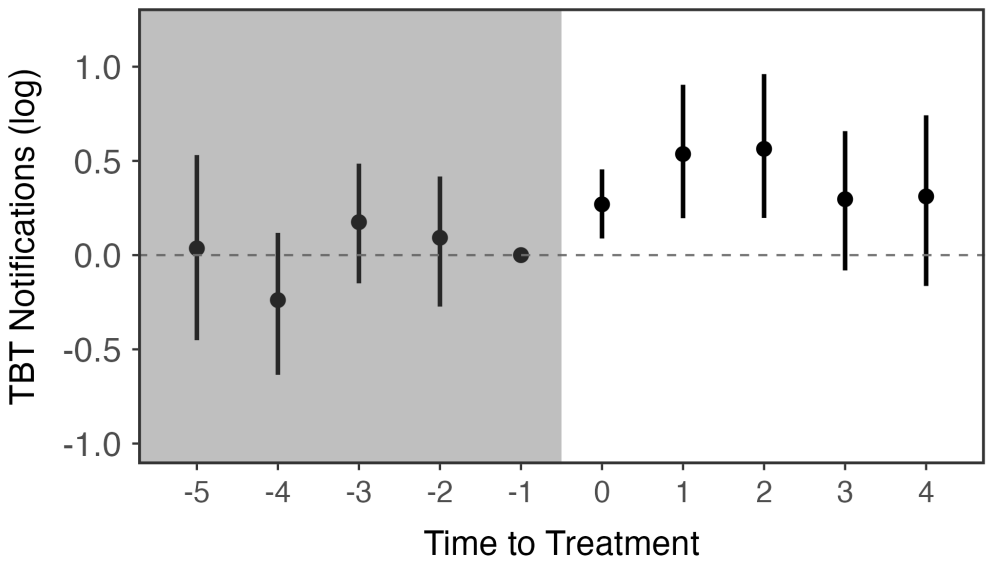

Figure 2: *Effect of TBT dispute exposure on members' TBT notifications (log), 1995-2022.* Difference-in-differences estimates on the effects of third party participation in TBT disputes on members' annual TBT notifications (log) are plotted in the unshaded area. Placebo estimates are plotted in the shaded area and $t-1$ is used as the reference period to estimate the effects from $t-5$ to $t-2$. The model uses covariate balance propensity score weighting and uses bootstrap method to estimate 90% confidence intervals.

the dispute. Complainants already hold higher levels of awareness about the SPS/TBT agreement, which is a condition to undertake the filing of the complaint. As a result, participating in the dispute would have less importance to enhance their perception of the rules. We refit the model for complainants and respondents and the results conform to our expectations. Serving as a respondent has a null effect on a member's notification pattern, whereas serving as a complainant slightly increases the frequency of notification by 33.5% in the same year of requesting consultation but has no effect thereafter. The results are shown in Appendix B.2.2.

We also fit models to analyze the effects of third party participation in TBT and SPS disputes separately. We compute the DiD estimates by matching five years of treatment history prior to a member's initial participation in the dispute and comparing third party's notification patterns with non-participants. As Figure 2 shows, third party participants in a TBT dispute increase their annual TBT notifications by 28.5% to 58.8%, relative to

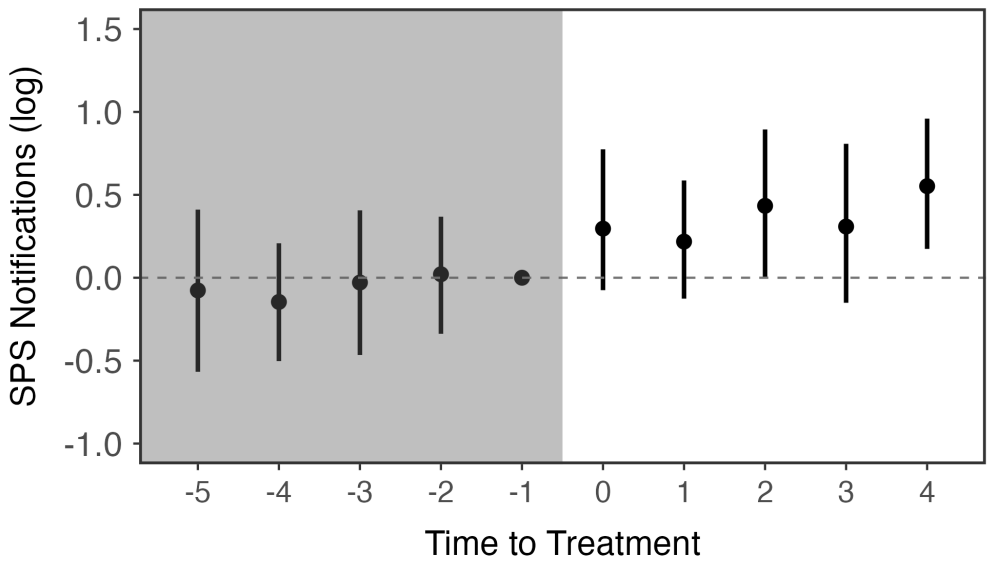

Figure 3: *Effect of SPS dispute exposure on members' SPS notifications (log), 1995-2022.* Difference-in-differences estimates on the effects of third party participation in SPS disputes on members' annual SPS notifications (log) are plotted in the unshaded area. Placebo estimates are plotted in the shaded area and $t-1$ is used as the reference period to estimate the effects from $t-5$ to $t-2$. The model uses covariate balance propensity score weighting and uses bootstrap method to estimate 90% confidence intervals.

non-participants. The effect is significant in the year when the consultation was first requested, and increases over the years as members get more involved in the dispute as a third party. Similarly, we find that serving as a third party in an SPS dispute leads to 31.4% to 59.5% increases in SPS notifications, compared to non-participants (Figure 3). The effects increase over the years and become more pronounced four years after the initial exposure to the SPS case. To prove the validity of our estimates, we conduct a placebo test and estimate treatment effects five years prior to the dispute. This allows us to examine whether third party participants foresee the upcoming dispute and change their notifying behaviors beforehand. Figure 2 and 3 show that the estimates from $t-5$ to $t-1$ are not significantly different from 0.

We present a series of supplementary analyses in Appendix B.2. First, instead of initial participation as a third party, we allow the same member to enter and exit the treatment multiple times and estimate the treatment effects of serving as a third party in several

TBT and SPS cases. We find a similar pattern with this alternative measure of third party participation but the effect size is smaller compared to the initial exposure (see Appendix B.2).

Second, we test whether the length of time in third party participation matters. Each year of the dispute case continuing adds to the years of exposure to legal practices. If states need more time to gain legal expertise and awareness, we would expect the treatment effects to be greater as the length of years in a case as a third party increases. However, if the legal expertise is a one-time acquisition after the initial exposure, we would expect to see the treatment effect for the first year be larger than the following years. To test this possibility, we create a set of treatments from $t+1$ to $t+4$ and estimate the heterogeneous effects over different years of experience as a third party in a case.[10] The results in Appendix B.2.1 support learning through first exposure to new information, as we see the positive effect only for the initial year.

Third, we investigate different types of notifications. One concern is whether adjudication encourages countries to modify or replace existing policies in order to resolve conflicts with WTO legal requirements. We replace regular notifications of new regulations with addendum, revisions, and corrigendum and find similar results (see Appendix B.4). This evidence supports that countries respond to their knowledge of enforcement actions with both new policy notifications and adjustments through changes to existing policies. We also present results from fixed effect models as robustness checks in Appendix B.

6.2 The impact of legal exposure on product-specific notifications

In a more narrow test, we examine whether the regulatory changes made by third party states are limited to the product involved in a given dispute. Both the legal precedent and the credibility of government commitment to take enforcement action on behalf of

[10] We calculate the length of years in each single case as a third party, and then take the average for all cases.

an industry will be most relevant for policies related to similar products. In a product-specific channel of diffusion, the new information gained by third party participation is most likely to change the notification patterns for products addressed in the dispute. Alternatively, general updating of information about the rules would alter notifications across a wide range of products beyond those named in the dispute.

To test this, we create state-year-dispute level data and analyze the impact of legal exposure on a state's notifications. For each dispute, we use a difference-in-difference estimator to compare the change in notifications on related products issued by third party participants with the notifications on the same set of products by other states that are not participants in the dispute. This approach enables us to measure the influence of legal exposure on product-specific notification patterns. For instance, in DSU 231—a case about sardine import labeling requirements—countries like Chile and Canada serve as third party participants, while Brazil and Japan do not. We compare the third party states' notifications on fish products with 4-digit HS codes (HS 0302, 0303, 0304, 0305) against non-participants' notifications with the same product codes. After estimating the effects for each individual dispute, we aggregate them across all disputes to assess the overall impact of legal exposure on product-specific notification patterns. We assess the validity of our approach by showing the parallel trends before and after third party participation (see Figure B.5).

As shown in Figure 4, acting as a third party leads to a 23.8% increase in product-specific notifications relative to other states that do not participate as a third party. The effect size is smaller (9.05%) when we include state-level controls such as lagged notifications and the other covariates from our previous model specification (GDP per capita, imports and exports, tariff rates, UN voting, V-dem scores, governance and regulatory quality). This represents the conservative estimate for a product-specific channel of spillover because it only considers changes in notifications for related products. Recall that our analysis of aggregate notifications across all products in the previous section 6.1 showed

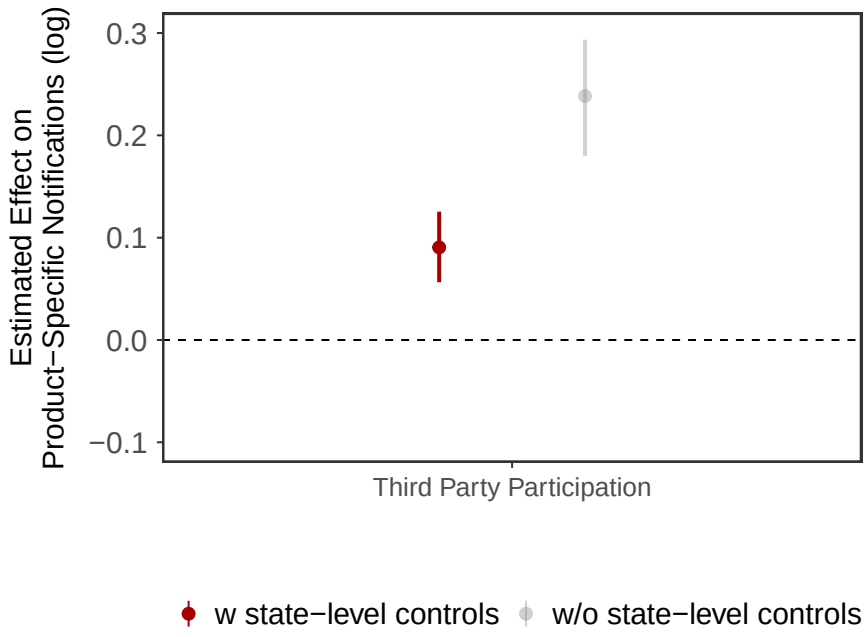

Figure 4: *Difference-in-difference estimates of legal exposure on members' product-specific notifications (log), 1995-2022.* The plot shows effects of legal exposure on a member-state's product-specific annual notifications (log), average across all TBT and SPS disputes. The bar indicates 90% confidence interval estimated with bootstrap.

a larger effect size in which notifications are estimated to increase from 52.6% to 77.3% after the initial experience of third party participation. These results suggest that third party states are more likely to notify about products directly affected by the dispute, but there are spillover effects across product categories. By confirming both product-specific policy adjustment and a broader spillover, our findings provide evidence that dispute resolution promotes regulatory cooperation.

We further examine separate estimates for individual disputes and find heterogeneous effects (see Figure 5). While some disputes, such as DSU 270 (Fresh Fruit and Vegetables), show large effects of legal exposure, others like DSU 77 (agricultural products) and DSU S76 (textile and apparel) reveal negative effects in which a country appears to have reduced its notifications on related products after its participation as a third party. The results here indicate that the impact of legal exposure on notification patterns is not uniform across disputes. Differences such as the nature of the legal claims, the composition

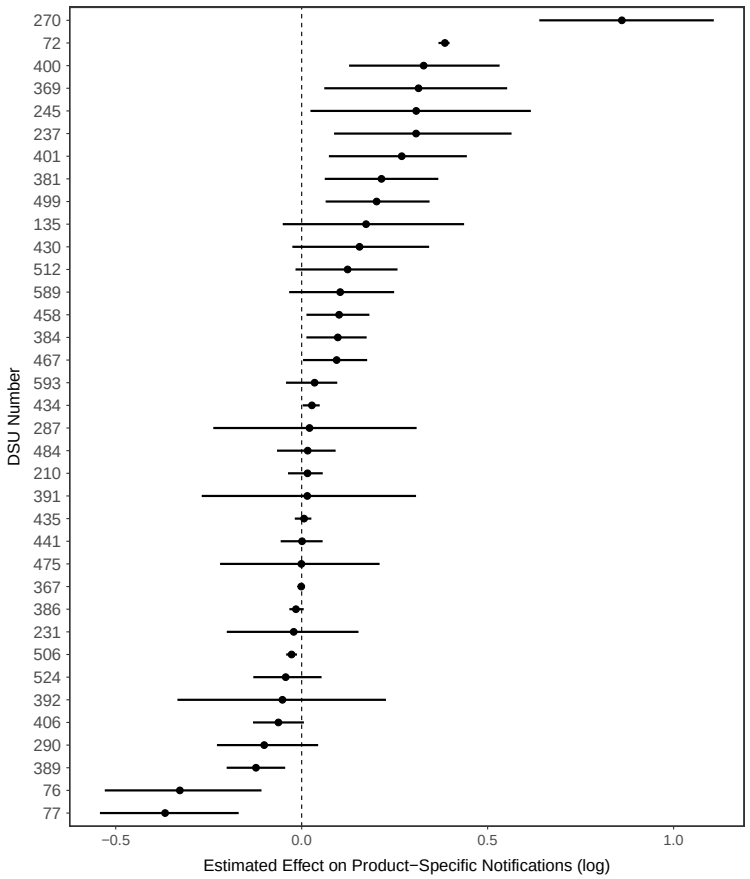

Figure 5: *Difference-in-difference estimates of legal exposure on members' product-specific notifications (log) by dispute, 1995-2022.* The plot shows effects of legal exposure on a member-state's product-specific annual notifications (log), estimated separately for each individual TBT and SPS disputes. The bar indicates 90% confidence interval estimated with bootstrap.

of third party states, and/or the underlying economic interests could all moderate the impact of legal exposure on notification patterns. Understanding the specific context of each dispute is crucial to evaluate the effectiveness of any given case.

6.3 Product similarity and the ripple effect of the Tuna Dolphin case

Another path for exposure to the case occurs through related trade interests. In our economic exposure hypothesis, we posit that states who trade in the products implicated in a specific dispute case will increase their engagement with the rules thereafter. We expect that the officials in government and business stakeholders who closely follow the

case will update their beliefs about the rules. Here we focus on economic interests in the context of a single dispute.

One of the most prominent cases for TBT arose in 2008 when Mexico filed a complaint against the United States for its policy limiting the labeling of tuna as "dolphin-safe" based on fishing methods. The the case highlights the difficulty of balancing regulatory autonomy with the need to prevent trade discrimination in the context of a highly sympathetic cause for the environmental movement to protect dolphins and support consumer choice through labeling. Given the behavior of dolphins in the eastern tropical Pacific Ocean to swim near tuna, some fishermen had targeted sightings of dolphins as a way to track the tuna. Using large purse seine nets they would capture the valuable tuna stock, which often also entrapped the accompanying dolphins. The practice had become prevalent for the Mexican fishing fleet. To discourage this method that had resulted in the deaths of large numbers of dolphin, the U.S. created a "dolphin-safe" label to indicate tuna caught by methods that did not inflict harm on dolphins.[11] Mexico objected that the labeling policies discriminated against their exports of tuna to the United States because of a higher certification burden imposed on fish caught in the eastern tropical Pacific Ocean. In an earlier case brought by Mexico under the GATT in 1991, the panel ruled against the U.S. prohibition of tuna from Mexico based on their fishing methods.[12] But the United States did not change the regulation for labeling. By the time Mexico brought the labeling case to the WTO, the policy issues were well known but faced a new challenge in the context of the WTO rules.

The WTO dispute, "United States - Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (DS381)," lasted four years culminating in the adop-

[11] United States Code, Title 16, Section 1385, The Dolphin Protection Consumer Information Act (DPCIA) first adopted in 1990, and subsequent implementing regulations, and the court ruling in Earth Island Institute v. Hogarth, 494 F.3d 757 (9th Cir. 2007) were all considered part of the regulation reviewed by the WTO.

[12] Mexico did not request adoption of the GATT panel report in recognition that removal of the embargo alone would not restore consumer demand for its fish. See Baroncini and Brunel (2020) for detailed overview of the full case.

tion of the Appellate Body Report in 2012. The report ruled that the U.S. measure was inconsistent with Article 2.1 of the TBT agreement because it imposed less favorable conditions for tuna from Mexico entering the U.S. market.[13] The report concluded that the provision violated TBT article 2.2 because the U.S. measure was "more trade-restrictive than necessary" by hurting the ability of Mexico to sell tuna in the United States even though its fishermen had adopted measures to minimize harm to dolphins. But this was not the end of the case. Multiple rounds of litigation examined U.S. policy revisions intended to bring the measure into compliance. Private market analysts suggested the ruling would have no impact on sales for Mexico as U.S. tuna processors were unlikely to change their sourcing, but the government pushed ahead.[14] Arbitrators issued authorization for Mexico to suspend concessions.[15] In the last formal action after the second recourse to compliance appeals under Article 21.5, on January 11 2019, the Appellate Body report was adopted by Members. This report held that the 2016 revised labeling policy was consistent with the TBT. This final outcome was heralded by the United States as a victory for recognizing its environmental regulation as a non-discriminatory policy that served legitimate environmental purposes.

The jurisprudence in the case addressed several gaps in the TBT including the definition of international standards, and this will carry implications for the the entire set of measures governed by the agreement (Villarreal, 2018, p. 185). It serves as a critical case for managing trade and environment goals that clarifies legal principles related to the potential discrimination arising from procedures for product labeling based on production

[13] The U.S. regulation did not prohibit the import or sale of tuna, but the WTO ruling upheld the labeling policy nevertheless constituted a technical regulation. This legal point referred to an earlier case precedent in EC-Sardines as it clarified the application of the TBT to voluntary labeling schemes by defining what constitutes a technical measure. Appellate Body Report, U.S.–Tuna II, at paragraph 198.

[14] "WTO: 'Dolphin-safe' label discriminates against Mexico; The international body's decision could force the United States to water down rules for the "dolphin-safe" tuna label." *The Washington Post*, 20 May 2012.

[15] The arbitration panel found in favor of Mexico and authorized it to suspend concessions equal to the level of the nullification or impairment arising from U.S. non-compliance, which was determined to be $163.23 million U.S. dollars. For case details, see WTO summary available at `https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds381_e.htm`.

process. In a report on the Tuna Dolphin case and another WTO dispute on labeling, a Congressional Research Service report concluded "These cases can provide guidance to Congress and executive agencies when formulating technical regulations, including labeling programs."[16] To actually measure governments internalizing the knowledge of a case is difficult, especially when its ramifications were much more broad than the question of how to devise a dolphin-safe label for tuna imports consistent with the TBT. A search of notifications to the TBT committee yields over one hundred on the topic of labeling fish alone. Almost all of these were issued after the start of the tuna dolphin case in 2008, although the only notification specifically about dolphin-safe labels was a filing by the United States regarding its regulatory revision in response to the case.[17] The significance of the case more generally lies in opening the dialogue among members about how to use the TBT to balance environmental regulations and free trade. This points to the potential for a wider range of responses.

We are interested in learning whether members whose economic interests were affected by the dispute were more likely to change their notification practices. In this section, we use DSU 381 as an example and test if the WTO dispute between the US and Mexico incentivized other members that rely heavily on tuna products to actively change their regulatory policies. We expect that these governments closely followed the case, and in the process received a tutorial about TBT regulations. We argue that this experience would make them more likely to recognize that their own measures balancing trade and environment could be subject to scrutiny and therefore decide to participate in the committee process.

To assess the impact of the case on tuna exporter cooperation with the TBT agreement, we adopt a similar approach to the previous analysis for measuring a treated group with high exposure to the case for comparison to a control group. Specifically, we apply the

[16] CRS, "The World Trade Organization Agreement on Technical Barriers to Trade and Recent Food Labeling Cases," Report R44210, 25 September 2015.

[17] The search of all WTO member notifications to the TBT since 1995 that include a reference to fish and labeling produced 208 notifications, with 114 about fish labeling. Twenty were filed before 2008.

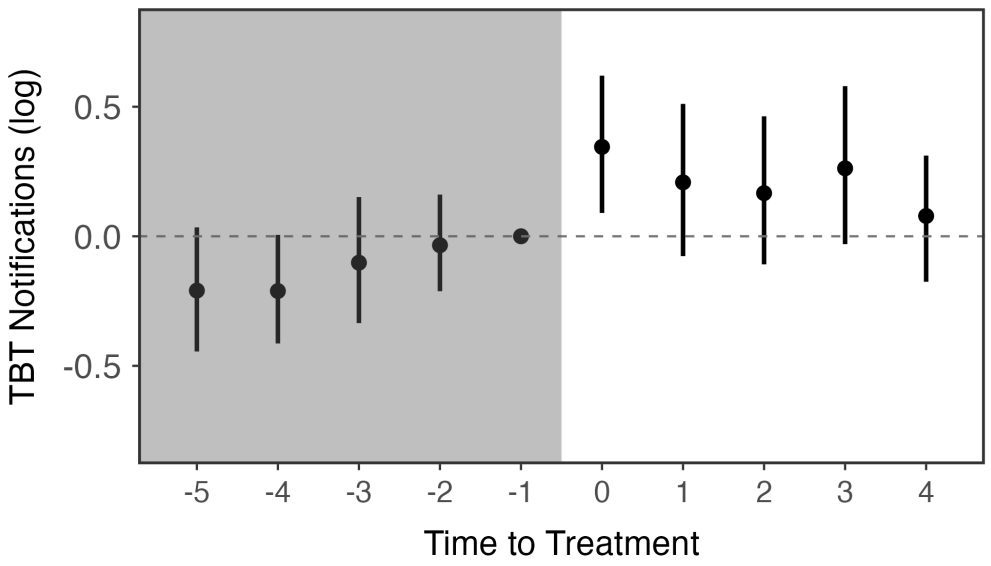

Figure 6: *Effect of economic exposure on members' TBT notifications (log), 1995-2020.* The plot shows difference-in-differences estimates for the impact of DSU 381 on annual TBT notifications (log). The shaded area indicates the estimates for the pre-treatment period before the dispute case filing. The model uses covariate balance propensity score weighting and estimates 90% confidence intervals with bootstrap.

matching strategy and match on (1) five years of treatment history prior to the DSU 381 complaint filing in 2008, and (2) state-level covariates (these are the same variables used in earlier analysis). Then we compute the DiD estimates and compare members who rank in the top 10% as tuna exporters.[18] We exclude the US and Mexico in the analysis in order to focus on spillover from the case for bystanders with economic exposure as distinct from the interests at stake for the complainant and respondent. We use annual TBT notifications as the dependent variable because DSU 381 centers around import labeling requirements and a legal claim citing the TBT agreement.

We find supporting evidence that WTO adjudication makes members who have a trade interest become more active reporting regulatory policies. Figure 6 shows that tuna-dependent exporters submit 16.6% to 34.5% more TBT notifications when Mexico requested consultations with the US. Considering the long duration of this dispute with

[18] The measure is calculated in terms of trade-weighted share of tuna exports in total exports.

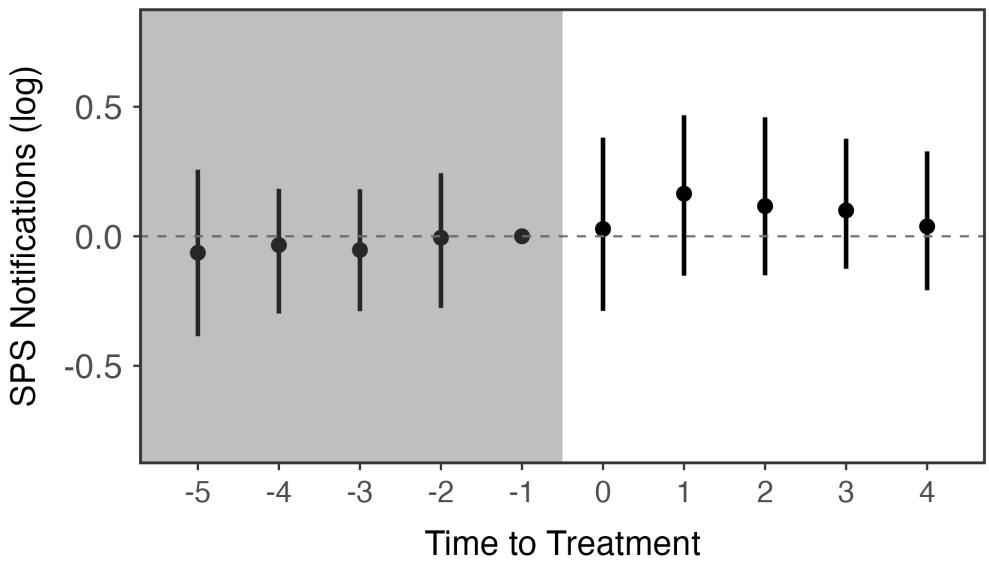

Figure 7: *Effect of economic exposure on members' SPS notifications (log), 1995-2020.* Difference-in-differences estimates on being affected by DSU 381 on members' annual SPS notifications (log) are plotted in the unshaded area. Placebo estimates are plotted in the shaded area and $t-1$ is used as the reference period to estimate the effects from $t-5$ to $t-2$. The model uses covariate balance propensity score weighting and estimates 90% confidence intervals with bootstrap.

prior GATT history and lingering compliance problems, it is remarkable to observe an uptick in regulatory notifications following the complaint. Our analysis pinpoints that the response is significantly greater among those governments that we expect to have been most attentive to the case based on their trade profile. The effect size is smaller compared to the legal exposure effects through third party participation (the effects are around 28.5% to 58.8%). We compare the list of tuna-dependent exporters and third party participants in DSU 381. While there is some overlap between these two lists, the first list also includes a range of island countries like Sri Lanka, Tonga, Seychelles, Samoa, Fiji, and Barbados which on average make 0.49 TBT notifications annually.[19] In a robustness check to address concerns about endogeneity between the case and trade flows, we use alternative measures for the treatment by focusing on members' export profiles in 2007,

[19] Third party participants in DSU 381 are Australia, Brazil, Canada, China, Ecuador, European Union, Guatemala, India, Japan, Republic of Korea, New Zealand, and Norway. There are 35 members that achieve status as a top tuna exporter (see list in Appendix C.1).

the year before the consultation was requested. We find a similar pattern with this alternative measure of the treatment with a smaller effect size. The results are present in Appendix C.1.

We also conduct a placebo test using SPS notifications as the dependent variable. We would expect tuna-dependent exporters to change their notifying behaviors to the TBT Committee rather than the SPS Committee because the labeling policy measure fell within the jurisdiction of the TBT agreement. The analysis confirms that tuna-dependent exporters do not submit more SPS notifications in response to the DSU381 case (see Figure 7).

7 Conclusion

This paper evaluates the role of enforcement and monitoring within the WTO. By studying how dispute cases impact participation in the notification of regulations, we highlight the many ways in which legal procedures are embedded in a larger system of interaction among states. Many states are following cases outside of the direct complainant and respondent, which creates a larger audience that could be subject to the impact of any single dispute. In addition, policies unrelated to the targeted measure could be implicated by a new interpretation of law in the dispute. Through broadening the lens of inquiry, we gain appreciation for how states build support for a rule-based trade order.

Our analysis suggests that spillover from WTO disputes generates more cooperation. We argue that active enforcement promotes the deterrent and precedent effect necessary to form a focal point around cooperation with the rules. We observe this cooperation in the form of more notifications of regulatory changes. Those who are close to SPS/TBT disputes, whether through third party participation or trade product similarity, increase their engagement with the system. We find that the initial experience as a third party in a SPS or TBT case corresponds to increasing all notifications to the SPS and TBT committees.

Further evidence at the individual dispute level reveals the notifications are more likely to rise for regulations affecting the same product area related to the dispute claim, although there is heterogeneity among the disputes in this effect. Looking at the single case of the Tuna-dolphin dispute, we find a differential increase among the top tuna exporters and in the relevant body for TBT committee regulations. Adjusting policies and adding transparency improves the coherence of the trading system.

Future work will examine more closely the types of rulings that lead to greater harmonization. Where possible, one could trace the type of legal conclusion and map onto the changes of regulations. This would require a more fine-grained analysis building on the intuition that exposure to law makes states more likely to comply through future policy adjustment.

After having been heralded as one of the strongest international courts, the WTO dispute settlement body has suffered from reduced legitimacy and functionality as the United States blocks the appointment of Appellate Body justices. Critics point to procedural problems and discontent with specific rulings. Our research highlights the larger value of a rules-based enforcement system to encourage cooperation. While much research focuses on the impact of disputes for the trade of the complainant and respondent or analyzes legal rulings, our study examines the system-wide impact of enforcement. Even without a legal case being brought against their own policy, governments may react to enforcement with greater cooperation.

Regulatory cooperation is necessary to support a global economy. As policymakers debate how to uphold resilience of supply chains, it is worth revisiting the success that has been achieved over years of coordination on standards. Calls for making trade compatible with labor and environmental standards grow stronger. To foster sustainable trade, governments must continue to improve their regulatory measures. Yet doing so in a hostile environment that confronts coercive economic diplomacy and rising protection is likely to create new challenges. Transparency is more important than ever. Our paper demon-

strates that enforcement actions play a significant role in fostering broader engagement with the rules-based economic order.

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A Appendix

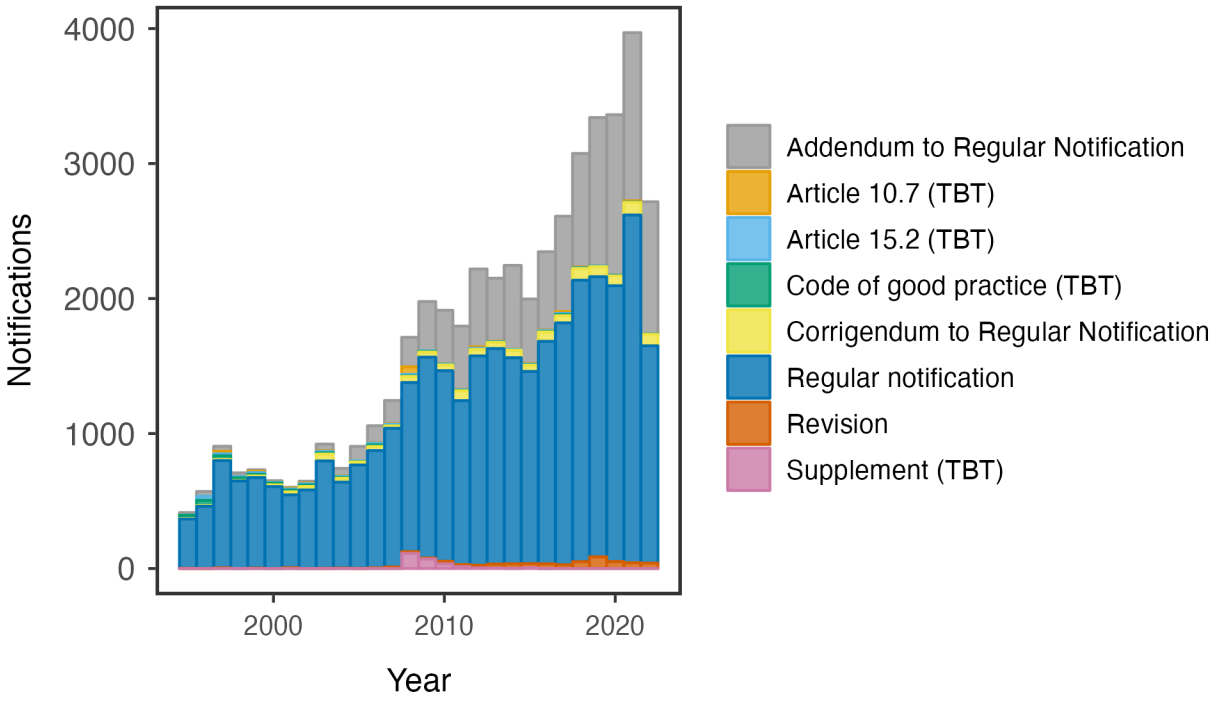
A.1 Summary Table

Table A.1

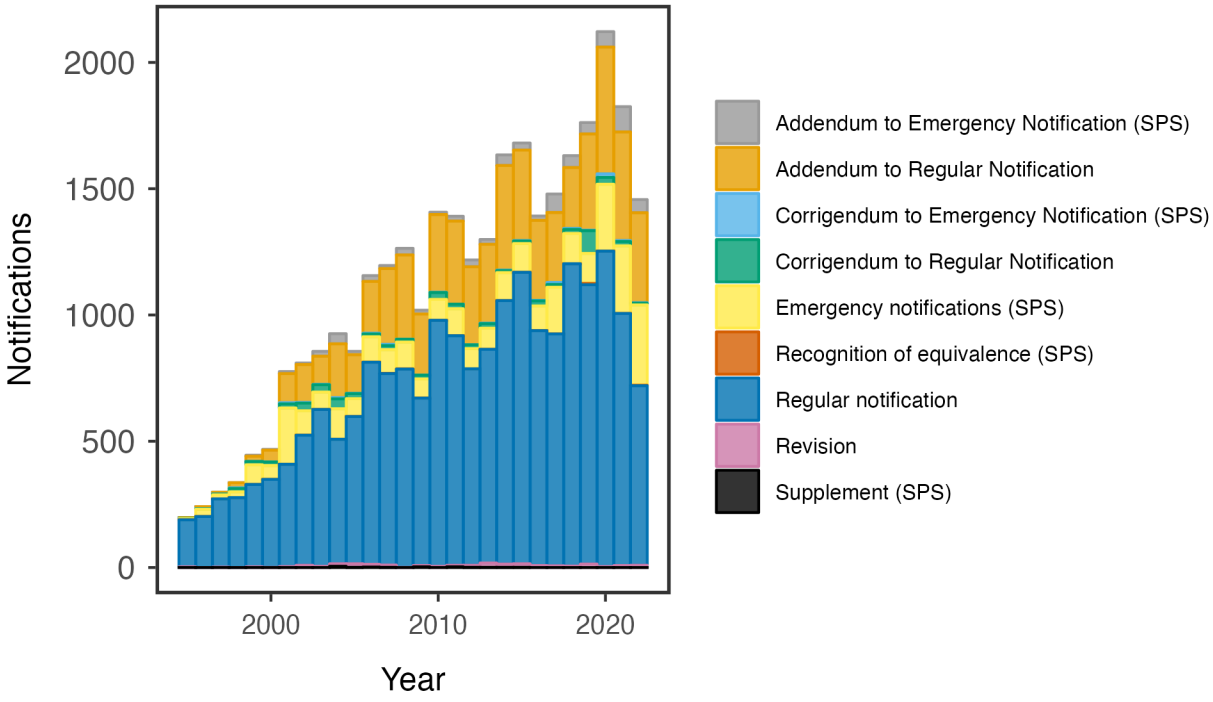
Statistic	N	Mean	St. Dev.	Min	Max
year	3,780	14.500	8.079	1	28
state	3,780	68.000	38.975	1	135
combined third party	3,780	0.254	0.435	0	1
TBT third party	3,780	0.236	0.425	0	1
SPS third party	3,780	0.198	0.398	0	1
WTO member years	3,780	12.341	8.631	0	28
export log	3,494	8.472	2.691	1.739	15.707
import log	3,494	8.897	2.225	3.951	15.683
UN ideal point	3,513	−0.238	0.770	−2.026	3.163
applied tariff weighted	2,579	7.346	9.874	0.000	421.500
GDP per capita	3,587	8.099	1.540	4.616	12.094
V-Dem score	3,310	0.386	0.241	0.017	0.869
regulatory quality	3,048	−0.087	0.899	−2.349	2.426
effectiveness	3,051	−0.047	0.858	−2.366	2.255
transparency index	1,536	1.378	2.030	−4.932	7.978
treatment thirdparty (multiple entry)	3,780	0.085	0.279	0	1
treatment thirdparty tbt (multiple entry)	3,780	0.068	0.252	0	1
treatment thirdparty sps (multiple entry)	3,780	0.050	0.217	0	1
treatment complainant	3,780	0.018	0.132	0	1
treatment complainant tbt	3,780	0.012	0.110	0	1
treatment complainant sps	3,780	0.011	0.102	0	1
treatment respondent	3,780	0.015	0.122	0	1
treatment respondent tbt	3,780	0.010	0.097	0	1
treatment respondent sps	3,780	0.010	0.098	0	1
notifications sps sum	3,780	5.303	18.694	0	339
notifications tbt sum	3,780	9.010	24.617	0	423
notifications sum	3,780	14.313	37.572	0	464
notifications sum log	3,780	1.185	1.583	0.000	6.142
notifications tbt sum log	3,780	0.972	1.409	0.000	6.050
notifications sps sum log	3,780	0.670	1.183	0.000	5.829

A.2 Notification Data

TBT Notifications (1995-2022, all types)

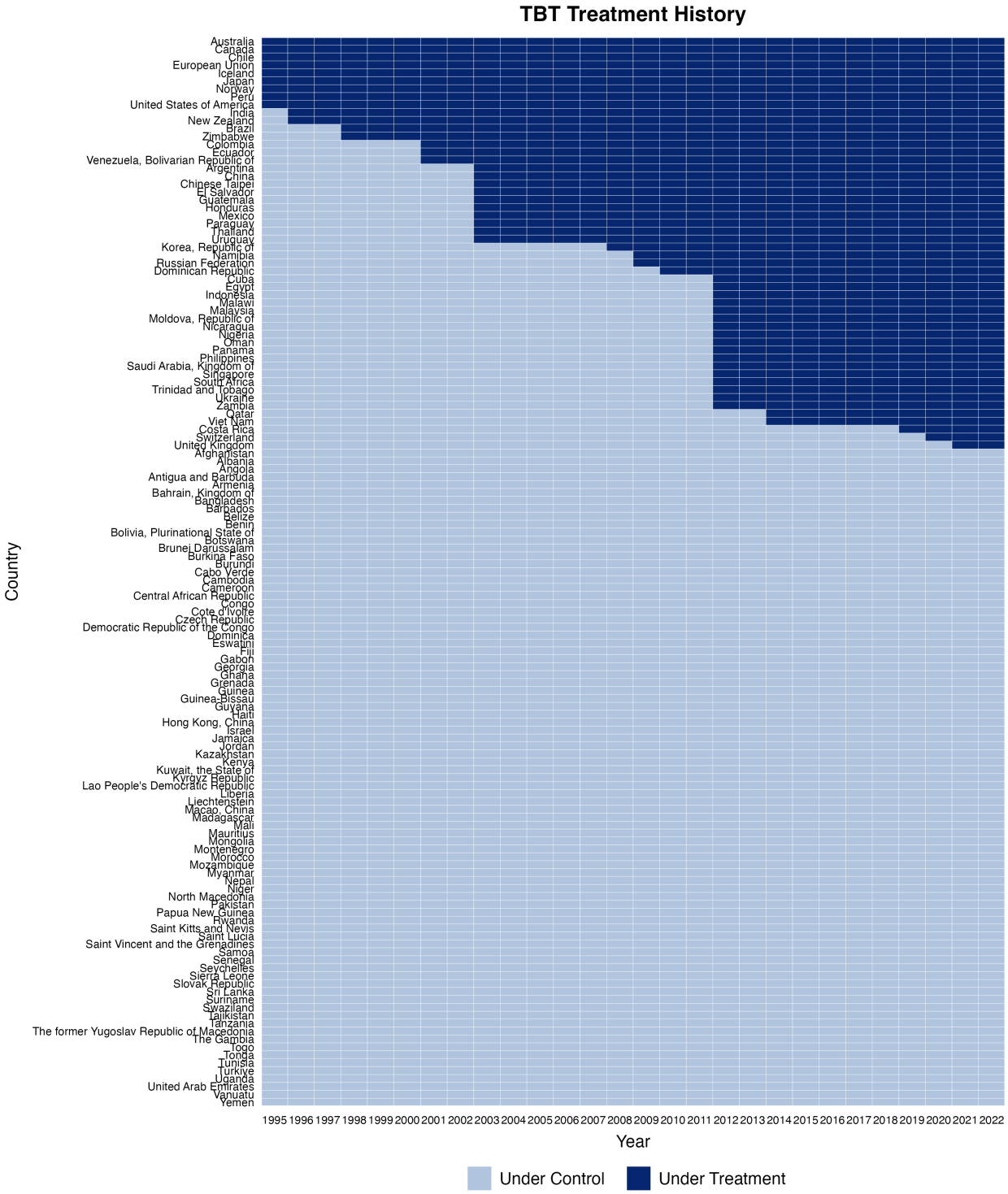


SPS Notifications (1995-2022, all types)

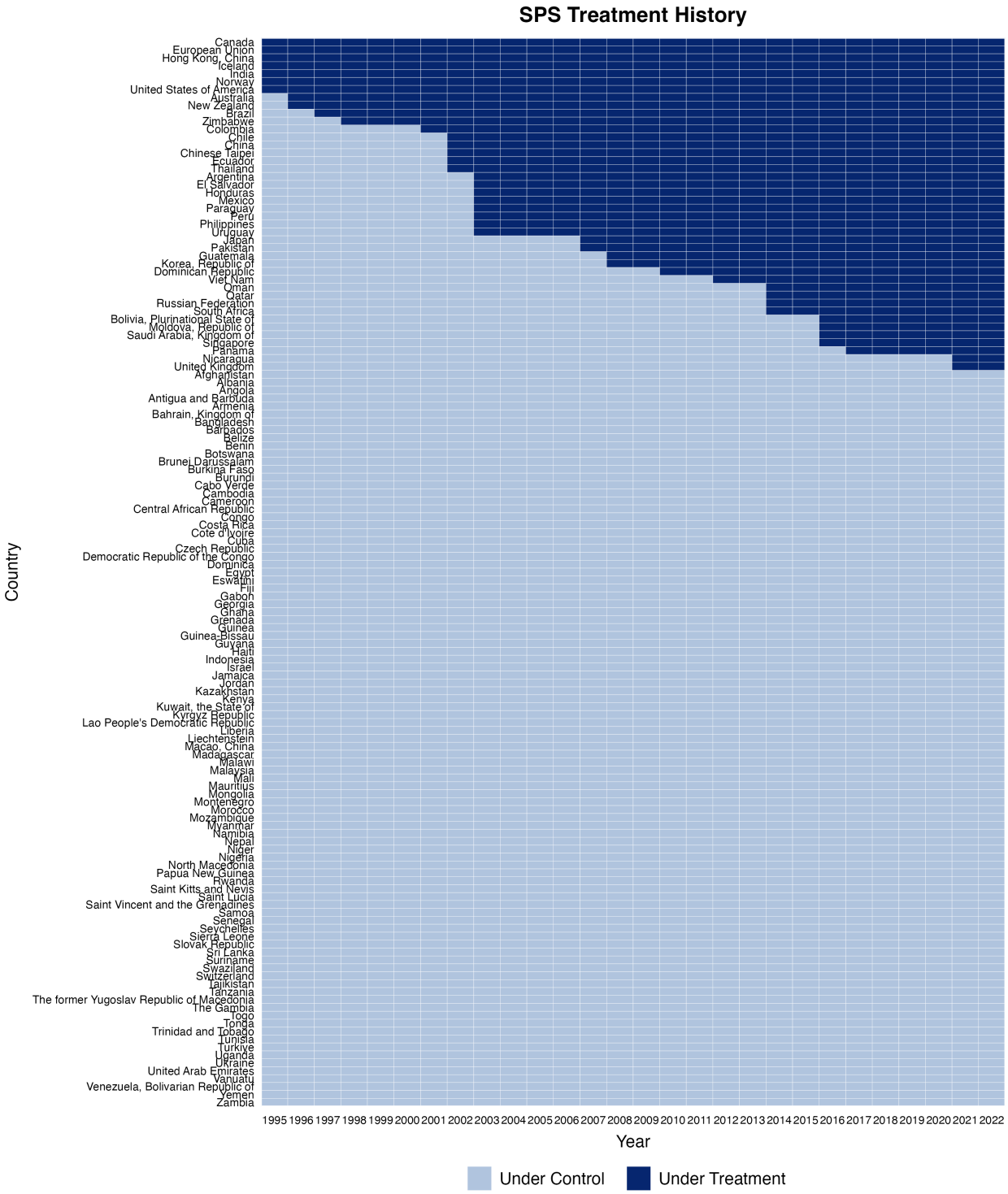


A.3 Treatment history plot

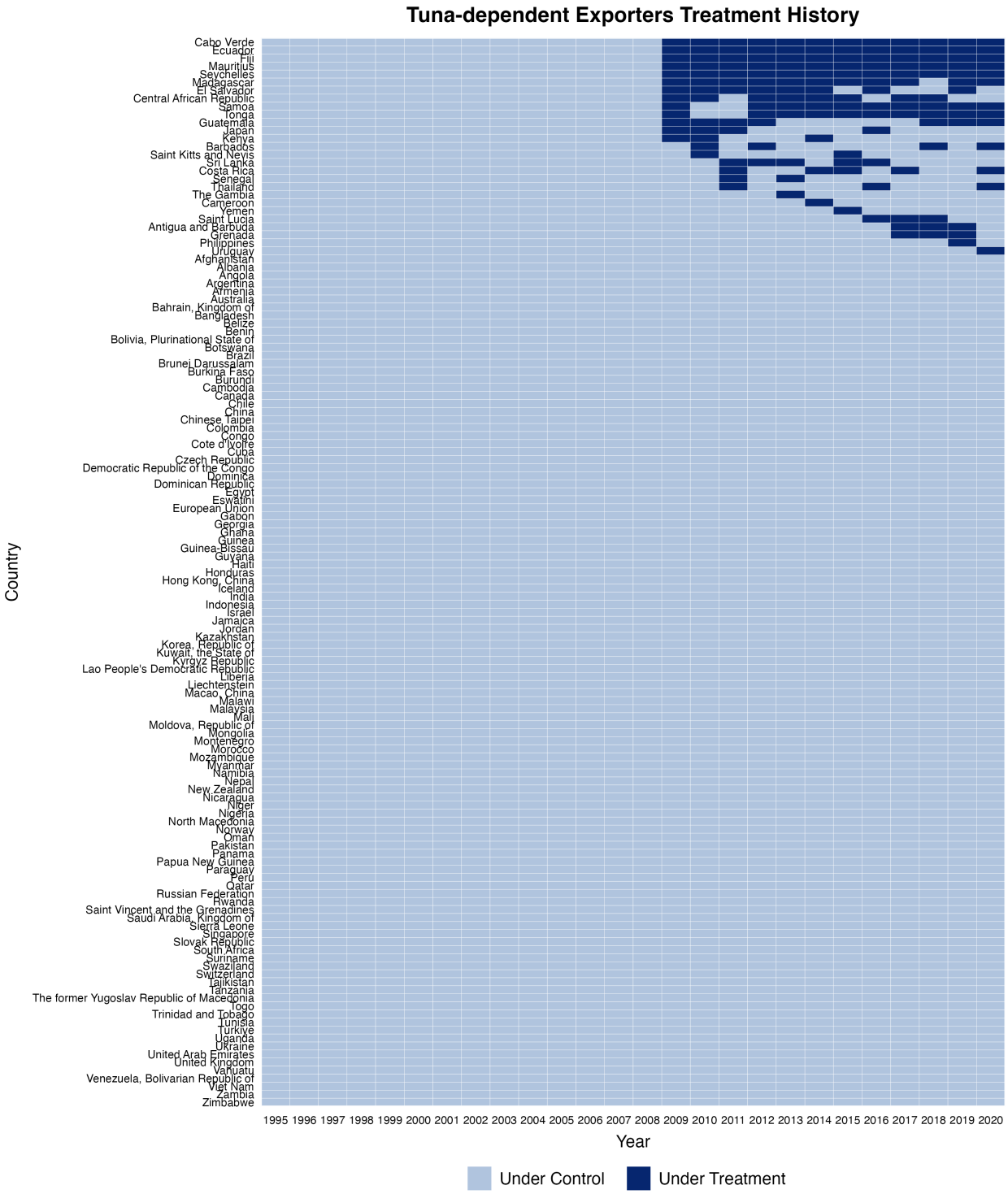
TBT treatment history



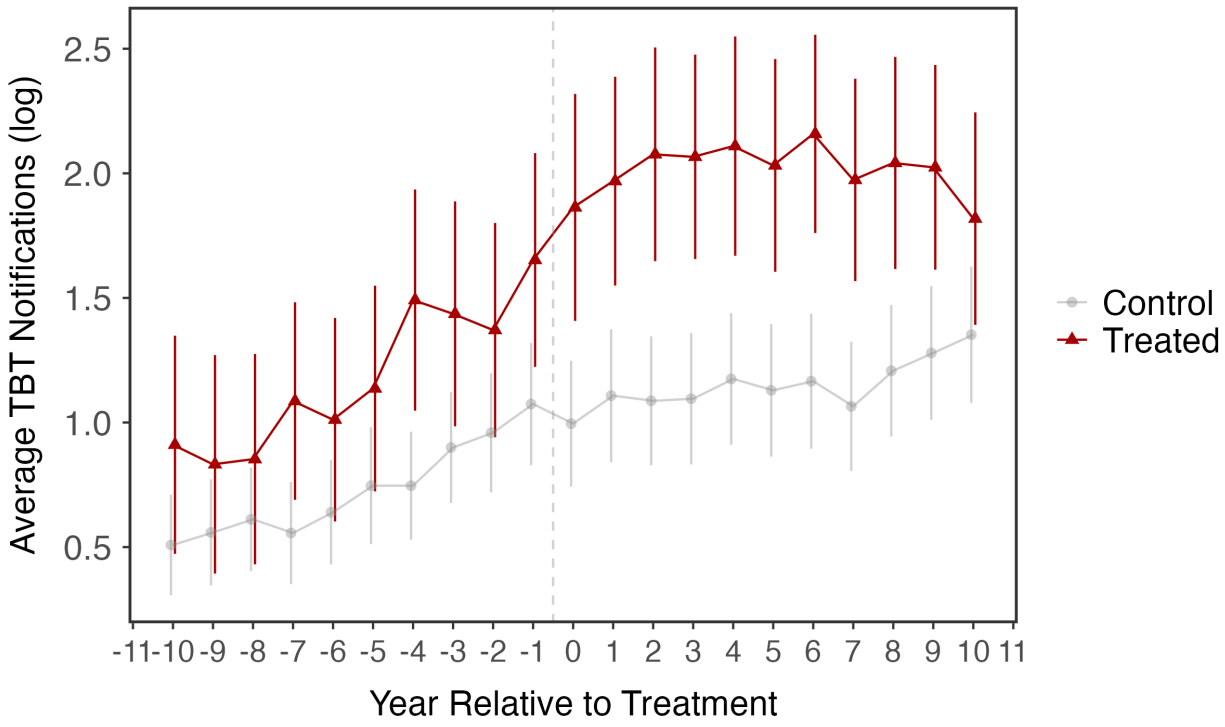
SPS treatment history

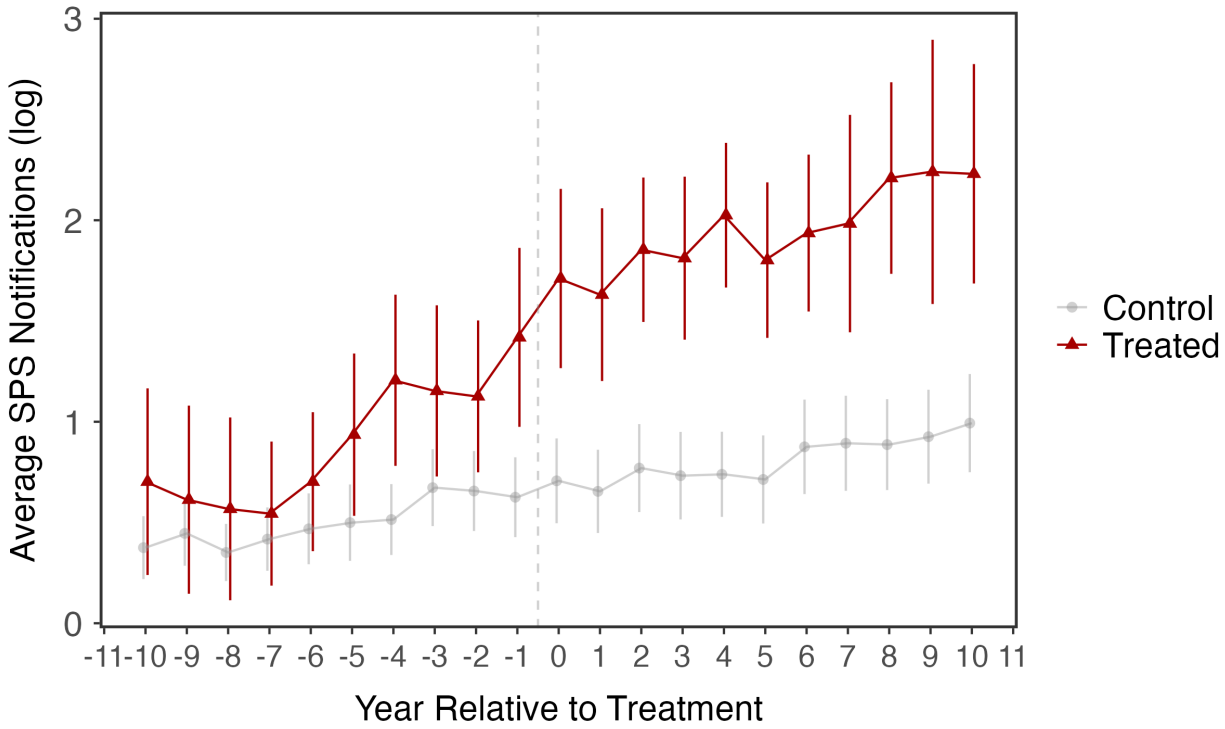


Top 10% tuna-dependent exporters treatment history



A.4 Parallel Trends Checks





A.5 Covariate Balance Checks

third party participation

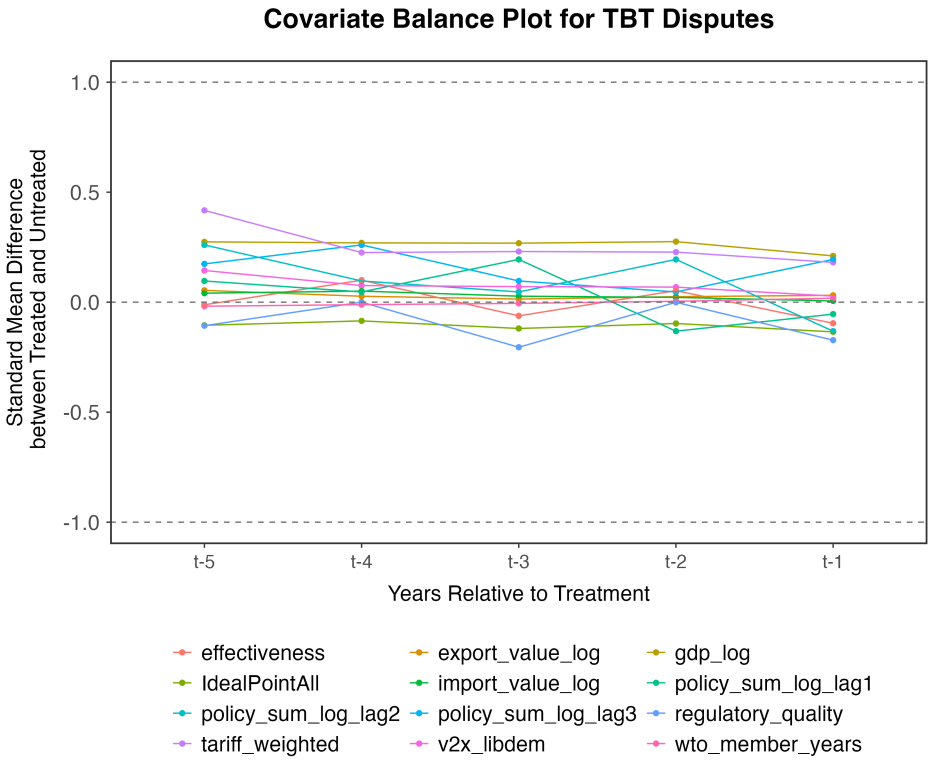


Figure A.1: The plot shows the covariate balance of TBT disputes over the pretreatment time period of 5 years ($t-5$ to $t-1$). The lines indicate the standardized mean difference for different state-level covariate after applying covariate balancing propensity score (CBPS) weighting to refine the matched set.

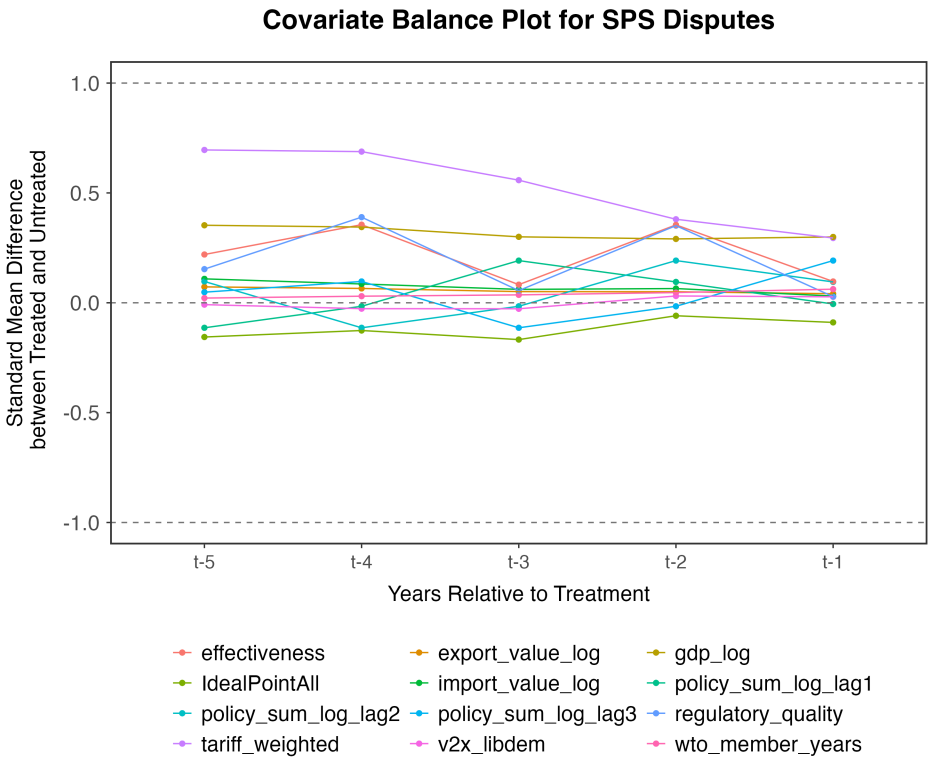


Figure A.2: The plot shows the covariate balance over the pretreatment time period of 5 years ($t-5$ to $t-1$). The lines indicate the standardized mean difference for different state-level covariate after applying covariate balancing propensity score (CBPS) weighting to refine the matched set.

Tuna-dependent exporters

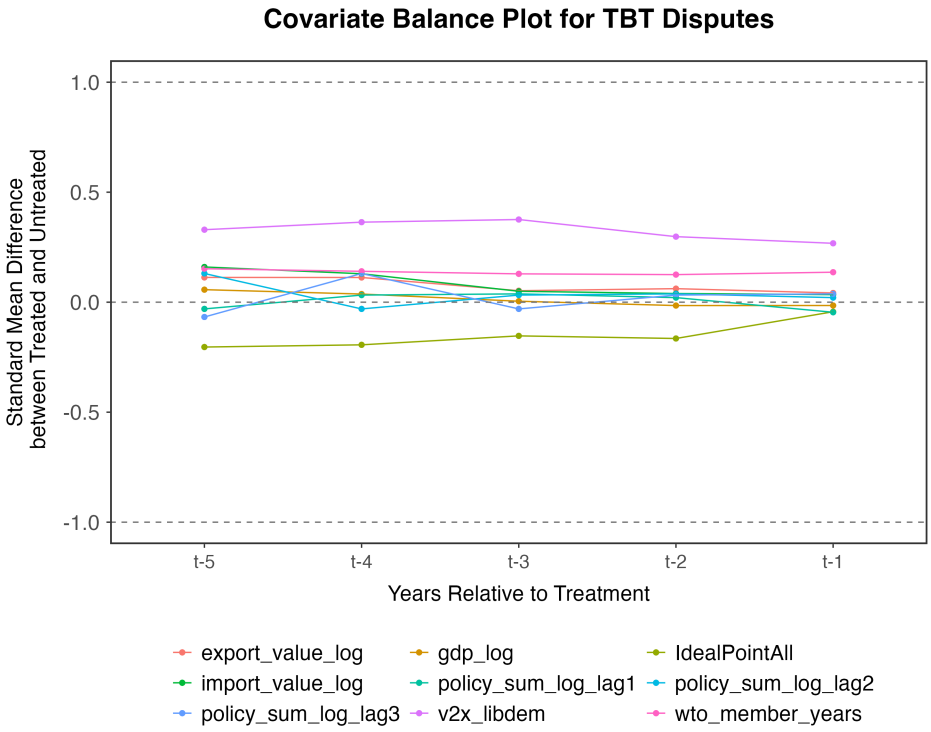


Figure A.3: The plot shows the covariate balance over the pretreatment time period of 5 years ($t-5$ to $t-1$). The lines indicate the standardized mean difference for different state-level covariate after applying covariate balancing propensity score (CBPS) weighting to refine the matched set.

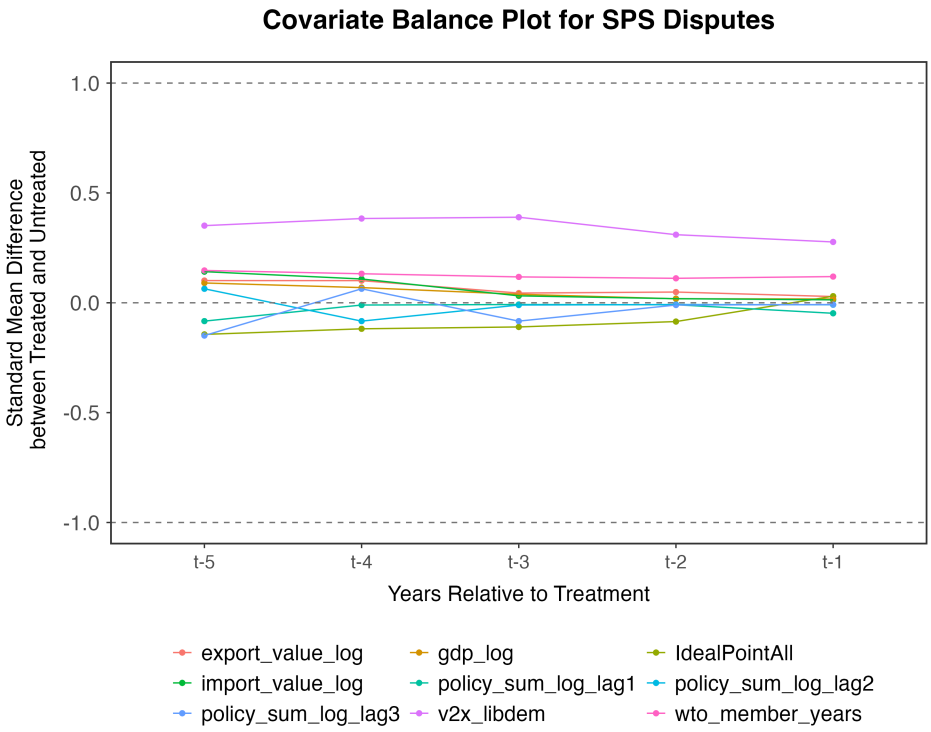


Figure A.4: The plot shows the covariate balance over the pretreatment time period of 5 years ($t-5$ to $t-1$). The lines indicate the standardized mean difference for different state-level covariate after applying covariate balancing propensity score (CBPS) weighting to refine the matched set.

B Additional analysis

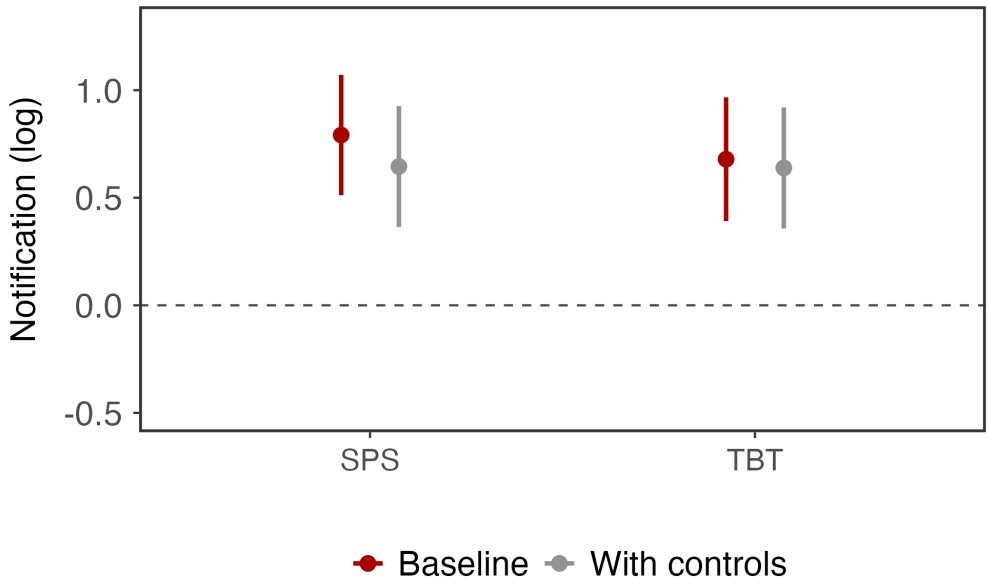
B.1 Two-way fixed effect estimates

Model

$$Y_{it} = \beta T_{it} + \zeta^{\top} \mathbf{X}_{it} + \alpha_i + \gamma_t + \epsilon_{it}$$

Y_{it} is the logged number of notifications. T_{it} represents the treatment status(third party participation). α_i and γ_t denote state and year effects. $\mathbf{X}$ indicates a set of time-varying control variables: GDP per capita, annual imports and exports, applied tariff rate for all products weighted by trade volumes, UN general assembly voting, V-dem scores, and years of being a WTO member state.

Results



B.2 On-and-off treatment assignment

In this section, we estimate the treatment effects using on-and-off treatment assignment instead of staggered adoption designs. Figure **??** shows the treatment effects of legal exposure on notification patterns by combining TBT and SPS cases. Overall, serving as a third party leads to 14.6% increase of notifications on the same year and has long-lasting effects on notification patterns 5 years after the initial exposure to the case.

Compared to the first-time exposure (staggered adoption design in the main analysis), having multiple exposures to TBT and SPS cases as a third party has a smaller impact (50.4% for the first-time exposure and 14.6% for multiple exposure).

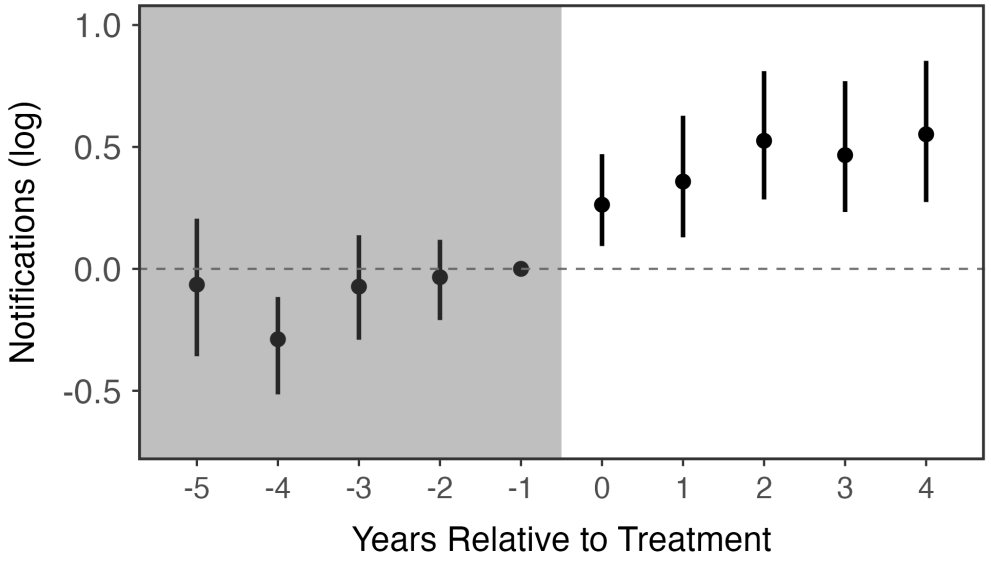
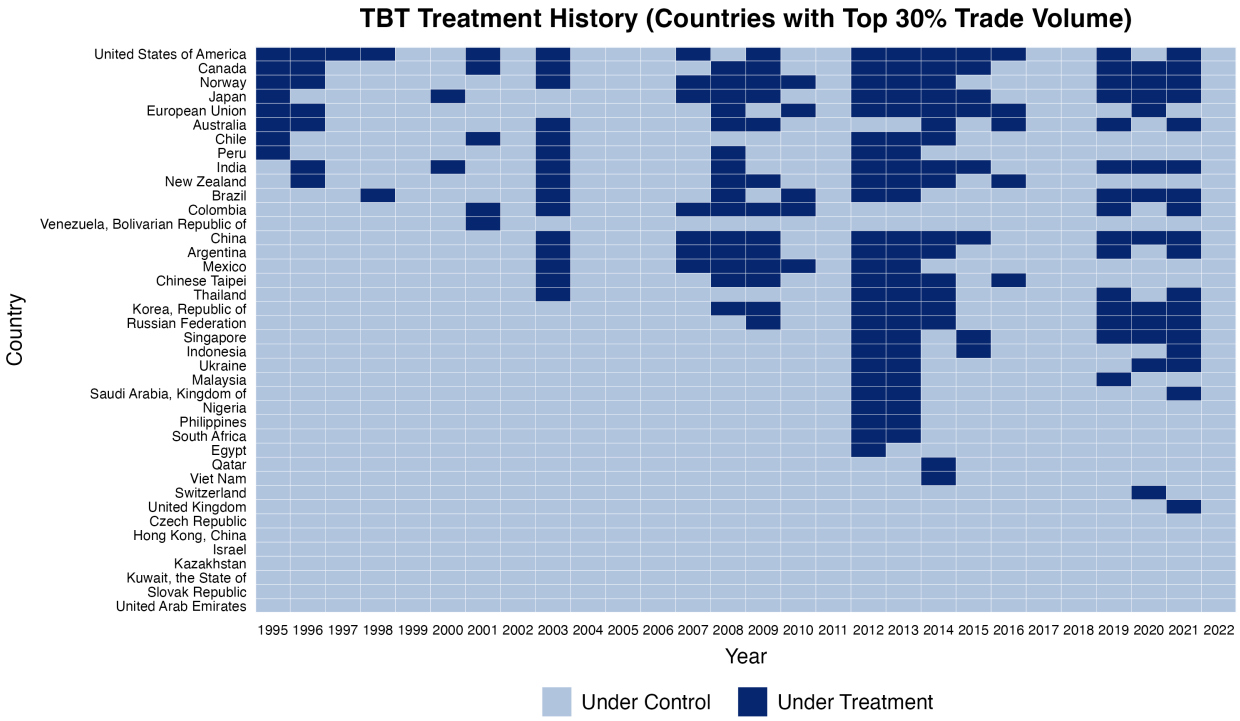
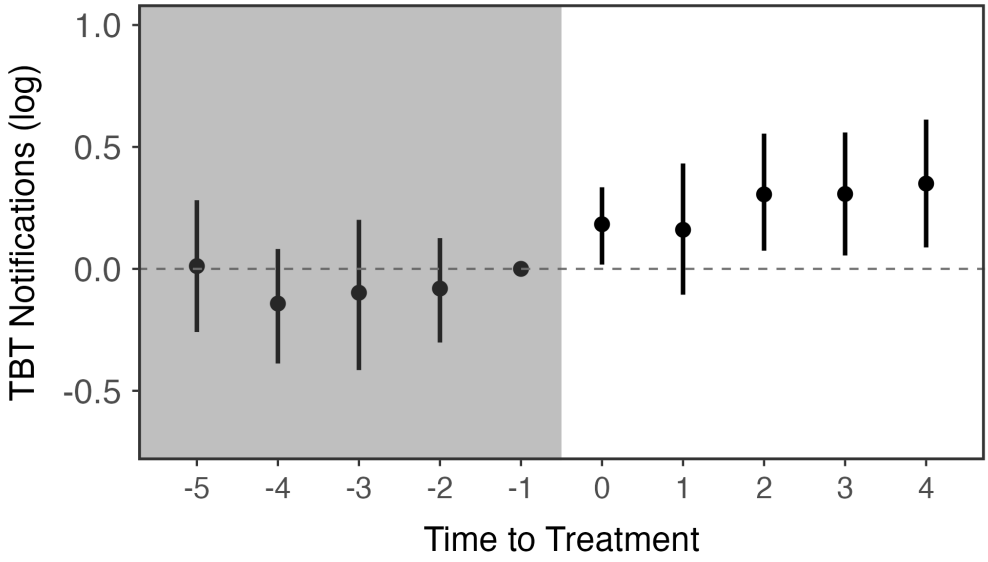


Figure A.5

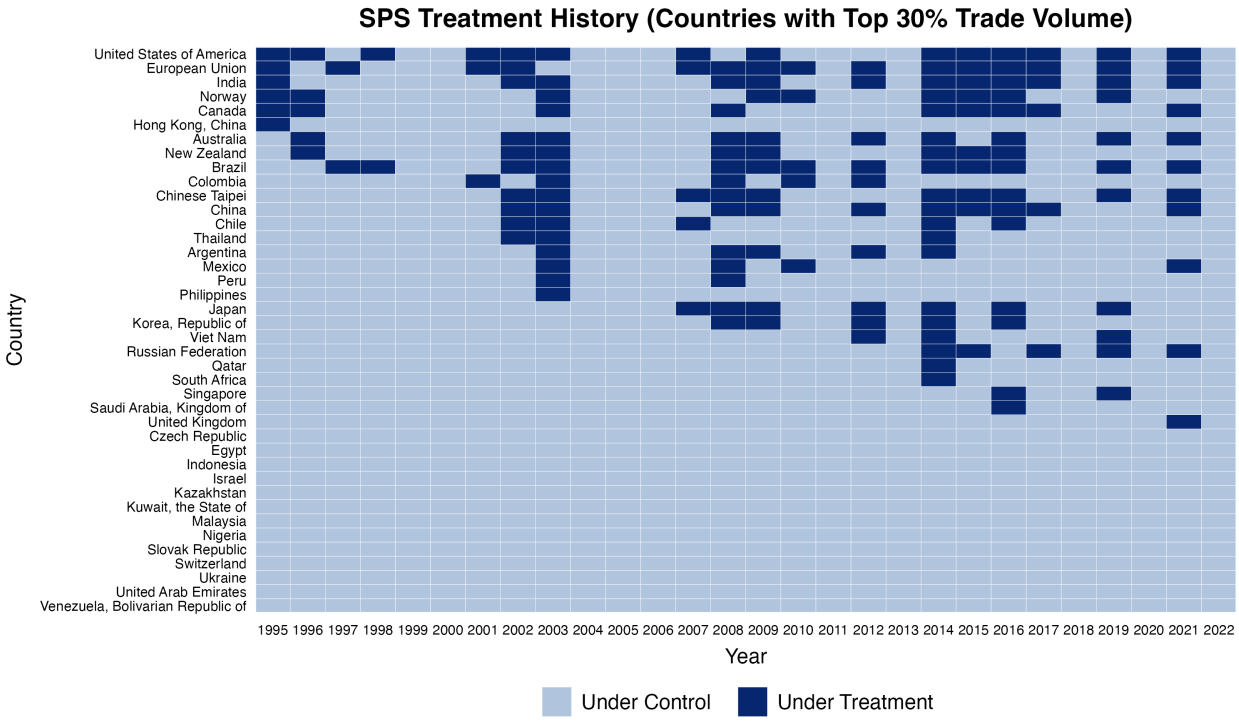
Then we separately estimate the effects of third party participation for TBT/SPS cases on TBT/SPS notification patterns, respectively. The following plots show the estimated effects with on-and-off treatment assignment instead of staggered adoption designs.

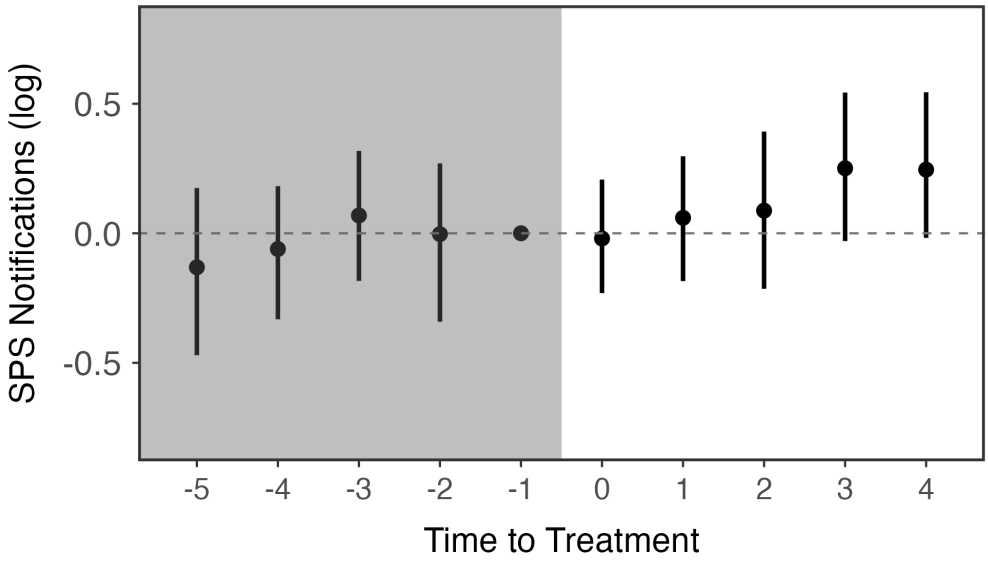
Third party legal exposure on TBT notification patterns





Third party legal exposure on SPS notification patterns


SPS Treatment History (Countries with Top 30% Trade Volume)
United States of America
European Union
India
Norway
Canada
Hong Kong, China
Australia
New Zealand
Brazil
Colombia
Chinese Taipei
China
Chile
Thailand
Argentina
Mexico
Peru
Philippines
Japan
Korea, Republic of
Viet Nam
Russian Federation
Qatar
South Africa
Singapore
Saudi Arabia, Kingdom of
United Kingdom
Czech Republic
Egypt
Indonesia
Israel
Kazakhstan
Kuwait, the State of
Malaysia
Nigeria
Slovak Republic
Switzerland
Ukraine
United Arab Emirates
Venezuela, Bolivarian Republic of
Country
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Year
Under Control
Under Treatment


SPS Notifications (log)
0.5
0.0
-0.5
-5
-4
-3
-2
-1
0
1
2
3
4
Time to Treatment

B.2.1 Using the length of exposure as treatment

Effects of years of exposure on TBT notifications

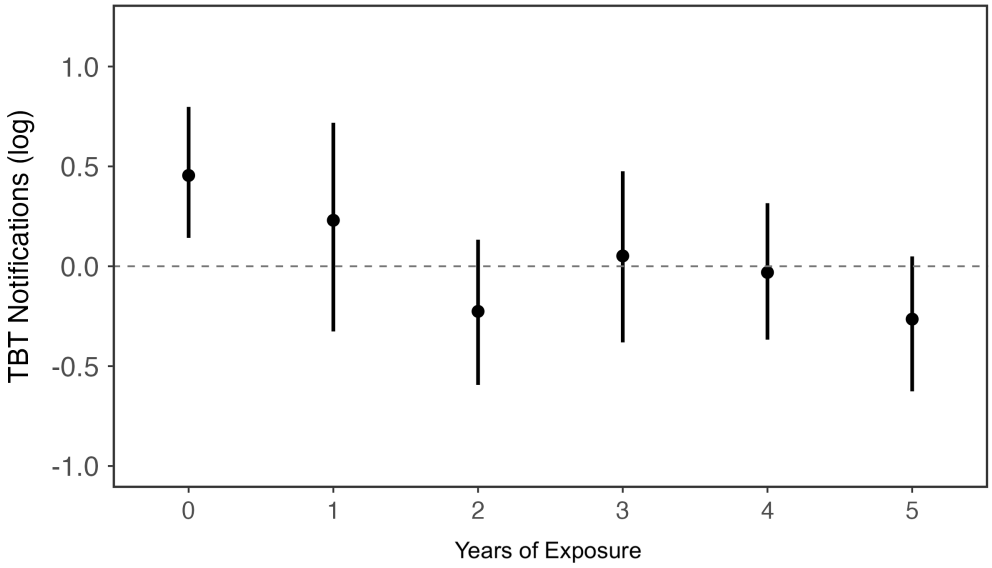


Figure A.6: *Effects of legal exposure on members' TBT notifications (log), 1995-2022.*
Difference-in-differences estimates are plotted for the effects of third party participation in TBT disputes on members' annual TBT notifications (log) by length of exposure.

Effects of years of exposure on SPS notifications

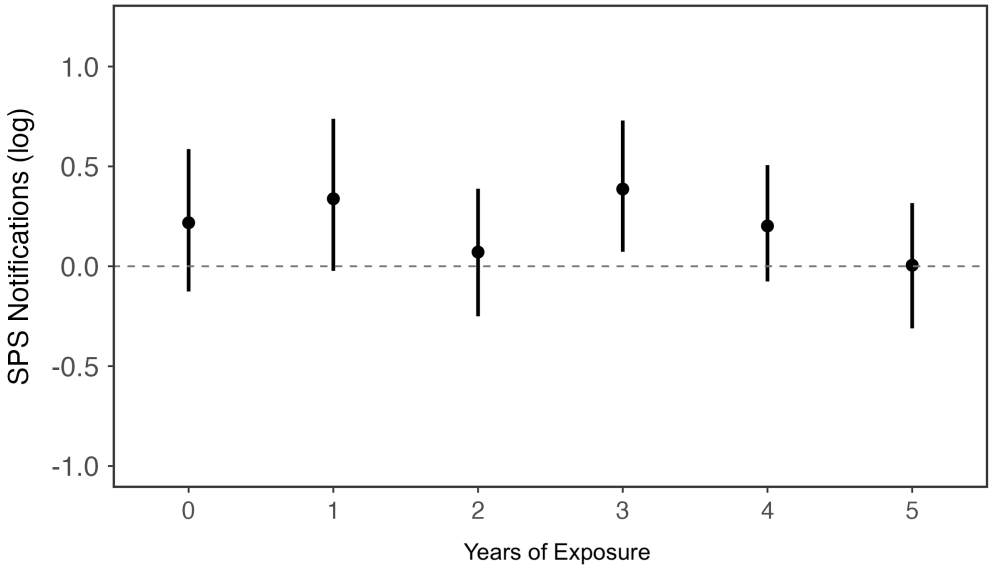
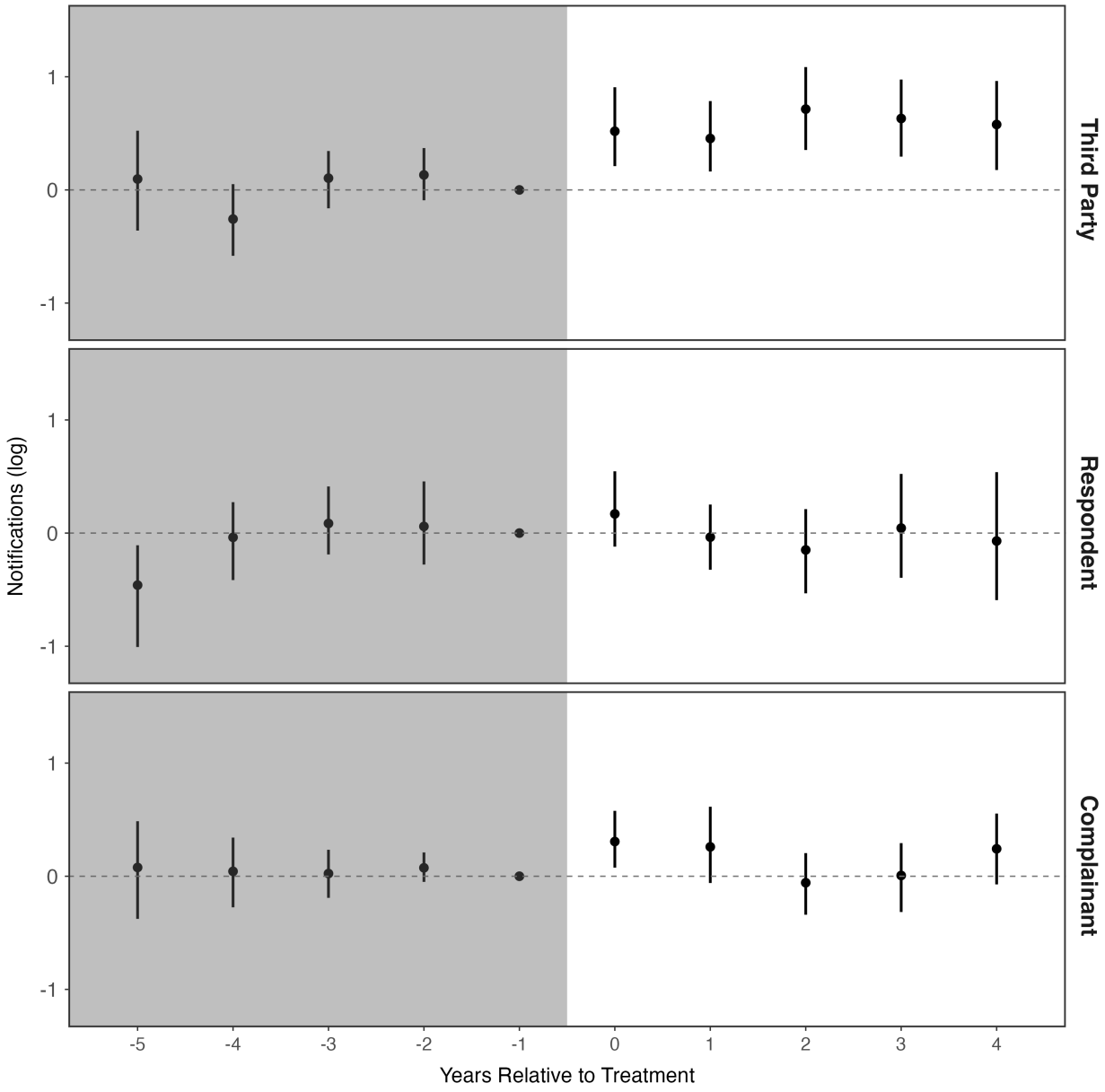


Figure A.7: *Effects of legal exposure on members' TBT notifications (log), 1995-2022.*
Difference-in-differences estimates are plotted for the effects of third party participation in TBT disputes on members' annual TBT notifications (log) by length of exposure.

B.2.2 Using complainant/respondent instead of third party participation

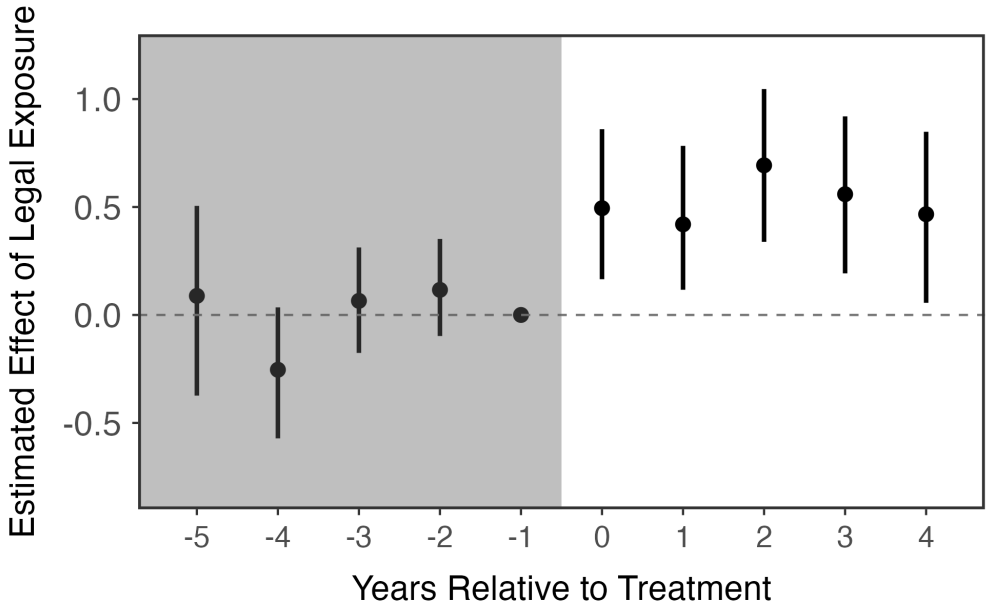
In this section, we estimate the effects of serving as a complainant/respondent on the notification patterns. The results show that serving as either complainant or respondent does not have a similar impact on states' notification behaviors.

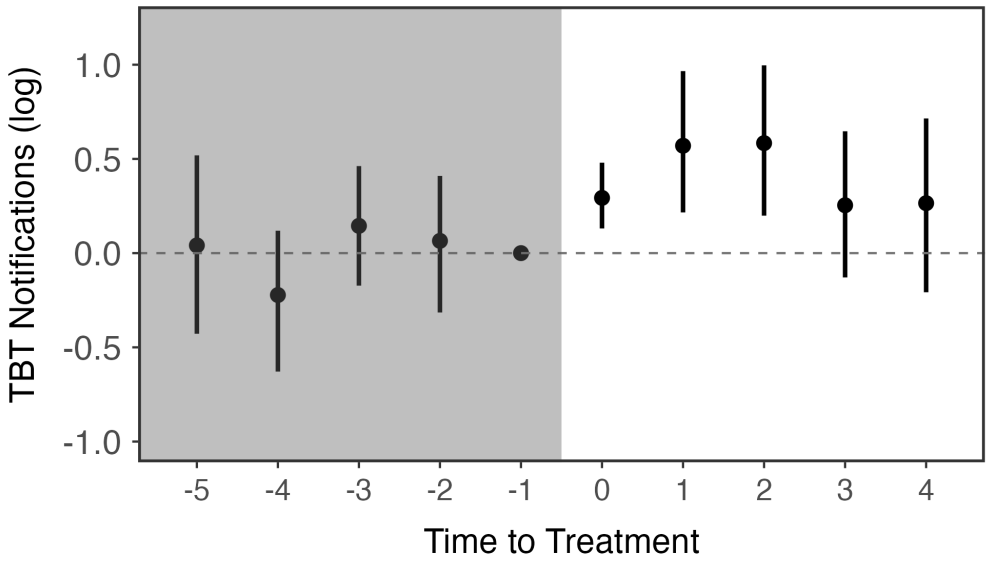
Combined results

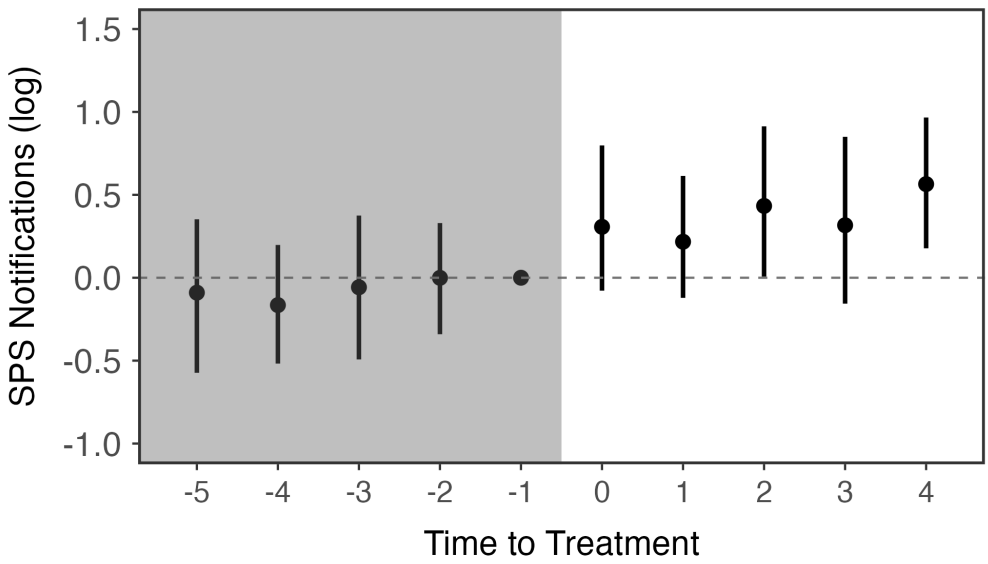


B.3 Transparency index

Including Hollyer et al. (2014) transparency measures as additional covariates to match on.

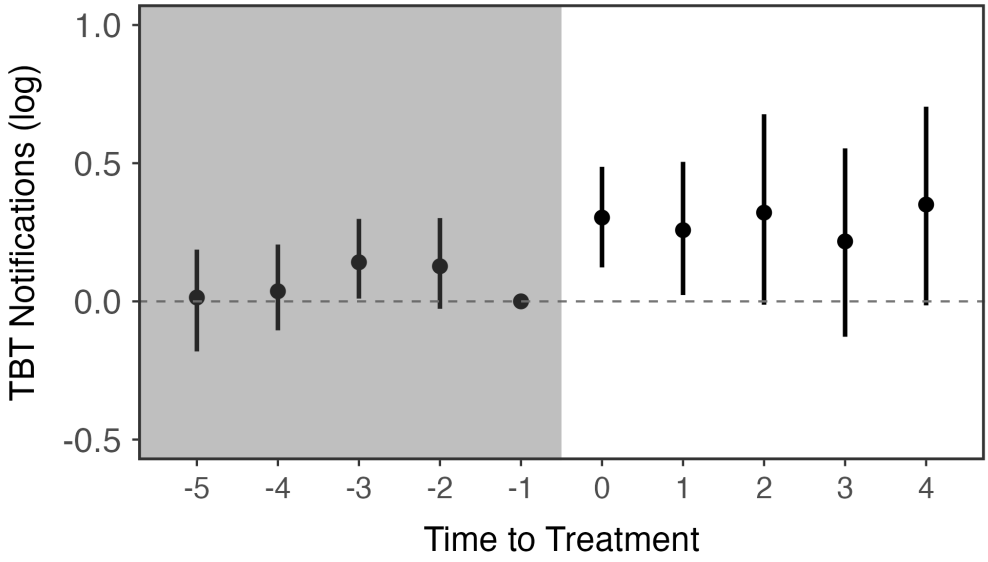




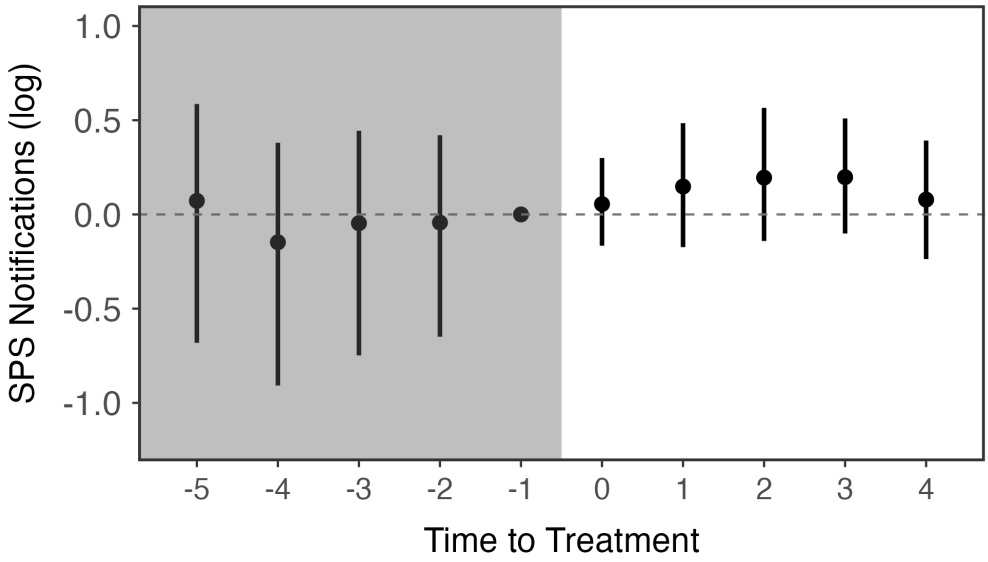

SPS Notifications (log)
1.5
1.0
0.5
0.0
-0.5
-1.0
-5
-4
-3
-2
-1
0
1
2
3
4
Time to Treatment

B.4 Addendum and Revisions

Third party legal exposure on TBT notification patterns (addendum and revisions)



Third party legal exposure on SPS notification patterns (addendum and revisions)



B.5 Product-specific analysis

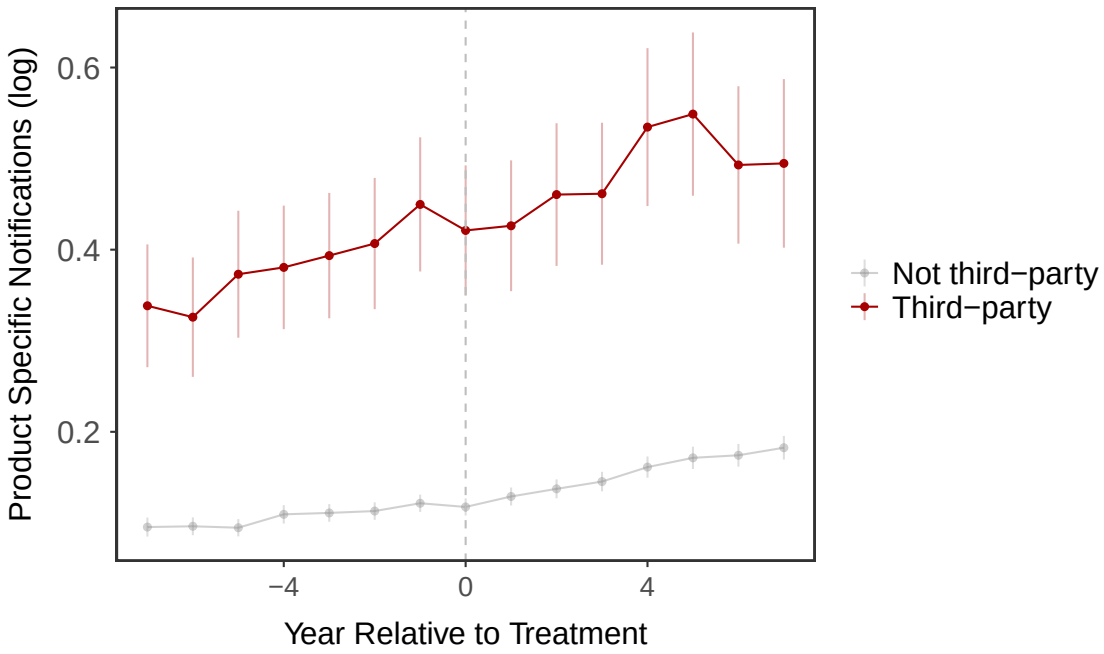
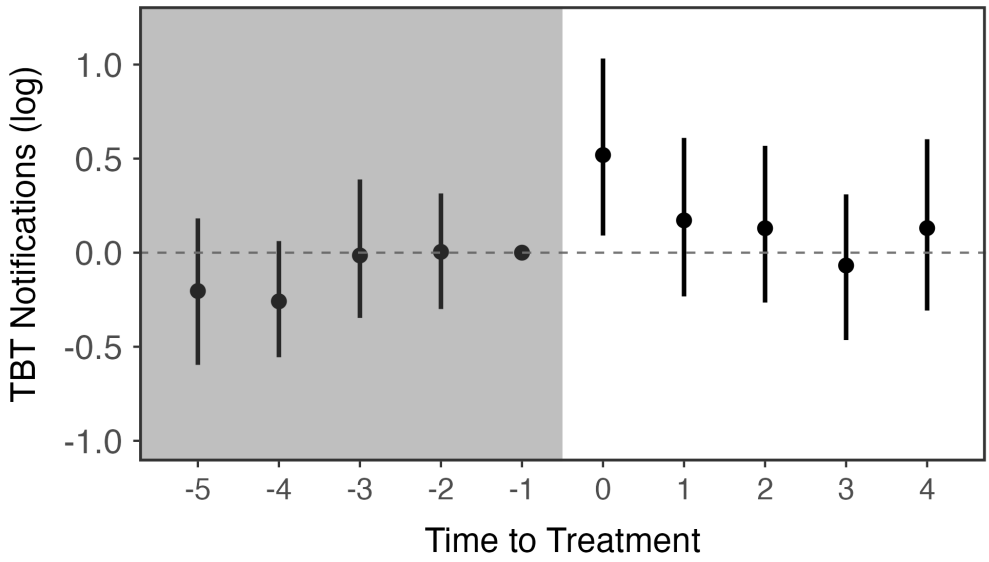
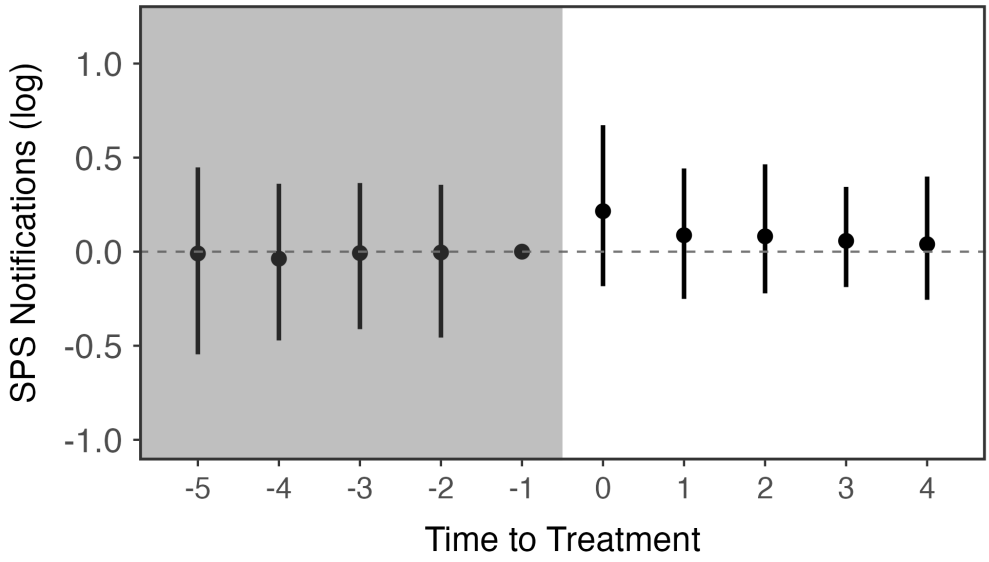


Figure A.8: *Parallel trends of legal exposure on members' product-specific notifications (log), 1995-2022.* The plot shows product-specific annual notifications (log) differently for the treated and control units.

C Case Study

C.1 DSU 381 as an Example

Members that ever rank 10% of all members in terms of weighted exports are Thailand, Japan, Kenya, Ecuador, Uruguay, Costa Rica, El Salvador, Yemen, Singapore, Philippines, Armenia, Panama, Guatemala, Sri Lanka, Gambia, Madagascar, Ghana, Tonga, Seychelles, Mauritius, Barbados, Central African Republic, Grenada, St. Lucia, Samoa, Tunisia, Laos, Afghanistan, Senegal, St. Kitts Nevis, Mali, Cape Verde, Cameroon, Fiji, Antigua Barbuda.

Treatment constructed based on 2007 export profile