# Mandatory Information Exchange, Cross-Border Income Shifting, and the Physical Flow of Tangible Goods

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**Abstract**

We examine whether mandatory tax information exchange agreements between governments have real effects on firms' physical trade in tangible goods. We posit that some of the physical trade in tangible goods flowing through low-tax jurisdictions is intended to facilitate income shifting. As such, shocks to enforcement via mandatory information exchange agreements could cause firms to change the physical flow of goods. Utilizing firm-level shipping container data, we find that adoption of bilateral Tax Information Exchange Agreements (TIEAs) between the U.S. and a foreign jurisdiction is associated with a significant decrease in the volume of imports by U.S. firms from that jurisdiction. We also find reallocation effects: U.S. firms increase imports from jurisdictions in the same subregion as the treated jurisdiction, resulting in minimal overall change in total imports. To our knowledge, ours is the first study to document a connection between enforcement-related tax disclosure, income shifting, and physical trade flows.

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## 1. Introduction

Information is the lifeblood of tax enforcement. In the international setting, it has become increasingly common for governments to enter into agreements with one another that facilitate the exchange of information for tax enforcement purposes (Hoopes et al. 2023). Combatting cross-border income shifting by multinational firms, also referred to as base erosion and profit shifting (BEPS), is a key enforcement priority for tax authorities worldwide (Dyreng and Hanlon 2021).[1] In this study, we examine whether mandatory tax information exchange agreements (TIEAs), which are designed to facilitate enforcement against aggressive cross-border tax planning, have real effects on firms' trade in tangible goods.

For the most part, prior literature provides little evidence on how tax planning and tax enforcement affect the physical flow of tangible goods, perhaps due to the lack of firm-level data on the flow of tangible goods. We posit that some imports of tangible goods are motivated, at least in part, by tax considerations or "tax driven." In other words, firms may use tangible goods imports as a means of shifting income to jurisdictions with lower tax rates. For example, in the era when software was embedded on compact discs (CDs), Microsoft allegedly shifted billions of dollars of income by embedding the software on CDs in a low-tax jurisdiction, and then shipping the CDs to the U.S. for sale (Kiel 2020). Similarly, pharmaceutical firms commonly manufacture their drugs outside the U.S., which they then ship to the U.S. for sale, with the real activity helping to justify reporting the majority of their profits outside the U.S. (Sullivan 2024; U.S. Senate 2023).[2] These examples suggest that tangible goods, especially differentiated goods with high markups and significant embedded intellectual property, may

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[1] Cross-border income shifting refers to the practice of multinational firms strategic reporting their earnings in low-tax jurisdictions (Drake et al. 2022, among others). While estimates vary, this practice is economically significant (Klassen and Laplante 2012; Blouin and Robinson 2024). Globally, cross-border income shifting also poses a threat to the tax bases of countries worldwide (Dyreng and Hanlon 2021).

[2] In 2022, the United States exported approximately $100 billion worth of pharmaceutical products while importing about $200 billion. Notably, the largest imports come from high-wage countries like Ireland, Switzerland, and Singapore, all of which offer special tax regimes for pharmaceuticals. This suggests that the trade deficit in pharmaceuticals is not primarily driven by low-wage and low-cost locations (Setser 2023).

be used to facilitate shifting income to low-tax jurisdictions. In fact, the Internal Revenue Service's (IRS) Large Business & International (LB&I) Practice Unit explicitly instructs examiners to review firms' sales and purchases of tangible goods and considers additional information as part of assessing firms' transfer pricing (IRS 2022).

Tax authorities are aided in their enforcement activities by mandatory information exchange agreements with tax authorities from other jurisdictions. To examine the effect of mandatory information exchange on the physical flow of tangible goods by firms, we exploit the staggered adoption of bilateral TIEAs between the U.S. and various foreign jurisdictions. TIEAs are bilateral information sharing agreements between jurisdictions, designed to facilitate cross-border tax enforcement (GAO 2011), and their adoption constitutes shocks to the transparency of firms' tax-related activities in foreign jurisdictions (Hoopes et al. 2023; Olbert et al. 2024; and Lester and Olbert 2025).[3] Prior research suggests that a TIEA with the U.S. would enhance the transparency of U.S. firms' activities in partner jurisdictions, which likely results in higher IRS scrutiny of U.S. firms' tax planning involving those jurisdictions (Braun and Weichenrieder 2015; Bennedsen and Zeume 2018; Li and Ma 2022). As a result, we predict that U.S. firms that have used tangible goods imports for aggressive income shifting may respond to a jurisdiction implementing a TIEA with the U.S. by reducing their physical imports of tangible goods from that jurisdiction. On the other hand, firms may react by increasing their physical imports of tangible goods to strengthen the economic substance of their transactions, in light of the greater scrutiny of their activities in low-tax jurisdictions. Moreover, if firms achieve income shifting primarily by transferring title without physically

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[3] The IRS frequently requests information exchanges with foreign tax authorities when it cannot obtain data directly from taxpayers or domestic sources, such as foreign records and government documents. From 2006 to 2010, the IRS processed 5,837 requests, primarily for corporate records and tax return data. Moreover, the U.S. engages in automatic information exchanges, transmitting millions of records annually. These exchanges have led to the uncovering of hidden noncompliance that the IRS likely would not have identified without the exchanged information (GAO 2011). Further details about the practical relevance of TIEAs are discussed in Section 2.3.

moving goods, we would not expect TIEAs to affect the physical flow of tangible goods.[4]

To examine our research question, we utilize the S&P Global Panjiva database, which contains firm-level shipping container data from 2007 to 2020. This database captures shipment-level data on transactions between foreign suppliers and U.S. customers (Smirnyagin and Tsyvinski 2022; Bisetti et al. 2024).[5] We construct a U.S. firm-jurisdiction-year sample, and employ a difference-in-differences (DiD) regression approach to study the effect of TIEAs on the physical flow of tangible goods. During the sample period, the U.S. signed new or amended existing TIEAs with Argentina, the Cayman Islands, Costa Rica, Hong Kong, the Isle of Man, Panama, and Singapore. The bilateral nature and staggered adoption of TIEAs allow us to construct powerful counterfactuals in a DiD design. For each TIEA, we build a separate event "case" that includes trade relationships between U.S. firms and foreign jurisdictions that have adopted a TIEA during the sample period (treatment group), as well as trade relationships between other U.S. firms and jurisdictions without such events during the sample period (control group). Our estimates capture the change in trade between U.S. firms and a jurisdiction three years before and three years after the adoption of a TIEA.

Our results show that the adoption of a TIEA between the U.S. and a foreign jurisdiction is associated with a significant decrease in the volume of imports by U.S. firms from that jurisdiction, relative to imports by other U.S. firms from control jurisdictions. In terms of the economic magnitude of the effect, our estimates suggest that the adoption of a TIEA leads to an approximately 20.9% reduction in imports from the treated jurisdiction, which is both economically and statistically significant. To assess the validity of the parallel trends assumption, we examine the effects of each year for three years before and after the TIEA. Our

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[4] For example, Caterpillar was criticized for its tax avoidance strategy, which involved passing title to subsidiaries in a low-tax jurisdiction without physically transporting the goods through that jurisdiction (U.S. Senate 2014).

[5] Under Title 19 of the United States Code of Federal Regulation (CFR), U.S. firms are obligated to report shipment details in cargo declarations to the U.S. Customs and Border Protection (CBP).

analysis reveals no significant pre-trends, which supports the assumption of parallel trends. The results are robust to using alternative measures of trade (e.g., dollar values of imports), matching between treated and control jurisdictions, addressing potential confounding events (e.g., U.S.-China tension), and extending the event windows to five years following the TIEA.

Next, we conduct an intrafirm trade analysis. To do this, we supplement the Panjiva database with two additional datasets (the *Who's Who* database and the *Orbis* database) to identify intrafirm imports. Conducting analysis at the exporter-importer relationship level, we find results consistent with our prediction that TIEA adoption leads to a reduction in intrafirm imports of tangible goods by U.S. multinationals from their foreign affiliates. The economic magnitude of this effect is comparable to our main findings, indicating that the decline in jurisdiction-firm-level imports is mainly driven by reductions in intra-firm transactions.

We leverage the granularity of the data and explore cross-sectional variation in the documented effects at the jurisdiction-, firm-, and product-levels. First, focusing on jurisdictional statutory tax rates, we find that the effects are concentrated on the TIEA between the U.S. and low-tax jurisdictions, supporting the interpretation that tax incentives are the primary mechanism behind our baseline results. Second, at the firm level, the negative impact of TIEAs on imports is stronger for firms that engaged more in outbound income shifting before TIEA adoption, indicating that TIEAs curb imports by reducing outbound shifting. Third, our product-level analysis reveals that firms decrease their imports of differentiated goods (e.g., electronics) after TIEA adoption, but not of substitutable goods (e.g., commodities). This pattern is consistent with the fact that differentiated goods often contain intangible components, which lack transparent pricing and give firms greater discretion in setting transfer prices.

Finally, we examine the spillover effects of TIEAs on trade reallocation. We find that U.S. firms increase imports from countries in the same subregion as the treated jurisdiction, with no evidence of shifting imports to different regions. These spillovers roughly offset the

decline in imports from treatment jurisdictions, suggesting firms reallocate imports from TIEA-affected areas to control areas, resulting in little overall reduction in total imports. At the firm level, such re-routing appears costly: U.S. multinationals with higher pre-TIEA imports from affected jurisdictions experience an increase in ETR after TIEA implementation.

This study makes several important contributions to the literature. First, we contribute to the literature on mandatory disclosure of tax information and its real effects. In the disclosure framework laid out by Hoopes et al. (2023), TIEAs serve as an example of mandatory private disclosure by third parties (i.e., from one government to another). Prior research shows TIEAs improve transparency (Bennedsen and Zeume 2018) and reduce tax avoidance (Li and Ma 2022), but there is no evidence yet on their impact on the physical flow of goods (Jacob 2022; Lester and Olbert 2025).[6] Trade in goods is a major component of the economy. The U.S. imported around $3 trillion of goods in 2023 (BEA 2023). By way of comparison, total U.S. personal consumption of goods (both imported and domestically produced) was around $6 trillion in 2023, and the total GDP was around $27 trillion (BEA 2023). Our study provides new evidence that firms respond to the adoption of TIEAs between the U.S. and foreign jurisdictions by re-routing trade: they reduce imports from the treated jurisdiction and increase imports from nearby, non-affected jurisdictions. While total imports overall change little, these re-routing behaviors indicate that enforcement effects are substantial enough to alter trade routes, suggesting that firms make real operational adjustments rather than mere tax reporting changes. As Lester and Olbert (2025, p. 49) note, the literature remains unclear on how much firms' real activities depend on tax avoidance and the relative timing and significance of these activities. Our results shed light on this, showing that while firms affected by TIEAs reroute trade flows, the overall reduction in physical imports is small. Nonetheless, their ETR increases

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[6] As Jacob (2022) and Lester and Olbert (2025) find, research on the real effects of taxation has focused on capital investment (Graham et al. 2011; Lester 2019; De Simone et al. 2022), labor (Williams 2018; Drake et al. 2022), and innovation (Armstrong et al. 2019; Williams and Williams 2021; Li et al. 2021; Goldman et al. 2023).

significantly, suggesting a decrease in tax savings from income shifting. Overall, our evidence suggests that stricter tax enforcement can reduce real imports by limiting income shifting, helping to address the "chicken-and-egg" problem concerning the timing of tax avoidance versus real responses. To our knowledge, ours is the first study to document a connection between enforcement-related tax disclosure, income shifting, and physical trade flows.[7]

Second, our findings contribute to a broader understanding of income shifting mechanisms by bridging the gap in the income shifting literature between the use of intangible assets and real effects on physical assets. Previous research on income shifting has focused on the use of intangible assets and R&D to facilitate income shifting to low-tax jurisdictions (Harris et al. 1993; Grubert 2003; De Simone et al. 2019; De Simone et al. 2020), as well as on the strategic location of intangible assets in low-tax jurisdictions by firms (Dischinger and Riedel 2011; Ciaramella 2023; Harshberger 2023). In contrast, prior research on the real effects of income shifting focuses on less mobile, productive factors such as employment (Williams 2018; Drake et al. 2022) and capital assets or physical establishments (Grubert and Slemrod 1998; De Simone et al. 2022; Chow et al. 2023). While intangibles and physical assets seemingly represent the two ends of a continuum, our study connects these perspectives by providing evidence that tangible goods also play a role in income shifting. We find that as with transactions involving intangible assets, firms have tax incentives to structure the trade of tangible goods in ways that help them shift income to lower tax jurisdictions. Our findings offer new insights into the mechanisms of income shifting (Lester and Olbert 2025).

Third, our study sheds light on the potential real consequences of tax enforcement (Jacob 2022; Lester and Olbert 2025), which we believe can help inform future tax policy

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[7] Existing research have examined transfer pricing by analyzing trade balances or trade values (e.g., Clausing 2001; Clausing 2003; Cristea and Nguyen 2016; Hebous and Johannesen 2021), our measure differentiates between import volume (e.g., container quantities) and prices, enabling us to disentangle changes in physical quantities from price manipulations. This distinction is crucial because firms can adjust transfer prices without changing the physical quantity, and our approach allows us to better identify genuine volume-based variations.

discussions (Barth 2018; Mills 2019; Hanlon 2021). Gallemore and Jacob (2024) conclude that policymakers should consider the effects on business activity when they set the level of enforcement. Many recent tax policy changes and proposals, such as BEPS Pillars 1 and 2, are motivated by the desire to reduce aggressive "paper" cross-border income shifting and raise tax revenue. Our findings suggest that income shifting often follows substance: if firms reallocate trade flows to justify income shifting, it may come at the expense of the most efficient allocation of resource, creating externalities (Lester and Olbert 2025). Policies targeting "paper" income shifting could lead to more efficient resource utilization to the extent that they curtail tax-driven trade flows that deviate from what would be optimal in the absence of income shifting. For example, changes to the flow of goods affect the usage of real resources for shipping and warehousing, including container ships and energy, which implies an adverse effect of cross-border tax planning on environmental and climate concerns.[8] As such, our findings suggest that policy discussions about income shifting and tax enforcement should consider not only traditional considerations of tax revenue, but also the real effects that arise from eliminating tax-driven inefficiencies from firms' supply chains and the physical flow of goods. We encourage further research into the important policy-relevant connections between cross-border income shifting and the flow of tangible goods.

## 2. Related Literature and Hypothesis Development

Multinational firms often avoid taxes through income shifting, which involves strategically recognizing earnings in low-tax jurisdictions via transfer price manipulations (Dyreng and Hanlon 2021). In this section, we review prior empirical evidence based on trade price data and recent studies on firms' real responses to income shifting incentives.

### 2.1 Prior Research on Income Shifting Incentives and Trade

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[8] Low-tax jurisdictions are often preferred by multinationals for intrafirm sales, indicating that tax incentives play a key role in establishing these hubs in global value chains (Jones et al. 2020).

Most prior research on income shifting incentives focuses on their effect on trade prices (transfer pricing) or trade balances (the product of price and quantity), rather than on *physical flow* of trade. For example, Clausing (2001) finds that the U.S. has less favorable intrafirm trade balances with low-tax countries, consistent with firms underpricing exports to and overpricing imports from low-tax jurisdictions. Also focusing on trade prices, Clausing (2003) shows that as foreign tax rates decrease, U.S. intrafirm export prices tend to fall, while import prices rise, supporting tax-motivated transfer pricing. Cristea and Nguyen (2016) find that Danish exporters underprice exports to low-tax jurisdictions and price higher in high-tax ones. Davies et al. (2018) report that French firms' internal export prices are lower than arm's-length prices in low-tax destinations. Liu et al. (2020), analyzing UK tax records, estimate that a one percentage point increase in the UK-destination tax differential reduces related-party export prices by about three percent, indicating income shifting to low-tax countries. Hebous and Johannesen (2021) find that German service trade firms import disproportionately from tax haven affiliates, which earn excess profits by overpricing sales to German parents.

Besides income tax rates, prior studies also find that firms manipulate transfer prices in response to tariff rates (Swenson 2001; Blouin et al. 2018; Kohlhase and Wielhouwer 2023). The incentives to adjust transfer prices work in opposite directions for tariffs and income taxes. Firms face a trade-off between minimizing tariffs and income taxes, as setting a high transfer price on imported goods will shift income to the supplying subsidiary but at the cost of increasing tariffs on imported goods (Blouin et al. 2018).

Another area of research examines how U.S. multinational firms' foreign operations relate to cross-border tax planning. Studies show that firms' tax haven operations are associated with lower ETR or increased income shifting (e.g., Harris et al. 1993; Hines and Rice 1994; Dyreng and Lindsey 2009; Markle and Shackelford 2012; Dyreng and Markle 2016; Klassen et al. 2017). For example, Jacob (1996) finds that firms with a large share of international

intrafirm sales relative to total global sales are more likely to manipulate transfer prices aggressively.[9] Similarly, Desai et al. (2006) find that industries with more extensive intrafirm trade have more tax haven operations than those with less intrafirm trade.

## 2.2 Real Responses to Income Shifting Incentives

To prevent income shifting, tax authorities require firms' intercompany transactions to be reported at an arm's length price. However, enforcing this standard is difficult. The challenge stems from the absence of observable open-market prices, especially for goods and services involving intangible assets without comparable prices in the market.[10] The literature suggests that intangible assets facilitate firms in shifting income to low-tax jurisdictions (Grubert 2003; De Simone et al. 2019; Cheng et al. 2020; De Simone et al. 2020). For example, firms often strategically locate their intellectual property in certain jurisdictions to facilitate income shifting (Dischinger and Riedel 2011; Karkinsky and Riedel 2012; Baumann et al. 2020; Ciaramella 2023). However, income shifting strategies relying solely on intangible assets face higher enforcement risk, as tax authorities may view such arrangements as primarily tax-driven with limited economic substance or non-tax business purpose (IRS 2022).

Recent studies suggest that multinational firms engage in real activities to enhance the economic substance of their transactions, in an effort to reduce the level of scrutiny from tax authorities and hence enhance the efficacy of accounting-based income shifting (Grubert and Slemrod 1998; Singh and Mathur 2017; Cen et al. 2017; Williams 2018; De Simone et al. 2022; Drake et al. 2022; De Simone and Olbert 2022; Chow et al. 2023). For example, Cen et al.

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[9] Harris (1993) suggests that firms characterized by high levels of interest, R&D, advertising, and intangible assets consistute the "flexibility partition," which possess greater discretion in transfer pricing.

[10] Intangible assets can facilitate income shifting for several reasons. First, the non-tax costs of locating intangible assets in low-tax justifications for tax purposes are generally lower than those of shifting tangible assets (Slemrod 1992; 2001). Second, the transfer prices for the use of intangible assets (e.g., royalties on patents) are unique to that asset and, therefore, subject to aggressive valuation by the firm (U.S. Senate 2013; Dyreng and Hanlon 2021). Third, intellectual property, such as patents, often serves as a common input factor for the operating affiliates within the group, providing the multinational group with opportunities for income shifting as affiliates are obligated to pay royalties to the patent owner (Baumann et al. 2020).

(2017) show that suppliers establish foreign subsidiaries in tax havens when their key customers also have subsidiaries there, providing economic substance to their transactions. Williams (2018) finds a link between a firm's incentives to shift taxable income into a specific country and both the likelihood that the firm offshores U.S. jobs to that country, and the number of U.S. jobs offshored to that country. Drake et al. (2022) find that firms' foreign employment is associated with greater outbound income shifting, suggesting that foreign jobs reinforce the economic substance of foreign operations and help reduce the tax uncertainty associated with the shifted income.[11] De Simone et al. (2022) find that corporate investments are determined not only by local investment opportunities, but also by the need to substantiate income shifting. Chow et al. (2023) identify that foreign tax holidays, which often require real investments like job creation and physical establishments, facilitate income shifting. Relevant to our study, two studies show that firms realign their real activities in response to changes in tax enforcement (De Simone and Olbert 2022; Fox et al. 2022). De Simone and Olbert (2022) show that European firms responded to mandatory private Country-by-Country Reporting by closing subsidiaries located in tax havens and increasing real activities in other low-tax jurisdictions, thereby better aligning their taxation with their economic activity. Similarly, Fox et al. (2022) find a significant decline in U.S. multinational firms' investments in countries under investigation by the European Commission for potential state aid, suggesting that increased enforcement uncertainty leads firms to re-evaluate their foreign real operations. Overall, prior literature focuses on the relocation of productive factors such as capital investment and labor to low-tax jurisdictions. However, no studies have examined the effect of income shifting incentives on the physical flow of tangible goods, much less the role of mandatory enforcement-related disclosure on the physical flow of tangible goods.

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[11] In a recent working paper, Mayberry and Zakota (2025) introduce a measure of "tax haven economic substance," which is based on the proportion of employees located in tax havens. They find that higher levels of economic substance in tax havens reduce the tax settlement risk linked to tax avoidance.

We expect that multinational firms use some intercompany trade in tangible goods to facilitate income shifting to low-tax jurisdictions. As a baseline, a firm might import goods to the U.S. from another high-tax jurisdiction and only locate intangible assets in a low-tax jurisdiction, relying solely on intercompany royalties to shift income to the low-tax jurisdiction. Alternatively, the firm could structure its physical supply chain such that tangible goods are imported from a low-tax jurisdiction. In this case, the transfer price assigned to the imported goods would determine the amount of income shifted to the low-tax jurisdiction. In fact, the transfer price can include income related to intangibles held in the low-tax jurisdiction, such as royalties on patents, which would be embedded in the price charged to the U.S. entity importing the goods. In other words, tangible goods, especially differentiated goods with high markups and embedded intellectual property, may be used to shift income to low-tax jurisdictions. This argument is supported by anecdotal evidence from tech firms like Microsoft (Kiel 2020) and the trade patterns of U.S. pharmaceutical companies that manufacture a significant proportion of their drugs abroad and import them for sale (Sullivan 2024; U.S. Senate 2023).

## 2.3. Deterrent Effects of TIEAs

TIEAs are bilateral disclosure mandates designed to enhance the sharing of tax-related information and strengthen tax enforcement between the two signing jurisdictions (Lester and Olbert 2025). The foundation for the exchange of tax-related information on multinational firms was initially established through bilateral treaties known as Double Taxation Agreements (DTAs) (Olbert et al. 2024). While DTAs primarily aim to prevent double taxation that can occur when income is taxed in multiple jurisdictions, TIEAs serve as enforcement mechanisms that supplement taxpayer self-reporting (De Simone and Stomberg 2024).[12] From an institutional perspective, TIEAs establish a formal framework that empowers the tax

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[12] TIEAs generally amend Article 26 of bilateral DTAs to facilitate information exchange between tax authorities, allowing the tax authority of a signing country, where a suspected tax evader resides, to request information from the other signing country where the evader may hold assets (De Simone and Stomberg 2024).

authorities, such as the IRS, to access vital financial and transactional data from foreign tax authorities. This enhanced access substantially improves the IRS's ability to detect, investigate, and enforce compliance regarding offshore assets, income, and transactions of U.S. taxpayers. Operationally, TIEAs are implemented through a structured process that minimizes legal ambiguities and administrative delays. In the U.S., the Secretary of the Treasury is the "competent authority" responsible for implementing the agreement's provisions. For administrative purposes, the IRS's Deputy Commissioner for the LB&I Division acts as the operational delegate responsible for executing the tax information exchanges.[13]

The IRS typically requests information from a foreign tax authority that it cannot readily obtain directly from the taxpayer or through domestic means.[14] Examples include: third-party records held abroad, foreign governmental records, as well as interviews or examinations. In addition to these request-based exchanges, the U.S. participates in automatic information exchanges with the partnering countries, transmitting about 2.5 million records annually and receiving approximately 2.1 million. These exchanges have been crucial in uncovering hidden noncompliance and significant tax assessments that the IRS likely would not have identified without the exchanged information (GAO 2011).[15]

Essentially, the tax information obtained through foreign tax authorities can enhance IRS enforcement. Automatic information exchanges under TIEAs can provide initial data that

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[13] The LB&I Division is responsible for tax administration activities for domestic and foreign businesses with a U.S. tax reporting requirement and assets equal to or exceeding $10 million.

[14] According to a report by the Government Accountability Office (GAO 2011), between 2006 and 2010, the IRS processed 5,837 information exchange requests, including both incoming requests initiated by foreign countries and outgoing requests initiated by the United States. For incoming requests, the most common types of information sought were corporate records (31%), tax return data (27%), and third-party interviews (20%). For outgoing requests, the most frequently requested data were tax return information (32%), corporate records (24%), and bank records (21%). The median processing time for U.S.-initiated requests was about 139 days, while for requests received from foreign countries, the median was around 108 days.

[15] The exchange of information under TIEAs is strictly confidential. As stated on the IRS website, "Information exchanged may only be disclosed to and used by courts, administrative bodies and others involved in and for the purposes of assessment, collection, or administration, enforcement or prosecution, or determination of appeals concerning the taxes covered by the agreement." Due to these confidentiality requirements, we are unable to obtain data on how the IRS has used TIEAs in specific tax audits or examinations of U.S. corporate taxpayers.

flag potential noncompliance even before formal audits begin; for instance, disclosures of offshore accounts or dividends from foreign entities can alert the IRS to possible issues and prompt targeted investigations. When the IRS has shortlisted taxpayers for investigation, TIEAs enable the IRS to request specific information about foreign-held assets, bank accounts, or transactions. Furthermore, TIEAs can enhance evidence collection during later stages of an audit, i.e., when the IRS needs proof to verify or challenge taxpayer disclosures, especially if initial data is insufficient. Information obtained through TIEAs can also serve as corroborative evidence to strengthen the IRS's case in enforcement actions or court proceedings.

We expect that adopting a bilateral TIEA between the U.S. and a foreign jurisdiction will significantly enhance the IRS's ability to uncover tax noncompliance by U.S. multinationals operating in that partner jurisdiction. As a result, by increasing both the likelihood of detection and the information advantage for the IRS during an audit, the TIEA is likely to discourage U.S. firms from engaging in tax avoidance that lacks economic substance, even when they are not currently under IRS investigation. After an audit is underway, there is little a firm can do to bolster the economic substance of transactions that have already occurred. Consistent with this view, existing research documents the deterrent effect of TIEAs on tax avoidance by individuals and corporations (e.g., Johannesen and Zucman 2014; Hanlon et al. 2015; Bennedsen and Zeume 2018). For example, Hanlon et al. (2015) find evidence suggesting that U.S. individuals reduced a form of tax evasion known as "round tripping" with low-tax jurisdictions after those jurisdictions signed TIEAs with the United States. Braun and Weichenrieder (2015) find that TIEAs are associated with fewer operations in tax havens by German firms. Bennedsen and Zeume (2018) find that one-third of firms affected by TIEAs engage in haven hopping by moving subsidiaries from tax havens that entered TIEAs to tax havens that did not. Li and Ma (2022) find that the adoption of information exchange standard reduces tax avoidance by affected U.S. multinational firms. As explained below, the

implementation of bilateral TIEAs provides a quasi-natural experiment to examine how mandatory information exchange affects the imports of tangible goods.

Before the enactment of TIEAs, we expect that firms would carefully weigh the tax benefits of income shifting against the costs involved. In our context, these costs could include the costs of altering their imports of tangible goods to support the income shifting strategy. In essence, firms maintain an equilibrium in which they engage in income shifting while also modifying a portion of their imports of physical goods from low-tax jurisdictions for tax purposes prior to TIEA adoption. However, the enactment of a bilateral TIEA between a foreign country and the U.S. is likely to disrupt this equilibrium. As noted in Bennedsen and Zeume (2018), while TIEAs do not directly affect corporate taxes, they enhance tax authorities' enforcement capabilities by increasing information sharing. This, in turn, raises the uncertainty associated with future benefits from tax planning in these jurisdictions, prompting firms to reassess their income shifting strategies. Based on previous research (Braun and Weichenrieder 2015; Bennedsen and Zeume 2018; Li and Ma 2022), we expect that TIEAs will exert a significant deterrent effect on firms' income shifting. Furthermore, this deterrence could influence firms' real economic activities (Hanlon 2018; De Simone and Olbert 2022; Fox et al. 2022). Therefore, as tax enforcement increases with respect to a particular low-tax jurisdiction through the adoption of a bilateral TIEA with the U.S., we expect U.S. firms to reduce their tax-driven imports from the affected jurisdiction, leading to hypothesis H1 below:

> **H1:** *After a bilateral TIEA has been established between the United States and a specific jurisdiction, U.S. firms will reduce their imports from that jurisdiction relative to imports from unaffected jurisdictions.*

Despite our prediction in H1, it is possible that we could observe no change, or even an increase, in imports from jurisdictions following the adoption of a bilateral TIEA with the U.S. First, TIEAs may not be effective at increasing tax enforcement and thus may not affect firms'

behavior. In particular, TIEAs have been criticized for limited multilateral cooperation due to their bilateral nature, as well as for insufficient automatic information exchange (Tax Justice Network 2009).[16] Second, the incremental enforcement effect of TIEA may exert pressure on firms to enhance the economic substance supporting their income shifting by increasing their economic activities, which may include trade with that specific foreign country, to help substantiate whatever income shifting they continue to conduct with the affected jurisdiction. Finally, the well-known Caterpillar's offshore tax strategy implies that U.S. multinationals can attempt income shifting by transferring title without physically moving goods (U.S. Senate 2014).[17] If firms rely exclusively on income shifting by transferring title without physically moving goods, we would not expect to see firms scaling back their physical imports from jurisdictions that signed a new bilateral TIEA with the U.S. Overall, while we expect bilateral TIEA adoption to reduce the attractiveness of the treated jurisdiction for income shifting and thus reduce tangible goods imports that were part of such income shifting, it is an empirical question whether firms respond in this manner, or at all.

## 3. Sample and Research Design

### 3.1. Import Database

We obtain information about U.S. firms' imports from the S&P Global Panjiva database, which collects shipment-level data on transactions between foreign suppliers and U.S. customers. Title 19 of the United States Code of Federal Regulations (CFR) requires U.S. firms to report shipment details in cargo declarations to U.S. Customs and Border Protection (CBP).

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[16] Five out of the seven TIEA events in our sample involve "Automatic Exchange of Information" and "Spontaneous Exchange of Information," making this concern unlikely to impact our study.

[17] Such strategies entail high upfront consultation fees, increased tax audit risk, and negative media coverage; for example, the U.S. Senate (2014) reports that Caterpillar paid over $55 million in tax consulting fees to PricewaterhouseCoopers for its offshore tax strategy. Also, tax authorities scrutinize these strategies for lacking economic substance and violating arm's length principles. In 2018, the IRS disallowed Caterpillar's strategy and billed $2.3 billion in unpaid taxes and penalties. The dispute was resolved with a $740 million IRS settlement in 2022. The tax disputes also attracted negative media coverage from major press outlets. These substantial costs suggest that such strategies may not be the only tax strategies that firms use.

For each shipment transaction, Panjiva gathers information about the senders, the consignee, the origin and destination of the shipment, the product codes, and item descriptions, etc.

We link U.S. consignees to their ultimate parents in Compustat using the linkage table provided by Panjiva. For brevity, we denote each U.S. firm-jurisdiction as a trade relationship. Next, we create a relationship-year panel spanning from 2007 to 2020. We conduct the analyses at the annual level to mitigate concerns related to large seasonal fluctuations in international trade. In particular, we aggregate the transactional level database to the U.S. firm-jurisdiction-year level and define the transaction volume in a year of a relationship as the total number of containers shipped from a jurisdiction to the U.S. firm in a year. Missing values — relationship-years without trade in a year (e.g., before the formation of a relationship or after the relationship ends) — are set to zero. Finally, we remove utility and financial firms (SIC 4900-4999, 6000-6999), and transportation firms (SIC 4000-4899) involved in goods movement and storage.

### 3.2. Sample Construction and Identification Strategy

Panel A of Appendix I lists the implementation of bilateral TIEAs between the U.S. and various foreign jurisdictions between 2010 and 2018. These events include the signing of TIEAs with Argentina, Costa Rica, Hong Kong, Panama, and Singapore, as well as amendments made to TIEAs with the Cayman Islands and the Isle of Man to incorporate provisions related to "Automatic Exchange of Information," and "Spontaneous Exchange of Information."[18] For each event, we define the treatment group as trade relationships between U.S. firms (denoted as affected firms) and the jurisdiction adopting the TIEA. The control group comprises trade relationships between non-affected U.S. firms and jurisdictions that did not adopt a TIEA with the U.S. during the sample period. We obtained the texts of TIEAs and

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[18] The U.S. signed TIEAs with Liechtenstein and Monaco in 2008 and 2009. However, the database does not include import information specifically from U.S. firms regarding these two countries. To mitigate their impacts on the results, we exclude relationships with these two jurisdictions from the control group. All of our results are robust if we include relationships with these jurisdictions in the control sample.

related documents from the U.S. Treasury Department's website.[19]

We estimate the direct effect of TIEAs on imports using the methodology proposed by Giroud et al. (2024).[20] To address potential violations of the Stable Unit Treatment Value Assumption (SUTVA), we exclude trade relationships between affected U.S. firms and non-TIEA jurisdictions, as these could reflect trade relocation effects. We focus on a short event window—three years before to three years after the event year—to alleviate concerns about confounding events. It is worth noting that because most bilateral TIEAs with the U.S. in our sample were signed at the end of a year, we code the next year as the event year if a TIEA was signed after June of a year. We also remove observations of event year $t$ for the cohort with event year $t$ because i) the shipment in year $t$ is affected by order backlogs in the pre-period, and ii) it takes time for regulators to enforce a TIEA.

Our final sample consists of 66,277 event-relationship-year observations after requiring the availability of control variables used in the main analyses, which comprises 1,274 unique treatment relationships and 2,957 control cohort-relationships. Following Giroud et al. (2024), we then estimate the following Equation (1):

$$Import_{i,j,t} = \beta_1 Treat_{j,e} \times Post_{e,t} + \beta_2 Post_{e,t} + \beta_3 X_{i,t-1} + \beta_4 X_{j,t-1} + \kappa_e + \tau_t + \nu_{i,j} + \varepsilon_{i,j,e,t} \qquad (1)$$

where $i, j, e,$ and $t$ denote firms, jurisdictions, TIEA event, and years, respectively. The dependent $Import$ is the trade volume between firm $i$ and jurisdiction $j$, which is defined as the number of containers shipped from jurisdiction $j$ to firm $i$ in year $t$.[21] $Treat_{j,e}$ is a binary variable that equals one if jurisdiction $j$ signed or amended a TIEA with the U.S. $Post_{e,t}$ is a binary variable that equals one for years following the event year $t$. $\kappa_e$ are the event fixed effects. $\tau_t$ are the year fixed effects that allow us to control for macro-factors (e.g., financial crisis) that might affect international trade. $\nu_{i,j}$ are the relationship (i.e., firm-jurisdiction) fixed effects,

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which controls for time-invariant relationship characteristics (e.g., distance to exporting jurisdiction) and allows us to track the temporal changes in trade volume over time.[22] As the dependent variable is a count variable, we estimate the equation using Poisson regression (Cohn et al. 2022). $\beta_1$ is the DiD estimate that captures the effect of TIEAs on the trade volume of treatment relationships, which is expected to be negative.

Following prior studies (e.g., Li and Ma 2022; Kim et al. 2023), we include a set of firm-level characteristics ($X_{i,t-1}$) that might be correlated with tax planning and imports. In particular, we control for pre-tax returns on assets (*ROA*), firm size (*Size*), market-to-book ratios (*MTB*), growth of sales (*Sales Growth*), and leverage ratios (*Leverage*) to capture fundamental performance and growth opportunities. We also include the inventory-to-assets ratio (*Inventory*) to capture the importance of procurements. Next, we include the fixed assets ratio (*PPE*), capital investment (*CAPX*), intangible asset ratio (*Intangibles*), and R&D expenditure ratio (*RD*) because of the differential tax rules for fixed and intangible assets and investments. Further, we control for foreign operating activities by including the ratio of pre-tax foreign income to total assets (*Foreign Income*) and an indicator for non-zero foreign income (*FI Dummy*), and tax loss carryforwards by including both the annual change in net operating loss carry-forward ($\Delta NOL$) and an indicator for positive net operating loss carry-forward (*NOL*). We gather information on these metrics from the Compustat database.

Lastly, we control for country-level characteristics ($X_{j,t-1}$) in the exporting jurisdiction following existing research (Cristea and Nguyen 2016; Davies et al. 2018; Hebous and Johannesen 2021). These jurisdiction-level factors include the natural logarithm of population (Log (*Population*)), natural logarithm of GDP per capita (Log (*GDP per capita*)), natural

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[22] Any potential increased public scrutiny of Caterpillar's strategy following its public hearing during our sample period should not confound our results, as it would affect firms broadly rather than solely within our treated jurisdictions and around TIEA enactments. Consequently, our DiD design with multiple treatment years can effectively isolate the TIEA effect from other common economic shocks, including boarder changes in public attention to certain tax strategies.

logarithm of exchange rates (Log (*Exchange*)) relative to the U.S. dollar, and annual corporate tax rate (*Corporate Tax Rate*). The jurisdiction-level economic variables are gathered from the Penn World Tables version 3.0, whereas statutory corporate tax rates are collected from the Tax Foundation. All control variables are lagged by one year to mitigate confounding effects. All continuous variables are winsorized at the 1% and 99% levels to alleviate the effect of outliers. We cluster standard errors by jurisdiction as our variable of interest (*Treat*) is constructed at the exporting jurisdiction level.

### 3.3 Descriptive Statistics

Figure 1 presents imports by U.S. public firms from each jurisdiction, as reported by Panjiva. We compute the import volume from a jurisdiction in a year as the total number of containers (in thousands) shipped from the jurisdiction to all U.S. public firms in the year, and report the average annual transaction volume over the period 2007-2020. The figure indicates that U.S. public firms mainly import from Asia, followed by Canada and South America. Appendix III lists the top 100 importers in our sample based on the total number of containers shipped to the firm from 2007 to 2020. In our sample, Walmart Inc., Costco Wholesale Corp., and Michaels Companies Inc. are among the top three firms in terms of imports.

Panel A of Table 1 reports the distribution of our stacked sample across Fama-French 48 industries of U.S. importing firms. It shows that industries that rely heavily on outsourcing, including Pharmaceutical Products, Electronic Equipment, and Wholesale have the largest number of observations (7.51%, 7.48%, and 7.38% of observations, respectively). We also observe that our sample encompasses a wide range of industries. Panel B of Table 1 reports the summary statistics for the key variables used in our regression. The average *Import* is 5.54, suggesting that an average firm imports 5.54 containers from a jurisdiction in a year. The median *Import* is zero because our sample includes firm-jurisdiction-years before the first year when the firm imports goods from the jurisdiction and after the year when the relationship ends,

which allows us to identify the effects on relationship formation and deterioration. 9.1% of firm-jurisdiction-years are classified into the treatment group, which is unsurprising given that only ten jurisdictions adopted a TIEA in our sample period and three of them (Ecuador, Jersey, Guernsey) do not export tangible goods to the U.S. based on the Panjiva database.

An average firm has a pre-tax ROA of 2.3%, assets of $1,200 million (= $e^{7.09}$), market-to-book ratio of 2.76, and leverage ratio of 0.24. Further, 62.3% of the sample firms report positive foreign income, suggesting that importing firms engage in foreign sales activities. These statistics are largely consistent with those of previous studies (Dyreng and Lindsey 2009; Klassen and Laplante 2012; De Simone et al. 2019). It should be noted that our sample primarily consists of firms engaged in international trade, making them naturally larger compared to those in other studies.

## 4. Main Results

### 4.1. Validity Tests: The Presence of Tax-Driven Imports

Our hypotheses hinge on the premise that at least some tangible goods imports by U.S. firms are tax-motivated; otherwise, the TIEA should not have a material impact on their imports. Before reporting the results of the effect of TIEA adoption on trade, we first assess this premise by relating a firm's ETR to its import activities.[23] For this purpose, we aggregate our firm-jurisdiction-year panel into a firm-year panel. To capture the intensity of potential tax-motivated imports, we develop a measure, *Avg TaxRate Import,* which is the average corporate income tax rate of all jurisdictions from which the firm imports products, weighted by the volume of imports from a jurisdiction. In Table 2, we regress firms' GAAP ETR on *Avg TaxRate Import* and firm-level controls. We include year fixed effects to control for variation in macro conditions, and firm fixed effects to control for slowly-moving firm characteristics

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[23] Prior research documents that firms' tax haven operations are associated with lower ETR (Dyreng and Lindsey 2009; Markle and Shackelford 2012; Law and Mills 2022).

(e.g., location of incorporation and headquarter). Column (1) shows that the coefficient on *Avg TaxRate Import* is significantly positive, suggesting that firms are able to achieve a lower ETR when a greater fraction of imports originates from jurisdictions with a higher tax rate. A one-standard-deviation decrease in the average statutory tax rates of importing jurisdictions is associated with a 0.52 percentage lower in the importing firm's *GAAP ETR*. These results are consistent with some imports by U.S. firms being tax motivated. We next test our hypothesis that the adoption of a TIEA has an impact on the physical flow of goods.

### 4.2. Baseline Results

Table 3 presents the baseline results of our hypothesis testing. First, we include only event, firm-jurisdiction and year fixed effects in the regression as control variables to mitigate the concern that including controls affected by the treatment may undermine the ability to draw causal inferences (Imbens and Rubin 2015). Column (1) shows that the coefficient on *Treat×Post* is significantly negative, suggesting that firms reduce tangible goods imports from a jurisdiction after it enters a bilateral TIEA with the United States. Results are robust after including a host of firm and jurisdiction characteristics in column (2). The estimates suggest that TIEA adoption leads to an approximately 20.9% reduction in tangible goods imports from the treated jurisdictions.[24] These results suggest that the adoption of a TIEA between the U.S. and a jurisdiction reduces the volume of imports by U.S. firms from that jurisdiction.

The key identification assumption in our DiD design is that the trends of the treatment relationship's imports would be the same in the absence of TIEA. To test this, we replace *Treat×Post* with the interaction terms between *Treat* and year indicators from three years before to three years after the TIEA for a cohort. We omit the indicator for year $t-1$, which serves as the benchmark. Figure 2 plots the coefficients of the interaction terms and their 10%

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[24] Calculated as $[e^{(-0.234)} - 1] = -0.209$. This translates to a \$631,641 reduction in the value of goods imported from treated jurisdictions for an average treatment relationship. An average firm imports 14.72 containers of goods from treatment jurisdictions in the pre-period, with the average value per container equal to \$205,313. The back-of-the-envolop calculation suggests that TIEA reduces import value by \$631,641 (=14.72×205313×20.9%).

confidence intervals. Supporting the parallel trends assumption, we find that the coefficient for each pre-period is indistinguishable from zero. Rather, the coefficient for each post-period is significantly negative, suggesting a persistent effect of TIEA on U.S. firm imports.

In sum, the results suggest that firms reduce imports from a jurisdiction after it enters a TIEA with the U.S, supporting our prediction that some imports are tax-driven.

## 4.3. Intrafirm Trade

A key limitation of the Panjiva database is that it does not distinguish between intrafirm and arm's length trades, with the former being more likely to be tax-motivated. Existing research finds that intrafirm trade is prevalent, with over half (and up to three-quarters) of affiliates worldwide (and in North America) exporting to or importing from their U.S. parents (Alfaro et al. 2025). Similarly, reports from the BEA and the U.S. Census find that over 40% of imports are from related parties (Ruhl 2013; 2015). These statistics suggest that our measure is relevant despite the limitation. To address this concern further, we identify intrafirm transactions and examine the impact of TIEA on intrafirm imports.

To this end, we supplement the Panjiva database with two additional datasets: the *Who's Who* database and the *Orbis* database, which provide comprehensive data on firms' global subsidiaries collected from both public and private sources. Using fuzzy name matching, we identify intrafirm trades between U.S. parents and their foreign subsidiaries. This process yields 26,114 unique exporter-importer relationships (including private U.S. importers) classified as intrafirm trades, representing about 0.5% of the total exporter-importer relationships in the Panjiva database. The relatively small proportion likely reflects the limited public disclosure of subsidiary data. To mitigate measurement error, we conduct our analysis at the exporter-importer relationship level, rather than aggregating data to the jurisdiction-

importer level as in Section 3.1.[25] We follow the procedure in Section 3.2 to construct a stacked sample, with relationships now defined at the exporter-importer level. We include relationships with private U.S. importing firms in this analysis to enhance statistical power, though our results (untabulated) remain robust when using solely relationships with public firms.

Table 4 presents the results. Column (1) shows that the coefficient on *Treat×Post* is negative (−0.238) and statistically significant at the 5% level. The Poisson regression estimate corresponds to a 21.2% (= $e^{(-0.238)} - 1$) decrease in imports by U.S. multinationals from their foreign affiliates. This economic magnitude is comparable to the findings reported in Table 3, suggesting that the decline in jurisdiction-firm-level imports is primarily driven by reductions in tax-motivated infrafirm imports. Column (2) validates the parallel trends assumption, showing that the effect is insignificant prior to TIEA adoption but becomes significant post-reform. Overall, the results are consistent with the hypothesis that TIEA adoption reduces intrafirm imports of tangible goods by U.S. multinationals from their foreign affiliates.

### *4.4. Cross-sectional Tests at the Jurisdiction, Firm, and Product levels.*

To corroborate our inference that U.S. firms reduce tangible goods imports because the TIEA raises the costs of tax-driven income shifting, we leverage the granularity of the data and examine cross-sectional variation in the main effect at the jurisdiction, firm, and product levels. If TIEAs exert a broad policy effect that directly discourages trade across the board, we would expect to see effects that are uniform across countries, firms, and products.

### *4.4.1 Heterogeneity by Jurisdictions' Statutory Corporate Income Tax Rates*

We first examine the variation in statutory corporate income tax rates among the treated TIEA jurisdictions. We group treatment jurisdictions into groups with high and low corporate

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[25] In an (untabulated) cross-sectional analysis based on the firm-jurisdiction-year specification in Equation (1), we decompose our *Treat* variable into two indicator variables to separate the effects for firms with at least one subsidiary in the treatment TIEA jurisdiction during the pre-period, and for firms without any subsidiaries in that jurisdiction in the pre-period. Our results suggest that a bilateral TIEA between a foreign jurisdiction and the U.S. has a more substantial impact on reducing imports by U.S. firms if they have subsidiaries in that jurisdiction.

tax rates. If the aforementioned results are tax driven, we expect that the adoption of a TIEA between the U.S. and a low-tax jurisdiction will have a larger impact on U.S. firms' imports than TIEAs with high-tax jurisdictions.

To test this prediction, we separately construct a stacked sample for each group. For example, the regression sample for the group with low corporate tax rates comprises (i) treatment relationships between U.S. firms and jurisdictions with below-median corporate tax rates and (ii) control relationships between U.S. firms and control jurisdictions in the same event cohort. We then estimate Equation (1) for each sample and report the results in Panel A of Table 5. For these cross-sectional tests, treated TIEA jurisdictions with low statutory tax rates include the Cayman Islands, Hong Kong, the Isle of Man, and Singapore, while jurisdictions with high statutory tax rates include Argentina, Costa Rica, and Panama.

Column (1) shows that the coefficient on *Treat×Post* is negative and significant at the 1% level for TIEAs signed with low-tax jurisdictions. A TIEA between the U.S. and a low-tax rate jurisdiction reduces imports by about 24.2% (= $e^{(-0.276)} - 1$). By contrast, Column (2) shows that *Treat×Post* is insignificant for TIEAs between the U.S. and high-tax jurisdictions. These results support tax incentives as the underlying mechanism of our baseline results.

*4.4.2 Heterogeneity by Firms' Pre-TIEA Outbound Income Shifting Aggressiveness*

After analyzing the impact of jurisdictional statutory tax rates on our results, we further support the tax incentive mechanism by investigating the cross-border income shifting behavior of U.S. importing firms prior to the adoption of the TIEA. We expect that tax-aggressive firms are more likely to engage in tax-driven imports before the reform, and the TIEA is thereby expected to have a greater disciplining effect on these firms.

We use two measures of outbound income shifting aggressiveness. The first is a firm-year measure of outbound score (*Outbound*), which captures the magnitude of a firm's net outbound payments from the U.S. to its controlled foreign corporations in the year prior to the

event year (De Simone et al. 2019). We then decompose *Treat* into two dummies: *Treat, High Outbound*, which is the product of *Treat* and an indicator for firms with outbound scores above the median, and *Treat, Low Outbound*, which is the product of *Treat* and an indicator for firms with outbound scores below the median. Column (1) of Panel B of Table 5 shows that the coefficient on *Treat, High Outbound×Post* is significantly larger than that on *Treat, Low Outbound×Post*, suggesting that TIEA implementation has a greater impact on imports for firms with stronger ex ante tax-motivated outbound income shifting.

In Column (2), we use *Shift_Out,* an indicator variable that captures outbound income shifters (Collins et al. 1998; Klassen and Laplante 2012), as our second measure. In the regression, we define *Treat, High Shift_Out*, which is the product of *Treat* and an indicator for firms classified as outbound income shifters (*Shift_Out* = 1) in any year of the pre-period. Similarly, *Treat, Low Shift_Out* is the product of *Treat* and an indicator for firms not classified as outbound income shifters (*Shift_Out* = 0) throughout the pre-period. The coefficient on *Treat, High Shift_Out×Post* is negative and significant at the 1% level, and it is significantly larger than that on *Treat, Low Shift_Out×Post*. Overall, the results are consistent with our prediction that TIEAs decrease imports by discouraging outbound income shifting.

### 4.4.3 Heterogeneity by Product Characteristics

In our last cross-sectional analysis, we examine whether the effects vary with the degree of product homogeneity. Differentiated products often include intangible components, which allow firms to inflate the price of imported differentiated products from related parties to manipulate their income for tax purposes. This flexibility allows firms offering unique products and services to set transfer prices that benefit them, as tax authorities find it difficult to identify comparable arm's length prices (Holmstrom and Tirole 1991; De Simone 2016; De Simone and Sansing 2018). By contrast, standardized, substitutable goods face higher competition, resulting in more transparent pricing and leaving limited room for tax-driven importing

activities. Therefore, we posit that TIEAs to lead to larger reductions in U.S. imports of differentiated goods compared to substitutable goods from the partner jurisdiction.

We decompose products into substitutable versus differentiated goods according to their HS product code following the approach of Rauch (1999), which has been widely adopted in the literature (e.g., Bloom et al. 2021; Martin et al. 2023; Pierce and Yu 2023). For each firm-jurisdiction-year, we separately compute the firm's imports of substitutable goods (*Import_Substitutable*) and differentiated goods (*Import_Differentiated*) from the given jurisdiction in the year. We estimate regression Equation (1) using these new measures as the dependent variable and report the results in Table 6.[26] Column (1) reports the results for imports of differentiated goods. As predicted, the coefficient on *Treat×Post* is significantly negative, suggesting that the adoption of a TIEA on average reduces the imports of differentiated goods by approximately 26.9% (= $e^{(-0.314)} - 1$). In contrast, Column (2) reports the results for imports of substitutable goods and shows a negative but insignificant coefficient on *Treat×Post*. These findings suggest that TIEA implementation has a greater impact on the flow of differentiated goods than on substitutable goods, consistent with our expectation.

Overall, the heterogeneity in our results supports the notion that the main effect occurs through reduced outbound income shifting, rather than a direct impact of TIEAs on trade.

## 5. Additional Analyses

### 5.1 The Effect on Pricing

Our results suggest that U.S. firms decrease tangible goods imports from jurisdictions that sign a TIEA with the U.S., consistent with the notion that tax-driven imports were present before the TIEA. These tax-driven imports are typically associated with higher product prices, which are used to shift income to low-tax jurisdictions. We predict that TIEAs not only

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[26] The sample size decreases as the dependent variable contains more zeros after separating two types of goods, and additional observations are dropped due to separation effects (e.g., lack of variation in the outome variable with the includion of relationship fixed effects) under Poisson regression.

decrease the physical volume of imports but also lead to lower product prices.

In this subsection, we provide initial evidence to shed light on this prediction. The Panjiva database records the dollar value for each transaction. We use the dollar value per container for a firm-jurisdiction to approximate the product price. In particular, we first compute the average dollar value per container for each firm-exporter-year, and then calculate the firm-jurisdiction product price as its average value across all exporters in the jurisdiction. We re-estimate Equation (1) using the natural logarithm of the firm-jurisdiction product price as the dependent variable (*Value Per Container*). Table 7 shows that *Treat×Post* is significantly negative across all the specifications. For example, column (2) suggests that TIEA adoption is associated with a 30.5% reduction in value per container. These results imply that even when firms continue to import from the treatment jurisdiction, the input price declines. However, we acknowledge that the results should be interpreted with caution, as the value of products is declared by firms and many transactions have a missing value.

### 5.2 Spillover Effect: Trade Relocation

We next investigate whether firms reallocate imports from treatment jurisdictions to alternative jurisdictions in the post-TIEA period. Prior to TIEA adoption, firms may have engaged in strategic trade rerouting, whereby products originating in jurisdiction A were channeled through jurisdiction B then routed to the U.S. to exploit tax arbitrage opportunities. Such rerouting could allow firms to minimize their tax liabilities by taking advantage of differences in tax regimes or information-sharing practices across jurisdictions. However, the implementation of TIEAs increases the transparency of cross-border transactions and raises the cost of such tax-avoidance strategies. Consequently, firms discontinue the use of jurisdiction B as an intermediary and instead ship products directly from jurisdiction A to the U.S. This strategic shift would manifest as a decline in imports from treatment jurisdiction B to the U.S. and a corresponding increase in imports from jurisdiction A to the U.S.

To test the relocation effect, we again follow the methodology of Giroud et al. (2024) to construct a new event-firm-jurisdiction-year sample. For each TIEA event, we define the treatment group (*Treat Spillover* = 1) as relationships between control jurisdictions and affected U.S. importing firms, i.e., firms that imported from the jurisdiction implementing a TIEA with the U.S. during the sample period. The control group (*Treat Spillover* = 0) consists of relationships between control jurisdictions and non-affected U.S. importing firms. We restrict our analysis to control jurisdictions located in the same subregion (e.g., Southern Asia) as the treatment jurisdictions, as geographic proximity makes the rerouting tactics more economically and logistically viable.[27] We then examine changes in import volumes for these relationships from three years before to three years after the TIEA adoption using Equation (2):

$$Import_{i,j,t} = \beta_1 Treat\ Spillover_{j,e} \times Post_{e,t} + \beta_2 Post_{e,t} + \beta_3 X_{i,t-1} + \beta_4 X_{j,t-1} + \kappa_e + \tau_{j,t} + v_{i,j} + \varepsilon_{i,j,e,t} \quad (2)$$

*Treat Spillover* is an indicator for relationships between control jurisdictions and affected U.S. importing firms. We control for relationship and jurisdiction-year fixed effects, and firm characteristics as in Equation (1). As shown in Table 8, the coefficient on *Treat Spillover×Post* is positive and significant at the 1% level. In terms of economic significance, imports from control jurisdictions that are geographically proximate to the treatment jurisdiction increase by approximately 21.5% (= $e^{(0.195)} - 1$) after the TIEA adoption. This magnitude is comparable to the 20.9% reduction in imports from treated jurisdictions documented in Table 3. These findings collectively support the presence of a trade relocation effect, suggesting that firms reduce their reliance on the treatment jurisdictions as intermediaries and instead opt to ship products directly from original jurisdictions to the U.S.

### *5.3 Effect on Effective Tax Rates*

Having documented that TIEAs lead to trade route adjustments by U.S. firms, we next examine whether these firms also reduce income shifting. To this end, we examine the effect

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[27] We find no evidence that firms relocate to subregions distinct from the treatment jurisdictions (untabulated).

on ETRs, which captures decreases in tax savings linked to reduced outbound income shifting. We collapse the event-firm-relationship-year sample into an event-firm-year sample and estimate Equation (3), which is a DID estimation with a continuous treatment variable.

$$GAAP\ ETR_{i,t+1} = \beta_1 TIEA\ Imports\ (\%) \times Post_{e,t} + \beta_2 Post_{e,t} + \beta_3 X_{i,t-1} + \kappa_e + \tau_t + v_i + \varepsilon_{i,e,t} \quad (3)$$

where $i$, $t$, and $e$ denote firm, year, and TIEA event, respectively. The dependent variable is the GAAP ETR in the following year. *TIEA Import (%)* is the percentage of imports from treatment jurisdictions in the year prior to the event year for a given TIEA event, multiplied by 100. By construction, *TIEA Import (%)* equals zero for non-affected U.S. importing firms. *Post* is an indicator variable for the years following the event year. We include firm-level controls specified in Equation (1), and event, firm, and year fixed effects. Table 9 shows that *TIEA Import (%) × Post* loads positively. Focusing on Column (2), a one-standard deviation increase in *TIEA Import (%)* is associated with a 1.1 percentage points drop in ETR in the post-period. These findings indicate that U.S. firms with greater pre-implementation exposure to TIEA-treated jurisdictions experience a significant increase in ETR following TIEA implementation, suggesting reduced tax savings from decreased outbound income shifting.

### 5.4 Robustness Tests

#### 5.4.1 Alternative Measure of Imports

Table 10 reports the robustness tests for our baseline specifications in Table 3. In Panel A, we show that our results are robust to alternative measures of imports, including the number of individual shipments (Column 1) and the total dollar value of transactions in millions (Column 2). Our results are consistent across different measurement choices.

#### 5.4.2 Confounding Events

Two prominent events that could influence tax-motivated international trade during our sample period are the enactment of the Tax Cuts and Jobs Act (TCJA) in 2017 and the escalation of the U.S.-China trade war beginning in 2016. While our DiD design with multiple

treatment years inherently mitigates concerns about confounding events, we perform additional

analyses to ensure that our findings are not driven by these high-profile events.

First, given that the TIEA between the U.S. and Singapore coincides with the passage

of the TCJA, we exclude the Singapore TIEA from our sample and re-estimate Equation (1).

As shown in Column (1) of Panel B, Table 10, our results remain robust. Second, to account

for the potential impact of U.S.-China trade tensions, we exclude imports from China from our

regression analysis and find consistent results in Column (2). Third, the TIEA between Hong

Kong and the U.S. was signed in 2014, the same year as the Hong Kong protests. To mitigate

the potential confounding effect of U.S.-China tensions related to these protests on U.S. imports

from Hong Kong, we exclude the Hong Kong TIEA from our sample and re-estimate Equation

(1). As shown in Column (3) of Panel B, Table 10, our results continue to be robust.

*5.4.3. Contemporaneous Change in Institutional Quality*

One potential concern is that the implementation of TIEAs may be confounded with

changes in the institutional quality of the jurisdiction. We conduct two sets of analyses to

address this concern. In our first set of analyses, we examine whether TIEA adoption is

associated with changes in institutional quality. To this end, we create a jurisdiction-year

sample over the period from 2005 to 2020, and estimate the following Equation (4):

$$\textit{Institional Quality}_{i,t} = \beta_1 TIEA_i \times Post_t + v_i + \tau_t + \varepsilon_{i,t} \tag{4}$$

where $i$ and $t$ denote to jurisdiction and year, respectively. Following Leuz et al. (2009), we

explore six indices of institutional quality sourced from World Governance Indicators,

including Voice and Accountability, Political Stability, Governance Effectiveness, Regulatory

Quality, Rule of Law, and Control of Corruption. *TIEA* is an indicator for jurisdictions

implementing a TIEA with the U.S. during the sample period, and *Post* is an indicator for the

post-TIEA period. The regression model also includes jurisdiction and year fixed effects. As

reported in Panel B of Appendix I, the correlations between *Treat×Post* and all six indices are

statistically indistinguishable from zero, suggesting that TIEA adoption is unlikely to be confounded with contemporaneous change in institutional quality.

To further address this concern, in the second set of additional analyses, we augment Equation (1) by incorporating six measures of institutional quality. As reported in Panel C of Table 10, these jurisdiction-level institutional quality variables exhibit weak associations with imports, primarily because the inclusion of firm-jurisdiction fixed effects absorbs a substantial portion of the variance in institutional quality. The coefficient on *Treat×Post* remains negative and statistically significant at the 1% level across all specifications, suggesting that our findings are robust and not driven by confounding changes in institutional quality.

### 5.4.4. Matching

Our results validate the parallel trends assumption by demonstrating that treatment and control relationships exhibit similar import activities prior to the event year. In this section, we further enhance the comparability between affected and non-affected U.S. importing firms, as well as between treatment and control jurisdictions, by adopting a matching approach. In Column (1) of Panel D, Table 10, we match affected and non-affected U.S. importing firms based on import volumes and pre-tax profitability. Specifically, we require firms to fall within the same terciles of import volume and pre-tax income, both measured in the year preceding the TIEA implementation. Our results remain statistically and economically similar. In Column (2), we impose additional matching criteria to ensure that treatment and control jurisdictions have similar export volumes and export growth rates in the year prior to the event year, thereby aligning their international trade activities. This approach also improves the balance of our sample, with treatment relationships representing 55.81% of the sample and control relationships representing 44.19%. Importantly, our inferences remain robust.

*5.4.5 Longer Term Impacts*

A natural question arises as to whether the observed effect on imports persists over a longer horizon or reverses over time. To examine this, we extend our event window to five years following the implementation year for each TIEA case. We replace the *Post* indicator with a series of year-specific dummy variables relative to the event year, setting the benchmark period to year *t*–1. We report the estimated coefficients in Panel E of Table 10. The results show that the interaction terms between *Treat* and the post-event year dummies remain consistently negative, with no evidence of trade reversal. This suggests that the impact of TIEAs on tax-motivated import activities is not only significant but also persistent over time.

## 6. Conclusions

We examine whether the adoption of mandatory tax information exchange agreements (TIEAs) has real effects on the physical flow of tangible goods. TIEAs are agreements designed to facilitate enforcement against aggressive cross-border tax avoidance by providing for mandatory information sharing between jurisdictions. We posit that some of the physical trade in tangible goods flowing through low-tax jurisdictions is intended to facilitate income shifting. If so, shocks to tax enforcement via mandatory information exchange could cause firms to change their physical flow of goods. Therefore, we predict that U.S. firms that have used tangible goods imports to facilitate outbound income shifting respond to a jurisdiction signing a TIEA with the U.S. by reducing their physical imports of tangible goods from that jurisdiction.

To examine our prediction, we utilize firm-level shipping container data from the S&P Global Panjiva database. Using a difference-in-differences regression approach, we examine the adoption of TIEAs between the U.S. and specific jurisdictions. Our results show a significant decrease in the volume of tangible goods imports by U.S. firms from jurisdictions that adopted TIEAs, compared to imports from control jurisdictions.

We contribute to the literature on mandatory disclosure of tax information and its real

effects on economic behavior. For the most part, prior literature provides little evidence on how tax planning and tax enforcement affect the physical flow of tangible goods (Jacob 2022; Lester and Olbert 2025). To our knowledge, our study is the first to document a connection between enforcement-related tax disclosure, income shifting, and physical trade flows. We also bridge the gap in the income shifting literature between the use of intangible assets and the real effects on physical assets. While intangibles and physical assets seemingly represent the two ends of a continuum, our study connects the two by providing evidence that tangible goods also play a role in income shifting. Specifically, our findings suggest that firms take advantage of the differentiated nature of tangible goods, in which they can embed intellectual property and higher markups, to facilitate shifting income to low-tax jurisdictions in a way similar to how intangible assets facilitate tax planning. Our results, made possible by the granularity of firm and product level data, offer new insights that were not possible when analyzing aggregate country-level data, which is prevalent in trade studies. We also contribute to the literature on the real effects of tax enforcement. As Jacob (2022) and Lester and Olbert (2025) conclude in their literature reviews, prior research on the real effects of taxes has predominantly focused on areas such as capital investment, labor markets, and corporate R&D and innovation. Our study sheds light on an economically important but under-studied real effect in the tax literature – the physical flow of goods between countries.

We believe our findings can inform future tax policy discussions. Our findings suggest that policy discussions about tax enforcement of aggressive income shifting should consider not only traditional considerations such as effects on tax revenue, but also real effects on firms' supply chains and the physical flow of goods. We encourage further research into the important policy-relevant connections between cross-border income shifting and the flow of tangible goods between countries.

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**Figure 1 Annual Shipping Container Imports by U.S. Public Firms Over 2007-2020**

This figure presents the imports by U.S. public firms from each jurisdiction. Each year we compute the total number of containers (in thousands) shipped from each jurisdiction to U.S. public firms, and report the average annual imports over the period 2007-2020.

Average Annual Imports (in 1000s) by US Public Firms
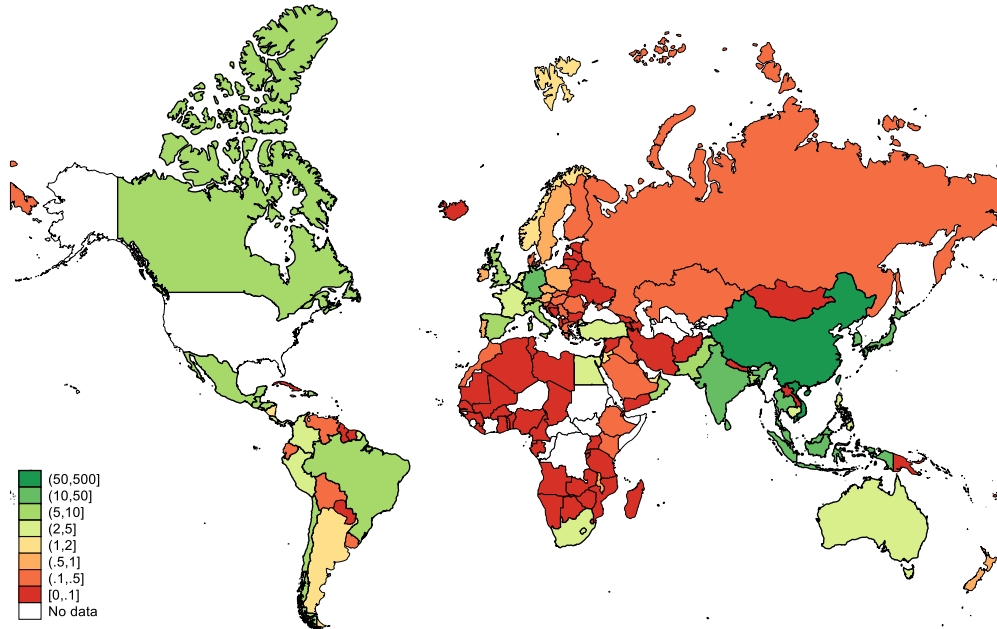
**Figure 2 The dynamic effect of TIEA on imports**

This figure presents the dynamic effects of TIEAs on tangible goods imports. To estimate the dynamic effects, we replace the *Treat×Post* indicator from Column (2) of Table 3 with the interaction terms between the *Treat* indicator and event-year indicators from t − 3 to t + 3 around event year t, taking event year t − 3 as our baseline. In this figure, we plot the estimated interaction coefficients and their associated 90% confidence intervals.
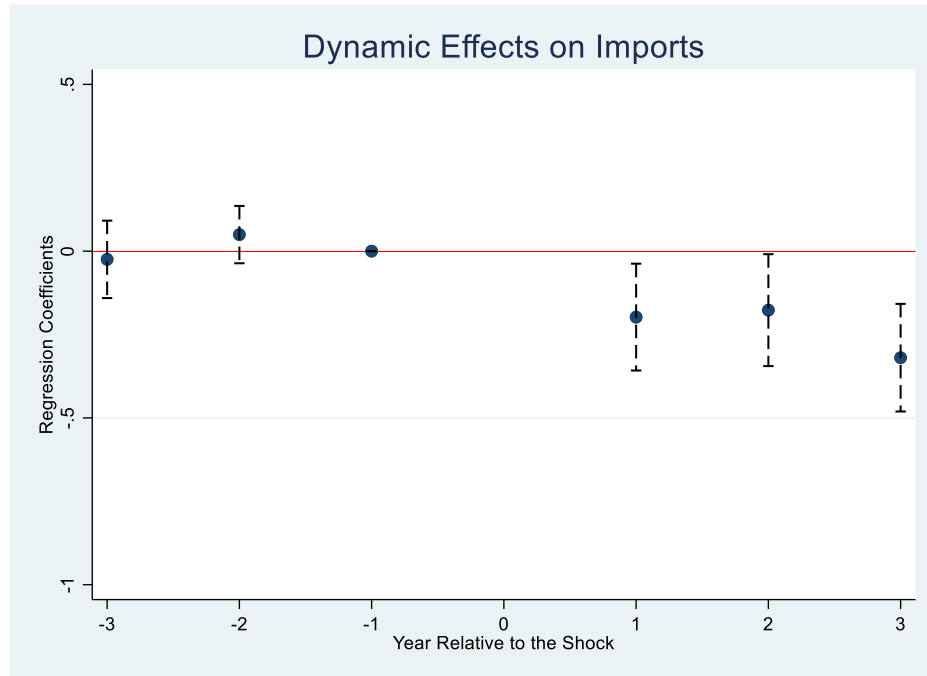
**Appendix I Bilateral Tax Information Exchange Agreements (TIEAs) with the United States**

**Panel A: List of TIEA Agreements**

This panel provides an overview of the jurisdictions that either signed or amended the TIEA with the U.S. during our sample period of 2007-2020. Note that Guernsey and Jersey are not included in our estimation sample because they report no shipping container imports by U.S. public firms during the sample period.

| Signatory Jurisdictions | TIEA Signature Date[28] | Include Article 6, "Automatic Exchange of Information," and Article 7, "Spontaneous Exchange of Information." |
|---|---|---|
| Argentina | Signed on 23 December 2016 | Yes |
| The Cayman Islands | Amended on 29 November 2012; Previously signed on 27 November 2001 | Yes |
| Costa Rica | Signed on 23 May 2018 | Yes |
| Hong Kong | Signed on 25 March 2014 | No |
| The Isle of Man | Amended on 13 December 2013; Previously signed on 2 October 2002 | Yes |
| Panama | Signed on 30 November 2010 | No |
| Singapore | Signed on 13 November 2018 | Yes |

**Panel B: Does TIEA Adoption Confound with Institutional Changes?**

This panel shows the association between TIEA adoption and institutional quality. The sample is a jurisdiction-year sample over the period from 2005 to 2020. The dependent variable in columns (1) to (6) is the indicator Voice and Accountability, Political Stability, Governance Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption, sourced from World Governance Indicators. *TIEA* is an indicator for jurisdictions implementing a TIEA with the U.S. during the sample period, and *Post* is an indicator for the post-TIEA period. All columns include jurisdiction and year fixed effects. The regression is estimated using OLS regression. All variables are defined in Appendix II. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | *Voice and Accountability* | *Political Stability* | *Government Effectiveness* | *Regulatory Quality* | *Rule of Law* | *Control of Corruption* |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *TIEA×Post* | 0.001 | 0.005 | 0.026 | 0.002 | 0.011 | 0.015 |
| | (0.018) | (0.017) | (0.021) | (0.012) | (0.017) | (0.014) |
| | | | | | | |
| Jurisdiction FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 2,848 | 2,848 | 2,848 | 2,848 | 2,848 | 2,848 |
| Adj. R2 | 0.990 | 0.982 | 0.996 | 0.996 | 0.997 | 0.995 |

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[28] Source: The U.S. Treasury website (https://home.treasury.gov/policy-issues/tax-policy/tax-information-exchange-agreements-tieas) and the OECD website (https://www.oecd.org/tax/exchange-of-tax-information/); assessed on March 19, 2023.

**Appendix II Variable Definitions**

| Variable | Definition |
|---|---|
| **Dependent Variable** | |
| *Import* | The number of containers shipped from the jurisdiction to the firm in the year. (Source: Panjiva) |
| *Import (Related Party)* | The number of containers shipped from an exporter to the firm in the year. (Source: Panjiva) |
| *Value per Container* | The natural logarithm of the firm-jurisdiction product price, defined as the average dollar value per twenty-foot equivalent unit container shipped from the jurisdiction to the firm in the year. (Source: Panjiva) |
| *Import_shipment* | The number of shipments from the jurisdiction to the firm in the year. (Source: Panjiva) |
| *Import_dollarvalue* | The dollar value of shipments from the jurisdiction to the importing firm in the year. (Source: Panjiva) |
| *Import_Differentiated* | The number of containers for differentiated goods shipped from the jurisdiction to the firm in the year. (Source: Panjiva) |
| *Import_Substitutable* | The number of containers for substitutable goods shipped from the jurisdiction to the firm in the year. (Source: Panjiva) |
| *ETR* | The GAAP effective tax rate. Total income tax expense (TXT), divided by pre-tax income (PI) net of special items (SPI). *GAAP ETR* is set as missing if the denominator is negative and is winsorized at [0,1]. (Source: Compustat) |
| **Independent Variable** | |
| *Treat* | A binary variable that equals one for treatment jurisdictions, i.e., those that signed or modified a TIEA with the U.S. between 2010 and 2018, and zero otherwise. (Source: U.S. Treasury website) |
| *Treat Spillover* | A binary variable that equals one for relationships between control jurisdictions and affected firms with imports from treatment jurisdictions implementing a TIEA with the U.S. between 2010 and 2018, and zero otherwise. (Source: U.S. Treasury website) |
| *TIEA Import (%)* | The percentage of imports from treatment jurisdictions in the year preceding the event year, multiplied by 100. (Source: Panjiva) |
| *Post* | A binary variable that equals one for years after the signing date of the TIEA, and zero otherwise. (Source: U.S. Treasury website) |
| *Outbound* | The outbound score developed in De Simone et al. (2019), which measures the magnitude of a firm's net outbound payments from the U.S. to its controlled foreign corporations in a given year. It is increasing in the magnitude of net outbound payments. (Source: De Simone et al. 2019). |
| *Shift_Out* | A binary variable that equals one if the firm is a likely outbound income shifter in year *t*, and zero otherwise. Following Collins et al. (1998), a firm-year is classified as income shifters (*Shift_Out* = 1) if it has an incentive to shift income out of the U.S., i.e., (average foreign tax rate < U.S. statutory tax rate), and there is evidence the firm is shifting domestic income out of the U.S. The latter is determined if the firm-year residual from Klassen and Laplante's (2012) income shifting model is negative. (Source: Compustat) |
| *Treat, High Outbound* | A binary variable that equals one if the exporting jurisdiction signs a TIEA with the U.S. and the firm has above-the-mediam value of *Outbound*, and zero otherwise. |
| *Treat, Low Outbound* | A binary variable that equals one if the exporting jurisdiction signs a TIEA with the U.S. and the firm has below-the-mediam value of *Outbound*, and zero otherwise. |
| *Treat, High Shift_Out* | A binary variable that equals one if the exporting jurisdiction signs a TIEA with the U.S. and *Shift_Out* = 1 in any year of the pre-period, and zero otherwise. |

| | |
|---|---|
| *Treat, Low Shift_Out* | A binary variable that equals one if the exporting jurisdiction signs a TIEA with the U.S. and *Shift_Out* = 0 in all years of the pre-period, and zero otherwise. |
| *ROA* | The ratio of pre-tax income (PI) to lagged total assets (AT). (Source: Compustat) |
| *Size* | Natural logarithm of total assets (AT). (Source: Compustat) |
| *MTB* | The ratio of the market capitalization (PRCC_F×CSHO) to the book value of equity (CEQ). (Source: Compustat) |
| *Leverage* | The ratio of long-term debt (DLTT) to lagged total assets (AT). (Source: Compustat) |
| *PPE* | The ratio of property, plant, and equipment (PPENT) to lagged total assets (AT). (Source: Compustat) |
| *CAPX* | The ratio of capital expenditure (CAPX) to lagged total assets (AT). (Source: Compustat) |
| *Intangibles* | The ratio of intangible assets (INTAN) to lagged total assets (AT). (Source: Compustat) |
| *RD* | The ratio of research and development expenditure (XRD) to lagged total assets (AT). (Source: Compustat) |
| *Sales Growth* | The growth rate of sales (SALE). (Source: Compustat) |
| *Foreign Income* | The ratio of pre-tax foreign income (PIFO) to average total assets (AT). (Source: Compustat) |
| *FI Dummy* | A binary variable that equals one if the firm has non-zero pre-tax foreign income (PIFO), and zero otherwise. (Source: Compustat) |
| *NOL* | A binary variable that equals one if the firm has positive value of net operating loss carry-forward (TLCF), and zero otherwise. (Source: Compustat) |
| *Change NOL* | The difference in the net operating loss carry-forward (TLCF) between years *t* and *t*–1, scaled by the lagged total assets (AT); set to zero if missing. (Source: Compustat) |
| *Inventory* | The ratio of inventory (INVT) to lagged total assets (AT). (Source: Compustat) |
| Log (*Population*) | Natural logarithm of the population of the exporting jurisdiction. (Source: Penn World Tables) |
| Log (*GDP per capita*) | Natural logarithm of the GDP per capita of the exporting jurisdiction. (Source: Penn World Tables) |
| Log (*Exchange*) | Natural logarithm of the exchange rate of the exporting jurisdiction. (Source: Penn World Tables) |
| *Corporate Tax Rate* | The statutory corporate tax rate of the exporting jurisdiction. (Source: Tax Foundation) |
| *Voice and Accountability* | The indice of Voice and Accountability for a jurisdiction-year. (Source: World Governance Indicator ) |
| *Political Stability* | The indice of Political Stability for a jurisdiction-year. (Source: World Governance Indicator ) |
| *Government Effectiveness* | The indice of Government Effectivenss for a jurisdiction-year. (Source: World Governance Indicator ) |
| *Regulatory Quality* | The indice of Regulatory Quality for a jurisdiction-year. (Source: World Governance Indicator ) |
| *Rule of Law* | The indice of Rule of Law for a jurisdiction-year. (Source: World Governance Indicator ) |
| *Control of Corruption* | The indice of Control of Corruption for a jurisdiction-year. (Source: World Governance Indicator ) |

**Appendix III List of Top 50 In-sample Importers based on Aggregate Shipments from 2007 to 2020**

| Company Name | #Container (TEU) | Company Name | #Container (TEU) |
|---|---|---|---|
| WALMART INC | 572611.7 | DOLLARAMA INC | 113419.9 |
| COSTCO WHOLESALE CORP | 541148.3 | STARBUCKS CORP | 107893.5 |
| MICHAELS COS INC | 469724.6 | BRICK LTD | 103118 |
| CANADIAN TIRE CORP  -CL A | 376660.5 | KIMBERLY-CLARK CORP | 96707.44 |
| PENNEY (J C) CO | 277706.1 | 99 CENTS ONLY STORES | 91591.97 |
| HANESBRANDS INC | 260285.8 | LEGGETT & PLATT INC | 90425.84 |
| DOLLAR GENERAL CORP | 255822.9 | HAVERTY FURNITURE | 88741.96 |
| MATTEL INC | 252561.7 | EMPIRE RESOURCES INC | 75957.28 |
| SEARS HOLDINGS CORP | 236800.2 | DECKERS OUTDOOR CORP | 71121.72 |
| BIG LOTS INC | 229074 | G-III APPAREL GROUP LTD | 70693.68 |
| HP INC | 228947.7 | PETSMART INC | 67649.97 |
| LOBLAW COMPANIES LTD | 185506.7 | TIMBERLAND CO  -CL A | 64351.06 |
| AMAZON.COM INC | 173107.9 | WEST FRASER TIMBER CO | 62158.89 |
| SKECHERS U S A INC | 170411.5 | LEXMARK INTL INC  -CL A | 61857.55 |
| PIER 1 IMPORTS INC/DE | 168923.3 | GENERAL MOTORS CO | 60967.73 |
| HASBRO INC | 152479.3 | HUDSON'S BAY CO | 57819.21 |
| COOPER TIRE & RUBBER CO | 145531.8 | CARDINAL HEALTH INC | 57138.21 |
| PVH CORP | 143953.1 | CABELAS INC | 56967.02 |
| BJ'S WHOLESALE CLUB INC | 142663.3 | PROCTER & GAMBLE CO | 55410.52 |
| FORD MOTOR CO | 139713.6 | DICKS SPORTING GOODS INC | 55344.88 |
| WILLIAMS-SONOMA INC | 138453.7 | BASSETT FURNITURE INDS | 51295.31 |
| CATERPILLAR INC | 129423.7 | FLEXSTEEL INDUSTRIES INC | 50997.96 |
| GOODYEAR TIRE & RUBBER CO | 123104 | OFFICEMAX INC | 50331.96 |
| UNDER ARMOUR INC | 115294.2 | JAKKS PACIFIC INC | 49323 |
| WOLVERINE WORLD WIDE | 113783.6 | LEAR CORP | 49110.82 |

**Table 1 Descriptive Statistics**

**Panel A: Distribution by Customer Industry**

This panel reports the distribution of our sample across the Fama-French 48 industry of the importing firm.

| Fama-French 48 Industry | Freq. (%) | Fama-French 48 Industry | Freq. (%) |
|---|---|---|---|
| Agriculture | 0.50 | Electrical Equipment | 4.42 |
| Food Products | 4.45 | Automobiles and Trucks | 4.79 |
| Candy & Soda | 0.28 | Aircraft | 2.15 |
| Beer & Liquor | 1.73 | Shipbuilding, Railroad Equipment | 1.39 |
| Tobacco Products | 0.16 | Defense | 0.61 |
| Recreation | 0.33 | Precious Metals | 1.23 |
| Entertainment | 0.25 | Non-Metallic and Industrial Metal Minin | 2.82 |
| Printing and Publishing | 0.16 | Coal | 0.11 |
| Consumer Goods | 1.69 | Petroleum and Natural Gas | 2.57 |
| Apparel | 0.82 | Personal Services | 0.34 |
| Healthcare | 0.42 | Business Services | 5.47 |
| Medical Equipment | 3.49 | Computers | 2.04 |
| Pharmaceutical Products | 7.51 | Electronic Equipment | 7.48 |
| Chemicals | 6.00 | Measuring and Control Equipment | 1.32 |
| Rubber and Plastic Products | 1.48 | Business Supplies | 4.03 |
| Textiles | 1.51 | Shipping Containers | 1.39 |
| Construction Materials | 4.27 | Wholesale | 7.38 |
| Construction | 1.94 | Retail | 3.09 |
| Steel Works Etc | 3.18 | Restaraunts, Hotels, Motels | 1.11 |
| Fabricated Products | 0.78 | Almost Nothing | 0.74 |
| Machinery | 4.56 | | |

**Panel B: Summary Statistics**

This panel reports summary statistics for the variables used in our main analyses.

| Variables | Obs. | Mean | Std | P10 | P25 | P50 | P75 | P90 |
|---|---|---|---|---|---|---|---|---|
| *Import* | 66,277 | 5.540 | 21.904 | 0.000 | 0.000 | 0.000 | 1.000 | 8.000 |
| *Treat* | 66,277 | 0.091 | 0.288 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| *Post* | 66,277 | 0.454 | 0.498 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
| *ROA* | 66,277 | 0.023 | 0.190 | -0.127 | -0.003 | 0.058 | 0.106 | 0.160 |
| *Size* | 66,277 | 7.089 | 2.179 | 4.226 | 5.749 | 7.101 | 8.757 | 10.129 |
| *MTB* | 66,277 | 2.764 | 4.023 | 0.675 | 1.230 | 2.096 | 3.511 | 6.046 |
| *Leverage* | 66,277 | 0.240 | 0.235 | 0.000 | 0.063 | 0.190 | 0.350 | 0.524 |
| *PPE* | 66,277 | 0.291 | 0.216 | 0.061 | 0.116 | 0.248 | 0.415 | 0.595 |
| *CAPX* | 66,277 | 0.047 | 0.046 | 0.010 | 0.018 | 0.035 | 0.060 | 0.097 |
| *Intang* | 66,277 | 0.214 | 0.234 | 0.000 | 0.022 | 0.138 | 0.342 | 0.532 |
| *RD* | 66,277 | 0.034 | 0.070 | 0.000 | 0.000 | 0.005 | 0.026 | 0.117 |
| *Sales Growth* | 66,277 | 0.083 | 0.269 | -0.143 | -0.032 | 0.045 | 0.145 | 0.311 |
| *Foreign Income* | 66,277 | 0.015 | 0.035 | -0.003 | 0.000 | 0.000 | 0.024 | 0.066 |
| *FI Dummy* | 66,277 | 0.623 | 0.485 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| *Change NOL* | 66,277 | 0.050 | 0.315 | -0.032 | -0.002 | 0.000 | 0.009 | 0.083 |
| *NOL* | 66,277 | 0.655 | 0.475 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| *Inventory* | 66,277 | 0.160 | 0.126 | 0.027 | 0.074 | 0.141 | 0.215 | 0.310 |
| *Log (Pop)* | 66,277 | 3.805 | 1.837 | 1.742 | 2.385 | 3.908 | 4.420 | 7.216 |
| *Log(PCGDP)* | 66,277 | 10.237 | 0.709 | 9.273 | 9.629 | 10.572 | 10.749 | 10.844 |
| *Log(Exchg)* | 66,277 | 1.775 | 2.282 | -0.300 | -0.104 | 1.350 | 2.873 | 4.691 |
| *Tax Rate* | 66,277 | 25.968 | 6.462 | 17.000 | 22.000 | 25.000 | 30.175 | 34.000 |
| *GAAP ETR* | 10,503 | 0.285 | 0.177 | 0.034 | 0.195 | 0.294 | 0.363 | 0.413 |
| *Avg TaxRate Import* | 10,503 | 0.254 | 0.049 | 0.192 | 0.230 | 0.250 | 0.285 | 0.314 |

**Table 2 Import Activities and Effective Tax Rate**

This table shows the association between imports and effective tax rates. The dependent variable is *GAAP ETR,* defined as the ratio of total income tax expense to pre-tax income net of special items. *Avg TaxRate Import* is the weighted average tax rate of all jurisdictions from which the firm imports products, with the weight set to total import volume from a jurisdiction-year. Both columns control for firm and year fixed effects. The regression is estimated using OLS regression. All variables are defined in Appendix II. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | GAAP ETR | |
| --- | --- | --- |
| | (1) | (2) |
| *Avg TaxRate Import* | 0.105** | 0.107** |
| | (0.051) | (0.051) |
| *ROA_Pretax* | | 0.110*** |
| | | (0.035) |
| *Size* | | 0.017** |
| | | (0.008) |
| *MTB* | | -0.001* |
| | | (0.000) |
| *Leverage* | | -0.011 |
| | | (0.020) |
| *PPE* | | -0.073** |
| | | (0.034) |
| *CAPX* | | 0.172** |
| | | (0.080) |
| *Intang* | | -0.028 |
| | | (0.023) |
| *RD* | | -0.318* |
| | | (0.175) |
| *Sales Growth* | | 0.008 |
| | | (0.013) |
| *Foreign Income* | | -0.582*** |
| | | (0.111) |
| *FI Dummy* | | 0.018* |
| | | (0.011) |
| *Change NOL* | | -0.008 |
| | | (0.040) |
| *NOL* | | -0.010 |
| | | (0.007) |
| *Inventory* | | -0.012 |
| | | (0.046) |
| | | |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |
| Obs. | 10,503 | 10,503 |
| Adj. R2 | 0.326 | 0.332 |

**Table 3 The Effect of TIEAs on the Physical Flow of Tangible Goods**

This table shows the effect of TIEAs on tangible goods imports. The dependent variable is *Import*, defined as the number of containers shipped from a given jurisdiction to the firm over the year. *Treat* is a binary variable that equals one for treatment jurisdiction implementing a TIEA for a given event and zero otherwise. *Post* is a binary variable that equals one after the treatment of the TIEA for a given event. All columns control for Firm-Jurisdiction, Year, and Event fixed effects, respectively. The regression is estimated using Poisson regression. All variables are defined in Appendix II. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | Import | |
| --- | --- | --- |
| | (1) | (2) |
| Treat×Post | -0.211** | -0.234*** |
| | (0.096) | (0.084) |
| Post | -0.008 | -0.017 |
| | (0.025) | (0.026) |
| ROA_Pretax | | 0.203 |
| | | (0.208) |
| Size | | -0.052 |
| | | (0.070) |
| MTB | | 0.006* |
| | | (0.003) |
| Leverage | | -0.236 |
| | | (0.149) |
| PPE | | -0.157 |
| | | (0.204) |
| CAPX | | 0.550 |
| | | (0.584) |
| Intang | | 0.268 |
| | | (0.185) |
| RD | | -0.038 |
| | | (0.828) |
| Sales Growth | | 0.141*** |
| | | (0.050) |
| Foreign Income | | -1.013 |
| | | (0.696) |
| FI Dummy | | 0.325* |
| | | (0.173) |
| Change NOL | | -0.060 |
| | | (0.077) |
| NOL | | -0.049 |
| | | (0.064) |
| Inventory | | 0.358 |
| | | (0.321) |
| Log(Pop) | | -2.505 |
| | | (2.153) |
| Log(PCGDP) | | -1.008* |
| | | (0.540) |
| Log(Exchg) | | -0.242 |
| | | (0.164) |
| Tax Rate | | -0.011 |
| | | (0.014) |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 66,277 | 66,277 |
| Pseudo R2 | 0.767 | 0.769 |

**Table 4 Intrafirm Trade (Firm-Supplier Level Evidence)**

This table shows the effect of TIEAs on tangible goods imports from a related party. The dependent variable is *Import (Related Party)*, defined as the number of containers shipped from a given related party to the firm over the year. *Treat* is a binary variable that equals one for treatment jurisdiction implementing a TIEA for a given event and zero otherwise. *Post* is a binary variable that equals one after the treatment of the TIEA for a given event. All columns control for Firm-Supplier, Year, and Event fixed effects, respectively. All variables are defined in Appendix II. The regression is estimated using Poisson regression. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

|  | Import (Intrafirm) | |
| --- | --- | --- |
|  | (1) | (2) |
| *Treat×Post* | -0.238** |  |
|  | (0.111) |  |
| *Treat×Pre (-3)* |  | -0.057 |
|  |  | (0.098) |
| *Treat×Pre (-2)* |  | 0.008 |
|  |  | (0.156) |
| *Treat×Post (+1)* |  | -0.282* |
|  |  | (0.164) |
| *Treat×Post (+2)* |  | -0.118 |
|  |  | (0.178) |
| *Treat×Post (+3)* |  | -0.395*** |
|  |  | (0.097) |
|  |  |  |
| Controls | Yes | Yes |
| Firm-Supplier FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 221,390 | 221,390 |
| Pseudo R2 | 0.682 | 0.682 |

**Table 5 Heterogeneity**

This panel shows the effect of TIEAs on tangible goods imports, conditional on the income shifting incentives. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. All variables are defined in Appendix II. All regressions are estimated using Poisson regression. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

**Panel A: Heterogeneity by Statutory Corporate Income Tax Rate**

This panel shows the effect of TIEAs on tangible goods imports, conditional on the statutory corporate income tax rate of the treatment jurisdiction. Column (1) reports results for the events of TIEA jurisdictions with low tax rate. Column (2) reports results for the events of TIEA jurisdictions with high tax rate. Control variables are included but not tabulated for brevity.

|  | Import | |
|---|---|---|
|  | Treatment Jurisdictions with Low Statutory Tax Rate (the Cayman Islands, Hong Kong, the Isle of Man, and Singapore) | Treatment Jurisdictions with High Statutory Tax Rate (Argentina, Costa Rica, and Panama) |
|  | (1) | (2) |
| *Treat×Post* | -0.276*** | -0.044 |
|  | (0.094) | (0.276) |
|  |  |  |
| Controls | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 34,922 | 26,486 |
| Pseudo R2 | 0.787 | 0.728 |

**Panel B: Heterogeneity by Ex Ante Outbound Income Shifting Aggressiveness**

This panel shows the effect of TIEAs on tangible goods imports, conditional on the firm's ex ante outbound income shifting aggressiveness. Column (1) partitions treatment firms based on the outbound score developed in De Simone et al. (2019). Column (2) partitions treatment firms based on the likelihood of being a outbound income shifter.

|  | Import | |
|---|---|---|
|  | (1) | (2) |
| *Treat, High Outbound×Post* ($\beta_1$) | -0.229*** |  |
|  | (0.085) |  |
| *Treat, Low Outbound×Post* ($\beta_2$) | -0.107 |  |
|  | (0.079) |  |
| *Treat, High Shift_Out×Post* ($\beta_1$) |  | -0.269*** |
|  |  | (0.091) |
| *Treat, Low Shift_Out×Post* ($\beta_2$) |  | -0.227*** |
|  |  | (0.083) |
|  |  |  |
| $\beta_1 - \beta_2$ | -0.122** | -0.042* |
|  | (0.038) | (0.082) |
|  |  |  |
| Controls | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 63,154 | 66,277 |
| Pseudo R$^2$ | 0.754 | 0.769 |

**Table 6 Heterogeneity by Product Differentiations**

This table shows the effect of TIEAs on tangible goods imports, conditional on the nature of the imported products. The dependent variable is the number of containers shipped from a given jurisdiction to the firm over the year. In Column (1), we count only the number of containers for differentiated goods, whereas in Column (2), we count only the number of containers for substitute goods. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. The regression is estimated using Poisson regression. All variables are defined in Appendix II. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the Jurisdiction level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | Import_Differentiated | Import_Substitutable |
|---|---|---|
| | (1) | (2) |
| Treat×Post | -0.314*** | -0.178 |
| | (0.098) | (0.119) |
| | | |
| Controls | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 42,391 | 19,694 |
| Pseudo R2 | 0.759 | 0.528 |

**Table 7 The Impact on the Pricing of Tangible Goods Imports**

This table shows the effect of TIEAs on the pricing of tangible goods imports. The dependent variable *Value per Container* is the natural logarithm of the dollar value of each container shipped from a given jurisdiction to the firm over the year. The sample size shrinks substantially because many transactions report missing values. *Treat* is a binary variable that equals one for a jurisdiction implementing a TIEA for a given event and zero otherwise. *Post* is a binary that equals one after the treatment of the TIEA for a given event. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. The regression is estimated using Poisson regression. Control variables are included in Column (2) but not tabulated for brevity. The regression is estimated using OLS regression. All variables are defined in Appendix II. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

|  | *Value per Container* | |
|---|---|---|
|  | (1) | (2) |
| *Treat×Post* | -0.367** | -0.305*** |
|  | (0.149) | (0.114) |
|  |  |  |
| Controls | No | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 6,867 | 6,867 |
| Pseudo R2 | 0.758 | 0.763 |

**Table 8 Spillover Effect: Trade Relocation**

This table shows the spillover effect of TIEAs on tangible goods imports from control jurisdictions that are close to treatment jurisdictions. The dependent variable is *Import*, defined as the number of containers shipped from a given jurisdiction to the firm over the year. *Treat Spillover* is a binary variable that equals one for relationships between control jurisdictions and affected U.S. importing firms. *Post* is a binary variable that equals one after the treatment of the TIEA for a given event. All columns control for Firm-Jurisdiction, Year, and Event fixed effects, respectively. Control variables are included in Column (2) but not tabulated for brevity. All variables are defined in Appendix II. The regression is estimated using Poisson regression. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | *Import* | |
|---|---|---|
| | (1) | (2) |
| *Treat Spillover×Post* | 0.196*** | 0.195*** |
| | (0.072) | (0.064) |
| | | |
| Controls | No | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year-Jurisdiction FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 35,159 | 35,159 |
| Pseudo R2 | 0.818 | 0.819 |

**Table 9 Effect of TIEAs on Effective Tax Rate**

This table shows the effect of TIEAs on effective tax rates. The dependent variable is *GAAP ETR,* defined as the ratio of total income tax expense to pre-tax income net of special items in the next year. *TIEA Import (%)* is the fraction of import from treatment jurisdiction for a given event and zero otherwise. *Post* is a binary that equals one after the treatment of the TIEA for a given event. Both columns control for firm and year fixed effects. Column (2) includes firm-level control variables, including *ROA*, *Size*, *MTB*, *Leverage*, *PPE*, *CAPX*, *Intangible*, *RD*, *Sales Growth*, *Foreign Income*, *FI Dummy*, *Change NOL*, *NOL*, and *Inventory*. The regression is estimated using OLS regression. All variables are defined in Appendix II. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the jurisdictional level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | GAAP ETR | |
| --- | --- | --- |
| | (1) | (2) |
| *TIEA Import (%) ×Post* | 0.005** | 0.004** |
| | (0.002) | (0.002) |
| | | |
| Controls | No | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 9,591 | 9,591 |
| Adj. $R^2$ | 0.189 | 0.195 |

**Table 10 Robustness Tests**

This table shows the robustness tests about the effect of TIEAs on tangible goods imports. All continuous variables are winsorized at the 1% and 99% levels. All variables are defined in Appendix II. Standard errors are clustered at the Jurisdiction level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

**Panel A: Alternative Measure of Trade Volume**

This panel reports the results using alternative proxies for imports. The dependent variables are *Import_shipment* and *Import_dollarvalue* in Columns (1) and (2), respectively. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. The regression is estimated using Poisson regression.

|  | *Import_shipment* | *Import_dollarvalue* |
| --- | --- | --- |
|  | (1) | (2) |
| *Treat×Post* | -0.263*** | -0.285** |
|  | (0.087) | (0.118) |
|  |  |  |
| Controls | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 63,544 | 31,859 |
| Pseudo R2 | 0.783 | 0.705 |

**Panel B: Impact of TCJA and US-China Tension**

The dependent variable is the number of containers shipped from a given jurisdiction to the firm over the year. Column (1) removes the Event of TIEA with Singapore from the sample. Column (2) removes imports from China. Column (3) removes the Event of TIEA with Hong Kong from the sample. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. The regression is estimated using Poisson regression.

|  | *Import* | | |
| --- | --- | --- | --- |
|  | *Remove TIEA with Singapore* | *Remove China* | *Remove TIEA with Hong Kong* |
|  | (1) | (2) | (3) |
| *Treat×Post* | -0.177** | -0.270*** | -0.241*** |
|  | (0.080) | (0.089) | (0.089) |
|  |  |  |  |
| Controls | Yes | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Event FE | Yes | Yes | Yes |
| Obs. | 59,447 | 59,221 | 56,787 |
| Pseudo R2 | 0.772 | 0.768 | 0.771 |

**Panel C: Controlling for Institutional Quality**

The dependent variable is the number of containers shipped from a given jurisdiction to the firm over the year. Columns (1) to (2) augment the regression model in column (2) of Table 3 with the World Governance Indicator of Voice and Accountability, Political Stability, Governance Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption, respectively. Column (7) includes all six indices as controls. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. The regression is estimated using Poisson regression.

| | *Import* | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| *Treat×Post* | -0.280*** | -0.236*** | -0.228*** | -0.230*** | -0.209** | -0.236*** | -0.264*** |
| | (0.088) | (0.085) | (0.084) | (0.087) | (0.090) | (0.084) | (0.087) |
| *Voice and Accountability* | -0.583** | | | | | | -0.556* |
| | (0.280) | | | | | | (0.316) |
| *Political Stability* | | 0.276 | | | | | 0.165 |
| | | (0.173) | | | | | (0.177) |
| *Government Effectiveness* | | | -0.189 | | | | -0.449 |
| | | | (0.320) | | | | (0.336) |
| *Regulatory Quality* | | | | 0.077 | | | -0.074 |
| | | | | (0.344) | | | (0.347) |
| *Rule of Law* | | | | | 0.513 | | 0.453 |
| | | | | | (0.395) | | (0.404) |
| *Control of Corruption* | | | | | | 0.299 | 0.264 |
| | | | | | | (0.270) | (0.317) |
| Other Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Event FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 65,762 | 65,762 | 65,762 | 65,762 | 657,62 | 65,762 | 65,762 |
| Pseudo R2 | 0.770 | 0.770 | 0.769 | 0.769 | 0.770 | 0.770 | 0.770 |

**Panel D: Matching**

The dependent variable is the number of containers shipped from a given jurisdiction to the firm over the year. Column (1) requires control firms and treatment firms to be in the same terciles of import volume and pretax income (measured in the year before TIEA for an event). Column (2) further requires control jurisdictions and treatment jurisdictions to be in the same terciles of export volume and export growth (measured in the year before TIEA for an event). All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. The regression is estimated using Poisson regression.

| | *Import* | |
| Match on: | *Firm Import Volume, Firm ROA_Pre Tax* | *Firm Import Volume, Firm ROA_Pre Tax, Jurisdiction Export Volume, Jurisdiction Export Growth* |
|---|---|---|
| | (1) | (2) |
| *Treat×Post* | -0.216** | -0.298** |
| | (0.090) | (0.122) |
| *% of Treatment Obs.:* | *12.08%* | *55.81%* |
| Controls | Yes | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 46,863 | 10,144 |
| Pseudo R2 | 0.773 | 0.793 |

**Panel E: Longer Term Impacts**

The dependent variable is the number of containers shipped from a given jurisdiction to the firm over the year. We extend the sample to five years after an event to investigate the persistence of the effects. All columns control for Firm-Jurisdiction, Year, and Event fixed effects. Control variables are included but not tabulated for brevity. The regression is estimated using Poisson regression.

| | *Import* | |
| --- | --- | --- |
| | (1) | (2) |
| *Treat×Pre (-3)* | 0.004 | -0.031 |
| | (0.074) | (0.072) |
| *Treat×Pre (-2)* | 0.037 | 0.048 |
| | (0.050) | (0.053) |
| *Treat×Post (+1)* | -0.179* | -0.188* |
| | (0.101) | (0.101) |
| *Treat×Post (+2)* | -0.143 | -0.184* |
| | (0.105) | (0.103) |
| *Treat×Post (+3)* | -0.278*** | -0.325*** |
| | (0.096) | (0.101) |
| *Treat×Post (+4)* | -0.371*** | -0.406*** |
| | (0.089) | (0.092) |
| *Treat×Post (+5)* | -0.392*** | -0.416*** |
| | (0.120) | (0.121) |
| | | |
| Controls | No | Yes |
| Firm-Jurisdiction FE | Yes | Yes |
| Year FE | Yes | Yes |
| Event FE | Yes | Yes |
| Obs. | 85,615 | 85,615 |
| Pseudo R2 | 0.771 | 0.773 |