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Intra-Industry Trade, Global Value Chains, and Preferential Tariff Liberalization

RESEARCH NOTE

Leonardo Baccini
McGill University

Andreas Dür
University of Salzburg

and

Manfred Elsig
University of Berm

This research note presents a new dataset on the speed of tariff liberalization in sixty-one preferential trade agreements (PTAs) signed by fifty states and regional economic organizations over the period 1995 to 2013. We use this dataset to test prominent arguments concerning the impact of intra-industry trade and global value chains on the political economy of trade. Our results indicate that the speed of tariff liberalization through PTAs is considerably faster for intermediate goods than for finished products. This is in line with the most prominent argument about how global value chains affect the political economy of trade liberalization. At the same time, we find mixed evidence for the impact of intra-industry trade on the ease of trade liberalization, which reflects strong cross-country variation. We conclude with a discussion on how the dataset can help tackle important questions in international political economy and inform ongoing debates on trade agreements.

Introduction

With the multilateral trade negotiations at the World Trade Organization (WTO) stalled for many years, preferential trade agreements (PTAs) have become the main means to reduce tariffs and liberalize trade. Many contemporary PTAs deal with a large number of nontariff barriers and trade-related sectors, such as investments, intellectual property rights, procurement policy, and competition policy. Nevertheless, the liberalization of trade in goods through tariff elimination remains a core objective of all PTAs. Tariff liberalization, however, does not apply equally to all goods. While some tariffs are eliminated immediately upon entry into force of a PTA, with others the cuts occur over time according to different time schedules. Similarly, while some tariffs are fully eliminated, others are reduced only partially. Still, others are fully exempt from tariff liberalization.

This variation provides fertile ground for testing arguments about how market structures affect the political economy of trade. Two strands of research are particularly prominent. The first investigates the consequences of intra-industry trade (IIT) for the political economy of trade. One group of scholars shows that more IIT is associated with greater net support for trade liberalization (Lipson 1982; Milner 1997; Manger 2012, 2015; Kim 2017). IIT may reduce direct competition between products, hence lowering the number of domestic companies that perceive foreign imports as a threat. Another group suggests that IIT may empower narrow protectionist groups (Gilligan 1997; Kono 2009). We should expect this effect if IIT makes lobbying for protection into a private good and thus facilitates the political mobilization of protectionist interests.

The second strand of research analyzes the consequences for trade politics of the globalization of production in the form of global value chains (GVCs). GVCs make companies increasingly reliant on imports of intermediate goods, that is, goods that are sourced for the purpose of serving as inputs for the production of other goods. Via this mechanism, GVCs have been depicted as facilitating trade liberalization (Chase 2005; Manger 2009; Blanchard and Matschke 2015; Gawande, Hoekman, and Cui 2015; Baccini, Pinto, and Weymouth 2017), reducing industries' demand for the use of trade remedies (Jensen, Quinn, and Weymouth 2015), and helping countries to achieve deep economic integration (Antràs and Staiger 2012; Chase 2005; Manger 2009; Johns and Wellhausen 2016; Kim 2015).

We are able to test these arguments by using an original dataset on the speed and extent of tariff liberalization

Leonardo Baccini is an assistant professor in the Department of Political Science at McGill University, Montreal, Canada, and a research fellow at CIREQ, Montreal, Canada. Information on his publications and working papers is available at https://sites.google.com/site/leonardobaccini/.

Andreas Dür is a professor of international politics at the University of Salzburg, Austria. His latest book is *Insiders versus Outsiders: Interest Group Politics in Multilevel Europe*, published by Oxford University Press. Further information is available at https://sites.google.com/site/andduer/home.

Manfred Elsig is an professor of international relations at the University of Bern and the former director of the Swiss Science Foundation's NCCR Trade Regulation (www.nccr-trade.org).

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commitments at a highly disaggregated level of fifty states and regional economic organizations in a total of sixty-one PTAs signed between 1995 and 2013. We start in 1995 to focus on PTAs signed after the end of the Uruguay Round of multilateral trade negotiations (1986–1994), which may have affected tariff concessions in PTAs in various ways. The PTAs that we analyze are those signed by the seven largest trading entities. The dataset, however, also includes the commitments of the partner countries of these seven major trading entities, which encompass both developed and developing economies. The countries covered by our analysis thus exhibit substantial variation on several dimensions. The resulting dataset goes far beyond the datasets on tariffs and tariff concessions that earlier research relies upon. Previous studies focus on the WTO (Pelc 2011), a single trade agreement (Chase 2003), or a small set of trade agreements (Manger 2012, 2015). Until now the only study to rely on tariff data for a large number of countries to assess the political economy of trade aggregates tariffs at the industry level (Gawande, Krishna, and Olarreaga 2012).[1] Our use of highly disaggregated data from a wide range of countries thus allows for a more comprehensive and robust assessment of the impact of IIT and GVCs on (preferential) trade liberalization than that found in existing research.

We find limited or no evidence that IIT facilitates preferential liberalization. If anything, in the presence of IIT, tariffs tend to go to 0 more slowly than in the absence of IIT. This finding is consistent with previous studies highlighting that product differentiation facilitates protectionist groups (Gilligan 1997; Kono 2009) or, at the very least, generates conflicting preferences toward preferential liberalization among firms operating in the same industries (Osgood 2017). This research note adds to this literature by showing a great deal of heterogeneity across countries when it comes to the effect of IIT on preferential trade liberalization. To the best of our knowledge, we are the first to document this variation, since the previous literature mostly focuses on the United States in explaining tariff cuts or relies on very aggregated country-level data.

At the same time, we find that the speed of preferential trade liberalization in intermediate goods is significantly and substantively faster than the speed of preferential trade liberalization in finished goods. This finding suggests that GVCs are a key driver of the proliferation of trade agreements, a result in line with Chase (2005) and Manger (2009). However, we find limited evidence that the effect of GVCs is heterogeneous across countries, though the United States is an important exception in this regard. Indeed, we find that the United States cuts tariffs more slowly in intermediates than in final goods. This finding demonstrates how politically controversial offshoring is in the United States, a result in line with Owen (2017).

The analysis and results matter for several important international relations debates. For one, we contribute to the literature on the design of international institutions (Koremenos, Lipson, and Snidal 2001). We find that the design of tariff concessions is driven by country and dyad characteristics rather than by issue characteristics. Moreover, our findings speak to studies that try to explain cleavages across classes, sectors, or firms over trade liberalization (Rogowski 1987; Milner 1988; Hathaway 1998; McGillivray 2004; Milner and Kubota 2005). These studies overlook the importance of GVCs in explaining why some interest groups push for liberalization. The key result of this note rectifies this oversight, indicating that tariff cuts on parts and components receive overall greater support than tariff cuts on finished goods. Future studies could make use of the rich cross-country variation of our data to explore how these cleavages in combination with domestic institutions affect trade policy in the current era of globalization. Finally, building on seminal work on the WTO (Gowa and Kim 2005; Goldstein, Rivers, and Tomz 2007), the dataset that we present could also be used to study the effects of international institutions, by investigating to what extent tariff concessions matter for trade and/or investment flows.

Tariff Liberalization in PTAs

We put together an original dataset containing the tariff concessions made by fifty trading entities in sixty-one PTAs. Table A1 in the appendix lists these PTAs. The sixty-one PTAs are the subset of agreements concluded by Australia, Canada, China, the European Union (EU), Japan, South Korea, and the United States between 1995 and 2013, for which we could extract tariff commitments. We selected these seven trading entities because they are the most important trading powers, are located in different regions of the world, and have signed PTAs with many countries at different levels of development. In several respects, the resulting sample of PTAs is similar to the population of PTAs that were signed in the past twenty years (for a discussion of the population of agreements, see Dür, Baccini, and Elsig 2014, 356–58). For example, 65 percent of the 353 PTAs signed in the period covered here are bilateral agreements, and 67 percent of the PTAs in our sample are bilateral.[2]

For the sixty-one PTAs, we extracted 156 tariff schedules, each containing around five thousand tariff lines at a highly disaggregated level. All PTAs contain at least two tariff schedules, one for country A vis-à-vis country B, and one for country B vis-à-vis country A. Plurilateral agreements, such as the Dominican Republic–Central America Free Trade Agreement, can contain several tariff schedules (in this case we have seven different tariff schedules). Importantly, therefore, even though we focus on the agreements signed by seven large trading entities, our dataset covers countries at different levels of development, from different regions of the world, and with different political institutions.

Our data are highly disaggregated, namely at the Harmonized Commodity Description and Coding System (HS) six-digit level. At this level, we find tariffs for specific goods, such as "electricity meters" or "molds for glass." The six-digit level still aggregates tariff rates from a lower level of aggregation (the HS classification allows up to ten digits). On average, for our dataset, the six-digit level comprises data for 1.76 lower level tariff lines. In addition to the average tariff existing before entry into force of the agreement, for each year from the entry into force of a PTA to the end of the implementation period, we collect data on the number of lower-than-six-digit tariff lines of a preferential type, the average tariff level that applies to the partner countries at the six-digit level, and the maximum tariff level that applies to the partner countries at this level. The data are compiled from two sources. We take tariff data for the year prior to entry into force of the PTA from the World Integrated Trade Solution (WITS) dataset, which relies on data reported by customs administrations. We then add information on

[1] Whereas we rely on preferential de jure tariffs at the six-digit ISIC level, Gawande et al. (2012) use applied tariffs under the most-favored nation principle, which are aggregated at the three-digit level.

[2] However, we cover a disproportionately large number of North-South agreements and a disproportionately small number of South-South agreements.

tariff concessions from the officially negotiated tariff schedules listed in the appendices of the PTAs.

Extracting tariff concessions directly from the tariff schedules, rather than just relying on WITS, has several advantages. First, WITS contains applied tariff rates. However, we need data on the concessions exchanged. Most often the two will coincide, but in some cases countries may not keep their promises. Second, WITS data only exist for the past, whereas we want to know the speed and extent of tariff liberalization in the future in cases where the implementation has not yet been concluded. Finally, and most importantly, WITS misses data for many preferential tariff lines. For example, for US tariffs on goods from Peru in 2006 (the year the Peru-US free trade agreement was signed), WITS contains data for 2,668 tariff lines. By contrast, our dataset contains tariff rates for 5,250 tariff lines at the same level of disaggregation. Tariff lines are not randomly omitted from WITS; in the above-mentioned case, for example, WITS fails to include all tariff lines for paper products and art objects and the vast majority of tariff lines for textiles. More importantly, for some agreements, average first-year tariff cuts are considerably lower or higher for tariff lines that are in WITS than for the full set of tariff lines. In Figure A1 in the appendix, we show this systematically for thirteen US trade agreements.

For PTAs signed by its members, the WTO stipulates that PTA partners should eliminate tariffs on substantially all the trade between them within a reasonable period. WTO rules further specify that a "reasonable length of time" should mean that the time taken to make tariff cuts "should exceed ten years only in exceptional cases" (World Trade Organization 1994). Notwithstanding these WTO principles, states have considerable leeway in designing tariff schedules. First, most countries do not bring all their tariffs to zero (see Figure 1). In the year before implementation starts, 37 percent of goods are already duty free.[3] In the year the implementation of an agreement starts, this increases to 70 percent. The share of tariff lines without duty then gradually increases over time. By the end of the transition period, however, most countries have exempted at least some tariffs from full elimination. In fact, only twenty-eight schedules in our dataset fully remove all tariffs. Across all tariff schedules, 8.3 percent of tariff lines remain higher than zero even after full implementation. Indonesia, for example, retained 1,208 tariffs on products imported from Australia under the 2009 ASEAN-Australia-New Zealand Free Trade Agreement. The US share of nonzero tariffs is relatively high because our dataset covers the US-Vietnam PTA, which only extended certain tariff cuts to Vietnam.

Second, the length of the transition periods during which countries implement the tariff cuts varies (see Figure 2).[4] Some countries insist on very long transition phases, which provide domestic producers with some breathing space and a transitory type of flexibility (Baccini, Dür, and Elsig 2015, 769). In fact, in our dataset the majority of PTA tariff schedules foresee tariff elimination over a period longer than the ten-year limit suggested by the WTO. For example, Colombia eliminates some tariffs vis-à-vis Canada over a twenty-one-year period. Some PTAs, however, foresee little or no transition phase. Iceland, Norway, Singapore, and Switzerland achieve all their tariff cuts immediately upon entry into force of their agreements.

Third, governments can determine whether they want to cut the tariffs early (front-loading), at a steady pace over

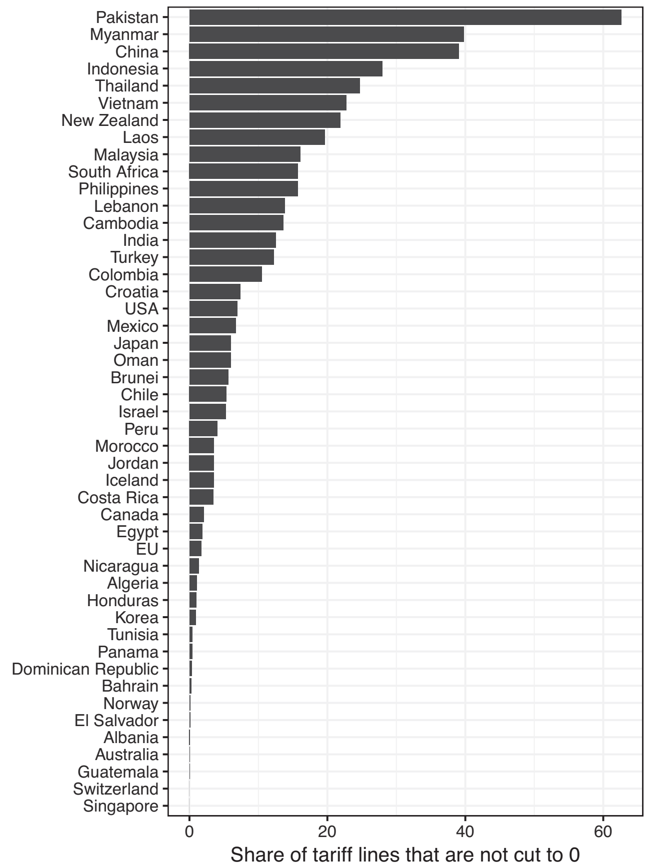

Figure 1. Share of tariff lines that are not cut to zero, by country

time, or late in the transition phase (back-loading). In our dataset, most liberalization takes place when the agreement enters into force. Countries only single out a few tariffs for cuts at a late stage. In the US-Australia trade agreement, for example, the United States left just a few tariff cuts to the end, among them the tariff for Australian beef. Of course, since tariff schedules are very detailed, negotiators can determine tariff levels at a highly disaggregated level. Any averages thus hide much variation across tariff lines within specific agreements.

Below, we use the number of years that it takes for a tariff rate to go to zero to measure the ambitiousness of tariff liberalization. We label this variable *time to zero*. Because most tariffs eventually go to zero, taking the overall tariff cut from the year before an agreement enters into force to the end of the transition phase would yield little variation across goods. How long it takes for a tariff to be eliminated, by contrast, is an important indicator of the ambition of trade liberalization for that good (Chase 2003, 160). Any delays give import-competing companies breathing space, while harming exporters. For products that have pre-PTA tariffs equal to zero, calculating time to zero does not make sense. Dropping these observations introduces selection bias since zero-duty products are not a random subsample of the tariff population. To correct this bias, we rely on a Heckman selection model, the details of which we provide below. For robustness checks we also calculate the percentage change between the pre-PTA tariffs and preferential tariffs in the year in which a PTA enters into force, which presents an alternative way of measuring the ambitiousness of tariff liberalization. We label this variable *tariff cut*.

[3] This value slightly overestimates the extent of free trade as, in line with WITS, our dataset lists specific tariffs and tariff rate quotas as zero duties.

[4] The mean is 0.0025 for Israel.

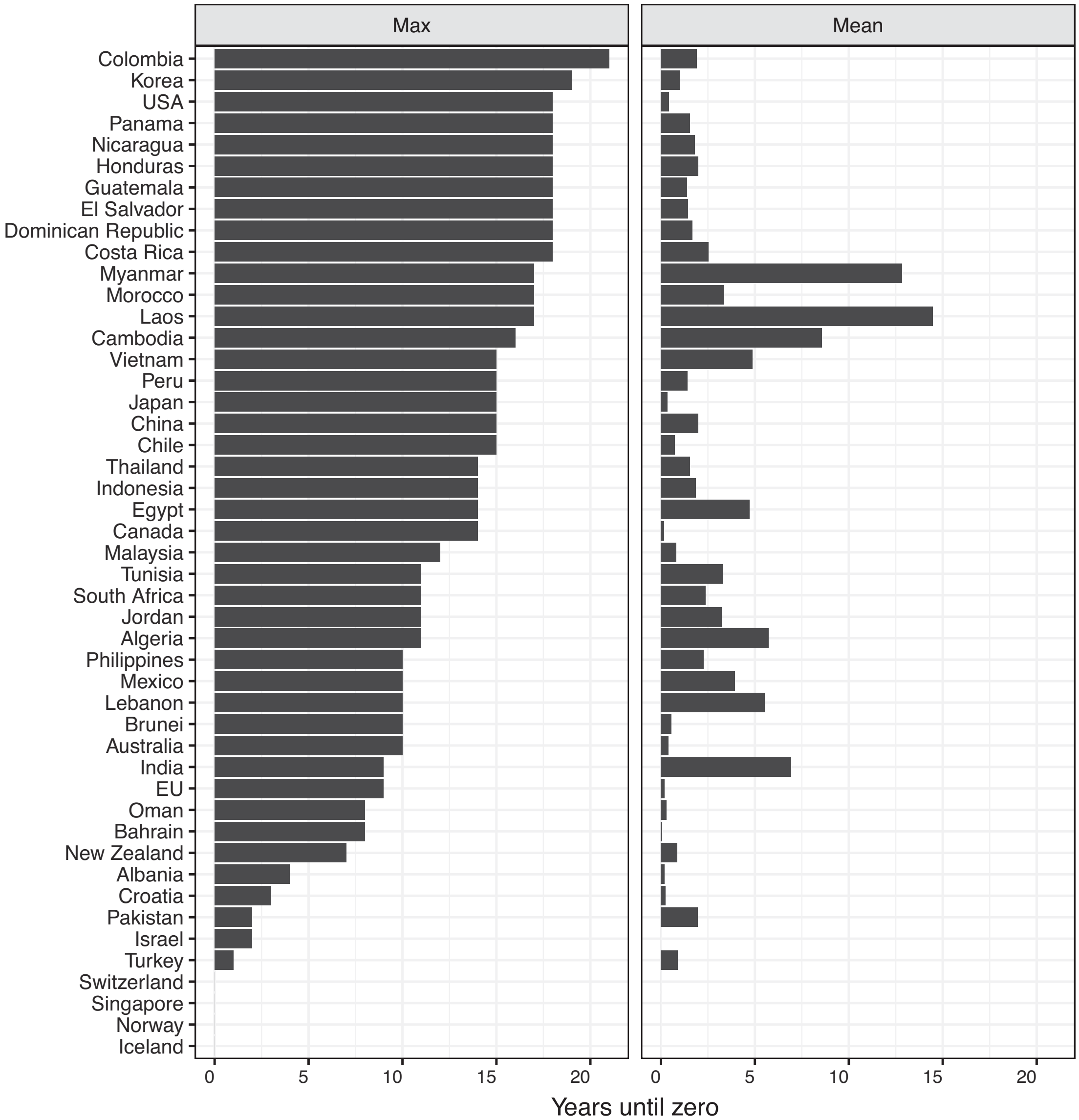

Figure 2. Years until tariff rates are zero, by country (max and mean)

Intra-Industry Trade and Global Value Chains

We use our dataset to test arguments derived from two important strands of research on the political economy of trade. These focus on the role of intra-industry trade and global value chains, respectively. Although IIT and GVCs are historically linked to each other, as both phenomena have become prominent in the most recent phase of globalization, they are largely independent: there can be IIT without GVCs and GVCs without IIT. In line with the literatures that developed these arguments, we build on the assumption that governments implement trade policies with the aim of maximizing support and minimizing opposition from economic actors. They may do so because they anticipate lobbying or respond to lobbying (Chase 2005; Dür 2010; Manger 2015) or because they expect that hurting economic actors will reduce electoral support (for example, via increased unemployment). They have ample information about the trade policy preferences of economic actors, either as a result of their experience with previously implemented trade policies or because economic actors themselves make such information available.

Intra-Industry Trade

IIT measures the extent to which country A exports and imports the same goods and services to and from country B. These goods and services can either be vertically differentiated (they differ in their quality and price, such as a Fiat and a Porsche) or horizontally differentiated (they cater to different consumer preferences, such as high-end Samsung or Apple smart phones). Whereas *inter*-industry trade, which used to be the dominant pattern of market structure, arises from comparative advantage, *intra*-industry trade results from different consumer tastes and economies of scale.

Inter-industry trade reduces domestic price levels and drives less competitive domestic producers out of business. As a result, domestic producers oppose trade liberalization. Their lobbying may be counteracted by interests that benefit from cheap imports, such as consumers, wholesalers, and retailers (Destler and Odell 1987). In most cases, however, the pressure from import-competing producers outweighs the pressure from these free trade interests. Consumers often fail to organize because of collective action problems. Wholesalers and retailers, moreover, likely face greater uncertainty about the consequences of trade liberalization than domestic producers that face import competition.[5]

There is thus broad agreement that inter-industry trade leads to protectionist pressures. However, researchers still disagree on the consequences of *intra*-industry trade for the political economy of trade. Most studies find that IIT facilitates trade liberalization by reducing adjustment costs (Krugman 1981; Lipson 1982; Milner 1997; Manger 2012, 2015; Kim 2017). With IIT, overall demand allows the coexistence of many different companies. Fewer companies then will face a threat from higher imports. Even if some companies oppose trade liberalization in the presence of IIT, an industry that experiences both imports and exports will exhibit ambiguous trade preferences. This ambiguity will hamper lobbying by import competitors (Osgood 2017), which prefer no—or, if this is not possible, at least slower—trade liberalization. The hypothesis that results from this argument is the following:

H1a: *Tariffs are cut faster in PTAs for goods that are characterized by IIT than for goods that are not characterized by IIT.*

Gilligan (1997) and Kono (2009), however, contend that IIT makes it easier for import-competing companies to solve collective action problems. With IIT, they argue, lobbying for protection becomes a private good. Imports of cars from South Korea to the European Union, for example, mainly hurt producers of small cars such as Fiat, which then have an incentive to push for protection rather than to free ride on the lobbying activities of producers of more high-end cars. IIT should thus strengthen the demand for protectionist trade policies. The hypothesis that results from this argument is the exact opposite of Hypothesis 1a.

H1b: *Tariffs are cut faster in PTAs for goods that do not experience IIT than for goods that experience IIT.*

Global Value Chains

An alternative strand of research focuses on the role of GVCs for the political economy of trade. Over the past few decades, production has gone global. Because of declining costs of transport and the liberalization of trade and foreign investment, companies have started to source more inputs from countries that have locational advantages, such as a more cost-effective workforce. Trade in intermediate goods now accounts for two-thirds of total imports for the majority of Organisation for Economic Co-operation and Development (OECD) countries (Johnson and Noguera 2012, 224). The rise of GVCs is a phenomenon that is independent of the rise of IIT, although both phenomena became evident at around the same time. In fact, a good traded within GVCs can be either differentiated or homogeneous. For example, computer chips are often traded within GVCs and tend to be highly differentiated. By contrast, sugar is also traded within GVCs (as an input for the food and beverage industry) but is a relatively homogeneous good. Equally, finished goods traded outside of GVCs can be either differentiated (a car) or relatively homogeneous (a T-shirt). The two phenomena are thus independent of each other. A low correlation between our empirical measures, as discussed below, also confirms this point.

A key consequence of the globalization of production is to make a number of companies increasingly dependent on the import of intermediate goods for their production process. These companies view lower domestic trade barriers for intermediate goods as an important objective, as such barriers have a direct impact on their production costs. Even relatively low tariffs on a series of inputs can have important consequences for the final price of a finished good (Yi 2010, 365). Downstream industries thus have become another key trade policy constituency for intermediate goods. The net effect of this development should be to increase support for trade liberalization. For these intermediate goods, opposition from domestic producers to trade liberalization should be (at least partly) offset by support for liberalization from downstream companies that use the good in their production process. The European chemical industry, for example, typically lobbies in PTA negotiations for a liberalization of import tariffs on primary resources that it needs in the production process[6]. Overall, therefore, the hypothesis that results from this argument is the following:

H2: *In PTAs, tariffs on intermediate goods are cut faster than tariffs on finished goods.*

In the discussion above, we assume that countries decide on tariff cuts in PTAs unilaterally. PTAs, however, result from negotiations. This should matter most for issues where participating countries need to agree on a single outcome. For example, the provisions on competition policy contained in PTAs tend to apply to all member countries equally. This is not the case for the trade policy outcomes, namely tariff cuts, which we look at in this article. Country A can cut its tariff for a good while country B keeps its tariff for that same good. The bargaining power of country B could still explain this outcome. In our analysis, however, all member countries of a PTA appear in the dataset both as country A (when explaining their tariff cuts) and as country B (when explaining the tariff cuts they receive in the other member countries). To the extent that bargaining power is at work, therefore, it should make us find no effect for IIT or GVCs. For example, country B would force country A to quickly cut its tariff on an intermediate good, but keep its own tariff. In the overall analysis, we would only see modest liberalization for that good.

Empirical Analysis

Explanatory Variables

In terms of explanatory variables, to test Hypothesis 1a and Hypothesis 1b we need to operationalize IIT. To do so, we rely on trade data from the BACI database that is disaggregated at the six-digit level of the HS.[7] We use average trade data over a four-year period, as trade flows can undergo considerable fluctuations.[8] For each tariff line, we calculated the Grubel Lloyd index of IIT ($1 - \frac{|imports - exports|}{imports + exports}$), as is standard in the empirical trade literature (Grubel and Lloyd 1971). The Grubel Lloyd index scores between 0 (when countries only import from or only export to the other country) and 1 (when the two countries simultaneously import and export the same amount of a good).[9] Figure A2 in the appendix shows the mean of *IIT* by HS section.

[5] On the role of uncertainty in explaining protectionism, see Rodrik (1995, 1479).

[6] Interview with a representative of the European chemical industry, 6 October 2015.

[7] CEPII 2014. We provide more information on this dataset in the appendix.

[8] Our results do not change if we use two-year or six-year windows. Since BACI data are only available as of 1995, the full four-year window is not present for the first four years of our time span. The year fixed effects included in our models control for this.

[9] In our dataset we have three entities, ASEAN, the EU, and CAFTA, which are treated as trade blocs in tariff schedules. For these blocs we first sum imports and exports of each member country with the trade partner. We then use these values to calculate the Grubel Lloyd index.

The Grubel Lloyd index is not defined when there is no trade between two countries, since the denominator would be 0. For these observations, and when trade data are completely missing, we set IIT to 0. Since trade data are unlikely to be missing at random, it is important not to lose these observations. To control for them, we include a dummy variable (*IIT missing*), which is assigned a score of 1 in the case of zero trade. Concretely, this implies conditioning the effect of IIT on countries exchanging goods within the given six-digit HS industry.

In robustness checks, we use Rauch's (1999) classification of goods to distinguish between differentiated and homogeneous goods. This measure derives from the idea that homogeneous goods are sold on organized markets, whereas products with some substitutability have reference prices. *Differentiated* is coded 1 for goods that Rauch classified as differentiated and 0 for all others, that is, organized exchange and reference priced.[10] Rauch's measure is disaggregated at the four-digit SITC (rev. 2) level and constant over time and across countries. However, Rauch's measure does not have missing values and is directly related to product differentiation, which should mainly be responsible for the effect of IIT on the political economy of trade. Figure A3 in the appendix shows the proportion of differentiated goods by HS classification. The correlation between differentiated and IIT at the product level is 0.32.

Hypothesis 2 emphasizes the distinction between finished and intermediate goods. To operationalize this distinction, we rely on a classification of products as being for "intermediate consumption," "final consumption," or of "mixed use" (Bekkers, Francois, and Manchin 2012; Timmer 2012). Mixed use suggests that products can serve both as intermediate goods and as final consumption goods. For instance, inulin, which is a dietary fiber used in processed food, is coded as a mixed-use good, since it is used both as an input for other products and as a final good by consumers. In comparison, malt is coded as a good used solely in intermediary consumption. In the online appendix (section A1), we describe the distinction in greater detail. In the models below, we include a dummy that takes the value of 1 for intermediate and mixed-use goods (labeled *intermediate*). Intermediate and mixed-use goods account for 77 percent of the products in our dataset. Tariffs prior to entry into force of a PTA are considerably lower for intermediates than for finished goods (means of 5.6 and 11.7, respectively).[11] This simple fact testifies to the importance of GVCs in the international trading system and suggests that countries' tariff lines had already been shaped in line with the interests of industries relying on imports prior to the date when our analysis begins. Moreover, Figure A4 in the online appendix shows the proportion of intermediates by HS section. In some sections, intermediates account for a very large proportion of the products (if not all). The average value of IIT is 0.07 for intermediates and 0.08 for finished goods. The correlation between IIT and intermediate is –0.02, which confirms that IIT and GVCs are distinct phenomena.

Control Variables

We include several control variables in the models below. First, we control for the level of tariffs before the formation of PTAs (*tmin1*) to account for the fact that these levels and the speed of tariff liberalization are not independent. Second, we control for exports and imports to avoid confounding the effect on preferential liberalization of IIT and GVCs with the effect on preferential liberalization of trade flows per se. Data on *exports* and *imports* come from CEPII (2014). For both imports and exports we are concerned about the variability of six-digit trade data. Thus, we use moving averages of imports and exports over the four years before the signature of PTAs.[12] Third, we control for gross domestic product (GDP) and GDP *per capita* (GDPpc) of countries A and B. Both market size, which is a proxy of power, and level of economic development are likely to affect tariff cuts. Data come from the World Development Indicators database (World Bank 2014). We further control for the regime type of country A (*democracy*), since the literature suggests that democracies are more open to trade than countries under authoritarian rule (Mansfield, Milner, and Rosendorff 2000). Data on regime type comes from Polity IV. Finally, we control for WTO membership, assigning a score of 1 if both countries are contracting parties to the WTO (*WTO*). Article XXIV of the WTO (and its predecessor, the GATT) asks countries that sign PTAs to cut tariffs on substantially all imports. WTO members might thus feel legally obliged to implement more ambitious preferential liberalization than nonmembers, in order to comply with article XXIV. Table A2 in the appendix shows univariate statistics for all our variables.[13]

Model Specification

Our identification strategy faces several challenges. As already mentioned, 37 percent of the goods in our dataset were duty free in the year prior to implementation of the PTA. To account for the selection effect arising from dropping these duty-free goods, we use a Heckman selection model. Specifically, we first estimate a probit model that predicts which products have pre-PTA tariffs equal to 0 (selection equation). As explanatory variables in the selection equation, we include all our predictors.[14] Moreover, we include a measure of country competitiveness at the six-digit level as an instrument for the selection equation. The rationale is that tariffs are more likely to be 0 in these industries in which countries are competitive. Data on country competitiveness comes from Hausmann, Hwang, and Rodrik (2007). To mitigate concerns of endogeneity, we use values of *country competitiveness* in 1992 (the first year for which we have data). We note a weak correlation between country competitiveness and the residuals of the outcome equation, adding plausibility to the exclusion restriction ($\rho \approx 0$). More formally, the selection equation is given by the following:

$$\begin{aligned} ZeroTariff_{ijp} = a_0 &+ \gamma_1 Intermediate_{ijp} + \gamma_2 IIT_{ijp} \\ &+ \gamma_3\, Country\ Competitivennes + \gamma_4 X1_{ijp} \\ &+ \gamma_5 X2_i + \gamma_6 X3_j + \gamma_7 WTO_{ij} + \varepsilon_{1ijp}. \end{aligned}$$

In the second stage (outcome equation), we run an ordinary least squares (OLS) regression on the subsample of products that do not have pre-PTA tariffs equal to 0 in line with a standard Heckman model. Since we use the logarithm of the number of years after which tariffs go to 0, an OLS regression approximates a survival analysis, while having the

[10] We use Rauch's (1999) "conservative" classification. Results are similar if we use Rauch's "liberal" classification.

[11] The difference in means is statistically significant.

[12] Results are similar if we use three-year or five-year moving averages.

[13] For ASEAN, the EU, and CAFTA, we take the sum of member countries' GDP and their average value of GDPpc and democracy. For the WTO, we use the minimum value across all member countries, that is, WTO scores 0 if at least one member country is not a WTO member.

[14] We are unable to include country A fixed effects because when doing so we lose almost fifty thousand observations due to perfect collinearity.

advantages of better handling the battery of fixed effects that we include on the right-hand side and not relying on the proportional hazard assumption.[15] To account for correlation between the error terms of the selection equation and of the outcome equation, we include the inverse Mills ratio on the right-hand side.[16] More formally, our full model specification of the outcome equation (with IIT as proxy for product differentiation) is given by the following:

$$TimetoZero_{ijp} = a_1 + \beta_1 IIT_{ijp} + \beta_2 Intermediate_{ijp} + \beta_3 X1_{ijp} + \beta_4 X2_i + \beta_5 X3_j + \beta_6 WTO_{ij} + \beta_7 InverseMillsRatio_{ijp} + \delta_i + \tau_t + \varepsilon_{2ijp}.$$

As discussed, *IIT* and *intermediate* are the main explanatory variables. X1 are dyadic control variables at the product level (*IIT missing*, *tmin1*, *exports*, and *imports*). X2 are control variables at the country A level, and X3 are control variables at the country B level. *WTO* is a dyadic dummy. α_0 and α_1 are constants. $\gamma 1$, $\gamma 2$, … $\gamma 7$ and $\beta 1$, $\beta 2$, …, $\beta 7$ are the coefficients of the selection equation and outcome equation, respectively. δ_i are country A fixed effects to account for cross-country heterogeneity, and τ_t are year fixed effects to account for year-specific shocks.[17] Finally, ε_1 and ε_2 are the error terms, which we assume are correlated.

Our unit of analysis is country A–country B–product (at the six-digit HS level). We rely on directed dyadic data, meaning that tariff cuts always refer to country A in our dataset. Our dataset does not include a time dimension because countries agree on the de jure tariff reductions that we are interested in at the time the PTAs are signed. The tariff cuts envisaged as being made after entry into force of a PTA are directly agreed by countries at the moment of PTA signature. Moreover, all the other time-varying independent variables take the value of the year prior to the signature of a PTA. The results do not change if we take the value up to three years prior to the signature of a PTA. Our estimates use robust standard errors clustered by products at the six-digit HS level.

We conclude with a further note on identification. While intermediate is presumably exogenous to tariffs cuts, a possible criticism of our empirical strategy is that IIT is endogenous to tariff cuts and not vice versa.[18] For instance, it may be that IIT is larger in industries with low tariffs, which likely generate more bidirectional trade, than in industries with high tariffs, which impede bidirectional trade. In this case, a negative effect of IIT on tariff transition would be upwardly biased. This problem affects virtually all empirical studies that explain trade policies. To our knowledge, there is no perfect fix for this issue. Rather, we implement several techniques aiming to reduce concerns of reverse causality and omitted variable bias.

First, we use tariff changes rather than tariff levels, while controlling for pre-PTA tariffs. Second, country A fixed effects account for any time-unvarying country-level characteristics, lowering the risk of omitted variable bias. Third, our dummy intermediate correlates strongly with two-digit HS fixed effects, meaning that some sectors have only intermediates and no finished goods. Similarly, some sectors include only differentiated goods. To ensure that specific sectors do not drive our results, we rerun our main models using multilevel statistical analysis with random intercepts and random slopes at the two-digit HS level. By analyzing variation *within* and *across* industries, we can explore industry-varying effects of IIT and intermediate (Gelman and Hill 2007).

Empirical Results

We begin by reporting the results of the selection equations (see Table 1, Model 1), which show that our instrument, country competitiveness, has the expected positive sign and is statistically significant. Thus, country competitiveness is a strong instrument for our Heckman model. Both IIT and intermediate have the expected positive sign and are statistically significant.

Looking now at the findings for intra-industry trade, we observe conflicting results for IIT. The sign of IIT is positive and significant in Model 2, which does not include fixed effects. That implies that for goods for which we observe intra-industry trade, tariffs go to 0 more slowly than in the absence of intra-industry trade. By contrast, the sign of IIT is negative in Model 5, which is a multilevel model with HS2-varying random intercepts. That implies intra-industry trade speeds up tariff cuts. In Models 3, 4, and 6, IIT is not significant at the conventional level. All in all, there is no strong evidence that intra-industry trade facilitates or speeds up preferential trade liberalization. The fact that the coefficient of IIT switches sign when including country fixed effects and varying intercepts and slopes at the industry level suggests that there is large cross-country and cross-industry heterogeneity. We return to this below.

Since these findings are at odds with some of the previous literature (Lipson 1982; Milner 1997; Manger 2012, 2015), we perform further tests to check their validity. In particular, we rerun our main models including the dummy for differentiated goods from Rauch (1999), whose measure relies on the existence of a reference price to distinguish between homogeneous and differentiated goods. Product differentiation is another proxy of patterns of bidirectional trade. The correlation between IIT and differentiated is 0.1.

We report results in Table A3 in the appendix. In all models, the sign of differentiated is positive and significant, implying that tariffs of differentiated products go to 0 more slowly than homogeneous goods and referenced priced goods. Importantly, the results of IIT do not change compared to the previous models, which makes sense given the low correlation between IIT and differentiated. The magnitude of the effect is important. In our best estimate, the speed of preferential liberalization in differentiated products is about 15 percent slower than the speed of preferential liberalization in homogeneous and referenced priced goods. In short, there is no evidence that product differentiation facilitates preferential liberalization. Thus, while there is a great deal of model dependence, our results are more in line with Hypothesis 1b than Hypothesis 1a.

We now move to analyze the results of intermediate in Table 1. The take-home message is unequivocal: the speed of preferential tariff cuts in intermediates is significantly and substantively faster than the speed of preferential cuts in finished goods. This is so, although we control for the level of tariffs before the formation of PTAs, that is for tmin1. The magnitude of the effect is striking. In our best estimate the speed of preferential liberalization in intermediates is

[15] Basu, Manning, and Mullahy 2004.

[16] Our results are virtually the same if we bootstrap standard errors to address the fact that the predicted values of the inverse Mills have standard errors that are not asymptotically efficient.

[17] We cannot include two-digit HS fixed effects, since there is no variation between intermediates and finished goods in many industries. In other words, two-digit HS fixed effects and intermediate correlate perfectly for many industries. To address this problem, we run multilevel models, which we discuss below.

[18] Our categorization of intermediates and final goods is exclusively based on products' characteristics and their use. It does not depend on whether the products are exported or imported, or which tariffs products face. Importantly, this categorization varies only across six-digit products, but does not vary across countries and over time.

Table 1. Main results

Variables	*(1) Probit tmin1 = 0*	*(2) OLS time to zero*	*(3) OLS time to zero*	*(4) OLS time to zero*	*(5) Mixed effects time to zero*	*(6) Mixed effects time to zero*
IIT	**0.04*****	**0.03*****	**0.01**	**–0.01**	**–0.03*****	**0.002**
	(0.01)	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**	**(0.02)**
Intermediate	**0.32*****	**–0.29*****	**–0.35*****	**–0.25*****	**–0.30*****	**–0.36*****
	(0.02)	**(0.02)**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.03)**
IIT missing	0.13***	0.06***	0.03***	–0.02***	–0.10***	–0.09***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
lnGDPpc A	0.50***	–0.50***	–0.58***	0.91***	0.67***	0.68***
	(0.03)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)
lnGDPpc B	–0.07***	0.05***	0.04***	0.05***	0.08***	0.07***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
lnGDP A	–0.18***	0.08***	0.09***	1.22***	1.29***	1.29***
	(0.00)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
lnGDP B	–0.004*	–0.01***	–0.02***	0.04***	0.04***	0.04***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
tmin1		0.004***	0.004***	0.004***	0.003***	0.003***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Exports	0.02***	0.03***	0.03***	0.04***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Imports	–0.01***	0.01***	0.01***	0.002*	0.0004	–0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Regime	–0.02***	–0.01***	–0.003***	0.02***	0.03***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
WTO	0.34***	–0.28***	–0.30***	–0.002	–0.16***	–0.15***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Inverse Mills ratio		–0.55***	–0.82***	–0.39***	–0.96***	–0.94***
		(0.05)	(0.05)	(0.07)	(0.08)	(0.08)
Country Competitiveness	0.09***					
	(0.02)					
Constant	–0.89***	3.85***	4.84***	–36.13***	–35.59***	–35.58***
	(0.19)	(0.07)	(0.07)	(0.55)	(0.61)	(0.61)
Year FE	No	No	Yes	Yes	Yes	Yes
Country A FE	No	No	No	Yes	Yes	Yes
HS2-varying intercepts	No	No	No	No	Yes	No
HS2-varying slopes	No	No	No	No	No	Yes
Observations	669,522	422,264	422,264	422,264	422,264	422,264
R-squared		0.28	0.30	0.42		

Notes: (1) Robust standard errors in parentheses (2) ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

about 36 percent faster than the speed of preferential liberalization in finished goods. These findings for intermediate strongly confirm the importance of GVCs in the current wave of preferential liberalization.

Table A3 confirms the results for intermediate. The sign of the coefficient remains negative and significant, though its size is generally smaller than in the models without differentiated. Moreover, the coefficients for the control variables have the expected signs, adding plausibility to our results. We also note that the *inverse Mills ratio* is statistically significant in every model, indicating that the error terms of the selection and outcome equations are indeed correlated and that selection bias must be taken into account in the outcome equation.

Two key strengths of our dataset are (1) that it covers the tariff concessions of many countries and (2) that it has *complete* coverage of all products at the six-digit level. We use this advantage to test to what extent the findings that we reported for intra-industry trade and intermediates are consistent across countries and across sectors. For this, we run Model 2 separately for each country and for each section in our dataset.[19] Figure 3 shows the coefficients for IIT and intermediate by country.

The effect of intra-industry trade is very heterogeneous across countries. In some countries, more intra-industry trade goes hand in hand with faster trade liberalization; in other countries we find just the opposite. China is the only major trading power with a negative and significant coefficient for IIT. Interestingly, the coefficient of IIT is positive and statistically significant for the United States and the EU. This result seems to imply that narrow interests are particularly powerful in the two major powers, leading to slow trade liberalization as intra-industry trade converts lobbying into a private good (Gilligan 1997). The fact that the US electoral system favors particularistic interests is well-known (Kono 2009, 902), whereas in the EU the quasi veto power of each member country in concluding trade agreements empowers narrow constituencies. For instance, Wallonia, a small French-speaking region of Belgium, recently delayed the signing of the Canada-EU Comprehensive Economic

[19] We rely on the twenty-one sections of the HS 2002 trade categorization.

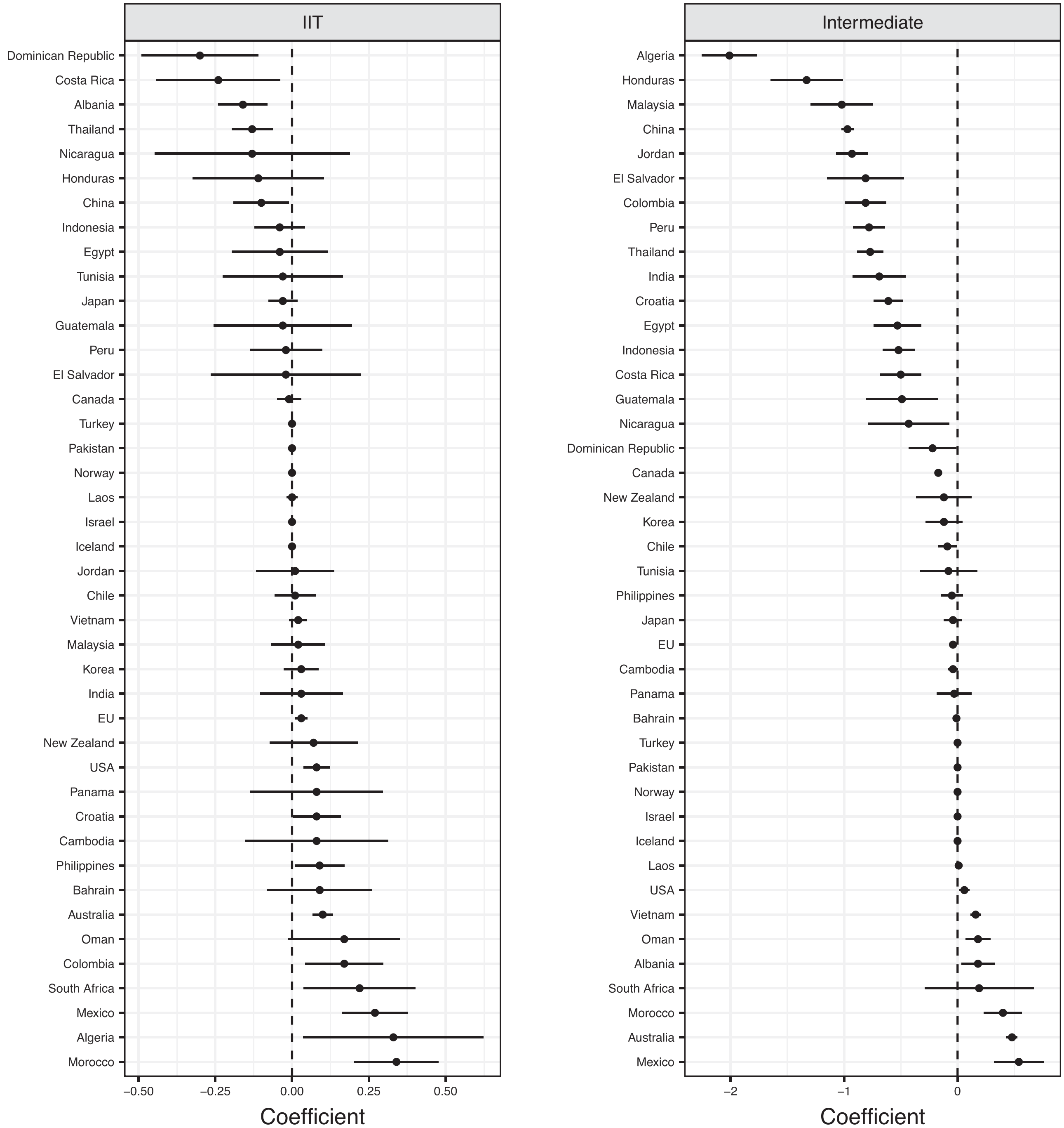

Figure 3. The effect of *IIT* and *intermediate* by country (coefficient plot)
Note: The figure shows the coefficients for *intermediate* and *IIT*, respectively, and the 95 percent confidence intervals.

Trade Agreement in part out of fear of competition from Canadian agricultural products, especially in the dairy sector (Rankin 2016).

By contrast, the finding that intermediates are cut more quickly than finished goods applies to most of the countries in our dataset. Only in seven out of forty-seven countries do we find a positive and statistically significant coefficient for intermediate, among them the United States. The result for the United States implies that this country exports (mostly high-tech) intermediates to be assembled in southern countries and reimports finished goods from these countries. Importantly, China cuts tariffs on intermediates substantively faster than tariffs on finished goods, confirming it to be a major hub of GVCs. Interestingly, there is no evidence that large countries cut tariffs in intermediates or for high-level intra-industry trade more slowly than smaller countries as a power argument would predict. Moreover, there is little evidence that level of development matters in explaining cross-country variation in the effect of IIT and GVCs on tariff transition.

Figure 4 shows the coefficients for IIT and intermediate by industry. Regarding IIT, only two industries show a negative and statistically significant sign: leather articles and textiles. The results for these sectors are in line with our

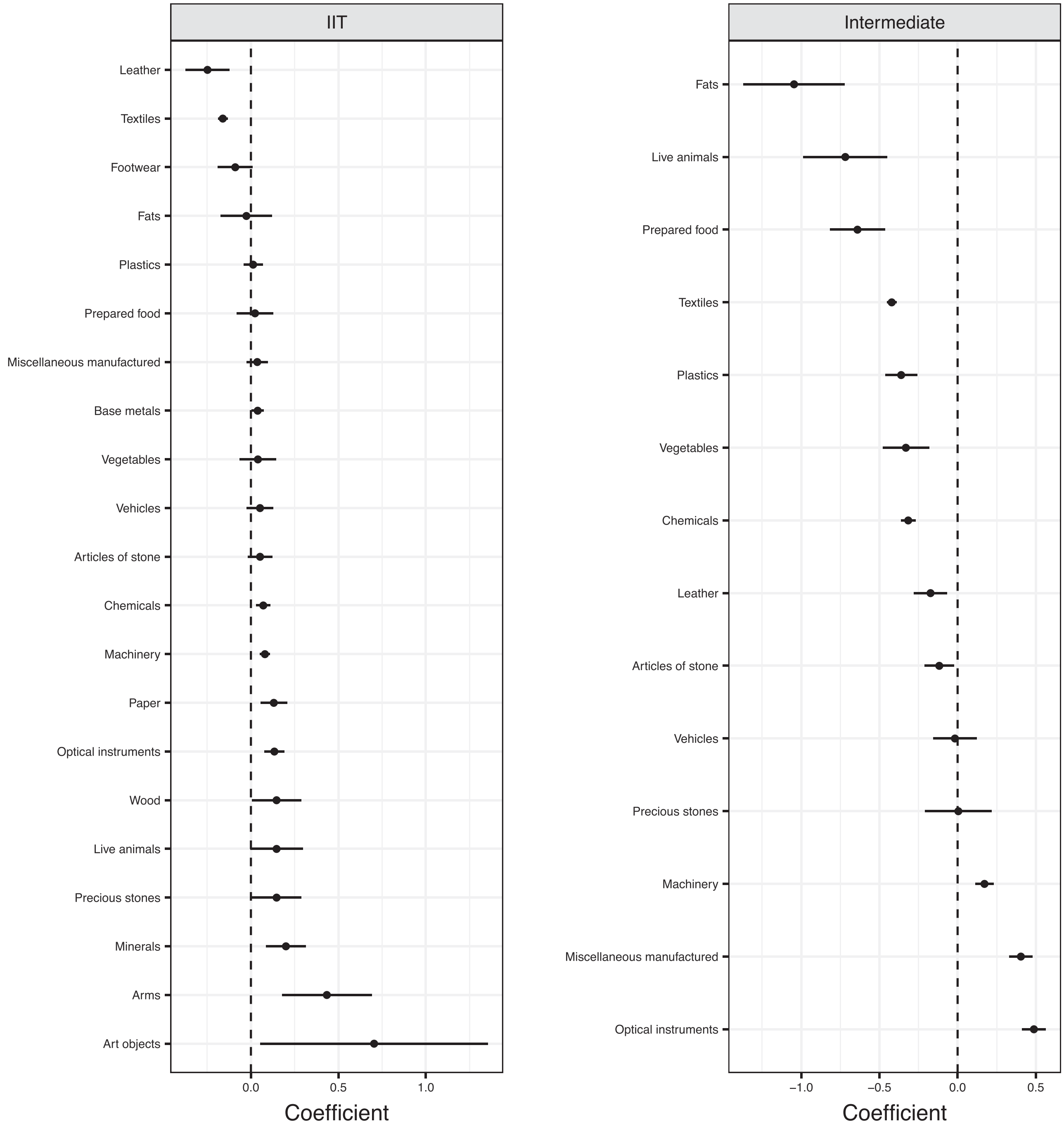

Figure 4. The effect of *IIT* and *intermediate* by industry (coefficient plot)
Note: See Figure 3.

expectations. In these cases, product differentiation—producing fashion clothes with a recognizable quality brand, for instance—allows countries to shelter their industries, to reduce the aforementioned adjustment costs, and therefore to speed up tariff cuts. However, it is striking that the coefficient for IIT is positive and significant for eleven sectors, confirming that intra-industry trade does not facilitate preferential liberalization in a large number of industries.

Regarding intermediate, the results are again clear-cut. The coefficient for intermediate is negative and significant for nine out of fourteen sectors. We are unable to estimate the coefficient of seven sections because all products within these sections are categorized as either intermediate or final goods. Thus, there is striking evidence that intermediates speed up preferential liberalization in the vast majority of industries. The only three sections that have a positive and significant coefficient are machinery, miscellaneous and manufactured articles, and optical instruments. These results may be driven by countries of the North, the EU, and the United States in particular, which reimport finished goods that were assembled in countries of the South.

We perform two final robustness checks. First, we explore how preferential liberalization evolves over time, interacting both IIT and intermediate with the year variable (see Table A4 and Figure A5). Both IIT and intermediate speed up trade liberalization more in recent years than in the 1990s and early 2000s. The result is particularly interesting for IIT, whose coefficient flips from positive to negative in 2007. Second, we use the percentage change between the pre-PTA tariffs and preferential tariffs in the year the agreement's implementation starts as an alternative outcome variable, which is another proxy for the ambition of tariff liberalization. The results of this analysis, which we report in the appendix (Table A5), are in line with the findings presented above.

Conclusion

We use an original dataset to test arguments about the impact of IIT and GVCs on the political economy of trade. The effect of intra-industry trade is ambivalent. Some of our results suggest that it goes hand in hand with faster and greater tariff cuts, while others indicate that it is accompanied by slower and smaller tariff cuts. These conflicting findings, obtained with an analysis of data for a large set of countries, mirror past findings: some studies find that IIT makes trade liberalization easier (Milner 1997; Manger 2015), whereas other research comes to the opposite conclusion (Gilligan 1997; Kono 2009). Indeed, our results reveal that the effect of IIT on tariff reduction is highly heterogeneous across countries, a point to which we will return below. By contrast, the results offer support for the argument that GVCs, by stimulating more trade in intermediates, facilitate trade liberalization. Offshoring thus has important effects on the balance of trade policy preferences in countries, a result that supports several recent studies (Chase 2005; Manger 2009; Blanchard and Matschke 2015; Jensen et al. 2015; Johns and Wellhausen 2016; Kim 2015; Baccini et al. 2017; Owen 2017).

A particular feature of this research note is that we test these arguments about the impact of IIT and GVCs using the universe of PTAs signed by seven major trading entities: Australia, Canada, China, the EU, Japan, South Korea, and the United States. This allowed us to also look at variation across countries. Whereas the effect of GVCs is relatively stable across countries, the finding of large cross-country variation in the relationship between IIT and tariff liberalization calls for further research. What explains this variation? One possible explanation is that IIT interacts with electoral institutions to determine trade policy outcomes (Kono 2009). Alternatively, the effect of IIT may be conditional on the type of goods a country mainly imports, with IIT possibly having different effects for final consumer goods than for intermediate goods. Our dataset will allow for future research on these issues.

Our dataset also allows researchers to better investigate a number of other important questions. For one, it can contribute to a better understanding of the political economy of trade liberalization at a highly disaggregated level. Matching our tariff data with firm-level data would allow for a test of the main insights of the New New Trade Theory (Melitz 2003). For instance, key predictions of this theory hold that tariff cuts should be larger in industries in which highly productive firms, or firms with much arm's-length trade or FDI, operate. Related to this, the dataset can shed light on who gains from trade agreements, whether tariff cuts improve firms' performance, and which types of firms benefit the most. Since tariff transition periods are a type of flexibility that countries can include in international agreements (Baccini et al. 2015, 769), the dataset could also be used to test key predictions raised in the literature on the rational design of international institutions (Koremenos et al. 2001). For example, as distributional concerns most likely vary across sectors and products, our disaggregated data could allow for a test of the conjecture that the need for flexibility increases in parallel with the severity of the distribution problem (Johns 2014).

Scholars could also use the dataset to compare the effect of tariff cuts on trade and FDI with the effect of trade-related provisions, such as those on standards, public procurement rules, investment provisions, and intellectual property rights. For instance, previous studies find that trade agreements that include trade-related provisions increase trade significantly more than do agreements that exclusively deal with tariff cuts (Dür et al. 2014, 372). However, without including a measure of tariff cuts as a covariate, it is difficult to separate the two effects, since tariff cuts and trade-related provisions could be correlated, leading to spurious relationships. Disentangling the two effects would help answer the question regarding the degree to which tariffs still matter for trade, as well as what role the removal of behind-the-border measures plays in today's liberalization agenda. At a time when PTAs have become politically controversial, such efforts would shed new light on the question of whether there any benefits from signing PTAs.

In addition to new avenues of research, certain policy implications of our article merit attention. In particular, the data can help locate those actors most likely to object to protectionist border measures, such as an increase in tariffs of the kind advocated by members of the current Trump administration. This may help those interested in creating coalitions in favor of the current, open trading system. Moreover, it can inform policymakers about best practice in the reduction of tariffs in PTAs. For example, an analysis of the data can show whether a long phase-in period for tariff cuts really facilitates adjustment—and hence reduce job losses that increase opposition to free trade. Overall, by shedding new light on the politics of preferential trade liberalization, this study contributes to important and controversial policy debates in the current era of globalization.

Supplementary Information

Supplementary information is available at https://sites.google.com/site/leonardobaccini/publications/journals and at the *International Studies Quarterly* data archive.

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