# Firms' Preferences over Multidimensional Trade Policies: Global Production Chains, Investment Protection and Dispute Settlement Mechanisms*

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**Abstract**

In addition to the conventional focus on market access, recent trade agreements have included provisions related to other aspects of trade, such as investment protection, dispute settlement mechanisms, and escape clauses that enhance flexibility. We argue that preferences over these increasingly salient dimensions of trade policy will vary by firm, not by industry, and that a firm's preferences will depend on its position within global production networks. To estimate preferences over multiple policy dimensions, we use a conjoint experiment on firms in Costa Rica, a middle-income democracy in the developing world. We find that investment protection is the most salient trade policy dimension for firms who are most deeply integrated into global production networks. In addition, strong dispute settlement procedures are most valued by exporters who are not central to global supply networks. Furthermore, we find far fewer differences across industries than among firms, thus challenging the conventional focus on inter-industry distinctions in the trade policy literature.

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# 1 Introduction

Characterizing political actor's preferences over trade policy has been key for understanding the politics of trade (Rodrik, 1995). A vast literature examines the distributional implications of trade policy across different interest groups and individuals given their interests. Scholars identify the winners and losers based on numerous political and economic factors, such as factor ownership and mobility (Rogowski, 1987; Alt et al., 1996; Hiscox, 2002), electoral politics and political institutions (Mayer, 1984; Mansfield, Milner, and Rosendorff, 2000; Milner and Kubota, 2005), asset ownership (Scheve and Slaughter, 2001), and industry characteristics (Trefler, 1993; Grossman and Helpman, 1994), to name just a few. An implicit assumption underlying these studies is that policy preferences are one-dimensional in that actors either favor or oppose trade liberalization.

Despite the prevalence of one-dimensional characterizations of political actor's preferences, trade policy has become increasingly multidimensional. Current trade agreements not only address the elimination of tariffs and non-tariffs barriers for market access (i.e., freer trade), but also encompass various rules and standards regarding production, environmental protection, flexibility of commitments, investment protection, and dispute settlement mechanisms (Rosendorff and Milner, 2001; Busch, 2007; Kucik, 2012; Estevadeordal, Suominen, and Teh, 2009; Mansfield and Milner, 2012; Dür, Baccini, and Elsig, 2014). These latter types of policies have much more complicated implications for trade. Over the last several decades, scholars have noted the multidimensionality of trade agreements, and carefully examined the political implications of each of these policy dimensions (Goodman, Spar, and Yoffie, 1996; Busch, 2007; Kucik and Reinhardt, 2008; Blanchard, 2010; Wellhausen, 2015; Blanchard, Bown, and Johnson, 2016). However, that actors might evaluate these new forms of trade policy apart from the dichotomy between free trade and protectionism and that they might weigh the multiple aspects of complex trade policies in their entirety have remained understudied.

In this paper, we examine variation among firms to better understand the multidimensional nature of policy preferences. In particular, we investigate how different types of firms value investment protection and dispute settlement mechanisms in relation to other policy dimensions such as market access and export subsidies. We argue that the degree of a firm's involvement in global value chains (GVCs hereafter) will affect their evaluation of different policy dimensions. Specifically, firms embedded within a global production network will perceive strong protection of investment as the *most* important aspect of trade

policy, while powerful dispute settlement mechanisms will be more important for firms outside of such networks.[1] Our argument relies on the assumption that firms positioned differently in terms of GVCs cope with the risks and uncertainties inherent in global trade differently. While firms in GVCs are parts of interrelated contractual relations, sharing the risks of time-inconsistency problems among themselves, other firms that engage in trade autonomously must rely on other instruments, such as strong dispute settlement mechanisms, to ensure that their international trade flows are not disrupted. As Johns and Wellhausen (2016) point out, global supply chains may serve as "informal property rights" institutions, whereby firms' activities in multiple nations are tightly linked.

The main contribution of this paper is to show that firms evaluate various policy dimensions differently depending on their engagement in international trade in general and global production networks in particular. We argue that the conventional way of portraying political actors' preferences as *either* in favor of protectionism *or* trade liberalization, or somewhere in between, on a single dimensional space is too restrictive. That is, firm's preferences are multidimensional since trade policies consist of multiple issue areas (Lauderdale and Clark, 2014). This is not to say that each policy issue is independent from the other. In fact, a firm's preferences over one policy issue are likely to depend on the availability and utility of other trade policies. For instance, firms need to calculate the value of investment protection given the current barriers to market access as well as the extent to which they can challenge foreign governments through dispute settlement mechanisms. Nevertheless, certain policy dimensions will become more or less salient than others when firms consider multiple aspects of a given policy at once.

To estimate a firm's preferences over various policy areas in their entirety instead of focusing on each dimension separately, we employ conjoint analysis (Hainmueller, Hopkins, and Yamamoto, 2014, and references therein). It is a survey method that allows us to identify firms' relative preferences across multiple policy dimensions based on a fully randomized design. In the conjoint design, respondents are provided with information about all the policy dimensions *at once* and for each dimension the policy attribute is assigned randomly. This method is designed to estimate the intensity of firms' preferences over each policy dimension in relation to others. Thus, it serves our goal of obtaining a comprehensive picture of the multidimensional preferences of firms.

We conducted our study in Costa Rica, which is a stable democratic country that has opened up to trade by joining the GATT in 1990, and signing 13 PTAs over the years. We introduce data to show

[1] Throughout the paper we will use the terms global production chains and global production networks interchangeably.

that Costa Rica is a typical middle income developing country in terms of its economy and that it is part of global production networks. We surveyed 214 Costa Rican firms who were presented with five sets of paired trade policies that differ in degree along the following five dimensions: (1) investment protection, (2) reduction of tariff and non-tariff barriers, (3) export subsidies, (4) use of dispute settlement mechanisms, and (5) flexibility of international commitments.

We find that for many types of firms, the standard trade policy measures of yesteryear—tariffs and subsidies—are no longer their most important concerns.[2] Instead, exporters and multinationals, but especially the latter, prefer strong investment provisions. We also find that there exists much heterogeneity among exporters. First, exporters that are involved in GVCs by engaging in both exports and imports consider investment protection as the most important policy dimension, unlike exporters outside of GVCs and domestic firms. Second, strong dispute settlement procedures are most preferred by exporters that are outside of these global production networks. Finally, using various measures of industry classifications, we do not find consistent evidence for inter-industry variation in trade policy preferences. Rather, firm characteristics seem to matter more than industry characteristics in shaping preferences over trade policies, especially with respect to investment protection and dispute settlement mechanisms. Our findings call into question whether existing accounts of why governments engage in trade agreements will also apply to trade agreements with multiple policy instruments (Bagwell and Staiger, 1999; Grossman and Helpman, 1994).

Our work builds upon the rapidly growing literature on firm-level theories of international political economy (Bombardini, 2008; Plouffe, 2015; Kim, 2016; Osgood, 2016; Osgood et al., Forthcoming). Our investigation of firm's preferences over multiple policy dimensions provides an important link to the literature that has focused on firms' heterogeneous interests on a specific policy issue, such as FDI (foreign direct investment) regulation, anti-dumping or market access (Jensen, Quinn, and Weymouth, 2015; Baccini, Impullitti, and Malesky, 2015; Pandya, 2016). Yet, consistent with the literature, we find that preferences over different dimensions of trade policy will vary by firm, not industry. Our theoretical framework also extends the new, new trade theory (Melitz, 2003; Bernard et al., 2007) that has become an important component for studies of trade politics. While the new, new trade theory (NNTT) focuses

[2]It is important to note that tariffs still play an important role in deterring market access in many countries. For example, as of 2014, Costa Rica's mean applied MFN tariff rate is 7%. Its mean rate on 4,898 dutiable products is 13.28%. More than 91% of tariff lines are dutiable in China, and its mean MFN applied ad valorem rate is 10.62%.

on firm's productivity differences in explaining firms' heterogeneity in accessing foreign markets, we distinguish among exporters by highlighting the differences arising from their involvement in GVCs.[3]

The rest of the paper is organized as follows. In Section 2, we theoretically investigate firms' preferences over multiple trade policy issues such as investment protection and dispute settlement mechanisms. Section 3 sets forth our experimental design and the data. In Section 4, we present empirical results on firm's heterogeneous preferences over multiple policy dimensions, and discuss the relevance of the inter-industry comparison. Finally, Section 5 discusses the appropriateness of Costa Rica for examining our hypotheses, and the importance of firms' political roles in the new economic environment. The last section draws wider conclusions.

# 2 How Firm Preferences Vary with the Extent of their Involvement in Global Trade

Important changes have occurred in the nature of global trade flows: while overall trade has grown fast, intra-industry trade and exchanges within global production networks have grown the fastest (Krugman, 1980; Bernard et al., 2010; Antràs, 2003). These two forms of trade now account for well over 80 percent of all trade flows (OECD, 2013). What is more, the prevalence of import and export flows within the same industry in a country and the growth of global production networks suggest that theories of trade policy-making need to consider firms as one of the primary political actors.

First, firms' heterogeneous engagements in international trade — even within the same industry — have important implications for understanding trade politics. Although differences across industries are still relevant, intra-industry trade implies that firms within the same industry are producing highly differentiated products and that some of them face import competition while others export. In fact, the presence of intra-industry trade (i.e., import and export flows in an industry occurring concurrently) requires the recognition of heterogeneous preferences across firms because firms with different levels of engagement in trade coexist in the same industry. That is, industries are now populated with import-competing domestic firms, exporting firms, and multinational firms, with potentially little overlap in their salient trade policy preferences. Firms within the same industry thus will have different preferences for trade policy and different interests in political activity related to trade.

[3]Recent estimates show that MNC-coordinated production chains account for 80 percent of global trade, with local firms contributing 40 to 50 percent of export value added. See Johns and Wellhausen (2016, p. 33).

Second, the expansion of global production networks also generates firm-level differences, even among firms that engage in international trade (Hummels, Ishii, and Yi, 2001; Yi, 2003). Many firms now import and export intermediate goods to supply their own subsidiaries or other firms as a part of a network of global production, while others outside of such networks tend to trade autonomously. Global production networks are linked to multinational firms and firms that import and export simultaneously. First, multinational firms establish production facilities in various countries and use the different products they make in each to source inputs into their final products in a global production network. Second, many local firms now import and export mainly to serve GVCs; they import inputs from their upstream partners and export parts and components, which then become inputs into production by their downstream partners. These local firms are key elements in global supply chains as they contribute almost 50 percent of export value added (OECD, 2013).

The growth of intra-industry trade and global production networks has accompanied the growing importance of different types of trade policies (e.g., Büthe and Milner, 2008; Dür, Baccini, and Elsig, 2014). All major bilateral and multilateral trade negotiations in recent years have focused not only on traditional policy measures affecting market access, such as tariffs, subsidies, and non-tariff barriers (NTBs), but also increasingly on other policy instruments such as investment provisions, dispute settlement mechanisms, and flexibility measures. While many scholars have noted the changes in trade flows described above, however, fewer have connected them with the rise of new dimensions of trade policy and firm's heterogeneous interests over them. In fact, most theories of trade and studies of trade policy have focused primarily on differences across industries with respect to traditional policy tools for market access (e.g., Magee, Brock, and Young, 1989; Grossman and Helpman, 1994; Rodrik, 1995; Grossman and Helpman, 1997; Kono, 2006).

Although market access is still an important policy issue for political actors, other policies have become increasingly relevant for firms that engage in these new forms of international trade. The protection of firms' investments abroad has become particularly important because governments cannot credibly commit to forgoing exploitative policies such as nationalization or discriminatory regulation and taxation (Jensen et al., 2012). Investment protection involves different types of clauses that include not only general commitments to foster FDI, but specific provisions regarding the treatment of foreign investors. In general, there are three elements that could be in an investment provision: 1) national treatment, 2) Most Favored Nation (MFN) treatment, and 3) investment dispute settlement procedures with

international arbitration included. In NAFTA for instance, Articles 1102 and 1103 (part of its investment chapter) promise both national treatment and MFN treatment. The strength of investment provisions varies across agreements. As an example, the Japan-Malaysia PTA has all three elements: national treatment, MFN treatment, plus an investor dispute settlement mechanism that relies upon an international arbitration board. By contrast, the EFTA-Mexico PTA of 2000 is much weaker; it contains an investment provision (Section V) that offers some assurances regarding FDI, but makes no mention even of MFN or national treatment.

We argue that a firm's evaluation of investment protection will depend on its involvement in global production networks. Firms in GVCs tend to import intermediate goods from their upstream partners, while exporting their own products to firms in downstream production stages. What governs global production is a set of foreign direct investments across multiple nations. Consequently, these firms, even when they do not make direct investments themselves abroad, rely heavily on the stability of both production facilities and trade flows across various countries along the entire production chain. Although firms in GVCs will still value freer trade, investment protection will be the most salient issue because a disruption at any point in the production network is likely to affect the survival of the many firms involved. Thus, firms involved in global production networks will desire strong investment protection against any "expropriative motive" of foreign governments (Blanchard, 2010; Wellhausen, 2014, 2015).

Such demands are important in recent trade politics. Weak protection of investments by a foreign government makes firms in GVCs less likely to consider being involved in production chains that are associated with firms from that country, and hence domestic firms will be less likely to obtain contracts from them. In turn, offshoring and outsourcing will decline, and a country will lose out on taking part in GVCs. Hence it is in the interest of both the governments and the firms involved in GVCs to find a way to constrain the government's ability to use domestic policies for these expropriative purposes (Antràs and Staiger, 2012).

In this regard, the importance of investment protection will be particularly pronounced for multinational firms. Multinational firms internalize the externalities of the "hold-up problems" they face by vertically integrating with foreign firms. That is, trading within the boundary of firms but across national borders can prevent potential under-investments by their partners (Antràs, 2003). The key assumption underlying the stability of such contractual relations is that asset ownership will be protected by governments. In fact, multinational firms rely on complex investment protection provisions as they operate

in many countries. For example, Spentex Industries Ltd., an Indian textile manufacturing firm with its own GVCs involving firms in Uzbekistan, the Czech Republic, and Mauritius, created a Dutch subsidiary in order to file suit against the Uzbekistan government on the basis of the Netherlands-Uzbekistan BIT after its assets in Uzbekistan were seized. Indeed, recent studies have identified the importance of related-party intra-firm trade in shaping multinational firms' preferences. Jensen, Quinn, and Weymouth (2015) in particular show the importance of related-party contracts to trade preferences for firms. Blanchard (2010) further demonstrates that adding foreign ownership into a model of NNTT fundamentally changes the nature of trade politics; for profitable foreign investment to occur, it becomes imperative for governments to constrain themselves from using domestic policy tools to shift profits away from multinational firms. Using this theoretical framework, we present our first hypothesis.

HYPOTHESIS 1 *Firms most involved in GVCs will most prefer strong investment protection.*

To operationalize a firm's involvement in GVCs, we go beyond the version of NNTT (e.g., Melitz, 2003) that focuses primarily on distinguishing firms' engagement in *exporting* based on their productivity differences.[4] Specifically, we explore the differences among exporters based on their import activity and ownership structure. First, we distinguish "exporting-only" firms from exporters that also engage in importing inputs. As Bernard, Jensen, and Schott (2009) find, using detailed U.S. firm-level data, "Firms that both export and import have greater breadth of global engagement than firms that do not trade or firms that just export or just import." Although few studies investigate the co-occurrence of exports and imports, it is important to note that firms in GVCs often import intermediate goods from abroad while exporting their own goods for further processing, as noted above.[5] Second, we distinguish multinational firms with international ownership from other exporters with domestic ownership. As Helpman, Melitz, and Yeaple (2004) show both theoretically and empirically, the high productivity of multinational firms allows them to serve foreign markets directly through foreign investments rather than relying on exports incurring variable trade costs. That is, multinationals are fundamentally different from other firms with domestic ownership because they engage extensively in related-party trade to serve their own global

[4]Our approach is consistent with the recent advancement of NNTT such as Eaton, Kortum, and Kramarz (2011) and Antràs and Staiger (2012).

[5]One might alternatively define intermediate goods exporters as firms in GVCs. We note, however, that a lot of final goods exporters in developing nations are also parts of GVCs. In fact, we find that more than 60% of final goods producers in our sample are importing foreign products. These firms are mostly from manufacturing industries.

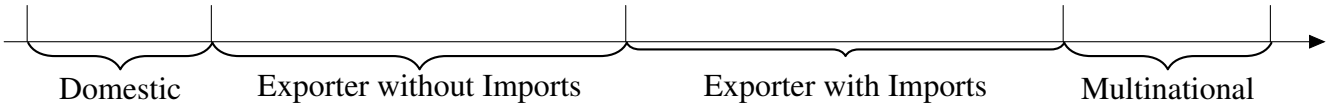


Figure 1: **Sorting Firms Based on their Involvement in Global Production Chains:** We distinguish two types of exporting firms depending on their levels of engagement in global production networks. Exporting firms without imports tend to export final goods without being involved in complex contractual relations with foreign partners. On the other hand, firms that simultaneously export and import depend on the stable operation of global production chains. Finally, multinational firms are most directly involved in GVCs as they make foreign direct investments to serve their own production chain.

production chains. We summarize our operationalization of firm's involvement in GVCs in Figure 1.

Next, we consider other trade policy instruments that are designed to mitigate global risks and uncertainties for firms. In particular, dispute settlements mechanisms (DSMs) designed to facilitate a more secure and predictable trading system have grown in importance. Many DSMs follow the WTO's successful formula for such processes (Busch, 2007). Like investment protection provisions, there exists large variation in the degree of legalism across dispute settlement mechanisms in international trade agreements. Some agreements include DSMs that are mostly diplomatic, while others are more legalistic (Smith et al., 2000; Kim, 2008). For example, the India-Nepal Free Trade Agreement does not include any third-party review and institutionalized means to reduce trade tensions. On the other hand, the Trans-Pacific Partnership Agreement (TPP) currently stipulates that any complaining member state may select a panel or a tribunal in which they can settle the dispute between governments. TPP also includes a separate investor-state dispute settlement (ISDS) mechanism, which grants investors and firms the right to sue foreign governments directly. With such strong DSMs, firms are empowered to bring cases against foreign governments either directly or indirectly when trade agreements are seemingly violated. That is, the ability of firms to formally challenge deviations from agreed commitments can function as an insurance mechanism for firms that engage in international trade.

The distinction that we made for exporters based on the levels of involvement in GVCs is also useful for understanding firms' preferences about DSMs. Specifically, we argue that the added value of DSMs in dealing with time inconsistency problems is lower for firms in global production networks than for autonomous firms. This is because the former have already reduced various uncertainties associated with trade through their contracts with their international partners. Firms in GVCs create relationship-specific

contracts amongst each other that can reduce the costs and risks of changes in foreign government policies through both economic and political means. First, firms have more direct control in writing their own contracts *specific to* their business relations than in crafting international trade agreements. Firms in GVCs rely on "relation-specific" contracts with particular partners to import and export, allowing them to flexibly respond to government policy changes within the boundary of the firm (offshoring) or by using their inter-firm contracts (outsourcing). These between-firm contracts, which firms have direct control over, can serve as insurance against unexpected changes in government trade policies. Relation-specific contracts thus give firms better economic capacity to deal with the risks of global trade and government intervention.

Second, firms in GVCs share the costs and risks of trade through their contractual relations, and uncertainties can be more effectively managed among themselves rather than by relying on formal dispute settlement mechanisms.[6] As Johns and Wellhausen note: "Firms in a supply chain are partners: if the host government breaches its contract with one firm in the chain, then all members of the chain can be harmed.... When a firm in a supply chain is targeted, other firms in the chain have incentives to exert effort to protect the target." This implies that a host government is most likely to honor its commitments to foreign firms which are economically linked to other firms in the host economy and to violate its commitments to foreign firms which operate in isolation. Hence relations-specific contracts in GVCs can help firms build political alliances within the countries they deal with.

On the other hand, firms that are not a part of GVCs will have to bear the costs by themselves. Unlike firms integrated in global production networks, these types of firms do not have added insurance through relation-specific production chains, making them more vulnerable to to unexpected government policy changes. Thus, for autonomous exporters outside of GVCs, the availability of other policy instruments such as DSMs that can help them manage the risks and uncertainties entailed in trade is highly desirable for their profitability and survival. They can enhance the predictability and stability of the terms agreed to in international trade agreements. For example, Fonterra, a dairy processor and exporter from New Zealand, demanded the active use of dispute settlement mechanisms against several foreign governments' support for their dairy industry. Trade Negotiations Minister Jim Sutton said "The WTO dispute settlement mechanism has proved extremely valuable for New Zealand. It has enabled better access for

[6]To be sure, firms should incur "contractural hazards" costs in maintaining their contractual relations in return for the benefits of risk-sharing (Henisz, 2000).

our butter to Europe and the removal of unjustified restrictions on our lamb exports to the U.S."[7] Similarly, as Jensen, Quinn, and Weymouth (2015) find, firms engaged in arm's length trade are actually much more likely to use anti-dumping measures than firms with related-party trade networks. Thus, we expect that autonomous exporters will desire that their governments have access to aggressive dispute settlement mechanisms to insure themselves against any unreasonable trade policy changes introduced by foreign governments. This set of claims leads to our second hypothesis.

HYPOTHESIS 2 *Strong dispute settlement mechanisms will be most preferred by autonomous exporters outside of GVCs.*

This is not to argue that firms in GVCs will consider DSMs to be unimportant. Rather, we expect them to find them less essential than investment protection, while autonomous exporters will find them more important than such protection, relatively. For example, multinationals will care about DSMs to the extent that their foreign investments and contracts can be insured through DSMs (see the third aspect of investment provision described above). This can be seen from the growing importance of investor-state dispute settlement (ISDS) mechanisms. Yet, the value of DSMs as an insurance mechanism against uncertainties will be diminished for firms in GVCs if they can cope with them through relation-specific contracts to begin with.

If DSMs are important policy instruments that provide insurance against volatile trading environments for firms that engage in international trade, other flexibility measures built into trade agreements can serve similar functions for domestic firms that experience foreign competition. Indeed, various escape clauses that allow flexibility in implementing the terms of agreements have grown in their importance and frequency over the last decades to mitigate risks and uncertainties associated with trade (Mansfield and Reinhardt, 2008; Pelc, 2009; Busch and Pelc, 2014). Most agreements now include various escape clauses and safeguards that allow trading parties to temporarily suspend parts of their agreements (through anti-dumping, countervailing duties, and national security exceptions, for example) (Rosendorff and Milner, 2001). We also explore firms' preferences for these types of escape clauses.

To be sure, there are numerous other trade policy issues and provisions that are part of agreements, such as labor standards, environmental protection, sanitary and phytosanitary (SPS) restrictions, and intellectual property rights (Horn, Mavroidis, and Sapir, 2010). Although our focus on investment provi-

[7] Available from http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=231596

sions, dispute settlement mechanisms, and flexibility measures along with traditional tariff and non-tariff barriers to trade is not exhaustive, the primary goal of this paper is to investigate how preferences of firms differ across these important, multiple policy dimensions. As noted, the prevalence of intra-industry trade and global production networks implies heterogeneity across firms even within the same industry. Simply put, we expect that intra-industry variation in preferences should be greater than inter-industry variation.

HYPOTHESIS 3 *Trade policy preferences will vary more by the type of firm than by their industry.*

In sum, unlike most studies that tend to view political actors' preferred trade policy as defined on a single dimension along a continuum from protection to free trade, we consider the preferences of firms to be multidimensional. Moreover, we argue that firms will evaluate each dimension differently, according to the nature of their insertion into the global economy. That is, for some firms investment provisions might be the most salient issue area, while for others traditional market access might have more direct impacts when each dimension is compared against others. Evaluating each dimension *in relation to* others poses significant empirical challenges, which conjoint analysis enables us to overcome.

# 3 Conjoint Design and Data

This section describes the design of our survey to estimate firms' preferences across multiple policy dimensions. We introduce our paired profiles conjoint design in Section 3.1. Section 3.2 describes some of the empirical challenges in a firm-level survey, and introduces our data.

## 3.1 A Paired Profiles Conjoint Design

Our main empirical challenge is to identify the *relative* salience of each dimension of the multidimensional preferences of firms. Conventional survey techniques are not suitable for this task as they are designed to elicit preferences over one dimension only (or a single policy that is a composite of many dimensions) in isolation from others, e.g., support for tariff reductions (or support for NAFTA). Such an approach is particularly problematic if firms' views on a given dimension change as they consider other dimensions at the same time.

We overcome this problem by employing randomized conjoint analysis (Hainmueller, Hopkins, and Yamamoto, 2014). Conjoint analysis is an experimental design that allows us to identify dimensions of trade policy that are especially salient for respondents relative to other attributes. In this paper, we

focus on estimating the Average Marginal Component Effect (AMCE) of each policy dimension on a firm's support for a set of proposed trade policies. As noted, when preferences are multidimensional, the effect of one dimension (e.g., investment protection) may differ depending on the valuations of other policy dimensions (e.g., aggressive use of DSMs). The AMCE is useful for finding out how different valuations of a specific policy dimension (e.g., weak vs. strong investment protection) influence the marginal probability that a proposed trade policy is chosen, while averaging over the effects of all other policy dimensions. Thus, conjoint analysis is suited for obtaining a comprehensive picture of the multidimensional preferences of firms. We focus on five aspects of trade policy: (1) investment protection, (2) reduction of tariff and non-tariff barriers, (3) export subsidies, (4) use of dispute settlement mechanisms, and (5) flexibility of international commitments.

We chose these five aspects of trade policy because they are the most prominent dimensions in contemporary trade agreements (e.g., Büthe and Milner, 2008; Dür, Baccini, and Elsig, 2014; Osnago, Rocha, and Ruta, 2015). All five affect either the prices of goods and services produced by firms or the costs firms face from other governments' policies on trade. Two of the five dimensions are very traditional measures: tariff reductions and export subsidies. Almost all studies of trade policy preferences examine tariffs and/or non-tariff barriers since they are the most common forms of trade protection. Export subsidies are a common topic within the WTO and an important aspect of trade relations. We want to see if these traditional policies are still the most important aspects of trade agreements for firms when other aspects of trade policy are considered simultaneously.

We use a paired conjoint design where firm representatives are asked to complete five tasks.[8] To ensure that the orderings of five dimensions do not affect the evaluation of other dimensions, we randomly vary the order across all tasks. In each task, respondents compare two trade policies that have randomly varying attributes across the five dimensions and choose the overall policy that reflects the preferences of their firm. To help respondents understand the context, we also provided a brief summary of the meaning of each policy dimension. We do not allow an option of choosing neither. This forced choice conjoint design is known to encourage survey respondents to more carefully examine the information about each policy and, more importantly, to increase their engagement with each task, relative to other

[8]To ensure that we have representatives whose interests are aligned with the broad interests of firms, we asked "What is your position in the company?", with four choices: 1) Owner/co-owner, 2) Director or manager, 3) Analyst, and 4) Other. 41.8% of the respondents who answered the question identified themselves as an owner and 48.8% as a director or manager.

designs such as single-profile conjoint (Hainmueller, Hangartner, and Yamamoto, 2015). In fact, our respondents completed 4.89 tasks out of 5 tasks on average. The paired design, where two profiles are presented next to each other, also makes it easy for firm representatives to compare the two policies on each dimension. Appendix A1 contains the complete wording we used for the conjoint experiment.[9]

## 3.2 Firm-level Data on Costa Rican Exporters

Firm-level theory has become an integral part of the international political economy literature. However, few empirical studies have directly examined the heterogeneity in firms' preferences towards various dimensions of trade policy. This is primarily due to the limited access to firms by researchers. In general, firms are reluctant to share information on their operations and performance as such data might be used to their disadvantage by competitors. The confidential nature of firm-level data also makes it difficult for researchers to examine sample selection problems even after a survey is conducted. That is, it is often impossible to verify whether a survey sample represents the population of interest because no information about the population, if not the sample, is available. Furthermore, a specific challenge for our study of firms' preferences over international trade policy is that it is even more difficult to obtain a reasonable number of exporting firms in our sample because only a very small number of firms export (Bernard et al., 2007).

To overcome the difficulty in approaching exporters, we partnered with PROCOMER (Promotora del Comercio Exterior de Costa Rica). The export promotion agency of Costa Rica provided us with contact information for a random sample of 1,506 exporters. In fact, this list covers a significant proportion of the entire universe of exporters in the country. For example, the number of firms that export at least one product in 2012 was 2,504. PROCOMER also provided firm-level export transactions data at the HS (Harmonized System) 10 digit product-level for the universe of Costa Rican exporters from 2000 to 2013. This confidential dataset offers unique data on (a) the identity of exporters and domestic producers, (b) the export destinations for each product, (c) product-level trade volumes (in US dollars), and (d) the types of products exported (e.g., intermediate or final goods), not only by our exporting respondents but also by any exporting firms in the population.

Next, we ensured that our survey also included domestic firms with no engagement in international trade. Since PROCOMER does not maintain contact information for non-trading domestic firms, we

[9] Appendix A2 contains original Spanish wording used for the conjoint experiment.

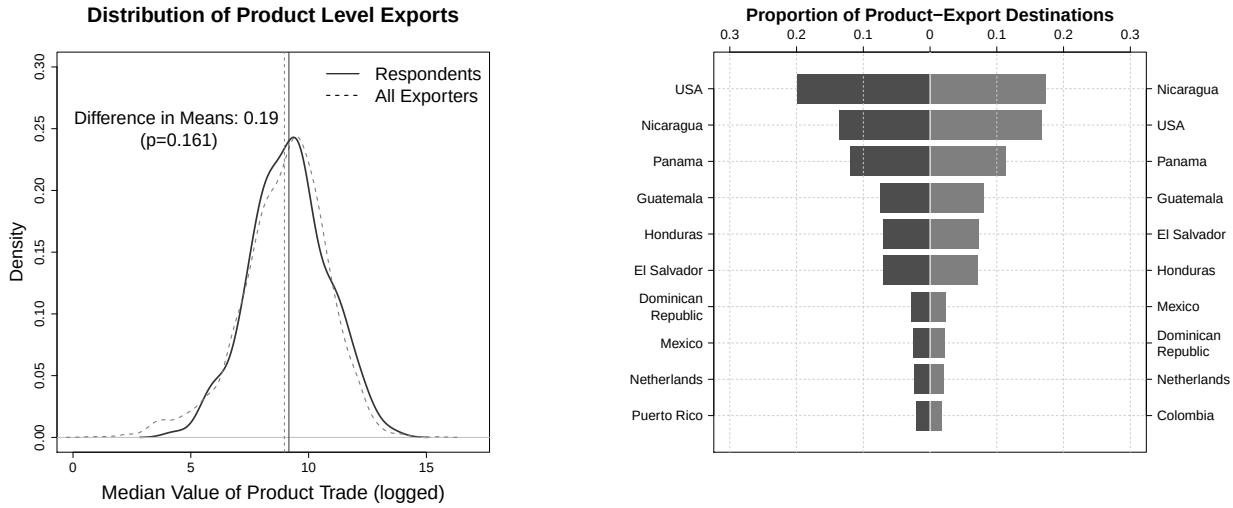


Figure 2: **Comparison between Exporting Respondents and All PROCOMER Exporters**: This graph shows that little differences exist between our respondents that export and the population of Costa Rican exporters. Left panel compares the export volumes while the right panel reports the top ten exporting destinations at the product level. The two vertical lines in the left panel correspond to the means of each distribution, which are not statistically different from each other.

made our best efforts to contact three other institutions that have such contacts: the Census Bureau, the Chamber of Industries of Costa Rica, and INCAE Business School. First, the Census Bureau provided contact information for 353 firms in our survey that are randomly sampled from their database. The Census used a stratified sampling methods at the industry level in order to ensure that firms from different industries were included in the sample. Second, the Chamber of Industries of Costa Rica provided contact information for 656 firms out of their 986 registered members. Finally, we added 136 firms to our contact list using our local partner INCAE's previous firm-level surveys.

We sent our survey via email to 2,577 firms, and 389 firms responded.[10] Our response rate of approximately $15\%$ is comparable to most firm-level surveys. In fact, the rate is not atypical for a survey of business conducted via email (see, for example, Mabert, Soni, and Venkataramanan, 2000; Dennis Jr, 2003; White and Luo, 2005; Baruch and Holtom, 2008; Anseel et al., 2010). Many firms from the latter three organizations are from sectors with non-tradable commodities, such as banks, energy supply, and retail. Thus, our analysis focuses on 214 firms in agriculture, mining and manufacturing industries (i.e., tradable goods producers).[11]

One of the main benefits of using PROCOMER data is that we directly observe the export activities

[10]The survey was conducted in two waves, from November 2013–February 2014 and then May–June 2014.

[11]These correspond to all ISIC Revision 4 codes 01 through 33.

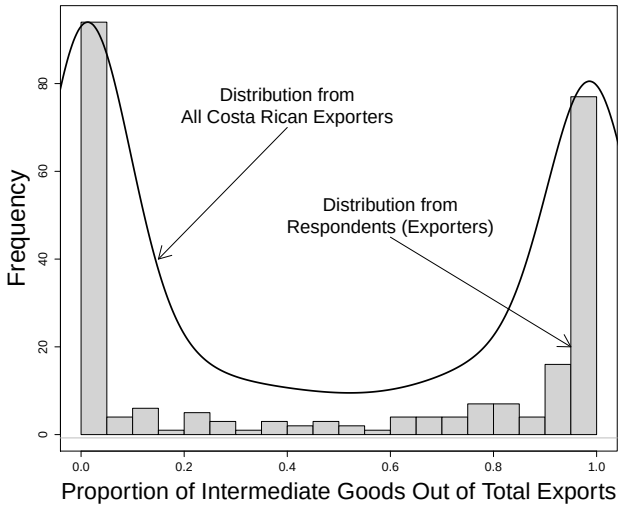


Figure 3: **Distribution of Intermediate Goods Exporters:** This figure demonstrates that the firms in our sample have product profiles similar to the universe of Costa Rican firms. The histogram shows the distribution of intermediate goods exports by our respondents. The solid line is a kernel density line of intermediate goods exports from all 2,412 Costa Rican firms who exported at least one product in 2011.

of all exporting firms. Specifically, we have data on the Harmonized System (HS) 10-digit product-level annual exports by all Costa Rican exporting firms. This allows us to overcome the aforementioned empirical challenges in comparing the characteristics of the sample against the population of interest. Figure 2 compares 191 respondents who exported at least one product in 2012 against all other 2,313 Costa Rican exporters. The left panel shows that the distributions of the median values of product-level exports across all products by the two groups (in logged US dollar). The two distributions are remarkably similar, and the difference in their means is statistically insignificant ($p = 0.161$). The right panel compares the proportion of product-destination combinations across the two groups. As is clear from the figure, the top ten export destinations are also similar although firms in our sample tend to export more products to the U.S. To further examine the product-level export behavior, we also compare the mean number of products exported by firms. On average, Costa Rican exporters export 10.87 products. Our exporting respondents export 1.91 more products than that, but the difference is statistically indistinguishable from each other ($p = 0.338$).

Finally, we examine the composition of products that firms export. Since most of the exporters are multi-product firms producing intermediate and/or final consumption goods, we compare the proportion of intermediate goods exported by the respondents against that of the entire exporters. To do this, we first create a mapping from each HS product to a Business Economic Categories (BEC) because the

latter categorizes products based on their main end use.[12] The proportion is then calculated by dividing the sum over all exports mapped to the list of BEC categories for intermediate goods by the firm's total exports.[13] Using this measure, we also check whether our exporting respondents are representative of Costa Rican exporters in terms of their product profile. Figure 3 compares the distribution of intermediate goods exports from all Costa Rican exporters (solid line) against the distribution from exporters in our sample (histogram). We also compare other factors such as 1) average annual exports, 2) the number of years firms exported, and 3) the sectoral distribution of our respondents against the population of exporters. We find no differences. Although we acknowledge that similar analyses cannot be conducted on non-exporting domestic firms due to the lack of firm-level information across all domestic firms, our random sampling procedure and the comparisons among the subset of exporters add confidence as to the generalizability of our findings.

# 4 Empirical Results

In this section we present our main empirical findings from the conjoint analysis regarding our three hypotheses. Section 4.1 provides detailed subgroup analyses to examine the heterogeneous interests among firms by adjusting for firms' different levels of engagement in international trade.[14] We find that investment protection is considered to be the most important dimension of trade policy for firms in GVCs, and that strong DSMs are most favored by exporters not in GVCs. We then discuss the validity of inter-industry comparisons in the presence of high within-industry heterogeneity in Section 4.2.

## 4.1 Firm Preferences over Investment Provisions and DSMs

We estimate Average Marginal Component Effect (AMCE) of each policy dimension as described in Section 3.1 in order to examine our first two hypotheses. For instance, we estimate the *difference* in probability of support for the candidate policy with strong investment protection compared against a policy with weak protection, while averaging over all possible combinations of the values in *all* the other four policy dimensions. We regress the choice dummy on sets of dummy variables for the policy attributes and use cluster-robust standard errors to account for the correlation across tasks completed by

[12] We used the concordance available from WITS (World Integrated Trade Solution).

[13] The following BEC products are categorized as intermediate goods used as inputs for downstream production: 111, 121, 21, 22, 31, 322, 42, 53.

[14] The results pooled across all respondents are available in Appendix A3.1.

the same firm. Following convention, we used the lowest level of liberalization in each dimension (e.g., `Weak Legal Protection`) as our reference category. Furthermore, informed by our theory, we estimate heterogeneous treatment effects across different pre-treatment group categories by conducting a set of subgroup analyses. We present the results from our conjoint analyses graphically to facilitate comparison across multiple policy dimensions and corresponding subgroups.[15]

To investigate the importance of investment provisions across different subgroups, we first sort firms into three categories with different levels of engagement in trade following Helpman, Melitz, and Yeaple (2004): domestic firms, exporters, and multinationals. To do this, we check to see if our survey respondents appear on the list of firms in the PROCOMER data in order to distinguish domestic firms from exporters. That is, a given firm is coded as `Domestic` if it has not exported any product since 2000. We then examine the ownership structure of the remaining firms to identify multinational firms. Specifically, we define a firm as `Multinational` if more than 80% of its share is owned by foreign firms. Note that all of the multinational firms export. We have a total of 49 multinationals, 133 exporters, and 32 domestic firms.[16] We start by comparing the difference between domestic firms and exporters that engage in international trade.

Figure 4 shows that the main difference comes from firms' preferences over investment protection. On average, firms who trade favor a trade policy with strong investment protection by 26 percentage points more than firms that do not trade. The difference is statistically significant. We also find that the former tends to value DSMs, while the latter prefers a policy with more flexibility, although the respective result does not achieve statistical significance at the 95% level.

We further investigate firms' interests based on our theoretical expectations. That is, we conduct a set of subgroup analyses across the four types of firms: domestic firms, autonomous exporters, exporters in GVCs, and multinationals. We classify a firm as an `Exporter in GVCs` if a firm exports *and* imports. These firms are parts of GVCs because they import foreign inputs to produce outputs that they export. For the remaining firms that are not owned by foreign firms and that do not import foreign products are defined to be `Autonomous exporter`. The subgroup analysis includes a full set of

[15]Numeric values for point estimates and standard errors from the regressions are available in table format in Appendix A3.2.

[16]Using different cutoff values does not change our results below. We ask the following question to measure foreign ownership: "Please indicate (roughly) the percentage of your company that is: Owned by the domestic private sector, State-owned, Foreign-owned."

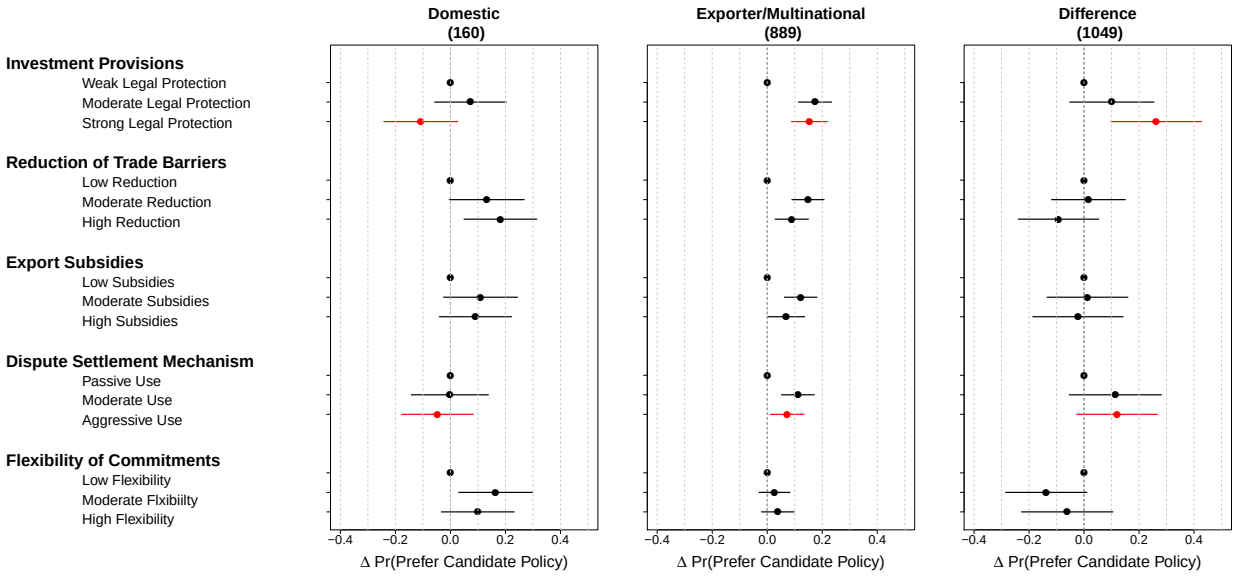


Figure 4: **Importance of Strong Investment Protection**: This figure compares preferences of firms for firms that engage in trade (`Exporter/Multinational`) against firms who only operate in the domestic market (`Domestic`). The main difference comes from the investment protection dimension. We highlight the estimated effects for strong investment protection and aggressive use of DSMs in red.

dummy variables for each group (i.e., saturated model), which identifies group-specific treatment effects non-parametrically. Although one can include a set of many other pre-treatment covariates and their respective effects, doing so might result in "p-hacking" and multiple testing problems (Imai, Ratkovic et al., 2013). Thus, our analysis focuses primarily on the different levels of firms' engagement in global trade consistent with our theory. Furthermore, we note that since both the policy attributes and their order as given to respondents are fully randomized in our conjoint design, our estimates are unbiased for the AMCE within each group, if there exists no other confounders conditional on their engagement in trade. Thus, we focus on the heterogeneous treatment effects in each group.

Figure 5 corroborates our Hypothesis 1 that preferences for investment provisions will differ depending on firms' levels of engagement in GVCs. We find that multinational firms (fourth column) are more than 20 percentage points more likely to favor a policy with strong legal protection of investments than a policy with weak protection; the effect is very strong both substantively and statistically. Consistent with Hypothesis 1, exporters in GVCs (third column) also support policies with strong investment protection; they are 15 percentage points more likely to choose a policy with strong legal protection than a policy with baseline category. Furthermore, investment protection is found to be the most important for these two groups even compared to traditional elements of trade policy such as tariffs and subsidies. This

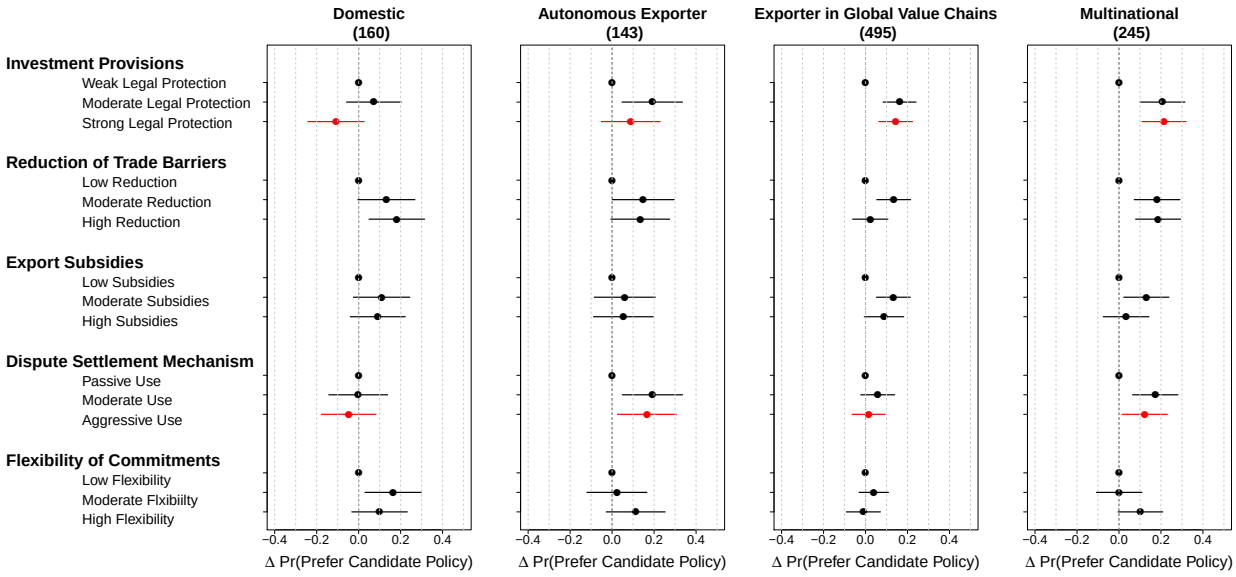


Figure 5: **Relation-specific Trade and Firms' Preferences:** This figure distinguishes autonomous exporters from firms that export and import. The latter are parts of GVCs and prefer strong investment protection. On the other hand, autonomous exporters who do not engage in relation-specific trade evaluate DSMs higher than any other dimension.

is in stark contrast with domestic firms (first column) and autonomous exporters (second column), for whom strong investment protection is not salient. We note that our sample size does not give sufficient statistical power to distinguish the statistical differences across groups. However, the subgroup analysis shows that the effects are heterogeneous with a clear ordering. Only firms actively engaged in GVCs are found to value strong investment protection.[17]

We also find that firm-level preferences regarding dispute settlement mechanisms vary. We expect that `Autonomous Exporters` will be concerned with DSMs in order to cope with the risks and uncertainties they face in the global trading environment. Consistent with Hypothesis 2, Figure 5 shows that dispute settlement mechanisms are the most important dimension for these exporters. Autonomous exporters are almost 20 percentage points more likely to support a policy with aggressive use of DSMs than a policy with passive DSMs. In contrast, exporters in GVCs do not consider DSMs as being that important relative to investment protection. We also find that multinationals tend to favor embedding strong DSMs into trade agreements, unlike domestic firms for which we find negative point estimates.

[17]That domestic firms support to reduce trade barriers in Figure 5 might seem counter-intuitive, but again the changing nature of trade is influencing this. We find that domestic firms that benefit from cheaper foreign inputs favor reduction of tariffs and non-tariffs barriers, whereas others value a more flexible trade policy. We provide this result along with other robustness check results on domestic firms and exporters in Appendix A3.

As noted earlier, this might be because multinational firms care about DSMs to the extent that they are related to investment protection. In sum, these findings accord with our theory that exporting firms outside of GVCs should desire to offset the risks and costs of sudden changes in variable trade costs through DSMs, whereas GVCs can serve as insurance by sharing unexpected costs through contractual relations.

## 4.2 Hypothesis 3: Inter-industry Comparison

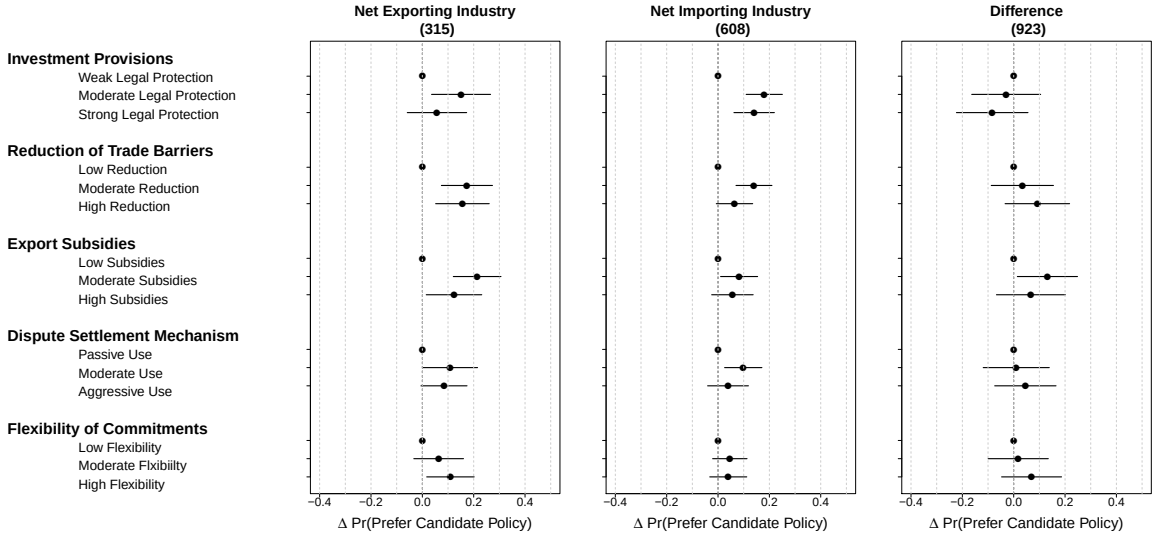


Figure 6: **Net Exporting vs. Net Importing Industries:** This figure shows that there is little difference between net exporting and net importing industries.

In the foregoing analysis, we have assumed that firms are the unit of analysis that we should privilege. Both the rise of intra-industry trade and NNTT imply that this should be our focus. But much previous research has focused on industries and so we now try to relate our findings to that literature. To do so in order to examine Hypothesis 3, we classify our firms into industries with either net exports or net imports, as a focus on comparative advantage as in a Ricardo-Viner model might suggest. We examine the preferences of the two groups over our five trade policies. Conventional trade theory would expect that they should differ strongly on tariff reductions and subsidies. That is, exporters should want tariff reductions and export subsidies most and importers should not want either. Figure 6 presents the results from this analysis for our five trade policies. We see little evidence for inter-industry differences; the right-most column shows the lack of differences across the two types of firms. We think this is largely because we are pooling firms with very different preferences by aggregating them at the industry level.

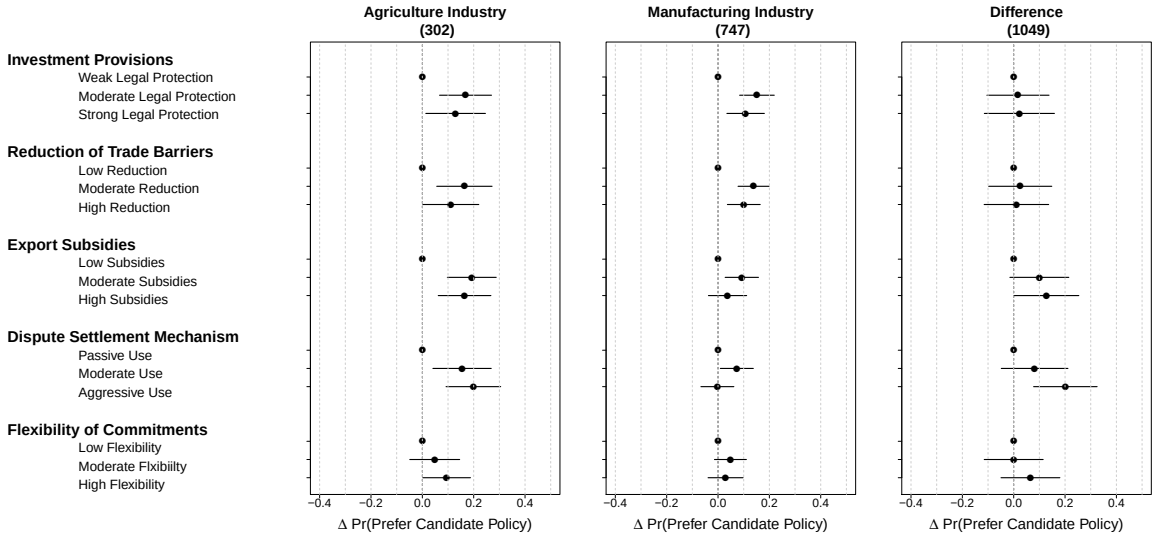


Figure 7: **Agriculture vs. Manufacturing Industries:** This figure makes a comparison between agriculture and manufacturing industries. Consistent with our theory, we find very little differences between the two industries.

Firms within an industry differ as much or more than across industries. This finding suggests that inter-industry differences are not sufficient for understanding the preferences of firms.

In Figure 7, we present more evidence consistent with the view that firm-level heterogeneity is more relevant than that of industries when it comes to understanding trade preferences, as in Hypothesis 3. This time, we compare firms in the agriculture industry against those competing in manufacturing industries. Traditionally, agricultural products (e.g., bananas) have constituted the biggest share of Costa Rican exports, while manufacturing has been more import-competing. However, the right-most column shows no significant differences in preferences over the five trade policies for these two types of industries. Aggregating firms into these broad industry groups blurs their preferences and obscures the fact that firms differ greatly within these categories. This is it not to say that inter-industry distinctions are entirely irrelevant. In fact, we find that firms in agricultural sector value DSMs. We note, however, that this is consistent with our expectation that firms that are not inserted in GVCs (e.g., firms in agriculture industry) tend to value DSMs.

Our analysis suggests that industries do not map consistently onto preferences over trade policy, as standard theories of trade might predict. We think the main reason for this is because trade flows are just as likely to be intra-industry or intra-firm as they are to be inter-industry. As shown in Figure 8 below, Costa Rica's intra-industry trade has grown significantly over time. We find that almost all industries in

Costa Rica have both exports and imports. Thus, it is firms within an industry that will vary in how much they export or import. In fact, in our data, we have the following distribution of firms in industries that are classified as net exporting (that is, where the volume of exports is higher than volume of imports): 12 domestic firms, 69 exporters, and 1 multinational. We get a distribution from net importing industries that is similarly varied: 22 domestic firms, 128 exporters, and 14 multinationals. As is evident, each industry has exporters and multinationals, and in fact we have a lot of multinationals in industries that would be classified as net importing. All of this data supports Hypothesis 3 and adds confidence to our focus on firm-level variation.

# 5 Discussion

Our findings strongly suggest that there exists important within-industry heterogeneity across firms. In this section we discuss why Costa Rica is a useful country to examine our hypotheses. We then discuss whether firm-level preferences matter in trade policy-making.

## 5.1 Trade Patterns of Costa Rica and Other Countries

Our analysis focuses on Costa Rica, which is a middle-income developing country. It is a stable democracy that opened its markets to global trade after the 1980s. Costa Rica signed CAFTA-DR with the US in 2009. As of 2016, Costa Rica had signed 13 PTAs, including ones with the US, EU, and China. Costa Rica has actively pursued policies to attract FDI. The government has sought growth through globalization, using FDI to insert the national economy into GVCs. Costa Rica has transformed its economic structure through this process so that now much of its production and exports are of higher-value goods and services, rather than agriculture or low value-added goods. The country has joined numerous GVCs, most of which are associated with efficiency-seeking FDI, rather than natural resources-seeking or market-seeking.

In order to understand how Costa Rica compares to other countries, we examine several sets of data to show that it is similar economically to many other countries. We first compare the levels of intra-industry trade between Costa Rica and other countries in the world using the Grubel-Lloyd index for each SITC 2 digit industry for each country.[18] Figure 8 shows the distribution of this measure for the countries

[18]Formally, the index for industry $k$ in country $i$ is given by $(1 - (|export_{ik} - import_{ik}|)/(export_{ik} + import_{ik}))$, where $export_{ik}$ ($import_{ik}$) denotes total exports (imports) of products in industry $k$ by country $i$ to (from) the world. We use SITC 2 digit "divisions" to define industries. Similar patterns arise when we use different industry groupings, e.g., Harmonized

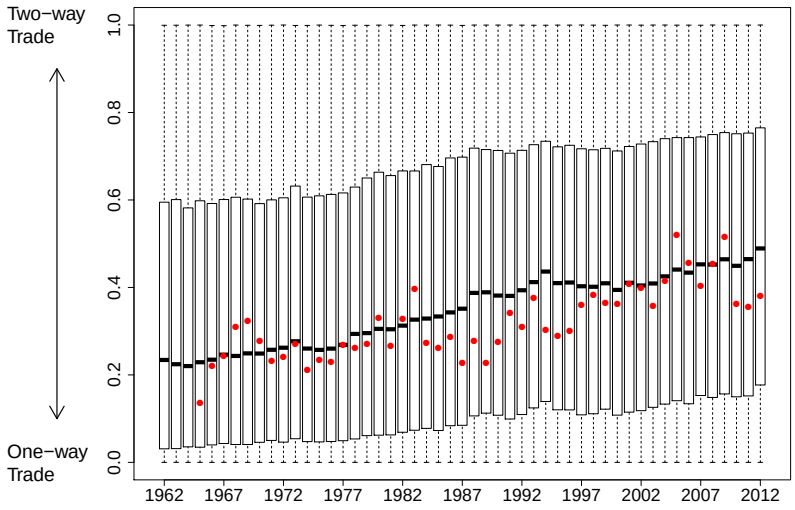


Figure 8: **Increasing Intra-industry Trade:** This figure displays the rising level of intra-industry trade, using the Grubel-Lloyd index across all SITC 2 digit industries from 1962 to 2012 across 104 nations. Each box-and-whister plot shows the full distribution of the index each year. The black horizontal line inside each box is the median level of the Grubel-Lloyd index for the given year across all industries and countries. The red dots indicate the median of the indices for Costa Rican industries, which mirrors the general rising trend.

across 50 years, whose median increases steadily over time. By the end of the period, the median level of the index (marked as the black line within each box-and-whister plot) was roughly 0.5, implying for example that a country imported 2 cars for every 6 cars exported. It also shows how Costa Rica (marked as red dots) has followed a similar time trend.

Next, we examine Costa Rica's involvement in GVCs. Table 1 reports descriptive statistics for foreign input usage and various degrees of country's participation in global production chains. The first column labeled as "% For. Input" presents the percentage of intermediate goods used for domestic production that are imported from foreign countries. This measure captures the extent to which countries rely on foreign intermediate goods. We used OECD's 2015 Input-Output Tables (IOT) to first calculate how much of foreign inputs are used for the production of the outputs of 34 industries.[19] We use the median value of the industry specific measures across all industries for each country. Our measure reveals that most countries—including Costa Rica—now import significant parts of their inputs from abroad (15% on average).

System 2 and 4 digit industries. The complete list of 104 countries used for this analysis is available in Appendix A5.

[19]We include all states on which the input-output data exists. See `http://www.oecd.org/sti/ind/IOT_Industries_Items.pdf` for the list of industries used for our calculation.

| Country | % For. Input | Upstream Exp | Upstream Imp | Country | % For. Input | Upstream Exp | Upstream Imp | Country | % For. Input | Upstream Exp | Upstream Imp |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 0.08 | 2.54 | 2.39 | Greece | 0.17 | 2.07 | 1.87 | Poland | 0.19 | 2.01 | 2.10 |
| Australia | 0.07 | 2.24 | 1.84 | Hong Kong | 0.20 | 1.95 | 2.10 | Portugal | 0.26 | 1.84 | 2.02 |
| Austria | 0.26 | 2.11 | 2.00 | Hungary | 0.32 | 1.94 | 2.19 | Russia | 0.06 | 2.80 | 1.89 |
| Brazil | 0.05 | 2.21 | 2.33 | Iceland | 0.10 | 2.60 | 2.01 | Saudi Arabia | 0.13 | 2.85 | 1.90 |
| Brunei | 0.11 | 1.30 | 1.85 | India | 0.15 | 1.97 | 2.24 | Singapore | 0.38 | 2.30 | 2.25 |
| Bulgaria | 0.27 | 2.18 | 2.06 | Indonesia | 0.10 | 2.16 | 2.44 | Slovakia | 0.25 | 2.13 | 2.15 |
| Cambodia | 0.16 | 1.32 | 2.16 | Ireland | 0.30 | 2.07 | 2.09 | Slovenia | 0.24 | 1.95 | 2.18 |
| Canada | 0.22 | 2.03 | 1.96 | Israel | 0.26 | 1.84 | 1.82 | South Africa | 0.11 | 2.20 | 2.04 |
| Chile | 0.18 | 3.22 | 1.98 | Italy | 0.12 | 1.91 | 2.04 | South Korea | 0.11 | 2.07 | 2.39 |
| China | 0.07 | 1.78 | 2.47 | Japan | 0.02 | 1.98 | 2.01 | Spain | 0.19 | 1.91 | 1.99 |
| Colombia | 0.06 | 2.16 | 2.22 | Latvia | 0.28 | 2.33 | 2.01 | Sweden | 0.29 | 2.07 | 2.00 |
| Costa Rica | 0.17 | 2.04 | 2.23 | Lithuania | 0.23 | 1.97 | 1.99 | Switzerland | 0.17 | 1.98 | 1.96 |
| Croatia | 0.13 | 1.91 | 1.95 | Luxembourg | 0.66 | 2.05 | 1.98 | Taiwan | 0.12 | 2.28 | 2.44 |
| Cyprus | 0.17 | 1.55 | 1.72 | Malaysia | 0.23 | 2.21 | 2.43 | Thailand | 0.22 | 2.00 | 2.38 |
| Czech Rep. | 0.18 | 2.04 | 2.18 | Malta | 0.14 | 2.40 | 1.95 | Tunisia | 0.26 | 1.75 | 2.16 |
| Denmark | 0.22 | 1.85 | 1.94 | Mexico | 0.19 | 1.74 | 2.20 | Turkey | 0.08 | 1.80 | 2.30 |
| Estonia | 0.32 | 2.08 | 2.05 | Netherlands | 0.20 | 2.14 | 2.05 | UK | 0.17 | 2.00 | 1.86 |
| Finland | 0.20 | 2.20 | 2.06 | New Zealand | 0.15 | 2.09 | 1.89 | USA | 0.10 | 2.10 | 1.82 |
| France | 0.17 | 1.94 | 2.00 | Norway | 0.18 | 2.45 | 1.94 | Viet Nam | 0.27 | 1.44 | 2.32 |
| Germany | 0.22 | 1.97 | 2.02 | Philippines | 0.18 | 2.29 | 2.41 | **World** | **0.15** | **2.04** | **2.01** |

Table 1: **Involvement in Global Production Chains**: This table summarizes the extent to which countries are involved in global production chains. The first column, "For.Input %" compares the percentage of foreign inputs used to produce outputs across 60 countries (including Rest of the World). The following two columns summarize the extent to which each country specializes in upstream or downstream stages of global production. A higher number under "Exp" ("Imp") column implies that the country tends to export (import) products in the upstream stages, whereas lower values imply that it specializes in exporting (importing) downstream goods.

Furthermore, we investigate in which stage of global production a country tends to be involved. That is, some countries are likely to export final goods (so called downstream production), whereas others focus more on exporting raw materials and intermediate goods (so called upstream) in global manufacturing. We used the measure developed by Antràs et al. (2012) which is based on trade data in 2002. The two columns in Table 1 labeled as "Exp" and "Imp" report the degrees of "upstreamness" for each country's exports and imports, where a higher (lower) value than the world mean implies that the country specializes in relatively upstream (downstream) stages of global production. For example, the table shows that China's exports consist more of goods for the final process of the production (value-added products in the downstream), while it tends to import more upstream products such as raw materials. We note that both the foreign input usage and the degree of upstreamness of Costa Rica is comparable to the average across all countries.

Finally, Figure 9 provides another view of Costa Rica's trade compared to other economies with

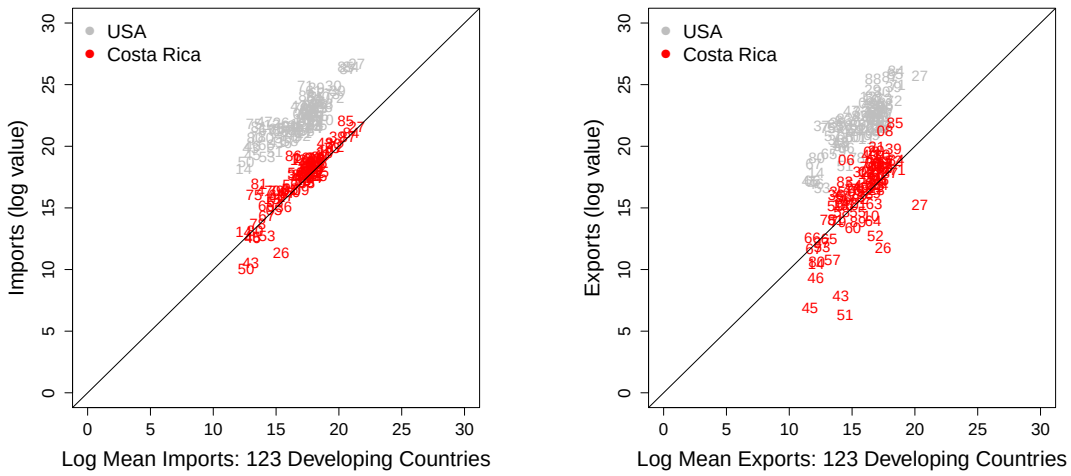


Figure 9: **Costa Rica's Imports/Exports Patterns:** This figure compares Costa Rica's imports and exports for each HS 2 digit industry (y-axis) against the median levels of imports and exports across 123 developing countries (x-axis). Each two digit number represents a HS2 industry. As a comparison, we also plot imports and exports of the U.S. (in grey), which are well above the 45 degree line.

similar sizes. This figure shows the amount of exports and imports by different sectors for Costa Rica compared to the medians of 123 other developing countries. What it reveals is that nature of Costa Rica's trade is very similar to that of other developing countries for numerous industries.

Taken together, the analyses in this section provide evidence that the country's economy is a representative example of many countries with similar economic sizes. Costa Rica may differ politically from other developing countries, but we focus on how its firms react given the economy they are in. We thus think that the results from our analysis may apply to other countries that are parts of global production networks.

## 5.2 Firm's Influence on Trade Politics

Do firms' preferences matter? Previous studies have suggested that firms do exercise a powerful role in trade policy (Milner, 1988; Gawande, Krishna, and Olarreaga, 2009; Gawande and Bandyopadhyay, 2000; Goldberg and Maggi, 1999; Manger, 2005; Mayda, Ludema, and Mishra, 2010). Recent research indicates that firms lobby heavily, that the biggest firms lobby the most, and that many lobby for liberalizing trade given their exporting and multinational character (Kim, 2016).

The rapid diffusion of PTAs in the past 30 years may reflect the underlying heterogeneous political demands from firms. Indeed, investment protection and DSMs have become particularly important

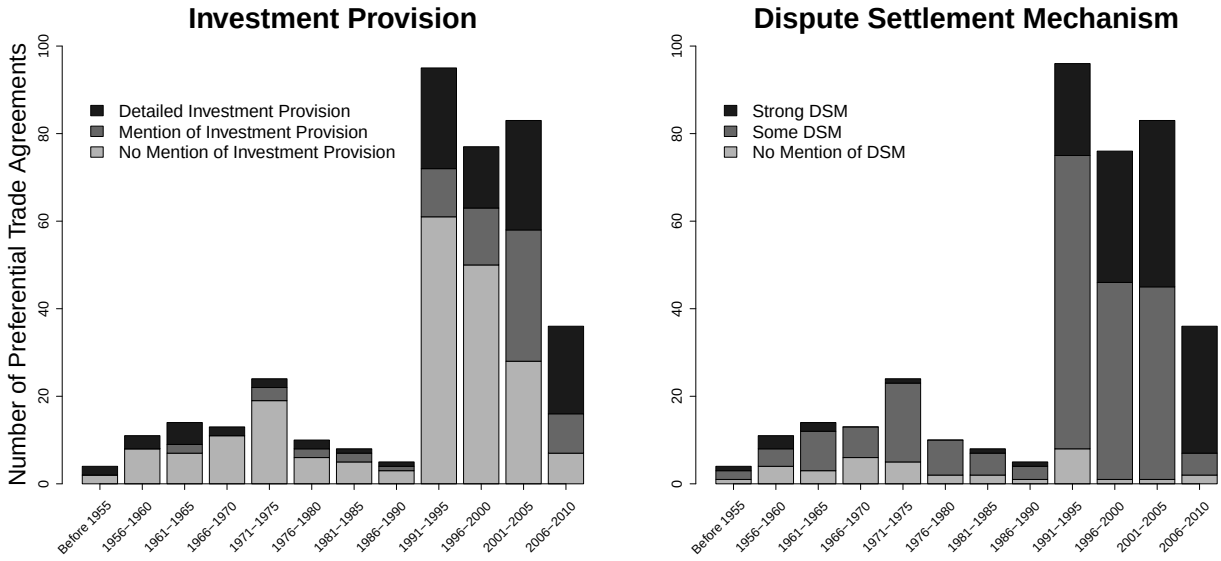


Figure 10: **The Rising Importance and Depth of Investment Protections and Dispute Settlement Mechanisms in PTAs:** This figure displays the number of trade agreements having stronger policies on two dimensions: investment protection and dispute settlement mechanisms. It shows that over time more agreements include stronger investment protections and DSMs.

components of trade agreements over time. Figure 10 shows the growing prevalence and the depth of investment provisions and DSMs in all reciprocal trade agreements using data available from Büthe and Milner (2008). This figure reveals that more PTAs include stronger investment protection and DSMs in recent periods. In the Web Appendix, we provide further evidence for temporal variation in trade policy dimensions using text analysis of all PTA agreements, which confirms the salience of investment protection and DSMs.

There is ample evidence that firms are politically active in shaping the contents of U.S. trade policies through lobbying. Although it is difficult to directly observe firm's political activities on the policy dimensions that we consider, we conducted an extensive text search of lobbying reports filed under the Lobbying Disclosure Act of 1995 in the U.S. in which firms briefly describe their interests. We found more than 3,500 reports within which firms across various industries expressed direct concerns about their investments and dispute settlements related to international trade. For example, Pepsico lobbied in 2011 on "Market reform and investment issues in Uzbekistan." A recent report from Samsung Electronics says that it is interested in "Foreign manufacturing investment in the U.S.; Marketplace Fairness Act," while Toyota lobbied on the 109th Congress Senate bill S.3549 that deals with strengthening oversight of foreign investment in the U.S. Similarly, the Bose Corporation expressed their concerns about "Brazil's retaliation list, following the U.S.-Brazil cotton dispute," while multinational brewing company

Anheuser-Busch lobbied on "brewing related commodity issues, international dispute settlement."

While we do not have direct evidence of firms in Costa Rica lobbying for these type of trade policies, we find that many firms in our sample are politically active. And our data indicate that the biggest firms—the multinationals—are the most active. In our survey we asked firms if they took political action with the following question: "Some firms are quite active in politics, while others tend not to take an active part. We would like to know if, during the last three to four years, your firm has contacted a member of Congress, COMEX (Foreign Trade Ministry) or the presidency about some political issue or problem?" Overall, one-third of respondents said they did. And the proportion of those politically active increases with their firm's integration into the world economy. In response to this, 28 percent, 34.4 percent and 40 percent of domestic firms, exporters, and multinationals, respectively, said that they contacted politicians directly regarding trade policies. This is consistent with other studies of firms' political activity in different contexts (e.g., Blanchard and Matschke, 2015).

# 6 Conclusions

Measuring political actors' policy preferences is a fundamental component of many subfields in political science research (e.g., Poole and Rosenthal, 1997; Voeten, 2000; Martin and Quinn, 2002; Clinton, Jackman, and Rivers, 2004; Spirling and McLean, 2007; Bonica, 2013; Bailey, Strezhnve, and Voeten, 2015). Researchers often find that preferences are highly multidimensional (Lauderdale and Clark, 2014). For example, Gerrish and Blei (2011) find that "ideal points" differ across issue areas even among lawmakers whose preferences are typically considered to be polarized along a one-dimensional ideological space. Unlike other unsupervised dimension deduction techniques based on item response theory models, we use conjoint analysis methods to measure the intensity of firms' preferences over specific trade policy instruments that are prevalent in contemporary trade agreements. Our research is among the first to illuminate the multidimensional nature of preferences for firms regarding trade policy.

Our investigation of firm preferences examines them by theorizing about the different problems faced by firms with different linkages to the global economy. We identify four types of firms: domestic, autonomous exporters, exporters with in GVCs, and multinationals. We advance NNTT by distinguishing exporters based on their involvement in GVCs. We expected that multinational firms would be most interested in investment protection given their global production networks. We also expected that exporters that are part of GVCs would be strongly supportive of investment protection. On the other hand,

we expected that autonomous exporters who are not members of global production networks should support strong dispute settlement procedures. Our results based on a conjoint experiment corroborate these hypotheses.

Distinguishing firms by their degree of integration into global trading networks is important. We find much heterogeneity across firms. When we disaggregate industries according to their firms' international exposure, as in Figure 4, we see that investment protection and strong DSMs are heavily favored by the most international firms only. Looking further into the different types of international ties firms can have, we see in Figure 5 that exporters vary significantly among themselves. Aggregating firms without respect to their insertion into the global economy risks misunderstanding their preferences for trade policy.

The changes in trade flows and heterogeneous firm preferences pose existential issues for the current world trading regime, governed by the WTO. And they indicate the direction of the changing content of PTAs over time. As two noted trade economists recently admitted, "as the prevalence of offshoring rises, effective trade agreements and the institutions that support them will have to evolve, from a market access focus toward a focus on deep integration ... From this perspective, the rise of offshoring can be seen to present the WTO with a profound institutional challenge" (Antràs and Staiger, 2012). Their point about offshoring becomes even more powerful when one considers GVCs generally, which include offshoring. Not only is the exchange of tariff concessions less important these days for some firms, but another major element of the WTO, its dispute settlement mechanism (DSM), may also be less relevant. Multinational firms and firms in GVCs have often replaced arms-length trade with firm-specific relationships that obviate the need for DSMs (Jensen, Quinn, and Weymouth, 2015). Our research thus can help illuminate the future character of the global trading system.

Our research also speaks to the design of PTAs. If large exporters and multinationals are the ones that lobby the most and affect policy, then we would expect that their preferences would be very salient in trade agreements. Many scholars have claimed that firms are a key source of pressure on governments in devising their trade policies and trade agreements. This is evident in our data and suggests one reason why more and more trade agreements include strong investment provisions as well as dispute settlement ones. Firms demand them and countries want to attract firms and be integrated into their global production chains.

Research in comparative and international political economy has often focused on the demand for tariffs, subsidies and non-tariff barriers by industry. Our research suggests that more attention should be

paid to firms, rather than industries, and to other dimensions of trade policy. Similarly, research on public opinion about trade should also investigate within-industry differences in individuals' employment. Researchers find that the impact of trade on wage inequality occurs *within* occupations and sectors because internationally trading firms pay higher wages (Helpman et al., Forthcoming). This is in stark contrast to many existing studies' assumption that individuals' wages are tied directly to industries, rather than firms. When researchers look at inter-industry differences as they relate to public attitudes, they should at least check the composition of firms (e.g., domestic, exporters, multinationals) within the industry to make sure the heterogeneity within it is not affecting their conclusions about the public. New types of trade flows engender new types of trade politics.

# References


Alt, James E., Jeffry Frieden, Michael J. Gilligan, Dani Rodrik, and Ronald Rogowski. 1996. The Political Economy of International Trade Enduring Puzzles and an Agenda for Inquiry. *Comparative Political Studies* 29 (6):689–717.

Anseel, Frederik, Filip Lievens, Eveline Schollaert, and Beata Choragwicka. 2010. Response Rates in Organizational Science, 1995–2008: A Meta-analytic Review and Guidelines for Survey Researchers. *Journal of Business and Psychology* 25 (3):335–349.

Antràs, Pol. 2003. Firms, Contracts, and Trade Structure. *Quarterly Journal of Economics* 118 (November):1375–1418.

Antràs, Pol, Davin Chor, Thibault Fally, and Russell Hillberry. 2012. Measuring the Upstreamness of Production and Trade Flows. *The American Economic Review* 102 (3):412–416.

Antràs, Pol, and Robert W Staiger. 2012. Offshoring and the Role of Trade Agreements. *American Economic Review* 102 (7):3140–83.

Baccini, Leonardo, Giammario Impullitti, and Edmund J. Malesky. 2015. Globalization and State Capitalism: Assessing Vietnam's Accession to the WTO. Working Paper. Available from <`http://www.freit.org/WorkingPapers/Papers/FirmLevelTrade/FREIT970.pdf`>.

Bagwell, Kyle, and Robert W. Staiger. 1999. An Economic Theory of GATT. *The American Economic Review* 89 (1):215–248.

Bailey, Michael A., Antov Strezhnve, and Erik Voeten. 2015. Estimating the Dynamic State Preferences from United Nations Voting Data. *Journal of Conflict Resolution*.

Baruch, Yehuda, and Brooks C Holtom. 2008. Survey Response Rate Levels and Trends in Organizational Research. *Human Relations* 61 (8):1139–1160.

Bernard, Andrew B., J. Bradford Jensen, and Peter K. Schott. 2009. Importers, Exporters and Multinationals: a Portrait of Firms in the US that Trade Goods. In *Producer Dynamics: New Evidence from Micro Data*. Chicago: University of Chicago Press.

Bernard, Andrew B., J. Bradford Jensen, Stephen J Redding, and Peter K. Schott. 2007. Firms in International Trade. *The Journal of Economic Perspectives* 21:105–130.

Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott. 2010. Intrafirm Trade and Product Contractibility. *American Economic Review* 100 (2):444-48.

Blanchard, Emily J. 2010. Reevaluating the Role of Trade Agreements: Does Investment Globalization Make the WTO Obsolete? *Journal of International Economics* 82 (1):63–72.

Blanchard, Emily J, Chad P. Bown, and Robert C Johnson. 2016. Global Supply Chains and Trade Policy. Technical report National Bureau of Economic Research.

Blanchard, Emily, and Xenia Matschke. 2015. US Multinationals and Preferential Market Access. *Review of Economics and Statistics* 97 (4):839–854.

Bombardini, Matilde. 2008. Firm Heterogeneity and Lobby Participation. *Journal of International Economics* 75 (2):329–348.

Bonica, Adam. 2013. Ideology and Interests in the Political Marketplace. *American Journal of Political Science* 57 (2):294–311.

Busch, Marc L. 2007. Overlapping Institutions, Forum Shopping, and Dispute Settlement in International Trade. *International Organization* 61 (04):735–761.

Busch, Marc L., and Krzysztof J. Pelc. 2014. Law, Politics, and the True Cost of Protectionism: the Choice of Trade Remedies or Binding Overhang. *World Trade Review* 13 (01):39–64.

Büthe, Tim, and Helen V. Milner. 2008. The Politics of Foreign Direct Investment into Developing Countries: Increasing FDI through International Trade Agreements? *American Journal of Political Science* 52 (4):741–762.

Clinton, Joshua, Simon Jackman, and Doughlas Rivers. 2004. The Statistical Analysis of Roll Call Data. *American Political Science Review* 98:355–370.

Dennis Jr, William J. 2003. Raising Response Rates in Mail Surveys of Small Business Owners: Results of an Experiment. *Journal of Small Business Management* 41 (3):278.

Dür, Andreas, Leonardo Baccini, and Manfred Elsig. 2014. The Design of International Trade Agreements: Introducing a New Dataset. *The Review of International Organizations* 9 (3):353–375.

Eaton, Jonathan, Samuel Kortum, and Francis Kramarz. 2011. An Anatomy of International Trade: Evidence from French Firms. *Econometrica* 79 (5):1453–1498.

Estevadeordal, Antoni, Kati Suominen, and Robert Teh. 2009. *Regional Rules in the Global Trading System*. New York: Cambridge University Press.

Gawande, Kishore, Pravin Krishna, and Marcelo Olarreaga. 2009. What Governments Maximize and Why: The View from Trade. *International Organization* 63 (03):491–532.

Gawande, Kishore, and Usree Bandyopadhyay. 2000. Is Protection for Sale? Evidence on the Grossman-Helpman Theory of Endogenous Protection. *The Review of Economics and Statistics* 82 (1):139–152.

Gerrish, Sean, and David Blei. 2011. Predicting Legislative Roll Calls from Text. Paper presented at the 28th International Conference on Machine Learning.

Goldberg, Pinelopi Koujianou, and Giovanni Maggi. 1999. Protection for Sale: An Empirical Investigation. *The American Economic Review* 89 (5):1135–1155.

Goodman, John B., Debora Spar, and David B. Yoffie. 1996. Foreign Direct Investment and the Demand for Protection in the United States. *International Organization* 50 (04):565–591.

Grossman, Gene M., and Elhanan Helpman. 1994. Protection for Sale. *The American Economic Review* 84 (4):833–850.

Grossman, Gene M., and Elhanan Helpman. 1997. *Trade Wars and Trade Talks*. Cambridge, Mass.: Springer.

Hainmueller, Jens, Daniel J Hopkins, and Teppei Yamamoto. 2014. Causal Inference in Conjoint Analysis: Understanding Multidimensional Choices via Stated Preference Experiments. *Political Analysis* 22 (1):1–30.

Hainmueller, Jens, Dominik Hangartner, and Teppei Yamamoto. 2015. Validating Vignette and Conjoint Survey Experiments against Real-world Behavior. *Proceedings of the National Academy of Sciences* 112 (8):2395–2400.

Helpman, Elhanan, Marc J. Melitz, and Stephen R. Yeaple. 2004. Export versus FDI with Heterogeneous Firms. *The American Economic Review* 94 (1):300-316.

Helpman, Elhanan, Oleg Itskhoki, Marc-Andreas Muendler, and Stephen Redding. Forthcoming. Trade and Inequality: From Theory to Estimation. *Review of Economic Studies*.

Henisz, Witold J. 2000. The Institutional Environment for Multinational Investment. *Journal of Law, Economics, and Organization* 16 (2):334–364.

Hiscox, Michael J. 2002. Commerce, Coalitions, and Factor Mobility: Evidence from Congressional Votes on Trade Legislation. *The American Political Science Review* 96 (3):593–608.

Horn, Henrik, Petros C. Mavroidis, and André Sapir. 2010. Beyond the WTO? An Anatomy of EU and US Preferential Trade Agreements. *The World Economy* 33 (11):1565–1588.

Hummels, David, Jun Ishii, and Kei-Mu Yi. 2001. The Nature and Growth of Vertical Specialization in World Trade. *Journal of International Economics* 54 (June):75–96.

Imai, Kosuke, Marc Ratkovic et al. 2013. Estimating treatment effect heterogeneity in randomized program evaluation. *The Annals of Applied Statistics* 7 (1):443–470.

Jensen, J. Bradford, Dennis P. Quinn, and Stephen Weymouth. 2015. The Influence of Firm Global Supply Chains and Foreign Currency Undervaluations on US Trade Disputes. *International Organization* 69 (4):913–947.

Jensen, Nathan, Glen Biglaiser, Quan Li, and Edmund Malesky. 2012. *Politics and Foreign Direct Investment*. Ann Arbor, Mich.: University of Michigan Press.

Johns, Leslie, and Rachel L. Wellhausen. 2016. Under One Roof: Supply Chains and the Protection of Foreign Investment. *American Political Science Review* 110 (2):31–51.

Kim, In Song. 2016. Political Cleavages within Industry: Firm-level Lobbying for Trade Liberalization. Working Paper. Available from <`http://web.mit.edu/insong/www/pdf/exporters.pdf`>.

Kim, Moonhawk. 2008. Costly Procedures: Divergent Effects of Legalization in the GATT/WTO Dispute Settlement Procedures. *International Studies Quarterly* 52 (3):657–686.

Kono, Daniel Y. 2006. Optimal Obfuscation: Democracy and Trade Policy Transparency. *American Political Science Review* 100 (03):369–384.

Krugman, Paul. 1980. Scale Economies, Product Differentiation, and the Pattern of Trade. *The American Economic Review* 70 (5):950-959.

Kucik, Jeffrey. 2012. The Domestic Politics of Institutional Design: Producer Preferences over Trade Agreement Rules. *Economics & Politics* 24 (2):95–118.

Kucik, Jeffrey, and Eric Reinhardt. 2008. Does Flexibility Promote Cooperation? An Application to the Global Trade Regime. *International Organization* 62 (03):477–505.

Lauderdale, Benjamin, and Tom Clark. 2014. Scaling Politically Meaningful Dimensions Using Texts and Votes. *American Journal of Political Science* 58:754–71.

Mabert, Vincent A, Ashok Soni, and MA Venkataramanan. 2000. Enterprise Resource Planning Survey of US Manufacturing Firms. *Production and Inventory Management Journal* 41 (2):52–58.

Magee, Stephen P., William A. Brock, and Leslie Young. 1989. *Black Hole Tariffs and Endogenous Policy Theory: Political Economy in General Equilibrium*. New York: Cambridge University Press.

Manger, Mark. 2005. Competition and Bilateralism in Trade Policy: The Case of Japan's Free Trade Agreements. *Review of International Political Economy* 12 (5):804–828.

Mansfield, Edward D, and Eric Reinhardt. 2008. International institutions and the volatility of international trade. *International Organization* 62 (04):621–652.

Mansfield, Edward D., and Helen V. Milner. 2012. *Votes, Vetoes, and the Political Economy of International Trade Agreements*. Princeton, N.J.: Princeton University Press.

Mansfield, Edward D., Helen V. Milner, and B. Peter Rosendorff. 2000. Free to Trade: Democracies, Autocracies, and International Trade. *The American Political Science Review* 94 (2):305–321.

Martin, Andrew, and Kevin Quinn. 2002. Dynamic Ideal Point Estimation via Markov chain Monte Carlo for the U.S. Supreme Court, 1953–1999. *Political Analysis* 10 (2):134–153.

Mayda, Anna Maria, Rodney D. Ludema, and Prachi Mishra. 2010. Protection for Free? The Political Economy of U.S. Tariff Suspensions. Technical report CEPR Discussion Paper No. DP7926. Available from <http://ssrn.com/abstract=1647505>. Accessed 15 September 2016.

Mayer, Wolfgang. 1984. Endogenous Tariff Formation. *The American Economic Review* 74 (5):970–985.

Melitz, Marc J. 2003. The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica* 71 (6):1695–1725.

Milner, Helen V. 1988. *Resisting Protectionism: Global Industries and the Politics of International Trade*. Princeton, N.J.: Princeton University Press.

Milner, Helen V., and Keiko Kubota. 2005. Why the Move to Free Trade? Democracy and Trade Policy in the Developing Countries. *International Organization* 59 (1):107–143.

OECD. 2013. Implications of Global Value Chains. Technical report OECD and World Trade Organization. Available from <https://www.oecd.org/trade/G20-Global-Value-Chains-2013.pdf>. Accessed 15 September 2016.

Osgood, Iain. 2016. Differentiated Products, Divided Industries: Firm Preferences over Trade Liberalization. *Economics and Politics* 28:161–180.

Osgood, Iain, Dustin Tingley, In Song Kim, Thomas Bernauer, Helen V. Milner, and Gabrielle Spilker. Forthcoming. The Charmed Life of Superstar Exporters: Firms and Trade Policy in Costa Rica. *Journal of Politics*.

Osnago, Alberto, Nadia Rocha, and Michele Ruta. 2015. Deep Trade Agreements and Vertical FDI: the Devil is in the Details. World Bank Policy Research Working Paper. Available from <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2683689>.

Pandya, Sonal S. 2016. *Trading Spaces: Foreign Direct Investment Regulation, 1970-2000*. New York: Cambridge University Press.

Pelc, Krzysztof J. 2009. Seeking Escape: The Use of Escape Clauses in International Trade Agreements. *International Studies Quarterly* 53 (2):349–368.

Plouffe, Michael. 2015. Heterogeneous Firms and Policy Preferences. In *The Oxford Handbook on the Political Economy of International Trade*, edited by Lisa Martin. New York: Oxford University Press.

Poole, Keith, and Howard Rosenthal. 1997. *Congress: A Political Economic History of Roll Call Voting*. New York: Oxford University Press.

Rodrik, Dani. 1995. Political Economy of Trade Policy. *Handbook of International Economics* 3 (3):1457–1494.

Rogowski, Ronald. 1987. Political Cleavages and Changing Exposure to Trade. *The American Political Science Review* 81 (4):1121–1137.

Rosendorff, B. Peter, and Helen V. Milner. 2001. The Optimal Design of International Trade Institutions: Uncertainty and Escapde. *International Organization* 55 (04):829–857.

Scheve, Kenneth F., and Matthew J. Slaughter. 2001. What Determines Individual Trade-Policy Preferences? *Journal of International Economics* 54 (2):267–292.

Smith, James McCall et al. 2000. The Politics of Dispute Settlement Design: Explaining Legalism in Regional Trade Pacts. *International Organization* 54 (1):137–180.

Spirling, Arthur, and Iain McLean. 2007. UK OC OK? Interpreting Optimal Classification Scores for the UK House of Commons. *Political Analysis* 15 (1):85–96.

Trefler, Daniel. 1993. Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of U.S. Import Policy. *Journal of Political Economy* 101 (1):138-160.

Voeten, Erik. 2000. Clashes in the Assembly. *International Organization* 54 (2):185–215.

Wellhausen, Rachel L. 2014. *The Shield of Nationality: When Governments Break Contracts with Foreign Firms*. New York: Cambridge University Press.

Wellhausen, Rachel L. 2015. Bondholders vs. Direct Investors? Competing Responses to Expropriation. *International Studies Quarterly* 59 (4):750–764.

White, Glenn, and Amy Luo. 2005. Business Survey Reponse Rates: Can They Be Improved. In *The Proceedings of the American Statistical Association, Section on Survey Research Methods*. Vol. 4.

Yi, Kei-Mu. 2003. Can Vertical Specialization Explain the Growth of World Trade? *Journal of Political Economy* 111 (1):52–102.