The Distributional Consequences of Preferential Trade Liberalization: Firm-Level Evidence

Leonardo Baccini Pablo M. Pinto S

Stephen Weymouth

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Authors

Leonardo Baccini

Department of Political Science McGill University leonardo.baccini@mcgill.ca

Pablo M. Pinto

Department of Political Science University of Houston ppinto@central.uh.edu

Stephen Weymouth

McDonough School of Business Georgetown University stephen.weymouth@georgetown.edu

The Distributional Consequences of Preferential Trade Liberalization: Firm-Level Evidence

Leonardo Baccini (Department of Political Science, McGill University) Pablo M. Pinto (Department of Political Science, University of Houston) Stephen Weymouth (McDonough School of Business, Georgetown University)

Abstract

While increasing trade and foreign direct investment, international trade agreements create winners and losers. Our paper examines the distributional consequences of preferential trade agreements (PTAs) at the firm level. We contend that PTAs expand trade among the largest and most productive multinationals by lowering preferential tariffs. We examine data covering the near universe of U.S. foreign direct investment and disaggregated tariff data from PTAs signed by the United States. Our results indicate that U.S. preferential tariffs increase sales to the United States from the most competitive multinational corporation subsidiaries operating in partner countries. We also find increases in market concentration in partner countries following preferential liberalization with the United States. By demonstrating that the gains from preferential liberalization are unevenly distributed across firms, our paper sheds new light on the firm-level, economic sources of political mobilization over international trade and investment policies.

Keywords: international political economy, international trade, preferential trade agreements, heterogeneous firms, market concentration

1 Introduction

Preferential trade liberalization is a defining feature of the current era of globalization. Debate surrounds the rapid proliferation of preferential trade agreements (PTAs) and their effect on the structure of global production. Powerful firms and industries are thought to support preferential liberalization because it lowers the cost of producing and selling abroad.¹ Governments appear acquiescent to new agreements because they signal a commitment to growth through global commerce.² Yet little is known about which firms primarily benefit from preferential agreements, or why. This is an important oversight, since such evidence could help explain firms' preferences and political mobilization over international economic policy.

To gain new insights, our study examines the distributional consequences of PTAs at the firm level. This approach follows a long tradition in the international political economy literature of privileging firms as central political actors. The seminal work of Milner persuasively illustrates how the internationalization of firms reduces their support for protectionism.³ Subsequent research incorporates firms' preferences and economic objectives to explain variation in trade policies across industries,⁴ the proliferation of North-South PTAs,⁵ non-tariff responses to import competition,⁶ and the formation of global supply chains.⁷ In studying the consequences of trade agreements, however, the existing research largely focuses on the redistributive effects across countries and industries, rather than firms.⁸ To better understand the winners and losers from PTAs within

¹Manger 2009; Blanchard and Matschke 2015.

²Büthe and Milner 2008; Mansfield and Milner 2012.

 3 Milner 1988.

⁴Hathaway 1998; McGillivray 2004.

⁵Chase 2003; Manger 2009.

⁶Jensen, Quinn, and Weymouth 2015.

⁷Johns and Wellhausen 2016.

⁸Gowa and Kim 2005; Goldstein, Rivers, and Tomz 2007; Büthe and Milner 2008; Gray 2013; Baccini and Urpelainen 2014. countries and industries, we assess the effects of preferential liberalization on the activities of multinational corporations (MNCs), the primary mediators of trade.⁹

We expect the distributional consequences of PTAs to vary substantially across firms, even within the same industry, and for different types of MNC activities. While the establishment of foreign subsidiaries defines MNCs, the economic objectives of their foreign operations differ in systematic ways: some sell primarily to the host country, while others focus on production activities for trade.¹⁰ Our study focuses on the effects of preferential liberalization on the expansion of MNC trade-related activities. We are guided by recent theoretical and empirical contributions in international trade suggesting that firm-level differences explain participation in trade and foreign direct investment (FDI).¹¹ For instance, there is strong evidence that exporting firms are significantly larger and more productive than those that serve only the domestic market.¹² Drawing on these insights, we posit that PTAs will have uneven consequences even among MNCs, with the largest and most productive firms disproportionately expanding their trade with partner countries as a result of preferential tariff cuts.

Our empirical analysis relies on rich data covering the near universe of U.S. multinational affiliates, collected by the Bureau of Economic Analysis (BEA). The BEA data are particularly useful for examining the effects of trade agreements on MNC activities because they enable us to distinguish between the two main types of FDI: trade oriented and market seeking. Specifically, the BEA data measure foreign affiliate sales by destination, including to the United States versus to the host market. Since we can observe MNC affiliate sales to the United States, we can directly test our argument about the unequal effects of U.S. PTA cuts on those sales.

Linking the BEA data with product-level preferential tariff data from all U.S. PTAs, we find strong evidence that preferential tariff cuts expand the trade-related sales of U.S. MNCs. Importantly, tariff cuts disproportionately increase trade among the largest, most competitive firms.

 $^{^9\}mathrm{MNCs}$ with production affiliates account for over 80% of U.S. imports and exports (Bernard, Jensen, and Schott, 2009).

 $^{^{10}}$ Helpman 2006.

¹¹Bernard and Jensen 1999; Melitz 2003; Helpman, Melitz, and Yeaple 2004.

¹²Bernard and Jensen 1999.

Our results are robust to using instrumental variables to account for the potential endogeneity of tariff cuts. To further explore the redistributive effects of preferential liberalization, we examine changes in the concentration of U.S. MNC sales. Consistent with our expectations, we uncover increases in the concentration of MNC economic activity in partner countries after signing a PTA with the United States, particularly in industries with higher preferential tariff reductions. Our findings suggest that the largest, most competitive firms are the principal beneficiaries of one of the central features of PTAs: preferential tariffs.

In revealing the winners of trade agreements, our paper also contributes to research on trade coalitions. The foundational literature considers divisions over trade policies between factors of production or industries,¹³ and a growing body of work contends that firms' varied political stances toward international economic policies *within* industries reflect differences in firm size, product differentiation, and in the location of firms' global operations.¹⁴ While our paper does not explicitly examine firms' political activities, our results suggest intra-industry political divisions over PTAs. Large and productive firms engaged in offshore production are most likely to rally in their support.

Our paper informs an evolving literature on the politics of trade. Traditional accounts of trade policy emphasize the tradeoffs between national welfare and interest group pressures in the implementation or liberalization of tariffs.¹⁵ A more recent turn in the literature studies variation in the depth of trade agreements, measured as the number of market-friendly provisions such as investor protections, competition policy, or reductions in administrative barriers to trade embedded in the accord.¹⁶ Our paper suggests that tariff reduction and market-friendly provisions have different distributional consequences: tariff cuts disproportionately benefit large firms, whereas greater depth helps smaller companies expand trade. An important implication of this result is that firm-

¹³Rogowski 1987; Frieden 1991; Hiscox 2002

¹⁴Milner 1988; Chase 2003; Bombardini 2008; Jensen, Quinn, and Weymouth 2015; Kim 2016;
 Osgood, Bernauer, Kim et al. 2015

¹⁵Bailey, Goldstein, and Weingast 1997; Bagwell and Staiger 1999; Grossman and Helpman 1994; Blanchard and Matschke 2015

¹⁶Büthe and Milner 2008; Baccini and Urpelainen 2014; Dür, Baccini, and Elsig 2014

 $\mathbf{3}$

level characteristics (e.g. size and productivity) and differences in trade and production activities should explain variation in support for different aspects of trade liberalization. Specifically, tariff reduction may be a more salient dimension for the largest multinationals with extensive global production networks, whereas smaller companies should value provisions protecting their assets and reducing non-tariff barriers to trade and investment. More generally, our paper suggests that debates over the politics of trade policy are best informed using evidence at the micro level. In exploring the design and consequences of trade agreements, it would therefore appear natural to focus analytical inquiry on the political and economic activities of firms.

2 Distributional Consequences of Preferential Liberalization

Trade agreements are a central feature of globalization and an important area of research in international political economy. Academic interest in the causes and consequences of PTAs has produced two relatively distinct bodies of literature.

One group of scholars explores the effect of preferential trade agreements on trade and investment flows among participants. The evidence suggests that PTAs have substantively increased trade flows¹⁷ and reduced trade volatility¹⁸ among member countries. In addition to their effects on trade, PTAs are also deemed to promote FDI by enabling governments to commit to policies desirable to foreign investors, particularly when the PTA includes strong investment provisions and dispute settlement mechanisms.¹⁹ The economic consequences of preferential liberalization

¹⁷Goldstein, Rivers, and Tomz 2007; Baier and Bergstrand 2007; Magee 2008; Dür, Baccini, and Elsig 2014. There is yet another tradition exploring ambiguities in the welfare effects of PTAs stemming from their discriminatory nature. Welfare-enhancing agreements shift production from inefficient domestic suppliers to more efficient suppliers in member countries. In contrast, trade diverting PTAs shift trade away from efficient non-member suppliers to less efficient partner countries. A normative assessment of the welfare and efficiency effects of PTAs is beyond the scope of this paper.

¹⁸Mansfield and Reinhardt 2008.

¹⁹Büthe and Milner 2008, 2014.

underscore the deep and growing linkages between foreign direct investment and trade in the global economy.

A second body of literature investigates the formation of PTAs. Scholars in this tradition focus on the economic interests and political influence of domestic constituencies. This literature extends traditional political economy models predicting factor or sector-based trade cleavages to examine the evolving global production strategies of multinational firms. A central argument is that PTAs benefit fragmented production networks, in which parts and components are produced in multiple countries and cross borders several times prior to final consumption. Barriers to trade restrict producers' opportunities to exploit country differences in the costs of factors of production, leading firms to lobby for liberalization with countries from which they source.²⁰ However, in examining the empirical content of this argument, the literature does not generally account for variation within industries in firms' capacities to invest and produce abroad, and thus cannot identify which firms most benefit from preferential liberalization.

While industry approaches are informative, greater disaggregation is desirable to the extent that *firm-level* differences explain firms' participation in trade and FDI.²¹ Firms integrate to varying degrees into the global economy, even within the same industry. Only the largest and most productive MNCs can afford the fixed costs (e.g., establishing and managing a plant abroad) and the variable costs (e.g., tariffs and inputs) of producing and sourcing abroad.²² Thus, the distributional consequences of trade may be most politically relevant at the level of individual firms, rather than industries.²³

Drawing on these advances in international trade theory, our paper contributes to the literature streams addressing the economic consequences and the political determinants of preferential liberalization. Our firm-level analysis seeks to paint a more comprehensive picture of the ways in which international economic institutions integrate global commerce, and to provide new insights into whose interests are most served by the recent proliferation of PTAs. In turn, by demonstrating

²⁰Chase 2003; Manger 2009; Blanchard and Matschke 2015; Kim 2015.

²¹Bernard and Jensen 1999; Melitz 2003; Helpman, Melitz, and Yeaple 2004.

²²Melitz 2003; Helpman, Melitz, and Yeaple 2004.

²³Milner 1988; Bombardini 2008; Manger 2009; Jensen, Quinn, and Weymouth 2015.

clear winners and losers from these agreements, our study provides micro-foundations for future work on the lobbying activities of MNCs over trade policy. In particular, our analysis unveils which firms are most likely to push for preferential liberalization and why.

2.1 PTAs and MNC Activities

PTAs are increasingly complex arrangements that cover a host of issues, including intellectual property rights (IPRs) and investor dispute settlement.²⁴ While the design of the PTA is likely to play an important role in promoting economic integration, the most direct channel through which PTAs may promote trade is through a reduction in trade costs resulting from preferential tariff cuts. To illustrate the magnitude of preferential tariff cuts offered by the United States to its various trading partners, we present a boxplot of the proportional tariff reductions implemented in all PTAs signed since 1990.²⁵ Figure 1 demonstrates that the United States reduces the large majority of its tariffs to zero in the first year in which PTAs come into force.

Figure 1 about here

We consider the ways in which preferential cuts affect MNC activities. The extant literature identifies two types of FDI: horizontal and vertical.²⁶ Horizontal FDI is *market* seeking: firms establish subsidiaries to serve the host market and to avoid trade barriers and other trade costs. Therefore, preferential concessions—particularly tariff cuts implemented by host markets—may

²⁴Table C.6 in Appendix C shows the design of all U.S. PTAs, which share a very similar template and include a large number of additional trade-related provisions and enforcement mechanisms, with the exception of the PTA with Vietnam (Baccini and Urpelainen, 2014).

²⁵Proportional tariff cuts capture the difference between most-favored nation (MFN) tariffs (prior to the formation of PTAs) and preferential tariffs in the first year in which the agreement is in force. Data come from the World Integrated Trade Solution (WITS) database and are disaggregated at the Harmonized System (HS) 6-digit level.

²⁶Carr, Markusen, and Maskus 2001; Helpman 2006. In practice, MNCs often conduct a combination of these activities. reduce the economic incentives for this type of FDI.²⁷ In contrast, vertical (or export-oriented) FDI is *resource* seeking: the parent company uses its foreign affiliates to add value to goods or services that are generally exported. We expect tariff cuts to directly influence trade-related FDI activities. More specifically, since PTAs lower tariffs among partner countries on a discriminatory basis, we expect PTAs to increase trade-related sales by MNCs present in partner countries.²⁸

However, not all firms benefit from preferential tariffs since not all firms export.²⁹ Firms' engagement in trade is explained by firm-level differences in size and productivity.³⁰ Productivity differences are relevant because exporters face additional trade costs, including the fixed costs of distribution and servicing, as well as variable costs such as transport, insurance, fees, and tariffs.³¹ More productive firms can charge low prices even in the presence of trade costs, whereas less productive firms must charge higher prices to recoup those costs, resulting in smaller market shares. In other words, there is a self-selection into export markets due to the existence of trade costs, which only productive firms can bear while remaining profitable.³²

Having identified which firms engage in trade activities, we can now explore how trade liberalization affects these activities. When countries form PTAs, tariff cuts reduce the variable costs of trade. This reduction in costs lowers the productivity threshold that firms must meet to sell to partner countries, motivating more firms to trade with PTA partners and increasing the value of exports for current exporters.³³ By promoting trade, lower preferential tariffs thus increase competition from new and existing exporters.³⁴

 $^{27}\mathrm{B\ddot{u}the}$ and Milner 2008.

²⁸Blanchard 2007.

²⁹This is true also for MNCs. Based on our calculations, about 30% of U.S. MNC foreign affiliates export to the United States, and around half of affiliates sell only to the host market.

³⁰Bernard and Jensen 1999; Bernard, Jensen, and Schott 2006; Melitz 2003.

 31 See Helpman 2006 for a review.

³²Bernard, Jensen, and Schott 2006.

³³The productivity threshold is the minimum level of productivity that firms must meet in order to export to new markets.

³⁴Bernard, Jensen, and Schott 2006.

Given differences in productivity and size, the intuition of heterogeneous firm models suggests uneven firm-level gains from preferential trade liberalization. These heterogeneous distributional consequences of trade liberalization occur through two channels. First, increasing competition leads to a reduction of prices, which, in turn, lower firms' profits.³⁵ Second, as larger and more productive firms expand their sales, the demand for labor increases in the countries in which they operate; in turn, real wages rise.³⁶ The combination of decreasing profits and rising costs forces smaller and less productive firms to either contract or exit the market—a process known as selection or churn.³⁷ Since the largest and most productive firms can afford to charge lower prices and can absorb higher wages, they expand sales to liberalizing countries at the expense of smaller less productive firms.

Thus, PTAs have uneven distributional consequences across firms, even among those within the same industry. In line with recent studies arguing that only a relatively small number of very large productive firms reap benefits from trade liberalization,³⁸ we expect a reallocation of sales even among MNCs, the most competitive economic actors in the world economy. To sum up, our core argument is that the largest and most productive firms will increase their trade with partner countries following the formation of PTAs.

2.2 Empirical Implications

Our contribution considers the role of intraindustry heterogeneity—in terms of affiliate size and productivity—in assessing the impact of PTAs on MNC exports. We focus on the effect of preferential tariff cuts offered by the United States on MNC affiliate sales to the U.S. market, which are directly observable in our data. Using MNC affiliates as our unit of analysis allows us to exploit extensive within-country and within-industry variation in preferential liberalization and differences in the relative size and productivity of subsidiaries. Moreover, by exploiting the most fine-grained

³⁵Melitz and Ottaviano 2008.

 $^{^{36}}$ Melitz 2003.

³⁷Melitz 2003; Helpman, Melitz, and Yeaple 2004; Melitz and Ottaviano 2008.

³⁸Osgood, Bernauer, Kim et al. 2015; Mayer and Ottaviano 2008.

unit of analysis available in the data, we are able to mitigate some endogeneity concerns, a point we return to below.

The policy mechanism through which PTAs increase trade among the most productive firms is straightforward. Lower preferential tariffs in the United States make shipping products back to the United States cheaper than shipping them to countries that are *excluded* from the PTA. Indeed, preferential U.S. tariff cuts directly reduce the trade costs for affiliates selling to the home (U.S.) market. Therefore, we should observe increases in sales from affiliates to the United States of products for which the United States implements preferential tariff cuts; these increases should scale with size and productivity.

Implication 1: Reductions in U.S. tariffs for PTA partner countries increase sales to the United States by the largest, most productive affiliates operating in liberalized industries.

Our argument leads to a secondary implication regarding the structure of MNC activities in partner countries. While we primarily focus on the activities of firms, the implications of our argument for the concentration of MNC activity are also potentially interesting—both economically and politically. In particular, given the uneven gains from preferential trade, we should also observe increases in market concentration among U.S. MNC affiliates in the partner country. That is, we expect the reallocation of sales from the least to the most productive firms to trigger an increase in market concentration among MNCs in their host markets. This mechanism operates through tariff reductions, which lower variable costs. In particular, after the United States implements preferential tariff cuts, larger and more productive firms should increase their market share at the expense of smaller and less productive ones.

Implication 2: The formation of PTAs between the United States and partner countries increases market concentration among U.S. affiliates operating in partner countries through preferential tariff cuts implemented by the United States.

3 Data and Model Specification

We use firm-level panel data from legally mandated BEA surveys of all U.S. multinationals. A U.S. multinational is the combination of a single U.S. firm, called the headquarters or parent firm, and

at least one foreign business enterprise, called the foreign affiliate. We use data on non-bank foreign affiliates drawn from the benchmark-year surveys (which have the most extensive coverage) and cover 1989, 1994, 1999, 2004, and 2009. Our analysis includes affiliates in up to 163 countries—the total number of countries in which (i) U.S. FDI was recorded by the BEA and (ii) the country-level covariates are available.

Our data record detailed information on the financial and operating activities of U.S. multinational firms and their affiliates abroad. For majority-owned affiliates, the destination of affiliate sales is also recorded, including affiliate sales to the United States and sales to the host country. Following Blanchard and Matschke, we examine affiliate sales to the United States to capture MNC trade-related activities; sales to the host country are considered horizontal FDI.³⁹ Our main dependent variable is the logged value of sales to the U.S., reported at the individual affiliate level. The affiliate-level sales data enable us to directly test our predictions about the effects of preferential tariff cuts on the activities of multinationals.

Table 1 provides a summary of U.S. multinational activities across the five benchmark years included in our analysis. The top panel provides aggregate counts of total affiliates as well as the number of affiliates according to the destination of sales. The table also records, at the headquarters level, the total number of firms in the analysis and the average number of affiliates of each MNC. The bottom panel provides summary statistics of our main affiliate-level variables.

3.1 Data on Preferential Tariffs and PTA Design

We collected new data on PTAs and PTA tariff cuts to conduct our analysis. Our tariff cuts variable is the difference between MFN and preferential tariffs.⁴⁰ We create a variable, *PTA Tariff* Cut (U.S.), which captures the proportional tariff reduction implemented by the U.S. with its

³⁹Blanchard and Matschke 2015

⁴⁰As noted, data come from WITS (2014) and are disaggregated at the HS 6-digit level. We create a crosswalk to the North American Industry Classification System (NAICS) and collapse the data to the 4-digit level to conform with the BEA industry classifications. See Appendix A.2 for further details.

trading partners, i.e., $\frac{MFN-PRF}{MFN}$. This variable equals 0 for sectors in countries that have no PTA in force with the United States.

To account for differences in the institutional design of PTAs, we rely on a continuous variable (*PTA Depth*) that captures the presence of competition-enhancing provisions in PTAs.⁴¹ Specifically, our indicator is built on 48 dummies that capture the presence of market-friendly provisions in a PTA, which remove behind-the-border barriers.⁴² To allow for comparison with earlier work, we create a series of variables indicating membership in PTAs with the United States. The variable *PTA with U.S.* is a dummy coded 1 for the first benchmark year after a country signs an agreement with the United States, and 0 otherwise.⁴³ We include additional country-level covariates. We create dummy variables for GATT and WTO membership to account for the potential confounding effects of multilateral (MFN) liberalization. The variable *BIT with U.S.* captures the presence of a bilateral investment treaty. The average score of *Depth* across all PTAs that a partner country has joined during the period prior to the benchmark is *Cumulative PTA Depth.* Finally, we include the (log of) *GDP per capita* to account for host market development. Descriptive statistics appear in Table C.1 in the Appendix.⁴⁴

3.2 Empirical Strategy

Our main (baseline) model is:

$$\begin{aligned} Sales_{aji,t} &= \alpha + \beta_1 \ PTA \ Tariff \ Cuts(U.S.)_{ij,t-1} + \beta_2 \ Size_{aji,t} + \beta_3 \ PTA \ Tariff \ Cuts(U.S.)_{ji,t-1} \\ &\times Size_{aji,t} + \beta_4 \ C_{i,t-1} + \varphi_i + \varsigma_j + \tau_t + \epsilon_{ajit}, \end{aligned}$$

where $\text{Sales}_{aji,t}$ is the amount of sales to the U.S. by affiliate *a*, in industry *j*, from host country *i* in period *t*. The variable *PTA Tariff Cuts (U.S.)* refers to the proportional preferential tariff cuts

⁴¹The data come from Desta (Dür, Baccini, and Elsig, 2014) and are available at http://www.designoftradeagreements.org/.

⁴²See Dür, Baccini, and Elsig 2014 for further details on the construction of *PTA Depth*.

⁴³The results are similar if we use the year in which PTAs enter into force.

⁴⁴We also run models with a full set of country-level controls, as in Büthe and Milner 2008. The inclusion of these controls does not affect our results (see Table C.2 in the Appendix.)

implemented by the United States, and $Size_{aji}$ indicates the (logged) number of affiliate employees.⁴⁵ The interaction term *PTA Tariff Cuts* $(U.S.)_{ij,t-1} \times Size_{aji}$ aims to capture the non-linear relationship between trade liberalization and sales. To further probe the hypothesis that the effect of preferential liberalization varies across firms, we examine *PTA Tariff Cuts* $(U.S.)_{ij,t-1}$ interacted with *Productivity*_{aji}, which captures productivity at the affiliate level.⁴⁶ While productivity and size are closely related theoretically and empirically,⁴⁷ we focus on size because the data on the number of employees are available for all firms. In the models that use productivity, we lose around 6,000 observations since the BEA does not calculate value added for all firms in the sample due to data limitations.

All models include $C_{i,t-1}$, a matrix including country-level controls, as well as industry ς_j , country φ_i , and year τ_t fixed effects. The country-level fixed effects capture all unobserved host country and U.S.-host country time-invariant factors. The industry fixed effects ς_j absorb omitted industry-specific determinants of affiliate activity; industry-specific institutions and policies; and, more importantly, industry-level political influence. Finally, $\beta_1 \dots$, and β_4 are the coefficients of interest, whereas ϵ is the error term. We estimate the models using ordinary least squares, with standard errors adjusted for clustering at either the country or industry level, depending on the specification.

⁴⁵We restrict the sample to affiliates with positive employees. Firms such as holding companies do not require employees to be a legal business entity abroad. The results are not sensitive to this restriction.

⁴⁶Following Bilir 2014, we measure productivity as the Solow residual, which we calculate for each firm-year by regressing the firm-level log of value added on firm-level physical assets, employment, and industry. The residuals of this regression are our time-varying measures of affiliate productivity (see Bilir 2014).

⁴⁷Bernard, Jensen, and Schott 2009.

4 Results

We first estimate the influence of PTAs and preferential tariff cuts on U.S. multinational affiliate trade-related activities. We then investigate changes in market concentration following PTAs.

4.1 PTAs and MNC Activities

Our estimates of Equation 1 appear in Table 2. The results in Column 1 indicate that sales to the United States increase for larger firms and decrease for smaller firms following a PTA with the United States. In Column 2, we find a similar effect for the depth of the PTA: the more comprehensive agreements are associated with increased sales for the largest firms. While suggestive, these results using PTA presence and design mask the large observed variance in preferential tariff cuts across sectors within PTAs, which we argued are likely to affect affiliate trade-related activities.

To test the first empirical implication directly, in Columns 3–4 we replace the PTA dummy (and PTA depth) with our measure of *PTA Tariff Cuts (U.S.)*. The estimates reported in Columns 3–4 strongly support our argument. Specifically, the estimated effects of U.S. preferential tariff cuts on affiliate sales to the United States positively scale with affiliate size (Column 3) and productivity (Column 4). Figure 2 illustrates the marginal effect of a tariff cuts reduce the vertical sales of smaller affiliates, and the marginal effect of preferential cuts on sales turns positive and statistically significant at around 45 employees, when a 10% tariff cut is associated with a 6% increase in sales to the United States.⁴⁸ For subsidiaries with 570 employees (around a one standard deviation above the mean of 110 employees), a 10% cut is associated with a 25% increase in sales; for entities nearing 3000 employees (i.e., approximately 37%.⁴⁹ We find consistent results using a flexible

⁴⁸The results are similar if we drop Vietnam, whose tariff cuts are smaller compared with other PTA countries; these are available upon request.

⁴⁹The figure displays the average marginal effect. At the cutoff for a statistically significant negative effect of around 7 employees, 98.4% of industries would be within sample (i.e., have at least one affiliate with fewer than 7 employees); 74% of MNCs would be within sample (i.e., have at

estimation, allowing the interaction coefficients to vary across the employment distribution. Specifically, interactions between tariff cuts and dummy variables corresponding to employment quintiles demonstrate that cuts are associated with statistically significant increases in sales for affiliates in quintiles 2–5 (compared to those in the bottom quintile), and with decreases among affiliates in the bottom quintile.⁵⁰

To further probe the tariff cuts mechanism, the analysis reported in Columns 5–6 exploits selectivity in preferential liberalization by constraining our analysis to industries in which there are no tariff cuts. This allows us to shut down the tariff mechanism and examine whether other features of PTAs, such as market-friendly provisions that apply across industries, influence MNC activities after the formation of PTAs. The estimated effects are quite different. Specifically, the interaction terms (*PTA with U.S.* × *ln Employees* and *PTA Depth* × *ln Employees*) enter with negative signs.⁵¹This suggests that in industries without cuts, market-friendly provisions that remove behindthe-border barriers appear to reallocate sales from the largest to the smallest affiliates. This is an area for future research.

We perform a number of robustness tests, which we report in Table 3. Our strategy is to employ panel techniques to address additional sources of potential bias. We demonstrate that our main results hold to the inclusion of HQ-year (column 1) and country-industry-year (Column 2) fixed effects, which among other things, absorb firm- and industry-level political influence. We also introduce country- (Column 3) and industry-specific (Column 4) time trends, which test whether the parallel trends assumption holds. In Column 5, we drop affiliates with positive sales to the least one affiliate with fewer than 7 employees). At the cutoff for a statistically significant positive effect at around 45 employees, 99.9% of industries are within sample and 98% of MNCs are within sample.

⁵⁰A graphical illustration of these results appears in Appendix Figure C.2.

⁵¹Appendix Figure C.3 provides a graphical representation of the interaction $Depth \times ln \ Employees$.

United States prior to the PTA, as these affiliates may be most likely to lobby for preferential cuts. Our results are consistent across each of these demanding tests.⁵²

We also estimate models at the level of the headquarters firm by aggregating the activities of individual affiliates in each country in which the firm is present. As the dependent variable we calculate, for each multinational in our sample, the sales to the United States of each of its affiliates, in each country in which it is present. This gives us a unique value of firm sales to the United States for each MNC-country-year observation. We then estimate our main interactive models and report the results in Appendix Table C.4. The results of this analysis are consistent: the largest and most productive MNCs disproportionately increase their exports to the United States following preferential liberalization.⁵³

If time-varying affiliate-level characteristics are correlated with affiliate sales and tariff cuts, our models would not be correctly identified and our estimates would be biased. This concern is brought to light by previous studies exploring the political economy of preferential tariffs. In particular, Blanchard and Matschke show that preferential concessions granted by the United States are endogenous to (industry-aggregated) affiliate sales to the United States.⁵⁴

We use an IV approach to address these concerns about endogeneity. Our main strategy, detailed in the Appendix, uses tariff concessions granted by partner countries during the PTA

⁵³We provide estimates of the effects of PTAs on horizontal sales to the host country in Table C.5. Our estimates reveal that a PTA is associated with higher affiliate sales to the host market. In contrast, we find no evidence that tariff cuts (either by the host country or by the United States) are associated with increased horizontal sales. These results are consistent with Büthe and Milner (2008, 2014).

⁵⁴Blanchard and Matschke 2015. See also Trefler 2004.

 $^{^{52}}$ We also examine the effect of PTAs on the extensive margins (i.e., the number of firms that export to the United States at the country-industry level). Our results suggest that PTAs have a weakly positive effect on extensive margins (see Appendix Table C.3).

negotiations as instruments for U.S. preferential cuts.⁵⁵ We extracted these partner country tariff commitments from tariff schedules included in the annexes of PTA treaties signed by the United States. Our data are disaggregated at the HS 6-digit level and cover more than 5,000 products for each U.S. PTA. Importantly, we have tariff commitments for all the U.S. PTAs. We note that these tariff concessions are *de jure*; i.e., they are not necessarily the same as the applied (*de facto*) preferential tariffs available in WITS. In line with our main explanatory variables, we operationalize *de jure* tariff cuts implemented by a partner country as the difference between the MFN tariff (pre-PTA) and preferential commitment at time zero, i.e., the year in which the PTAs come into force, divided by MFN tariffs. We label this instrument *Host Country de jure Cuts*.

Table 4 reports the results of IV estimations. Instrumenting U.S. PTA tariff cuts using the cuts implemented by the partner countries yields results in line with those presented in Table 2.⁵⁶ In particular, the results of the second stage reported in Columns 3 and 6 indicate that reciprocal liberalization through PTAs disproportionately increases the sales of larger and more productive affiliates.⁵⁷ In Column 6, *Host Country de jure Cuts* is weighted by a measure of export product similarity between the United States and the partner countries, based on the assumption that the United States has incentives to level the playing field, especially with trade partners that are close competitors.⁵⁸ In sum, the results from our IV estimations—paired with the other analyses using panel techniques—support our main hypothesis: that preferential trade liberalization increases

⁵⁵A second approach, also detailed in the Appendix, is to instrument for U.S. tariff cuts using tariff cuts implemented by other countries that form PTAs with the same U.S. PTA partner. The results of this alternative strategy appear in Appendix Table B.1.

⁵⁶Regarding the diagnostics: (1) the Kleibergen-Paap Wald $rk \ F \ statistic$ indicates that our models are not weakly identified; (2) the Kleibergen-Paap $rk \ LM \ statistic$ suggests that the models are not under-identified; and (3) the Anderson-Rubin Wald test demonstrates that the orthogonality conditions are valid.

⁵⁷To save space, the results of the productivity interactions are not reported, but they are similar to the OLS estimates and are available upon request.

⁵⁸We rely on the measure of export product similarity suggested by Finger and Kreinin 1979, which is widely used in other studies. See, for example, Barthel and Neumayer 2012. Appendix MNC trade-related activities between PTA partner countries and the United States, but mostly for the largest, most productive firms.

4.2 PTAs and Market Concentration

Next we examine the net effects of preferential trade liberalization on market concentration among U.S. MNCs operating in PTA partner countries. Using the BEA affiliate-level data, we compute Herfindahl-Hirschman Indices (HHI) of sales concentration and *four-firm* sales ratios at the country-industry level for each benchmark year.⁵⁹

Table 5 presents the results from models of sales HHI regressed on our PTA dummy, on *PTA Depth*, and on PTA tariff cuts. The dependent variable is computed at the 4-digit industry level. All of the models include country-industry dummies to control for time-invariant industry-level factors that are specific to each country. We also include a full set of country-level institutional and economic control variables that may be associated with PTAs and with market concentration, including political institutions, trade, and economic performance.

The evidence presented in Table 5 suggests that PTAs increase market concentration. Column 1 demonstrates that PTAs are associated with an increase in sales concentration among U.S. MNC affiliates. In Column 2, we find that market concentration correlates with *PTA Depth*. The estimates in Columns 3 and 4 demonstrate that preferential tariff cuts by the host country and the United States, respectively, are associated with increased market concentration. For instance, a 10% host country preferential tariff reduction is associated with a 0.5-point increase in the HHI index. In Columns 7–10, we re-estimate the model using the four-firm concentration ratio as the B.1 provides additional details about this measure. We multiply export product similarity by the *de jure* tariff cuts implemented by partner countries. We thank a reviewer for this suggestion.

⁵⁹Both variables are widely used measures of industry concentration. The HHI is the sum of the squared firm share of the total sales in its industry. Formally, $HHI = 100 \times \sum_{i=1}^{N} s_i^2$, where s_i is the market share of firm *i* in the industry, and *N* is the number of firms in the industry. The index ranges from 1 to 100, with higher values indicating greater market concentration. The four-firm ratios are the industry-specific share of sales accounted for by the four largest affiliates, which we also multiply by 100.

dependent variable, and we obtain very similar results. In terms of controls, we find that *Democracy* and *Cumulative PTA Depth* are associated with decreasing concentration.

In sum, the results of our analysis of U.S. MNC sales concentration are consistent with our conjecture that tariff cuts principally benefit the largest firms. One caveat is that we are not able to capture overall market concentration since we do not have data on all firms operating in each country. However, to the extent that MNCs are the most productive firms in host countries, we could expect a similar reallocation of sales from less productive domestic firms. If so, the overall concentration effects of PTAs may be larger than our estimates indicate. This is another interesting area for future research.

5 Conclusion

In this paper we analyze how PTAs influence the trade-related activities of MNCs in order to better understand the distributional implications of preferential liberalization. Drawing on recent insights in international trade theory, we argue that preferential liberalization has redistributive effects across firms within industries. The source of redistribution depends on the type of MNC activity and the competitiveness of the firm. Specifically, preferential tariffs increase trade with partner countries for the largest and most productive affiliates. A further implication of our argument is that PTAs lead to increases in economic concentration in liberalizing markets.

Our analysis of firm-level data covering the near universe of U.S. multinationals strongly supports our argument. We show that the largest and most productive firms disproportionately reap the benefits of liberalization through PTAs. Our results hold when we rely on demanding panel techniques and when we use IV analyses to mitigate concerns about endogeneity. We also find that preferential liberalization has led to sharp increases in the concentration of U.S. MNC sales in PTA partner countries. Our study is the first to demonstrate the uneven distributional effects of PTAs across multinationals.

While previous literature has argued that economic liberalization produces diffuse winners and concentrated losers,⁶⁰ our study finds instead that the *beneficiaries* of recent trade agreements

⁶⁰Alt, Carlsen, Heum et al. 1999; Baker 2005; Schonhardt-Bailey 1991.

are *highly concentrated*. Thus, a paradox of globalization is that the proliferation of PTAs generates handsome rewards, but mainly for the most powerful economic actors. This finding is in line with recent studies in international trade and is consistent with the growing popular and academic concern that globalization has contributed to the concentration of wealth in the hands of an elite group of individuals and firms. Moreover, as economic and political power are closely linked, the undue influence of concentrated interests over policy is another source of increasing consternation around the globe. With regard to firms' trade policy interests, our paper demonstrates that microlevel evidence can inform debates about the sources of political mobilization. Our results indicate that support for PTAs should be quite strong among the largest and most productive firms engaged in global production for a simple reason: they win.

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Figures and Tables



Figure 1: Tariff reductions in US PTAs since 1990

Note: The figure displays the distribution of proportional tariff cuts $(\frac{MFN-PRF}{MFN})$ implemented by the U.S. for 17 PTAs signed after 1990. Data come from WITS (2014) and are at the HS 6-digit tariff line.

Figure 2: Marginal Effect of U.S. Preferential Tariff Cuts on U.S. MNC Exports to the U.S., by Affiliate Size



Note: Marginal effects (and 95% confidence intervals) of U.S. PTA cuts based on results from Column 3 in Table 2. The marginal effect turns positive and statistically significant at around 45 employees.

Table 1	I: Descriptive	Statistics of	U.S. MNC	Activities		
Benc	chmark Year	1989	1994	1999	2004	2009
<u>Aggregate Level</u>						
Total affiliates		14,979	15,719	17,361	17,623	22,105
Total affiliates with						
positive sales to the host country		13,027	14,536	15,976	15,106	17,093
sales only to the host country		6,283	7,439	10,673	7,652	8,803
positive sales to the US		4,534	4,436	4,460	5,319	6,145
HQ-Level						
Total firms		1992	2121	1955	1877	2083
Number of affiliates	Mean	7.5	7.4	8.9	9.4	10.6
	Std. Dev.	16.0	16.3	20.5	23.4	29.7
Affiliate-Level						
Local Sales	Mean	45,730	57,779	77,566	95,649	117,666
	Std. Dev.	243,594	282,589	341,801	526,878	557,099
US Sales	Mean	7,420	8,501	12,511	16,371	16,550
	Std. Dev.	113,091	142,548	199,911	235,894	168,088
Employees	Mean	338	332	392	389	421
	Std. Dev.	1,460	1,380	1,817	2,297	2,600

Note: The sales data are reported in thousands of current U.S. dollars.

	(1)	(2)	(3)	(4)	(5)	(9)
					Affiliates in	n industries
		Full S	ample		without F	PTA Cuts
In GDP/capita	0.253*	0.254*	0.287	0.107	0.349^{**}	0.348^{**}
	(0.138)	(0.137)	(0.182)	(0.201)	(0.174)	(0.174)
GATT	0.215	0.214	0.263*	0.254	0.237	0.237
	(0.141)	(0.140)	(0.144)	(0.167)	(0.147)	(0.147)
WTO	0.118	0.117	0.215	0.208	0.068	0.069
	(0.199)	(0.199)	(0.199)	(0.213)	(0.194)	(0.194)
BIT with U.S.	0.195	0.195	0.279	0.119	0.228	0.229
	(0.133)	(0.133)	(0.177)	(0.188)	(0.185)	(0.185)
Cumulative PTA Depth	0.171^{***}	0.171^{***}	-0.014	0.021	0.108^{**}	0.107^{**}
	(0.054)	(0.054)	(0.045)	(0.052)	(0.044)	(0.044)
In Employees (affiliate)	0.586***	0.587***	0.592***		0.599***	0.598***
	(0.033)	(0.033)	(0.048)		(0.047)	(0.047)
PTA with U.S.	-1.229***				0.820^{***}	
	(0.280)				(0.300)	
PTA x Ln Employees	0.195^{***}				-0.215***	
	(0.046)				(0.057)	
PTA Depth		-0.420***				0.298***
		(0.107)				(0.104)
PTA Depth x Ln Employees		0.067***				-0.076***
		(0.018)				(0.020)
PTA Tariff Cuts (U.S.)			-2.149***	1.719***		
			(0.517)	(0.243)		
PTA Tariff Cuts (U.S.) x ln Employees			0.733^{***} (0.101)			
Productivity (affiliate)				0.500^{***}		
				(0.046)		
PTA Tariff Cuts (U.S.) x Productivity				0.493***		
Constant	-4.380***	-4.389***	-4.599***	-0.920	-5.257***	-5.249***
	(1.044)	(1.039)	(1.337)	(1.526)	(1.293)	(1.292)
Observations	70561	70561	70561	64699	64114	64114
Countries	163	163	163	163	163	163
R-squared	0.119	0.119	0.127	0.0815	0.0923	0.0922
Log-likelihood	-184653.6	-184656.5	-184350.1	-171362.5	-166124.8	-166125.6

The dependent variable is the log of total affiliate sales to the U.S. based on affiliate-level data from the BEA. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

		(1)	(7)	(c)	(4)	(c)
In GDP/capita		0.200		0.272	0.294^{*}	-0.062
		(0.157)		(0.301)	(0.153)	(0.145)
GATT		0.371^{***}		0.307	0.373^{***}	0.353 * * *
		(0.134)		(0.186)	(0.136)	(0.117)
WTO		0.352^{**}		0.462***	0.357^{**}	0.385^{**}
		(0.175)		(0.177)	(0.179)	(0.176)
BIT with U.S.		0.364^{**}		0.148	0.430^{***}	0.048
		(0.158)		(0.239)	(0.159)	(0.169)
Cumulative PTA Depth		-0.052	·	-0.058	0.004	0.069*
		(0.042)		(0.053)	(0.039)	(0.036)
PTA Tariff Cuts (U.S.)		-1.554***		-1.429**	-2.268***	0.422
		(0.537)		(0.554)	(0.540)	(0.562)
ln Employees (affiliate)		0.772***	0.636^{***}	0.771^{***}	0.667^{***}	0.703***
		(0.047)	(0.050)	(0.047)	(0.046)	(0.046)
PTA Tariff Cuts (U.S.) x ln Employees		0.681^{***}	0.701^{***}	0.682^{***}	0.703^{***}	0.720^{***}
		(0.109)	(0.105)	(0.111)	(0.105)	(0.110)
						HQ-year; drop
			Country-industry-	HQ-year FE,	HQ-year FE,	affiliates with pre-
	Notes:	HQ-year FE	year FE	country trend	industry trend	PTA U.S. exports
Observations		70561	70561	70561	70561	66929
Countries		163	163	163	163	163
R-squared		0.183	0.0779	0.186	0.227	0.194
Log-likelihood		-173441.0	-172576.4	-173318.2	-171495.5	-161205.8

Table 3: PTAs and U.S. MNC Affiliate Sales to the U.S., 1989-2009: Robustness Tests

The dependent variable is the log of total affiliate sales to the U.S. based on affiliate-level data from the BEA. Robust standard errors adjusted for clustering. *** p < 0.01, ** p < 0.05, * p < 0.10.

	(1)	(2)	(3)	(4)	(5)	(9)
	First Stage	First Stage	Second Stage	First Stage	First Stage	Second Stage
		PTA Cuts (U.S.) x ln		Weighted U.S. PTA	Weighted PTA Cuts (U.S.) x ln	
Dependent Variable:	U.S. PTA Cuts	Employment	In Sales to U.S.	Cuts	Employment	In Sales to U.S.
In GDP/capita	-0.005	-0.073	0.294	-0.005	-0.078	0.312*
	(0.011)	(0.060)	(0.181)	(0.011)	(0.062)	(0.182)
GATT	-0.024***	-0.110***	0.348^{**}	-0.024***	-0.112***	0.362^{**}
	(0.004)	(0.020)	(0.144)	(0.004)	(0.021)	(0.144)
WTO	-0.039***	-0.179***	0.286	-0.045***	-0.208***	0.304
	(0.00)	(0.042)	(0.200)	(0.010)	(0.046)	(0.202)
BIT with U.S.	-0.049***	-0.252***	0.321^{*}	-0.052***	-0.267***	0.347^{**}
	(0.008)	(0.045)	(0.176)	(0.00)	(0.050)	(0.176)
Cumulative PTA Depth	0.059^{***}	0.302^{***}	-0.110**	0.067***	0.345^{***}	-0.152***
	(0.008)	(0.041)	(0.055)	(0.00)	(0.046)	(0.058)
In Employees (affiliate)	-0.002***	-0.006***	0.582^{***}	-0.002***	-0.005***	0.580^{***}
	(0.00)	(0.002)	(0.047)	(0.00)	(0.002)	(0.047)
Instruments						
Host Country De Jure PTA Cuts for U.S.	0.534^{***}	-1.124***		0.644^{***}	-1.771***	
	(0.035)	(0.237)		(0.050)	(0.352)	
Host Country De Jure PTA Cuts x ln Employees	0.033^{***}	0.943^{***}		0.054^{***}	1.298 * * *	
	(0.006)	(0.057)		(0.010)	(0.087)	
Instrumented						
PTA Tariff Cuts			-2.577***			-2.458***
			(0.724)			(0.763)
PTA Tariff Cuts x ln Employees			1.000 * * *			1.070 * * *
			(0.141)			(0.148)
Observations			69010			69010
Countries			160			160
R-squared			0.0798			0.0773
Anderson-Rubin Wald test	4	4.84		52	2.24	
Kleibergen-Paap Wald rk F statistic	5	13.3		43	1.2	
Kleibergen-Paap rk LM statistic	5	7.16)9	.65	
1						

Table 4: PTAs and U.S. MNC Affiliate Sales to the U.S., 1989-2009: Instrumental Variables

Host country de jure preferential cuts instrument for U.S. preferential cuts. In columns 4-6, host country de jure preferential tariff cuts are multiplied by export product similarity with the United States. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

	Table 5: PTAs	and Mark	tet Concer	ntration in	n Host Cou	untries		
	(1)	(2)	(3)	(4)	(2)	(8)	(6)	(10)
					Four-Firm	Four-Firm	Four-Firm	Four-Firm
	IHH	IHH	IHH	IHH	Ratio	Ratio	Ratio	Ratio
In GDP/capita	-19.183***	-19.234***	-19.978***	-18.934***	-4.245***	-4.258***	-4.202***	-4.194***
1	(2.938)	(2.938)	(3.023)	(2.943)	(1.127)	(1.130)	(1.139)	(1.112)
Growth	-0.216*	-0.218*	-0.201	-0.209*	-0.017	-0.017	0.006	-0.017
	(0.127)	(0.127)	(0.131)	(0.127)	(0.021)	(0.021)	(0.019)	(0.021)
In Population	-1.572	-1.706	-1.934	-1.237	-0.372	-0.404	-1.203	-0.756
	(5.685)	(5.681)	(5.854)	(5.622)	(1.644)	(1.645)	(1.704)	(1.573)
Democracy	-0.265**	-0.263**	-0.143	-0.260**	-0.078	-0.077*	-0.083*	-0.089**
	(0.129)	(0.129)	(0.138)	(0.128)	(0.041)	(0.041)	(0.046)	(0.042)
Political Instability	0.140	0.145	0.308	0.118	-0.093	-0.091	-0.085	-0.112
	(0.211)	(0.212)	(0.220)	(0.211)	(0.080)	(0.080)	(0.081)	(0.080)
Trade	-0.038*	-0.038*	-0.038	-0.040*	-0.008	-0.008	-0.011*	-0.008
	(0.022)	(0.022)	(0.023)	(0.022)	(0.006)	(0.006)	(0.005)	(0.006)
GATT	-3.469*	-3.459*	-3.828**	-3.446*	-2.271***	-2.269***	-2.156***	-2.166***
	(1.854)	(1.855)	(1.904)	(1.859)	(0.531)	(0.532)	(0.503)	(0.512)
WTO	3.882	3.899	3.518	3.830	-0.408	-0.404	-0.334	-0.315
	(2.411)	(2.412)	(2.480)	(2.416)	(0.881)	(0.882)	(0.888)	(0.880)
BIT with U.S.	-0.443	-0.443	-0.724	-0.368	-0.627*	-0.627*	-0.621	-0.536
	(1.750)	(1.751)	(1.814)	(1.749)	(0.349)	(0.349)	(0.377)	(0.355)
Cumulative PTA Depth	-1.285**	-1.324***	-0.828	-1.108**	-0.383***	-0.392***	-0.458***	-0.440***
	(0.497)	(0.497)	(0.516)	(0.470)	(0.147)	(0.147)	(0.136)	(0.119)
PTA	2.677**				0.728*			
	(1.188)				(0.373)			
PTA Depth		0.953^{**}				0.256**		
		(0.380)				(0.121)		
PTA Tariff Cuts (Host)			5.334**				4.901***	
			(2.683)				(0.959)	
PTA Tariff Cuts (U.S.)				4.648**				3.520***
				(1.969)				(0.769)
Observations	17093	17093	15879	17093	17093	17093	15879	17093
Countries	134	134	134	134	134	134	134	134
R-squared	0.0664	0.0671	0.0651	0.0642	0.0360	0.0364	0.0456	0.0409
Log-Likelihood	-70877.1	-70876.3	-65673.7	-70876.1	-51486.6	-51486.0	-47094.1	-51462.6

sales data of affiliates of U.S. MNCs. All models include country-industry and year fixed effects. Robust standard errors adjusted for clustering. *** p < 0.01, ** p < 0.05, * p < 0.10. Note: The dependent variables are the Herfindahl-Hirschman Index (columns 1-4) and the four-firm sales share (columns 5-8), based on

Appendix A Data Sources and Descriptions

A.1 Data on U.S. Multinational Companies (Bureau of Economic Analysis, BEA)

The statistical analysis of firm-level data on U.S. multinational companies was conducted at the Bureau of Economic Analysis, U.S. Department of Commerce, under arrangements that maintain legal confidentiality requirements. Given legal constraints, the data must be analyzed onsite at the BEA and cannot be put on any website. Nevertheless, these data can be accessed by special sworn researchers; at the present time there are dozens of researchers with access to the data. A list of articles and working papers produced by academic researchers using BEA data is available at: http://www.bea.gov/papers/SSE_papers.htm.

The following is a description of the BEA special sworn employee program:

Recognizing that some research requires data at a more detailed level than that provided in its publicly disseminated tabulations, the International Economics Directorate of the Bureau of Economic Analysis maintains a program that permits outside researchers to work on site as unpaid special sworn employees of the Bureau for the purpose of conducting analytical and statistical studies using the microdata on multinational companies and international service transactions it collects under the International Investment and Trade in Services Survey Act.

This work is conducted under strict guidelines and procedures that protect the confidentiality of company-specific data, as required by law. Because the program exists for the express purpose of advancing scientific knowledge and because of legal requirements that limit the use of the data to analytical and statistical purposes, appointment to special-sworn-employee status under this program is limited to researchers. Appointments are not extended to any persons affiliated with organizations that collect taxes, enforce regulations, or make policy. Questions about BEA's program for outside researchers can be addressed to William Zeile at william.zeile@bea.gov. [Source: http://www.bea.gov/about/research_program.htm]

The ability to replicate our results is ensured because our program files and the data sets used to generate the results are available in a directory at the BEA that is accessible to all of its special sworn researchers. Once access has been arranged, all special sworn employees can obtain the data and the STATA code used to manipulate the data in the following directory: S: \research_archive\weymouth\BacciniPintoWeymouth_IO. The directory contains the following replication files: BPW_IO.dta and BPW_IO_Tables.do.

The data are collected by the BEA for the purpose of producing publicly available aggregate statistics on the activities of U.S. multinational enterprises. Any U.S. person with direct or indirect ownership of 10% or more of the voting securities of a foreign business during the benchmark fiscal year is a U.S. parent of the foreign business, which is termed its foreign affiliate. The U.S. multinational is the combination of the U.S. legal entity that has established or purchased the affiliate (i.e., the U.S. 'parent') and at least one foreign business enterprise (i.e., the foreign 'affiliate'). The International Investment and Trade in Services Survey Act requires that owners of foreign affiliates detail the balance sheets, income statements, and international transactions of their affiliates. As a result of the confidentiality assurances and the penalties for non-compliance, the coverage of the BEA data is considered nearly complete and the accuracy of the responses is high. In a typical benchmark year, the survey covers over 99% of affiliate activity by total sales, assets, and U.S. FDI. For instance, in the 1994 Benchmark Survey, participating affiliates accounted for 99.9% of total U.S. FDI.

The data include detailed financial and operating information at the level of the foreign affiliate and the U.S. parent. The affiliate sales information used in this study was extracted from the BEA's data files for each Benchmark Survey year, and then merged with the parent firm information to create a complete parent-affiliate-year panel. The sample includes all majorityowned affiliates; we exclude values: (1) that were imputed based on previous survey responses; (2) from firms in the financial sector; or (3) that correspond to a form rejected by the BEA due to inaccuracies.

The analysis relies primarily on affiliate-level sales data (disaggregated according to the destination of the buyer) from the quinquennial Benchmark Surveys. The benchmark years included in our study are 1989, 1994, 1999, 2004, and 2009. We characterize horizontal sales as those to the host country; vertical sales are sales to the United States.

A.2 Tariff Data

Data on MFN and preferential tariffs are collected from Trade Analysis Information System (TRAINS) and come from WITS (2014). They rely on Harmonized System (HS trade categorization. U.S. HS codes are established by the World Customs Organization (WCO), which assigns 6-digit codes for general categories; countries adopting the system then define their own codes to capture commodities at more detailed levels. In the United States, the most detailed level of disaggregation is ten digits by Pierce and Schott (2012). Since the U.S. HS system is rooted in WCO 6-digit HS, we construct concordance between 6-digit HS combined and 4-digit NAICS from 1996 to 2009 using two steps. First, based on concordance between 10-digit U.S. HS and 7-digit NAICS provided by Pierce and Schott (2012), we construct the concordance between 6-digit U.S. HS and 4-digit NAICS systems (H1, H2, and H3) to match 6-digit U.S. HS codes over time.

The variable *PTA Tariff Cuts (U.S.)* is built using the following steps. First, we identify for each PTA the year of ratification, in which the tariff cuts take effect. Second, we take the average value of the MFN tariff over the three years prior to the year of ratification.⁶¹ This represents our baseline for calculating the tariff cuts. We use the average value over three years to mitigate the impact of missing values. Third, we take the average value of the preferential tariff for the year of ratification and subsequent years. Again, the three-year average is meant to reduce the missing values. There are a couple of exceptions. We were unable to find preferential tariff data for the United States for 1994, so we rely on two years: 1995 and 1996.⁶² For Vietnam, the preferential tariff data come from the query "Tariff and Trade Analysis" rather than from "Find a Tariff" as for all the other PRF tariffs. This is because TRAINS does not consider tariffs resulting from the U.S.-Vietnam PTA to be preferential tariffs, but rather the non-MFN duty rate. Table A.1 summarizes the details of the data collection related to MFN and preferential (PRF) tariffs.

⁶¹The results are similar if we use 2-year or 4-year averages.

 $^{^{62}\}mathrm{The}$ results are similar if we also include 1997 so that we have a 3-year average for NAFTA as well.

РТА	Year Signature	Year Ratification	MFN	PRF
US-Australia	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-Bahrain	2004	2006	2003, 2004, 2005	2006, 2007, 2008
US-CAFTA-DR_Costa Rica	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-CAFTA-DR_Dominican Republic	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-CAFTA-DR_El Salvador	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-CAFTA-DR_Guatemala	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-CAFTA-DR_Honduras	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-CAFTA-DR_Nicaragua	2004	2005	2002, 2003, 2004	2005, 2006, 2007
US-Canada	1988	1989	no data	no data
US-Canada*	1992	1994	1991, 1992, 1993	1995, 1996
US-Chile	2003	2004	2001, 2002, 2003	2004, 2005, 2006
US-Colombia	2006	2012	no data	no data
US-Jordan	2000	2001	1998, 1999, 2000	2001, 2002, 2002
US-Korea	2007	2012	no data	no data
US-Mexico*	1992	1994	1991, 1992, 1993	1995, 1996
US-Morocco	2004	2006	2003, 2004, 2005	2006, 2007, 2008
US-Oman	2006	2009	2006, 2007, 2008	2009, 2010, 2011
US-Panama	2007	2012	no data	no data
US-Peru	2006	2009	2006, 2007, 2008	2009, 2010, 2011
US-Singapore	2003	2004	2001, 2002, 2003	2004, 2005, 2006
US-Vietnam**	2000	2001	1998, 1999, 2000	2001, 2002, 2002

Table A.1: MFN Tariffs and Preferential Tariffs (PRF).

* No data in 1994 when USA is the reporter country.

** According to TRAINS Measures, Vietnam's PRF should be from Non-MFN duty rate (measurecode 3).

Note: 1989, 2011, 2010, 2013 and 2014 USA tariff original product code is 10-digit or 8-digit HS code. Crosswalk to 6-digit HS uses different editions of the HS nomenclature:

a) 1989-1995: HS1988/92

b) 1996-2001, HS1996

c) 2002-2006, HS2002

d) 2007-2011, HS2007

e) 2012-2014, HS2012

A.3 Export Product Similarity

We rely on the measure of export product similarity suggested by Finger and Kreinin (1979):

$$Similarity(ab_t) = \sum_{c} Min[X_c(ac_t), X_c(bc_t)],$$

where a and b are two countries exporting a commodity c, and $X_c(ac_t)$ is the share of exports in commodity c of the total exports of a in year t. The similarity of a and b is the sum of the minima of the shares of a certain commodity of the total exports of a and b, respectively. The resulting index ranges from 0 (completely dissimilar) to 1 (completely similar). Our index covers five key manufacturing commodity sectors with data taken from the World Development Indicators (World Bank, 2015). In order to minimize missing values and to cover as many countries as possible, we focus on five manufacturing sectors, which have substantively better coverage than non-manufacturing sectors.

Appendix B Instrumental Variables Estimations

In this section we further address concerns about endogeneity with respect to preferential tariff cuts implemented by the United States. We rely on two IV analyses. Below we describe the details of each approach.

B.1 Instrumental Variables: Host Country de jure Cuts

As explained in the main text, our first IV analysis relies on tariff commitments agreed by U.S. trade partners and included in the annexes of the PTA treaties. We refer to them as *de jure* tariff cuts, which represent our instruments. Our data are disaggregated at the HS 6-digit level and cover more than 5,000 products for each U.S. PTA. Importantly, we have tariff commitments for all the U.S. PTAs. We note that these tariff concessions are *de jure*; i.e., they are not necessarily the same as the applied (*de facto*) preferential tariffs available in WITS. In line with our main explanatory variables, we operationalize *de jure* tariff cuts implemented by a partner country as the difference between the MFN tariff (pre-PTA) and preferential commitment at time zero, i.e., the year in which the PTAs come into force, divided by MFN tariffs. We label this instrument *Host Country de jure Cuts*.

Since our key variable is the interaction between tariff cuts and size, we also need to instrument this interaction term. Following Wooldridge (2012), we use the interaction between *Host Country de jure Cuts* and the number of employees to instrument for the interaction term in our main regressions. More formally, we estimate two stages. The first-stage models are:

$$PTA Tariff Cuts (U.S.)_{ij,t-1} = \beta_1 Host Country de jure Cuts_{ij,t-1} + \beta_2 Size_{aij,t} + \beta_3 Host Country de jure Cuts_{ij,t-1} \times Size_{aij,t} (1) + \beta_4 C_{j,t-1} + \varphi_j + \varsigma_i + \tau_t + \eta_{ij,t}$$

 $PTA Tariff Cuts (U.S.)_{ij,t-1} \times Size_{aij,t} = \beta_1 Host Country de jure Cuts_{ij,t-1} + \beta_2 Size_{aij,t}$ $+ \beta_3 Host Country de jure Cuts_{ij,t-1} \times Size_{aij,t}$ (2) + $\beta_4 C_{j,t-1} + \varphi_j + \varsigma_i + \tau_t + \zeta_{aij,t}$

The second-stage model is:

$$Sales_{aij,t} = \beta_1 PTA \ Tariff \ Cuts \ (U.S.)_{ij,t-1} + \beta_2 Size_{ij,t} + \beta_3 PTA \ Tariff \ \widehat{Cuts} \ (U.S.) \times Size_{ij,t} + \beta_4 C_{j,t-1} + \varphi_j + \varsigma_i + \tau_t + \epsilon_{aij,t}$$

$$(3)$$

The instrument is valid if it meets two criteria. First, host country de jure cuts should be correlated with U.S. PTA cuts. The intuition behind this assumption boils down to *reciprocity*. The United States is more likely to lower PTA tariffs in industries in which partner countries have also agreed to grant preferential concessions. Indeed, we find our instruments are always statistically significant in the first stage (see Table 4) and the F-statistic is always larger than 10. Second, *Host Country de jure Cuts* should not be correlated with sales to the U.S. except through their effects on U.S. tariff cuts. The distinction between *de jure* and applied tariffs should increase confidence in the exclusion restriction, since it is unlikely that tariff cuts agreed by *host countries* during the PTA negotiations affect exports to the United States (except through tariff cuts implemented by the United States).⁶³ Further details about the IV model specification and a discussion of the identifying assumptions are available in Appendix B.1.

⁶³The complexity of MNC activities present a potential challenge to this assumption. In particular, Jensen et al. (2015) note that MNCs often use their global affiliates as operating options, expanding production in particular countries when the policy environment changes in ways that reduce the costs of production. If host country de jure tariff cuts lower the costs of importing inputs used in the production of exports shipped to the U.S., there may be an indirect effect of host country tariffs on exports to the United States. To account for this, in unreported models we include as a control variable the value of affiliate intermediate inputs imported from the U.S. (as well as the interaction of this variable and firm size), and our results are unchanged. These results are available upon request.



Figure B.1: PTAs and U.S. MNC Affiliate Sales to the United States, 1989–2009. Instrumental Variables.

Marginal effects (and 95% confidence intervals) of U.S. PTA cuts (instrumented) based on results from Column 3 of Table 4.

B.2 Alternative IV Strategy: Other PTA Country Cuts

Our second IV strategy follows Cheng (2012). In particular, to instrument for U.S. PTA cuts, we use tariff cuts implemented by other countries that form PTAs with the same U.S. PTA partner. For instance, we use tariff cuts implemented by Canada as a result of its PTA with Costa Rica to instrument for tariff cuts implemented by the United States in its PTA with Costa Rica. The intuition is that the United States tries to negotiate the same (preferential) tariff deal agreed by other countries that compete in the same markets in order to level the playing field with potential competitors. We include PTAs negotiated either concurrently with or prior to the U.S. PTAs.⁶⁴ We label the instrument *Competitor Cut*. To further strengthen our identification strategy, and in line with our first IV analysis, we interact *Competitor Cut* with a measure of export product similarity between the United States and the partner countries in some estimates.

We are able to instrument only a subsample of the PTAs formed by the United States for three reasons. First, we are unable to instrument the PTAs that had been signed but were not in force by 2009, the last benchmark year in the BEA data. Second, we are unable to instrument Canada and Mexico, since we do not have data on PTAs formed before the North American Free Trade Agreement.⁶⁵ Third, we are unable to instrument tariff cuts for some PTAs, since data for some developing countries are not available (or are only very sparsely available) from WITS. We are left with seven instrumented PTAs: Australia, Chile, Costa Rica, Jordan, Morocco, Peru, and Singapore. For the full list of instrumented PTAs and their instruments, see Table C.7.

Since our key variable is the interaction between tariff cuts and productivity, we also need to instrument this interaction term. Following Wooldridge (2012), we use the interaction between *Competitor Cut* and *Size* to instrument for the interaction term in our main regressions. More formally, we estimate two stages. The first-stage models are:

$$PTA Tariff Cuts (U.S.)_{ij,t-1} = \beta_1 Comp Cut_{ij,t-1} + \beta_2 Size_{aij,t} + \beta_3 Comp Cut_{ij,t-1} \times Size_{aij,t} + \beta_4 C_{j,t-1} + \varphi_j + \varsigma_i + \tau_t + \eta_{ij,t}$$

$$(4)$$

$$PTA Tariff Cuts (U.S.)_{ij,t-1} \times Size_{aij,t} = \beta_1 Comp Cut_{ij,t-1} + \beta_2 Size_{aij,t} + \beta_3 Comp Cut_{ij,t-1} \times Size_{aij,t} + + \beta_4 C_{j,t-1} + \varphi_j + \varsigma_i + \tau_t + \zeta_{aij,t}$$
(5)

⁶⁵Canada formed PTAs with Portugal and Spain in 1954, with Australia in 1960, and with New Zealand in 1980. None of these has been ratified by the WTO, and they are all inactive except the PTA with Australia. Mexico formed several PTAs with other Latin American countries in the 1980s, none of which has been ratified by the WTO; they are now all inactive.

⁶⁴Before starting negotiations, trade partners establish a joint study group composed of highlevel officials and experts from both sides. This group assesses the potential for enhanced trade relations and suggests tariff reductions in specific industries. When the joint study group ends its work, formal negotiations begin. In all the PTAs used as instruments, the establishment of joint study groups and informal and formal negotiations overlap with those of the PTAs instrumented. Also note that treaties can be amended between signature and ratification.

The second-stage model is:

$$Sales_{aij,t} = \beta_1 PTA Tariff Cuts (U.S.)_{ij,t-1} + \beta_2 Size_{aij,t} + \beta_3 PTA Tariff Cuts (U.S.) \times Size_{aij,t} + \beta_4 C_{i,t-1} + \varphi_i + \varsigma_i + \tau_t + \epsilon_{aij,t}$$
(6)

Armed with our instruments, our identification strategy is sound if three conditions are satisfied. First, tariff cuts implemented by competitors should not impact affiliate sales to the United States. Since vertical FDI is affected almost exclusively by the level of tariffs with the home country, such a possibility seems remote. However, it might be the case that PTAs formed by U.S. competitors increase the economic activities of the affiliates of firms from those competitors, which in turn raises the demand for labor and other inputs in the partner countries. Such increases in wages and input costs may also affect the sales of U.S. affiliates operating in these host countries by increasing the costs of production. To mitigate this concern, we select countries that negotiated PTAs at about the same time the United States did, so that any effects on the labor market have no time to materialize. Table C.7 reports which PTAs we use to instrument *Competitor Cut*.

Second, our instruments have to be strong predictors of *PTA Tariff Cuts (U.S.)*. The correlation between our instrument and *PTA Tariff Cuts (U.S.)* is 0.7. All the diagnostics (reported in Table B.1) show that our instrument is strong, and that there are no concerns about underidentification.

Third, our instruments should not be correlated with (time-varying) industry characteristics. This might be the case if U.S. MFN tariffs (pre-PTA) are correlated with the MFN tariffs of U.S. competitors that form agreements with the same host markets. Indeed, the level of tariffs before the formation of a PTA may be a proxy for industry characteristics, which are in turn correlated with our outcome variable. Formally, $Cov(MFN_{US}, MFN_{USCompetitor}) = 0$. The correlation between U.S. MFN and U.S. competitors' MFN is very low: $\rho = 0.1$, as expected.

Table B.1 reports the results of the IV estimations. Instrumenting tariff cuts implemented under a PTA signed with the United States by the cuts implemented by the partner with third countries yields results in line with those presented in Table 2: as reflected in Column 2, reciprocal liberalization through PTAs leads to lower vertical sales by smaller affiliates and higher sales by larger ones. Importantly, both instruments are positive and statistically significant in the first stage (as reported in Table B.1). Regarding the diagnostics, (1) the Kleibergen-Paap Wald rk F statistic shows that our models are not weakly identified; (2) the Kleibergen-Paap rk LM statistic shows that our models are not under-identified; and (3) the Anderson-Rubin Wald test shows that the orthogonality conditions are valid. In sum, the results from our IV estimations (paired with the other analyses using panel techniques) support our main findings: large productive firms are the main beneficiaries of preferential liberalization.

	(1)	(2)	(3)
	First Stage	First Stage	Second Stage
		PTA Cuts (U.S.) x ln	
Dependent variable:	U.S. PTA Cuts	Employment	In Sales to U.S.
ln GDP/capita	0.055***	0.260***	0.323*
	(0.012)	(0.059)	(0.188)
GATT	-0.023***	-0.108***	0.278**
	(0.006)	(0.030)	(0.141)
WTO	-0.059***	-0.285***	0.126
	(0.011)	(0.056)	(0.186)
BIT with U.S.	-0.022***	-0.110***	0.144
	(0.004)	(0.020)	(0.222)
Cumulative PTA Depth	0.047***	0.232***	0.112*
	(0.007)	(0.034)	(0.061)
In Employees (affiliate)	-0.001***	-0.004***	0.593***
	(0.000)	(0.001)	(0.046)
<u>Instruments</u>			
Competitor Cut	0.350***	0.244	
	(0.068)	(0.379)	
Competitor Cut x ln Employees	-0.010	0.245***	
	(0.013)	(0.086)	
Instrumented			
PTA Tariff Cuts (U.S.)			-10.698***
			(2.821)
PTA Tariff Cuts (U.S.) x ln Employees			2.100***
			(0.646)
Observations	58716	58716	58716
Countries	150	150	150
R-squared			0.0676
Anderson-Rubin Wald test	1	5.49	
Kleibergen-Paap Wald rk F statistic	5	9.18	
Kleibergen-Paap rk LM statistic	3	9.30	

Table B.1: Preferential Cuts and U.S. MNC Affiliate Vertical Sales: Alternative IV Strategy

U.S. competitors' tariff cuts instrument for U.S. preferential cuts. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

Appendix C Additional Tables and Figures



Figure C.1: PTAs and U.S. MNC Affiliate Sales to the United States, 1989–2009 (Productivity)

Marginal effects (and 95% confidence intervals) of U.S. PTA cuts based on results from Column 4 in Table 2.

Figure C.2: PTAs and U.S. MNC Affiliate Sales to the United States, 1989–2009



Marginal effects (and 95% confidence intervals) of U.S. PTA cuts. Interactions terms are between tariff cuts and dummy variables corresponding to employment quintiles.

Figure C.3: PTA Depth and Sales to the U.S., 1989–2009 (Affiliates in Industries with Zero Tariff Cuts)



Marginal effects (and 95% confidence intervals) of U.S. PTA *Depth*. The sample is constrained to affiliates in industries without U.S. preferential tariff cuts.

Variable	Obs	Mean	Std. Dev.	Min	Max
In Sales to U.S.	70561	2.3925	3.8448	-	-
In Local Sales	70561	9.2876	3.0964	-	-
In Employees	70561	4.7047	1.6593	-	-
Productivity	64699	-0.0503	0.9938	-	-
PTA Tariff Cuts (U.S.)	18439	0.029	0.155	0	1
Host Country De Jure PTA Cuts for U.S.	17752	0.029	0.153	0	1
Competitor Tariff Cut	15917	0.034	0.171	0	1
ln GDP/capita	677	8.206	1.594	4.451	11.851
GATT	677	0.254	0.436	0	1
WTO	677	0.505	0.500	0	1
BIT with U.S.	677	0.198	0.399	0	1
Cumulative PTA Depth	677	1.461	0.927	0	3.204
PTA with U.S.	677	0.046	0.209	0	1
PTA Depth	677	0.135	0.620	0	3.400
Growth	674	3.536	4.371	-31.997	35.590
In Population	677	15.673	2.043	9.649	20.999
Democracy	574	2.693	6.874	-10	10
Political Instability	646	0.550	1.151	0	12.200
Trade	648	85.674	51.452	12.816	416.246

Table C.1: Summary Statistics

Note: The minimum and maximum values of the firm-level variables are suppressed to avoid disclosure of confidential information.

	(1)	(2)	(3)	(4)	(5)	(6)
ln GDP/capita	0.211	0.243	0.214	0.245	0.272	0.305*
	(0.174)	(0.167)	(0.174)	(0.167)	(0.179)	(0.178)
Growth	-0.009	-0.010	-0.009	-0.010	-0.011	-0.012
	(0.011)	(0.011)	(0.011)	(0.011)	(0.008)	(0.009)
In Population	0.409	0.338	0.414	0.344	-0.297	-0.271
	(0.539)	(0.502)	(0.540)	(0.504)	(0.356)	(0.355)
Democracy	-0.011	-0.013	-0.011	-0.013	-0.022*	-0.029**
	(0.015)	(0.014)	(0.015)	(0.014)	(0.012)	(0.012)
Political Instability	-0.004	-0.008	-0.005	-0.009	-0.022	-0.026
	(0.015)	(0.014)	(0.014)	(0.014)	(0.018)	(0.018)
Trade	0.004	0.004	0.004	0.004	0.004**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
GATT	0.222	0.252	0.223	0.251	0.380**	0.391**
	(0.169)	(0.158)	(0.169)	(0.158)	(0.177)	(0.177)
WTO	0.196	0.196	0.196	0.196	0.321	0.317
	(0.176)	(0.179)	(0.176)	(0.179)	(0.202)	(0.203)
BIT with U.S.	0.153	0.167	0.154	0.168	0.269	0.272
	(0.132)	(0.136)	(0.132)	(0.136)	(0.171)	(0.172)
Cumulative PTA Depth	0.150***	0.156***	0.151***	0.156***	0.005	0.010
	(0.053)	(0.054)	(0.053)	(0.054)	(0.043)	(0.043)
In Employees (affiliate)	0.619***	0.579***	0.619***	0.580***	0.620***	0.588***
	(0.024)	(0.033)	(0.024)	(0.032)	(0.048)	(0.047)
РТА	-0.229**	-1.307***				
	(0.098)	(0.247)				
PTA x Ln Employees		0.210***				
		(0.039)				
PTA Depth			-0.076**	-0.450***		
			(0.031)	(0.096)		
PTA Depth x Ln Employees				0.073***		
				(0.016)		
PTA Tariff Cuts (U.S.)					2.143***	-1.819***
					(0.235)	(0.552)
PTA Tariff Cuts (U.S.) x ln Employees						0.715***
						(0.103)
Constant	-10.296	-9.356	-10.394	-9.464	-0.241	-0.706
	(8.615)	(8.124)	(8.638)	(8.152)	(5.464)	(5.471)
Observations	65405	65405	65405	65405	65405	65405
Countries	133	133	133	133	133	133
R-squared	0.120	0.122	0.120	0.122	0.128	0.131
Log-likelihood	-170589.3	-170537.8	-170589.2	-170540.6	-170326.5	-170205.6

Table C.2: PTAs and Sales to the United States (Additional Controls), 1989–2009

The dependent variable is the log of total affiliate sales to the U.S. based on affiliate-level data from the BEA. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

	(1)	(2)	(3)
ln GDP/capita	0.921***	0.921***	0.899**
	(0.336)	(0.336)	(0.360)
GATT	0.608***	0.608***	0.625***
	(0.213)	(0.213)	(0.225)
WTO	0.212	0.212	0.252
	(0.231)	(0.231)	(0.244)
BIT with U.S.	0.239*	0.239*	0.255
	(0.139)	(0.139)	(0.157)
Cumulative PTA Depth	0.130**	0.130**	0.041
	(0.058)	(0.057)	(0.071)
PTA with U.S.	-0.137		
	(0.118)		
PTA Depth		-0.044	
		(0.037)	
PTA Tariff Cuts (U.S.)			1.277*
			(0.730)
Constant	-7.364***	-7.365***	-7.159***
	(2.542)	(2.543)	(2.715)
Observations	19377	19377	19377
Countries	165	165	165
R-squared	0.238	0.238	0.241

Table C.3: PTAs and Total Affiliates with Sales to the United States, 1989–2009

The dependent variable is the total number of affiliates with sales to the U.S. based on affiliate-level data from the BEA. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

	(1)	(2)
ln GDP/capita	0.231	0.271
	(0.225)	(0.320)
GATT	0.329**	0.405*
	(0.163)	(0.216)
WTO	0.294	0.320
	(0.220)	(0.257)
BIT with U.S.	0.428*	0.170
	(0.220)	(0.241)
Cumulative PTA Depth	-0.067	-0.042
	(0.049)	(0.058)
PTA Tariff Cuts (U.S.)	-1.172**	2.558***
	(0.508)	(0.238)
In Employees	0.908***	
	(0.044)	
PTA Tariff Cuts (U.S.) x Ln Employees	0.615***	
	(0.101)	
Productivity		0.549***
		(0.053)
PTA Tariff Cuts (U.S.) x Productivity		0.479***
		(0.171)
Constant	-4.204**	-1.121
	(2.104)	(3.058)
Observations	49342	46459
R-squared	0.260	0.151

Table C.4: PTAs and Sales to the United States (MNC Level), 1989–2009

The dependent variable is total affiliate sales to the U.S. for each MNC-country-year observation, based affiliate-level data from the BEA. Employees are summed to the MNC-country-year level. Productivity is the average of affiliate productivity for each MNC-country-year. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

Table C.5: PTAs and U.S. MNG	Affiliate Sale	es to the Hc	st Market, 1	1989-2009	
	(1)	(2)	(3)	(4)	(5)
In GDP/capita	0.668***	0.670^{***}	0.869***	0.869^{***}	0.829***
	(0.184)	(0.184)	(0.175)	(0.174)	(0.167)
GATT	0.353**	0.352^{**}	0.360^{**}	0.360^{**}	0.352**
	(0.146)	(0.146)	(0.146)	(0.145)	(0.141)
WTO	0.156	0.151	0.086	0.086	0.092
	(0.182)	(0.183)	(0.192)	(0.192)	(0.192)
BIT with U.S.	0.053	0.051	0.137	0.137	0.116
	(0.183)	(0.183)	(0.185)	(0.185)	(0.185)
Cumulative PTA Depth	-0.073**	-0.066*	-0.081**	-0.082**	-0.061*
	(0.036)	(0.037)	(0.036)	(0.036)	(0.036)
In Employees (affiliate)	0.654***	0.654^{***}	0.670^{***}	0.670^{***}	0.670^{***}
	(0.027)	(0.027)	(0.026)	(0.027)	(0.026)
PTA with U.S.	0.356***				
	(0.129)				
PTA Depth		0.106^{**}			
		(0.040)			
PTA Tariff Cuts (Host Country)			-0.024	-0.078	1.288
			(0.190)	(0.830)	(0.833)
PTA Tariff Cuts (Host Country) x ln Employees				0.010	
				(0.172)	
PTA Tariff Cuts (U.S.)					-1.221
					(0.800)
Constant	-1.786	-1.808	-3.389	-3.391	-3.051
	(3.001)	(2.999)	(2.834)	(2.825)	(2.691)
Observations	70561	70561	63899	63899	63899
Countries	164	164	164	164	164
R-squared	0.178	0.178	0.184	0.184	0.184
Log-likelihood	-168473.0	-168474.9	-152011.1	-152011.1	-151997.6

The dependent variable is the log of total affiliate sales to the host country based on affiliate-level data from the BEA. Robust standard errors adjusted for clustering. All models include country, year, and industry fixed effects. *** p < 0.01, ** p < 0.05, * p < 0.10.

РТА	Year	Services	Investment	IPRs	Competition	Government Procurement	Depth	Enforcement
US-Australia	2004	Yes	Yes	Yes	Yes	Yes	3.19	4.25
US-Bahrain	2004	Yes	Yes	Yes	No	Yes	3.01	4.50
US-CAFTA-DR	2004	Yes	Yes	Yes	No	Yes	3.13	4.50
US-Canada	1988	Yes	Yes	No	No	Yes	1.90	4.00
US-Canada	1992	Yes	Yes	Yes	Yes	Yes	2.74	4.25
US-Chile	2003	Yes	Yes	Yes	No	Yes	2.90	4.50
US-Colombia	2006	Yes	Yes	Yes	Yes	Yes	3.40	4.50
US-Jordan	2000	Yes	Yes	Yes	No	Yes	2.59	4.50
US-Korea	2007	Yes	Yes	Yes	Yes	Yes	3.26	4.25
US-Mexico	1992	Yes	Yes	Yes	Yes	Yes	2.74	4.25
US-Morocco	2004	Yes	Yes	Yes	No	Yes	3.19	4.50
US-Oman	2006	Yes	Yes	Yes	No	Yes	3.19	4.50
US-Panama	2007	Yes	Yes	Yes	No	Yes	3.19	4.50
US-Peru	2006	Yes	Yes	Yes	Yes	Yes	3.33	4.50
US-Singapore	2003	Yes	Yes	Yes	Yes	Yes	3.01	4.25
US-Vietnam	2000	Yes	Yes	Yes	No	No	2.69	0.50

Table C.6: Design of U.S. PTAs

Note: "Yes" means that a specific section regulating each trade-related issue is included in the treaty. Depth is built using a latent trait analysis of 48 dummy variables related to trade-related issues (Dür, Baccini, and Elsig, 2014). Data on enforcement come from Allee and Elsig (2016).

PTA	Signature	Ratification	PTA used as	Signature	Patification	
Instrumented	Signature	Ratification	instrument	Signature	Ratification	
US-Australia	18 May 2004	1 January 2005	Thailand-Australia	5 July 2004	1 January 2005	
US-Chile	6 June 2003	1 January 2004	South Korea-Chile	15 February 2003	1 April 2004	
US-Costa Rica	5 August 2004	1 January 2009	Canada-Costa Rica	23 April 2001	1 November 2002	
US-Jordan	24 October 2000	17 December 2001	EU-Jordan	24 November 1997	1 May 2002	
US-Morocco	15 June 2004	1 January 2006	EU-Morocco	26 February 1996	1 March 2000	
US-Peru	12 April 2006**	1 February 2009	Canada-Peru	29 May 2008	1 August 2009	
US-Singapore	6 May 2003	1 January 2004	Japan-Singapore	13 January 2002	30 November 2002	

Table C.7: PTAs Used to Build our Alternative Instrument

* Amended on December 3, 2010. ** Ratified with amendments on February 1, 2009.

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