The Depth of Preferential Trade Agreements
Online Appendix

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September 14, 2025

A.1 Additional Data Appendix

A.1.1 Import Tariffs

We collect raw import tariff data from two sources: the United Nations Conference on Trade and Development's Trade Analysis and Information System (UNCTAD-TRAINS) and the World Trade Organization's Integrated DataBase (WTO-IDB). The data are downloaded via the World Bank's World Integrated Trade Solutions (WITS) website,[1] and observations are available starting from 1988. For each partner-reporter-year (ijt-specific) combination, four types of tariff rates are available: Effectively Applied (AHS), Preferential (PRF), MFN applied (MFN), and MFN bound (BND). For each type of tariff rate, we choose the simple average rate (across products) reported by the database. We take the UNCTAD-TRAINS data as the benchmark, and supplement missing values with the WTO-IDB data. For the EU members as importers, we utilize the import tariffs reported by the reporter "EU" with respect to non-EU trade partners (unless the tariff rate is explicitly reported between an EU member state and a non-EU trade partner), and set the tariff rate between two EU member states to zero.

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[1] http://wits.worldbank.org/WITS/WITS/AdvanceQuery/TariffAndTradeAnalysis/AdvancedQueryDefinition.aspx?Page=TariffandTradeAnalysis.

Notably, close to 60% of observations across ijt for the period 1988–2015 have missing tariff data. We propose the following procedure to approximate and fill in the missing entries. To begin, we take the AHS rate as the default. If the AHS rate is missing, we fill it in with the PRF rate, provided that $PTA_{ijt} = 1$ or $GSP_{ijt} = 1$. If both the AHS rate and the PRF rate are missing, we fill in the missing entries according to the following sequence:

(I) Conditional on ij: if the reporter/importer j is a GATT/WTO member, we replace a missing tariff entry $\mathfrak{t}_{ijt}$ with observation $\mathfrak{t}_{ijt'}$ according to criteria (a)–(b) listed below, where t' is the closest year to t and in the same GATT/WTO round as t. If two candidate observations on $\mathfrak{t}_{ijt'}$ satisfy this timing condition, the observation from the earlier year is adopted.[2] Specifically:

(a) if $PTA_{ijt} = 1$ or $GSP_{ijt} = 1$, and $PTA_{ijt'} = 1$ or $GSP_{ijt'} = 1$, the rate $AHS_{ijt'}$ is used as a replacement only if both $AHS_{ijt'}$ and $PRF_{ijt'}$ are available at time t';[3]

(b) if $PTA_{ijt} = 0$ and $GSP_{ijt} = 0$, $MFN_{ijt'}$ is used as the first candidate replacement, and $BND_{ijt'}$ as the next candidate, provided that the partner/exporter i is a GATT/WTO member in both years t and t'. If i is not a GATT/WTO member in year t or t', $AHS_{ijt'}$ is used as a replacement;

(c) if no $\mathfrak{t}_{ijt'}$ within the same round are available by the above two criteria, we drop the restriction that t and t' are in the same GATT/WTO round and consider $t' = t - 1$ or $t' = t + 1$.

If the reporter/importer j is not a GATT/WTO member, we follow the same steps (a)–(c) above, but fill in the missing entries with the available $AHS_{ijt'}$ rate regardless of PTA_{ijt}, GSP_{ijt}, or i's GATT/WTO membership status.

(II) Conditional on jt, we fill in remaining missing observations on $\mathfrak{t}_{ijt}$ using information on the tariff rates imposed by j at time t on the other trade partners i':

(a) If the reporter/importer j is a GATT/WTO member, we replace the missing entry $\mathfrak{t}_{ijt}$ for a GATT/WTO member i with the median value of available $MFN_{i'jt}$ (and if missing, $BND_{i'jt}$) based on the subset of i' that are GATT/WTO members, and for a non-GATT/WTO member i with the median value of available $AHS_{i'jt}$ based

[2] The tariff sample period covers: Tokyo to Uruguay Round (1988–1994) and after Uruguay Round (1995–2015).

[3] In some scenarios, there exist inconsistencies between the constructed PTA/GSP indicators and the AHS/PRF tariff rates (e.g. $PTA = 1$ or $GSP = 1$, but AHS and PRF rates are not equal). In this case, we use $AHS_{ijt'}$ as the default instead of $PRF_{ijt'}$. If there are no tariff observations for ijt' in the Tokyo-to-Uruguay-round period, we look for observations from the nearest available year in the following round.

on the subset of i' that are not GATT/WTO members. As the next alternative, we extend the set of candidate tariffs from the same year t to all years of the same GATT/WTO round, and use the median value of candidate tariffs across all i' and t' that satisfy the conditions specified above.

(b) If the reporter/importer j is not a GATT/WTO member, we replace the missing entry $\mathfrak{t}_{ijt}$ with the median value of available $AHS_{i'jt}$ based on the subset of i' that shares the same GATT/WTO membership status as i. As the next alternative, we extend the subset of i' to all available $AHS_{i'jt}$ regardless of the GATT/WTO membership status of i and i'.

(III) Conditional on it, we fill in remaining missing entries of $\mathfrak{t}_{ijt}$ as follows. We first identify the set of importers j' that share the same GATT/WTO membership status as j, and whose tariff data are complete with respect to all of its trade partners at time t after Steps (I)–(II) above.

(a) Given this subset of importers j', we rank them in each GATT/WTO round based on their average real GDPs. We collect the real GDP data from Penn World Table Version 9.1 (PWT9.1).[4] For countries not included in PWT9.1, we calculate the real GDP by the ratio of the nominal GDP (cf. Section A.2) and the GDP deflators from World Development Indicators (WDI).[5]

(b) We then identify two countries j'_1 and j'_2 that have the nearest rankings to j in terms of real GDPs, such that $\text{rank}(j'_1) < \text{rank}(j) < \text{rank}(j'_2)$. If j is ranked at the top or bottom of the list, we identify the two countries with the closest rankings to j such that either $\text{rank}(j'_1) < \text{rank}(j'_2) < \text{rank}(j)$ or $\text{rank}(j) < \text{rank}(j'_1) < \text{rank}(j'_2)$. We replace the missing entry by the average of the tariff rates of the two identified importers, i.e., $(\mathfrak{t}_{ij'_1t} + \mathfrak{t}_{ij'_2t})/2$.

Starting with the raw data, the fraction of missing tariff observations across ijt for the period 1988–2015 is 59.48%. The fraction drops to 31.28% after Step I, and 17.20% after Step II. After Step III, the procedure proposed above helps eliminate all missing tariff observations for all years in 1988–2015 across all country pairs in the sample.

[4] https://www.rug.nl/ggdc/productivity/pwt/pwt-releases/pwt9.1?lang=en.
[5] https://data.worldbank.org/indicator/NY.GDP.DEFL.ZS.

A.1.2 Data on Domestic and International Trade in Merchandise and in Services

For additional analysis presented below in Section A.2.4 that differentiates trade flows by merchandise and services, we need data on domestic trade in merchandise and services, separately. The data sources listed in Appendix A.1 of the main paper only allow us to impute domestic trade (combining merchandise and services) based on aggregate gross output and aggregate exports. To compile the domestic and international trade flows for merchandise and services, respectively, we use the OECD Inter-Country Input-Output (ICIO) Tables,[6] which are available since 1995. We use the data for the period 1995–2015, aggregating sector-level trade flows for both intermediate production and final use. The industrial classification follows ISIC Rev.4.

We construct bilateral merchandise trade flows, X^g_{ijt}, by aggregating sector-level trade flows across ISIC Sections A, B, C, D, E, and F. To construct bilateral service trade flows, X^s_{ijt}, we aggregate sector-level trade flows across ISIC Sections G, H, I, J, K, L, M, N, O, P, Q, R, S, T, and U. The concordance table is sourced from the International Labour Organization.[7]

A.1.3 Classification of Developed and Developing Countries

We follow Rose (2004) and Subramanian and Wei (2007) in classifying traditional industrialized countries as developed countries.[8] However, this classification is time-invariant and does not reflect the rise of newly industrialized countries. Hence, we also consider classifying a country as developed based on the income threshold of US$6,000 per capita (in 1987 prices) used by the World Bank for high-income countries.[9] These thresholds have been updated annually by the World Bank since 1987, using the IMF's SDR (Special Drawing Rights) deflator to adjust for inflation. We extrapolate the thresholds for the period 1980–1986 using the same SDR deflator.[10] The World Bank threshold is in terms of GNI per capita, but the GNI data in earlier years are not readily available for a large number of countries. Thus, we classify countries as developed or developing based on their GDP per capita instead. Together, a country is classified as developed if its GDP per capita exceeds the threshold

[6] http://oe.cd/icio.

[7] https://ilostat.ilo.org/methods/concepts-and-definitions/classification-economic-activities/.

[8] See Appendix Table 2 in Subramanian and Wei (2003).

[9] https://datahelpdesk.worldbank.org/knowledgebase/articles/378833-how-are-the-income-group-thresholds-determined.

[10] https://datahelpdesk.worldbank.org/knowledgebase/articles/378829-what-is-the-sdr-deflator.

constructed above or if it belongs to the set of traditional industrialized countries listed in Subramanian and Wei (2003). Otherwise, it is classified as a developing country.

A.2 Additional Estimation Results

A.2.1 The Soviet Union/Russia Robustness Checks

In the benchmark sample, the Soviet Union and post-1991 Russia are regarded as the same country and included in the balanced panel of countries for analyses. Online Appendix Table A.1 verifies that the baseline estimation results remain similar if the Soviet Union and post-1991 Russia are excluded from the analysis.

A.2.2 Phase-In Effects of PTA

As a robustness check, we follow Baier and Bergstrand (2007) and estimate a specification that uses data at five-year intervals and includes controls for lagged 5-year and lagged 10-year PTA indicators. Table A.2 summarizes the findings. Note that the PTA indicators are defined such that $PTA_{ijt} = 1$ if a PTA is in force between a country pair ij in year t; $PTA_{ijt}^{lag5} = 1$ if a PTA has been in force for at least 5 years between a country pair ij in year t; and $PTA_{ijt}^{lag10} = 1$ if a PTA has been in force for at least 10 years between a country pair ij in year t. Thus, in Column 1, with only one PTA indicator PTA_{ijt} included, the slope coefficient of PTA_{ijt} captures the mean treatment effects of PTAs across years of treatment following the first treatment year. In Column 2, with PTA_{ijt} and PTA_{ijt}^{lag5} included, the coefficient of PTA_{ijt}^{lag5} indicates the incremental effect of PTAs after 5 years compared to the baseline effect of PTA_{ijt}. Finally, in Column 3, the coefficient of PTA_{ijt}^{lag10} indicates the additional incremental effect of PTAs after 10 years relative to the combined effects of PTA_{ijt} and PTA_{ijt}^{lag5}.

We find that the incremental effect of PTA_{ijt}^{lag10} is statistically insignificant, and the combined effect of PTA_{ijt} and PTA_{ijt}^{lag5} in Column 2 or Column 3 of Table A.2 (0.349 or 0.340) is close to the average post-PTA effect reported in Column 1 of Table A.2 (0.310), which in turn is also similar to the average post-PTA effect reported in Column 1 of Table 2 based on annual trade data (0.322). Thus, the welfare analyses conducted based on the baseline estimate in Table 2 can be regarded as reasonably representative of the total effects of PTAs, because the phase-in effects are effectively incorporated into the baseline estimate (which captures the mean treatment effect of PTAs across years of treatment following the first treatment year).

A.2.3 Difference-in-Differences Matching Estimation: Balance Checks and Parallel Pre-Trend Tests

In this section, we report the balance in the matching covariates between the matched treated and untreated subjects. In particular, we calculate the standardized mean differences (SMD) for each matching covariate, defined by the difference in means between two treatment groups divided by the pooled standard deviation:

$$\text{SMD} = \frac{\bar{X}_T - \bar{X}_C}{\sqrt{\frac{1}{2}(S_T^2 + S_C^2)}}, \tag{A.2.1}$$

where $\bar{X}_T$ and $\bar{X}_C$ denote the sample mean of the covariate in treated and untreated subjects, respectively, and S_T^2 and S_C^2 denote the sample variance of the covariate in treated and untreated subjects, respectively. See Austin (2009), Stuart (2010), and Ho et al. (2007) for the use of SMD to evaluate the balance on the covariates following matching. As highlighted by these papers, "although common, hypothesis t-tests and p-values that incorporate information on the sample size should not be used as measures of balance, for two main reasons. First, balance is inherently an in-sample property, without reference to any broader population or super-population. Second, hypothesis tests can be misleading as measures of balance, because they often conflate changes in balance with changes in statistical power." There is no clear consensus on what values of SMD constitute good balance; cutoffs of 0.25, 0.2, and 0.1 (in absolute value of SMD) have been suggested in this line of literature. Thus, we will evaluate the SMDs with these thresholds in mind.

Tables A.3–A.4 report the SMDs for the full set of matching covariates across six matching specifications (corresponding to the specifications reported in Table 4). The balance checks are performed for the matched sample under the 100% caliper. Recall that the best match is identified based on the baseline response in the pre-treatment year at $t - b$ ($\ln trade_{ij,t-b}$) and the list of matching covariates during the pre-treatment period: $(x_{t-b}, x_{t-b+1}, \ldots, x_{t-1})$. In view that the time-invariant matching covariates (e.g., distance) are not changing across years, we include them only once in the set of matching covariates. The other time-variant covariates (e.g., the economic sizes of the exporter-year and the importer-year, the GSP indicator, the WTO membership indicators, the MR terms, etc.) are controlled for across pre-treatment years ($t - b$, ..., $t - 1$). In evaluating the SMD, note that it is not critical for time-invariant covariates to match across treated and untreated subjects, because any differences in such time-invariant characteristics (and their effects on trade flows) will be cancelled out via difference-in-differences. It is also not critical for the baseline response at $t - b$ to be perfectly aligned in terms of *levels* across treated and untreated subjects, as the *same time-effect* condition, $E(y^0_{t+a} - y^0_{t-b}|d = 1, x) = E(y^0_{t+a} - y^0_{t-b}|d = 0, x)$, requires only that the within-subject change in potential untreated outcomes over time be the same across treatment groups. Thus, we can focus on the remaining set of time-variant matching covariates. As summarized by the histograms in Figure A.1, the SMDs are largely within the range of $[-0.1, 0.1]$ across all matching scenarios. The variables with SMDs outside the range are typically the MR terms associated with distance, i.e., the source and destination country-size weighted multilateral distances for each year during the 5-year pre-treatment period (cf. Tables A.3–A.4). Nonetheless, despite changing weights (due to changing country sizes) and hence time-variant MR distance terms, the SMDs for the MR distance terms are quite similar across years; hence, the difference-in-differences approach will effectively net out the effects of these relatively stable differences.

To further verify the balance of the matched subjects, we also use the estimator of Callaway and Sant'Anna (2021) to conduct the pre-trend test for the matched sample. Figure A.2 summarizes the results and suggests that there are no systematic differences in pre-treatment trends between matched treated and untreated groups. For matching specifications that control for tariffs with $a = 1$ or $a = 5$, the estimator detects some negative differences between the treated and untreated groups at one period before the treatment. However, this does not threaten the conclusion of a positive treatment effect. In sum, notwithstanding any remaining imbalance in the matching covariates, the matched treated and control subjects exhibit no systematic differences in their pre-treatment trends.

A.2.4 Heterogeneous PTA Effects

This section reports the estimation results of heterogeneous PTA effects referred to in the main text. In the first set of analysis, we examine whether the PTA effects differ systematically by development status. Based on the same data as in the benchmark (cf. Table 2), the specification in Table A.5 further interacts the PTA indicators with the development status of the exporting and the importing economy, respectively. We find that the average PTA effects on trade flows tend to be stronger for developing countries as exporters or as importers than developed countries. The differential impacts are also observed for shallow PTAs (P_nX, C_nNC) and deep PTAs (P_X, C_NC) in the sense that developing countries benefit systematically more from either shallow or deep PTAs than developed countries, although the difference in terms of development status is not statistically significant for deep PTAs. The notably large effect of P_nX_imL is seemingly larger than the effect of P_X_imL; however, the former is estimated with large standard errors, such that it is not statistically different from the latter. The same observation applies to the comparison between

C_nNC_imL and C_NC_imL.

In Table A.6, we examine the effects of PTAs on trade in merchandise and services, separately, based on the data constructed in Section A.1.2 for the period 1995–2015. The estimates indicate that PTAs have stronger effects on merchandise trade than services trade, and the difference is statistically significant. By further controlling for tariffs, the PTA-induced trade cost changes (beyond tariffs) still promote trade in a statistically significant manner, and more so on trade in merchandise than services (although the difference across trade categories is not significant in this case). The coefficient estimates for tariffs fall within the typical range of elasticity estimates found in the gravity literature. Trade in merchandise is found to respond more negatively to country-pair-level tariffs than trade in services, although the difference is not statistically significant.

In Table A.7–Table A.8, we estimate the impacts of different PTA depths on merchandise and services trade, respectively, based on the weighted coverage measures of PTAs as in Table 5 of the main paper. We find similar results that the trade effects increase along the ladder of PTA depths, moving from P_nX to P_X, or from C_nNC to C_NC. The further breakdown of the Core provisions by Border (B) and Behind-the-Border (H) policy areas suggests that PTAs with Behind-the-Border (H) policy areas tend to have stronger trade-promoting effects than those without, all else being equal; and PTAs with all Pref, MFN, and NC policy areas have stronger effects than PTAs with both Pref and MFN policy areas but without NC provisions, and further stronger than PTAs with just Pref provisions. The findings are similar for services trade, although the positive effects of PTAs on services trade tend to be weaker than those on merchandise trade, with the differences being less pronounced conditional on deep PTAs. This suggests that deep PTAs are especially critical for trade in services. Note that some PTA subcategories (e.g., nP_X and nPref_MFN_nNC) presented in the main paper are not present in this set of analyses differentiating between merchandise and services trade, because the sample based on the OECD ICIO Tables covers a smaller set of economies (72) and a shorter period (1995–2015).

A.3 Additional Simulation Results

In Table A.9–Table A.10, we report the welfare effects of WTO and its interaction with PTAs (and deep PTAs) based on the 5%-tile bootstrap GATT/WTO membership effect estimates in Table 3. The parallel results based on the 95%-tile bootstrap GATT/WTO membership effect estimates are reported in Table A.11–Table A.12. The patterns in these tables are similar to those observed in Table 7–Table 8 based on the benchmark GATT/WTO membership effect estimates, and discussed in Section 5.3 of the main paper. The welfare effects of GATT/WTO membership strengthen (weaken) relative to the benchmark as we adopt the 95%-tile (5%-tile) GATT/WTO membership effect estimates. Correspondingly, the PTA effects in the absence of GATT/WTO fall by more (less) relative to the factual with GATT/WTO, if we use the 95%-tile (5%-tile) GATT/WTO membership effect estimates as inputs for the counterfactual simulations. In sum, the complementarity between GATT/WTO and PTAs—particularly deeper forms of PTAs—strengthens (weakens) when we adopt higher-end (lower-end) GATT/WTO membership effect estimates.

A.4 Alternative Formulations of the Input Bundle

A.4.1 Modifications to the Counterfactual Equations

This section modifies the theoretical setup for the input bundle and allows the entry process to use input bundles whose labor intensity differs from that in the production process. Let Equation (12) continue to characterize the cost of the input bundle used in the production process. Let the entry process use input bundles with labor intensity κ such that the cost of the input bundle used in the entry process is:

$$c_i^e = w_i^{\kappa} P_i^{1-\kappa}. \tag{A.4.2}$$

The free-entry condition in Equation (13) is modified as:

$$\frac{\sigma - 1}{\sigma\theta} Y_i = N_i F_i c_i^e, \tag{A.4.3}$$

and the labor-market clearing condition is instead:

$$w_i L_i = b_i \left(1 - \frac{\sigma - 1}{\sigma\theta}\right) Y_i + \kappa \left(\frac{\sigma - 1}{\sigma\theta}\right) Y_i. \tag{A.4.4}$$

These translate into counterfactual conditions for the entry cost bundle:

$$\widehat{c}_i^e = \widehat{w}_i^{\kappa} \widehat{P}_i^{1-\kappa}, \tag{A.4.5}$$

for free entry:

$$\widehat{Y}_i = \widehat{N}_i \widehat{c}_i^e, \tag{A.4.6}$$

and for labor-market clearing, which remains the same as Equation (20). Thus, we have one extra set of variables $\{\widehat{c}_i^e\}$ to determine but also one extra set of conditions in (A.4.5).

Define $\bar{b}_{it} \equiv b_{it}\left(1 - \frac{\sigma-1}{\sigma\theta}\right) + \kappa\left(\frac{\sigma-1}{\sigma\theta}\right)$. The value $\bar{b}_{it}$ corresponds to the value-added share observed in the data. The assumption $\kappa = b_{it}$ corresponds to the case where $\bar{b}_{it} = b_{it}$. Following Bollard, Klenow and Li (2016) and Klenow and Li (2025), we allow for the scenarios where the input bundle used for entry is more labor intensive than in production, i.e., $\kappa > b_{it}$. Thus, we set κ to take on values greater than $\max_{it}\{\bar{b}_{it}\}$, where $\max_{it}\{\bar{b}_{it}\}$ is the maximum value-added share observed across country-years in the data (0.62). In particular, we allow κ to take on values in $[0.8, 1]$. Given $\bar{b}_{it}$ and κ, we then back out the values for b_{it}.

A.4.2 Sensitivity Analysis

Given the alternative formulation of the entry process introduced above, we assess the sensitivity of the results to variations in the value-added share used in the entry process. The effects on firm entry are summarized in Table A.13, where we also include the benchmark case (when $\kappa = b_{it} = \bar{b}_{it}$). Consistent with theoretical implications, the relatively larger increase in wages relative to aggregate prices (for countries that gain in real wages with PTAs) implies a higher entry cost as κ increases, and hence weakens the incentive for entry. To the limit when $\kappa = 1$, the mass of firms remains constant, as in the original Melitz model. This pattern (weaker entry effects as κ increases) holds across different parameter values for σ and θ.

In spite of the impacts on firm entry as κ changes, Table A.14 indicates that the impact of varying κ on welfare is negligible. To understand this result, note that we calibrate the parameter to match the same mean value-added share as observed in the data. As κ increases in the entry process, for a given observed value-added share $\bar{b}_{it}$, this implies smaller b_{it} in the production process. A larger κ reduces the welfare effects (via weaker firm entry effects), but a smaller b_{it} amplifies the welfare effects (since the multiplier effect via the use of intermediates in production is stronger). The simulation results suggest that these two countervailing effects exactly cancel out.

A.5 Additional Figures

In Figure A.3–Figure A.8, we present the full set of welfare effects across the years 1980 to 2015 at five-year intervals. They are in parallel to Figure 2–Figure 7 in the paper, where only the charts for 1980 and 2015 are displayed.

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Table A.1: Effects of PTA and PTA depths (1980–2015) excluding the Soviet Union and post-1991 Russia

	(1)	(2)	(3)
	Bilateral imports (million USD)		
gsp	-0.206***	-0.196***	-0.203***
	(0.0591)	(0.0576)	(0.0576)
comcur	0.477***	0.476***	0.474***
	(0.0411)	(0.0409)	(0.0410)
curheg_o	-0.153	-0.137	-0.140
	(0.1358)	(0.1271)	(0.1291)
curheg_d	0.290**	0.269**	0.277**
	(0.1271)	(0.1153)	(0.1180)
PTA	0.312***		
	(0.0318)		
nP_X		0.494	
		(0.4222)	
P_nX		0.147*	
		(0.0756)	
P_X		0.338***	
		(0.0299)	
C_nNC			0.185***
			(0.0535)
C_NC			0.355***
			(0.0332)
No. of Observations	722,628	722,628	722,628
pseudo R^2	0.999	0.999	0.999
Exporter-Year FE	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes
Exporter-Importer FE	Yes	Yes	Yes
Hypothesis Tests:			
$H_0 : \beta_{\text{P\_X}} - \beta_{\text{P\_nX}} = 0$		0.191***	
		(0.0736)	
$H_0 : \beta_{\text{C\_NC}} - \beta_{\text{C\_nNC}} = 0$			0.170***
			(0.0557)

Note:
(a) This table reports the estimation results of Equation (15) using PPML on a balanced panel of 146 economies. Intranational (domestic) trade flow observations are included. The indicator PTA_{ijt} equals one if a PTA is in force between exporter i and importer j at time t, and zero otherwise. Similarly, each of the PTA subcategory indicators (nP_X, P_nX, P_X, C_nNC, C_NC) equals one if the PTA in force between exporter i and importer j at time t is of the corresponding type, and zero otherwise. Refer to Figure 1 for the definition of the PTA subcategories.
(b) Robust standard errors are clustered at the exporter-importer level and indicated in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.2: Effects of PTA (1980–2015) — data in 5 year frequency

	(1)	(2)	(3)
	Bilateral imports (million USD)		
gsp	-0.115*	-0.119*	-0.118*
	(0.0642)	(0.0638)	(0.0637)
comcur	0.493***	0.466***	0.462***
	(0.0488)	(0.0496)	(0.0517)
curheg_o	-0.363**	-0.362**	-0.362**
	(0.1671)	(0.1656)	(0.1653)
curheg_d	0.228*	0.230*	0.230*
	(0.1261)	(0.1255)	(0.1254)
PTA_{ijt}	0.310***	0.245***	0.246***
	(0.0351)	(0.0278)	(0.0277)
PTA_{ijt}^{lag5}		0.104***	0.094***
		(0.0311)	(0.0229)
PTA_{ijt}^{lag10}			0.015
			(0.0354)
No. of Observations	154,656	154,656	154,656
pseudo R^2	0.999	0.999	0.999
Exporter-Year FE	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes
Exporter-Importer FE	Yes	Yes	Yes

Note:

(a) This table reports the estimation results of Equation (15), allowing for lagged effects of PTAs, using PPML on a balanced panel of 147 economies at five-year intervals from 1980 to 2015. Intranational (domestic) trade flow observations are included. Define $PTA_{ijt} = 1$ if a PTA is in force between a country pair ij in year t; $PTA_{ijt}^{lag5} = 1$ if a PTA has been in force for at least 5 years between a country pair ij in year t; and $PTA_{ijt}^{lag10} = 1$ if a PTA has been in force for at least 10 years between a country pair ij in year t.

(b) Robust standard errors are clustered at the exporter-importer level and indicated in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.3: Difference-in-Differences Matching Estimation — Balance Checks

PTA vs. no PTA	**b = 5 and a = 1**				**b = 5 and a = 5**				**b = 5 and a = 10**			
Covariate	M_1	Mean Treated	Mean Untreated	SMD	M_1	Mean Treated	Mean Untreated	SMD	M_1	Mean Treated	Mean Untreated	SMD
$\ln trade_{ij,t-5}$	2787	2.784	2.249	0.165	2167	2.751	2.023	0.225	1268	3.284	1.732	0.497
heg_o_{ij}	2787	0.019	0.019	0.005	2167	0.019	0.018	0.007	1268	0.014	0.013	0.007
heg_d_{ij}	2787	0.020	0.019	0.008	2167	0.019	0.018	0.010	1268	0.015	0.013	0.013
$comcol_{ij}$	2787	0.083	0.081	0.004	2167	0.095	0.095	-0.002	1268	0.137	0.137	0.000
$land_{ij}$	2787	0.216	0.208	0.018	2167	0.220	0.216	0.007	1268	0.293	0.276	0.034
$island_{ij}$	2787	0.327	0.323	0.009	2167	0.317	0.329	-0.022	1268	0.243	0.274	-0.061
$comlang\_ethno_{ij}$	2787	0.238	0.177	0.151	2167	0.267	0.182	0.205	1268	0.334	0.223	0.250
$contig_{ij}$	2787	0.070	0.043	0.114	2167	0.084	0.049	0.141	1268	0.125	0.060	0.225
$smctry_{ij}$	2787	0.034	0.022	0.074	2167	0.044	0.027	0.093	1268	0.065	0.019	0.230
$comleg_{ij}$	2787	0.353	0.340	0.027	2167	0.354	0.352	0.004	1268	0.426	0.405	0.042
$\ln wdist_{ij}$	2787	8.242	8.530	-0.338	2167	8.027	8.512	-0.587	1268	7.675	8.436	-0.982
$\ln Y_{i,t-5}$	2787	11.600	11.606	-0.003	2167	11.423	11.443	-0.009	1268	11.279	11.213	0.032
$\ln E_{j,t-5}$	2787	11.507	11.451	0.025	2167	11.288	11.193	0.042	1268	11.265	10.983	0.134
$GDPgrowth_{i,t-5}$	2787	0.085	0.088	-0.026	2167	0.075	0.076	-0.007	1268	0.034	0.033	0.006
$GDPgrowth_{j,t-5}$	2787	0.083	0.087	-0.035	2167	0.072	0.073	-0.007	1268	0.035	0.043	-0.069
$UnEmployment_{i,t-5}$	2787	0.066	0.063	0.045	2167	0.068	0.066	0.035	1268	0.066	0.066	0.007
$UnEmployment_{j,t-5}$	2787	0.068	0.068	0.001	2167	0.071	0.072	-0.015	1268	0.068	0.066	0.027
$gsp_{ij,t-5}$	2787	0.214	0.210	0.010	2167	0.190	0.185	0.014	1268	0.155	0.144	0.029
$comcur_{ij,t-5}$	2787	0.022	0.023	-0.005	2167	0.026	0.028	-0.011	1268	0.045	0.048	-0.015
$curheg\_o_{ij,t-5}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$curheg\_d_{ij,t-5}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$MR\_gsp_{ij,t-5}$	2787	0.304	0.300	0.009	2167	0.308	0.300	0.020	1268	0.343	0.335	0.020
$MR\_comcur_{ij,t-5}$	2787	-0.048	-0.051	0.022	2167	-0.063	-0.062	-0.009	1268	-0.082	-0.083	0.020
$MR\_curheg\_o_{ij,t-5}$	2787	0.000	0.000	0.005	2167	0.000	0.000	0.007	1268	0.000	0.000	0.010
$MR\_curheg\_d_{ij,t-5}$	2787	0.000	0.000	0.005	2167	0.000	0.000	0.008	1268	0.000	0.000	0.011
$MR\_heg\_o_{ij,t-5}$	2787	0.010	0.009	0.014	2167	0.009	0.008	0.014	1268	0.010	0.010	0.001
$MR\_heg\_d_{ij,t-5}$	2787	0.008	0.006	0.031	2167	0.008	0.005	0.034	1268	0.010	0.007	0.030
$MR\_comcol_{ij,t-5}$	2787	0.021	0.020	0.004	2167	0.021	0.021	0.005	1268	0.021	0.020	0.030
$MR\_land_{ij,t-5}$	2787	0.215	0.207	0.018	2167	0.219	0.216	0.007	1268	0.292	0.275	0.033
$MR\_island_{ij,t-5}$	2787	0.355	0.349	0.012	2167	0.350	0.359	-0.017	1268	0.285	0.311	-0.052
$MR\_comlang\_ethno_{ij,t-5}$	2787	0.164	0.147	0.067	2167	0.150	0.138	0.046	1268	0.145	0.137	0.031
$MR\_contig_{ij,t-5}$	2787	0.010	0.008	0.041	2167	0.010	0.007	0.041	1268	0.014	0.012	0.025
$MR\_smctry_{ij,t-5}$	2787	-0.082	-0.081	-0.025	2167	-0.089	-0.087	-0.053	1268	-0.092	-0.089	-0.091
$MR\_comleg_{ij,t-5}$	2787	0.217	0.220	-0.013	2167	0.217	0.227	-0.055	1268	0.213	0.224	-0.063
$MR\_\ln wdist_{ij,t-5}$	2787	8.781	8.840	-0.127	2167	8.770	8.864	-0.192	1268	8.805	8.930	-0.229
$bothwto_{ij,t-5}$	2787	0.842	0.847	-0.014	2167	0.818	0.825	-0.017	1268	0.722	0.732	-0.023
$imwto_{ij,t-5}$	2787	0.065	0.066	-0.003	2167	0.073	0.073	-0.002	1268	0.111	0.114	-0.007
$exwto_{ij,t-5}$	2787	0.072	0.071	0.003	2167	0.081	0.081	0.002	1268	0.126	0.125	0.005
$MR\_bothwto_{ij,t-5}$	2787	0.912	0.921	-0.023	2167	0.890	0.901	-0.025	1268	0.790	0.807	-0.037
$MR\_imwto_{ij,t-5}$	2787	0.078	0.074	0.013	2167	0.089	0.085	0.017	1268	0.134	0.127	0.020
$MR\_exwto_{ij,t-5}$	2787	0.084	0.080	0.018	2167	0.098	0.092	0.020	1268	0.149	0.138	0.032
$\ln Y_{i,t-4}$	2787	11.669	11.674	-0.002	2167	11.510	11.527	-0.008	1268	11.332	11.262	0.035
$\ln E_{j,t-4}$	2787	11.573	11.524	0.022	2167	11.372	11.277	0.042	1268	11.319	11.020	0.142
$GDPgrowth_{i,t-4}$	2787	0.072	0.073	-0.007	2167	0.085	0.088	-0.022	1268	0.047	0.050	-0.031
$GDPgrowth_{j,t-4}$	2787	0.069	0.067	0.022	2167	0.082	0.077	0.048	1268	0.045	0.035	0.090
$UnEmployment_{i,t-4}$	2787	0.066	0.063	0.045	2167	0.068	0.066	0.035	1268	0.066	0.066	0.007
$UnEmployment_{j,t-4}$	2787	0.068	0.068	0.001	2167	0.071	0.072	-0.015	1268	0.068	0.066	0.027
$gsp_{ij,t-4}$	2787	0.215	0.209	0.013	2167	0.191	0.182	0.023	1268	0.155	0.139	0.047
$comcur_{ij,t-4}$	2787	0.022	0.023	-0.005	2167	0.026	0.028	-0.011	1268	0.045	0.048	-0.015
$curheg\_o_{ij,t-4}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$curheg\_d_{ij,t-4}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$MR\_gsp_{ij,t-4}$	2787	0.300	0.295	0.012	2167	0.306	0.296	0.025	1268	0.343	0.331	0.031
$MR\_comcur_{ij,t-4}$	2787	-0.044	-0.046	0.027	2167	-0.058	-0.057	-0.007	1268	-0.078	-0.080	0.023
$MR\_curheg\_o_{ij,t-4}$	2787	0.000	0.000	0.005	2167	0.000	0.000	0.008	1268	0.000	0.000	0.011
$MR\_curheg\_d_{ij,t-4}$	2787	0.000	0.000	0.005	2167	0.000	0.000	0.008	1268	0.000	0.000	0.012
$MR\_heg\_o_{ij,t-4}$	2787	0.010	0.009	0.014	2167	0.009	0.008	0.014	1268	0.009	0.009	0.003
$MR\_heg\_d_{ij,t-4}$	2787	0.008	0.006	0.029	2167	0.008	0.005	0.032	1268	0.009	0.007	0.029
$MR\_comcol_{ij,t-4}$	2787	0.021	0.021	0.002	2167	0.022	0.022	0.003	1268	0.021	0.020	0.030
$MR\_land_{ij,t-4}$	2787	0.215	0.207	0.018	2167	0.219	0.216	0.007	1268	0.292	0.275	0.033
$MR\_island_{ij,t-4}$	2787	0.354	0.348	0.012	2167	0.348	0.357	-0.017	1268	0.283	0.309	-0.052
$MR\_comlang\_ethno_{ij,t-4}$	2787	0.163	0.147	0.063	2167	0.151	0.140	0.042	1268	0.144	0.137	0.028
$MR\_contig_{ij,t-4}$	2787	0.010	0.007	0.036	2167	0.010	0.007	0.035	1268	0.012	0.010	0.021
$MR\_smctry_{ij,t-4}$	2787	-0.081	-0.079	-0.027	2167	-0.087	-0.085	-0.055	1268	-0.093	-0.090	-0.089
$MR\_comleg_{ij,t-4}$	2787	0.220	0.222	-0.011	2167	0.221	0.230	-0.055	1268	0.215	0.226	-0.059
$MR\_\ln wdist_{ij,t-4}$	2787	8.782	8.840	-0.125	2167	8.767	8.857	-0.183	1268	8.814	8.935	-0.222
$bothwto_{ij,t-4}$	2787	0.856	0.858	-0.007	2167	0.836	0.839	-0.009	1268	0.751	0.755	-0.009
$imwto_{ij,t-4}$	2787	0.062	0.061	0.004	2167	0.069	0.068	0.005	1268	0.105	0.104	0.003

$exwto_{ij,t-4}$	2787	0.068	0.067	0.006	2167	0.077	0.075	0.007	1268	0.118	0.115	0.010
$MR\_bothwto_{ij,t-4}$	2787	0.930	0.932	-0.006	2167	0.913	0.915	-0.005	1268	0.831	0.833	-0.005
$MR\_imwto_{ij,t-4}$	2787	0.069	0.068	0.004	2167	0.079	0.078	0.004	1268	0.117	0.116	0.001
$MR\_exwto_{ij,t-4}$	2787	0.075	0.074	0.005	2167	0.086	0.085	0.006	1268	0.130	0.128	0.009
$\ln Y_{i,t-3}$	2787	11.740	11.745	-0.003	2167	11.588	11.605	-0.008	1268	11.371	11.299	0.036
$\ln E_{j,t-3}$	2787	11.640	11.595	0.020	2167	11.449	11.353	0.043	1268	11.354	11.042	0.150
$GDPgrowth_{i,t-3}$	2787	0.080	0.080	-0.005	2167	0.085	0.086	-0.001	1268	0.045	0.042	0.029
$GDPgrowth_{j,t-3}$	2787	0.078	0.077	0.010	2167	0.084	0.080	0.025	1268	0.043	0.031	0.115
$UnEmployment_{i,t-3}$	2787	0.066	0.063	0.045	2167	0.068	0.066	0.035	1268	0.066	0.066	0.007
$UnEmployment_{j,t-3}$	2787	0.068	0.068	0.001	2167	0.071	0.072	-0.015	1268	0.068	0.066	0.027
$gsp_{ij,t-3}$	2787	0.215	0.209	0.013	2167	0.191	0.182	0.023	1268	0.155	0.139	0.047
$comcur_{ij,t-3}$	2787	0.022	0.023	-0.005	2167	0.026	0.028	-0.011	1268	0.045	0.048	-0.015
$curheg\_o_{ij,t-3}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$curheg\_d_{ij,t-3}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$MR\_gsp_{ij,t-3}$	2787	0.294	0.290	0.012	2167	0.302	0.292	0.025	1268	0.341	0.330	0.029
$MR\_comcur_{ij,t-3}$	2787	-0.042	-0.045	0.040	2167	-0.054	-0.055	0.006	1268	-0.076	-0.079	0.052
$MR\_curheg\_o_{ij,t-3}$	2787	0.000	0.000	0.005	2167	0.000	0.000	0.007	1268	0.000	0.000	0.011
$MR\_curheg\_d_{ij,t-3}$	2787	0.000	0.000	0.004	2167	0.000	0.000	0.006	1268	0.000	0.000	0.013
$MR\_heg\_o_{ij,t-3}$	2787	0.010	0.009	0.015	2167	0.010	0.009	0.014	1268	0.010	0.009	0.004
$MR\_heg\_d_{ij,t-3}$	2787	0.009	0.007	0.030	2167	0.008	0.006	0.031	1268	0.010	0.007	0.028
$MR\_comcol_{ij,t-3}$	2787	0.021	0.021	0.002	2167	0.022	0.022	0.002	1268	0.021	0.020	0.030
$MR\_land_{ij,t-3}$	2787	0.215	0.207	0.018	2167	0.219	0.216	0.007	1268	0.292	0.275	0.033
$MR\_island_{ij,t-3}$	2787	0.352	0.346	0.012	2167	0.346	0.355	-0.017	1268	0.281	0.308	-0.052
$MR\_comlang\_ethno_{ij,t-3}$	2787	0.161	0.146	0.062	2167	0.151	0.140	0.042	1268	0.145	0.137	0.028
$MR\_contig_{ij,t-3}$	2787	0.009	0.007	0.033	2167	0.009	0.007	0.033	1268	0.011	0.010	0.016
$MR\_smctry_{ij,t-3}$	2787	-0.079	-0.078	-0.027	2167	-0.085	-0.083	-0.053	1268	-0.094	-0.091	-0.083
$MR\_comleg_{ij,t-3}$	2787	0.222	0.224	-0.013	2167	0.224	0.233	-0.055	1268	0.217	0.227	-0.058
$MR\_\ln wdist_{ij,t-3}$	2787	8.781	8.841	-0.129	2167	8.762	8.854	-0.188	1268	8.813	8.935	-0.228
$bothwto_{ij,t-3}$	2787	0.856	0.860	-0.009	2167	0.837	0.840	-0.009	1268	0.752	0.759	-0.015
$imwto_{ij,t-3}$	2787	0.062	0.061	0.004	2167	0.069	0.067	0.005	1268	0.104	0.103	0.005
$exwto_{ij,t-3}$	2787	0.068	0.066	0.009	2167	0.076	0.074	0.007	1268	0.118	0.113	0.015
$MR\_bothwto_{ij,t-3}$	2787	0.930	0.933	-0.008	2167	0.913	0.915	-0.005	1268	0.834	0.838	-0.010
$MR\_imwto_{ij,t-3}$	2787	0.069	0.068	0.003	2167	0.078	0.077	0.004	1268	0.115	0.115	0.003
$MR\_exwto_{ij,t-3}$	2787	0.075	0.073	0.007	2167	0.085	0.084	0.006	1268	0.129	0.125	0.013
$\ln Y_{i,t-2}$	2787	11.814	11.829	-0.007	2167	11.665	11.688	-0.011	1268	11.406	11.327	0.039
$\ln E_{j,t-2}$	2787	11.713	11.677	0.016	2167	11.527	11.433	0.042	1268	11.382	11.076	0.146
$GDPgrowth_{i,t-2}$	2787	0.082	0.091	-0.075	2167	0.085	0.091	-0.041	1268	0.046	0.037	0.066
$GDPgrowth_{j,t-2}$	2787	0.083	0.093	-0.073	2167	0.087	0.090	-0.024	1268	0.045	0.043	0.013
$UnEmployment_{i,t-2}$	2787	0.066	0.063	0.045	2167	0.068	0.066	0.035	1268	0.066	0.066	0.007
$UnEmployment_{j,t-2}$	2787	0.068	0.068	0.001	2167	0.071	0.072	-0.015	1268	0.068	0.066	0.027
$gsp_{ij,t-2}$	2787	0.215	0.209	0.013	2167	0.191	0.182	0.023	1268	0.155	0.139	0.047
$comcur_{ij,t-2}$	2787	0.022	0.023	-0.005	2167	0.026	0.028	-0.011	1268	0.045	0.048	-0.015
$curheg\_o_{ij,t-2}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$curheg\_d_{ij,t-2}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$MR\_gsp_{ij,t-2}$	2787	0.288	0.284	0.010	2167	0.296	0.288	0.023	1268	0.339	0.329	0.026
$MR\_comcur_{ij,t-2}$	2787	-0.040	-0.044	0.041	2167	-0.052	-0.053	0.008	1268	-0.075	-0.079	0.055
$MR\_curheg\_o_{ij,t-2}$	2787	0.000	0.000	0.003	2167	0.000	0.000	0.005	1268	0.000	0.000	0.008
$MR\_curheg\_d_{ij,t-2}$	2787	0.000	0.000	0.003	2167	0.000	0.000	0.005	1268	0.000	0.000	0.010
$MR\_heg\_o_{ij,t-2}$	2787	0.011	0.009	0.015	2167	0.010	0.009	0.014	1268	0.009	0.009	0.004
$MR\_heg\_d_{ij,t-2}$	2787	0.009	0.007	0.030	2167	0.008	0.006	0.031	1268	0.009	0.007	0.028
$MR\_comcol_{ij,t-2}$	2787	0.022	0.022	0.003	2167	0.023	0.023	0.003	1268	0.021	0.020	0.032
$MR\_land_{ij,t-2}$	2787	0.215	0.207	0.018	2167	0.219	0.216	0.007	1268	0.292	0.275	0.033
$MR\_island_{ij,t-2}$	2787	0.350	0.344	0.012	2167	0.343	0.352	-0.017	1268	0.278	0.305	-0.053
$MR\_comlang\_ethno_{ij,t-2}$	2787	0.160	0.145	0.062	2167	0.152	0.141	0.043	1268	0.146	0.137	0.033
$MR\_contig_{ij,t-2}$	2787	0.009	0.007	0.028	2167	0.009	0.007	0.030	1268	0.011	0.010	0.013
$MR\_smctry_{ij,t-2}$	2787	-0.077	-0.076	-0.029	2167	-0.083	-0.081	-0.054	1268	-0.093	-0.090	-0.076
$MR\_comleg_{ij,t-2}$	2787	0.225	0.227	-0.014	2167	0.227	0.237	-0.056	1268	0.219	0.230	-0.064
$MR\_\ln wdist_{ij,t-2}$	2787	8.777	8.837	-0.126	2167	8.752	8.845	-0.187	1268	8.804	8.929	-0.230
$bothwto_{ij,t-2}$	2787	0.875	0.877	-0.003	2167	0.859	0.861	-0.005	1268	0.788	0.789	-0.004
$imwto_{ij,t-2}$	2787	0.053	0.052	0.002	2167	0.059	0.058	0.002	1268	0.088	0.088	0.000
$exwto_{ij,t-2}$	2787	0.058	0.057	0.003	2167	0.065	0.063	0.006	1268	0.099	0.097	0.005
$MR\_bothwto_{ij,t-2}$	2787	0.944	0.945	-0.003	2167	0.929	0.930	-0.002	1268	0.864	0.864	-0.001
$MR\_imwto_{ij,t-2}$	2787	0.062	0.062	0.001	2167	0.071	0.070	0.001	1268	0.104	0.104	-0.001
$MR\_exwto_{ij,t-2}$	2787	0.067	0.066	0.002	2167	0.077	0.076	0.004	1268	0.115	0.114	0.004
$\ln Y_{i,t-1}$	2787	11.897	11.913	-0.008	2167	11.755	11.777	-0.010	1268	11.471	11.381	0.044
$\ln E_{j,t-1}$	2787	11.797	11.768	0.013	2167	11.618	11.529	0.040	1268	11.449	11.137	0.148
$GDPgrowth_{i,t-1}$	2787	0.090	0.091	-0.013	2167	0.098	0.097	0.010	1268	0.075	0.064	0.088
$GDPgrowth_{j,t-1}$	2787	0.088	0.091	-0.027	2167	0.096	0.097	-0.003	1268	0.076	0.072	0.033
$UnEmployment_{i,t-1}$	2787	0.066	0.063	0.045	2167	0.068	0.066	0.035	1268	0.066	0.066	0.007
$UnEmployment_{j,t-1}$	2787	0.068	0.068	0.001	2167	0.071	0.072	-0.015	1268	0.068	0.066	0.027
$gsp_{ij,t-1}$	2787	0.215	0.209	0.013	2167	0.191	0.182	0.023	1268	0.155	0.139	0.047
$comcur_{ij,t-1}$	2787	0.022	0.023	-0.005	2167	0.026	0.028	-0.011	1268	0.045	0.048	-0.015
$curheg\_o_{ij,t-1}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$curheg\_d_{ij,t-1}$	2787	0.001	0.001	0.000	2167	0.001	0.001	0.000	1268	0.002	0.002	0.000
$MR\_gsp_{ij,t-1}$	2787	0.283	0.279	0.009	2167	0.291	0.283	0.021	1268	0.336	0.327	0.025

$MR\_comcur_{ij,t-1}$	2787	-0.034	-0.039	0.054	2167	-0.042	-0.044	0.020	1268	-0.065	-0.070	0.055
$MR\_curheg\_o_{ij,t-1}$	2787	0.000	0.000	0.004	2167	0.000	0.000	0.006	1268	0.000	0.000	0.008
$MR\_curheg\_d_{ij,t-1}$	2787	0.000	0.000	0.003	2167	0.000	0.000	0.005	1268	0.000	0.000	0.011
$MR\_heg\_o_{ij,t-1}$	2787	0.011	0.010	0.016	2167	0.010	0.009	0.014	1268	0.009	0.009	0.005
$MR\_heg\_d_{ij,t-1}$	2787	0.010	0.007	0.031	2167	0.009	0.006	0.032	1268	0.009	0.007	0.028
$MR\_comcol_{ij,t-1}$	2787	0.023	0.023	0.003	2167	0.023	0.023	0.003	1268	0.021	0.020	0.031
$MR\_land_{ij,t-1}$	2787	0.215	0.207	0.018	2167	0.219	0.216	0.007	1268	0.292	0.275	0.033
$MR\_island_{ij,t-1}$	2787	0.349	0.343	0.012	2167	0.342	0.351	-0.018	1268	0.278	0.305	-0.054
$MR\_comlang\_ethno_{ij,t-1}$	2787	0.159	0.144	0.062	2167	0.151	0.140	0.045	1268	0.147	0.137	0.035
$MR\_contig_{ij,t-1}$	2787	0.008	0.007	0.024	2167	0.009	0.007	0.029	1268	0.011	0.010	0.015
$MR\_smctry_{ij,t-1}$	2787	-0.076	-0.074	-0.030	2167	-0.080	-0.078	-0.053	1268	-0.092	-0.090	-0.070
$MR\_comleg_{ij,t-1}$	2787	0.225	0.227	-0.013	2167	0.230	0.239	-0.055	1268	0.220	0.232	-0.066
$MR\_\ln wdist_{ij,t-1}$	2787	8.777	8.837	-0.129	2167	8.747	8.843	-0.194	1268	8.800	8.930	-0.237
$bothwto_{ij,t-1}$	2787	0.877	0.881	-0.011	2167	0.862	0.867	-0.015	1268	0.793	0.799	-0.016
$imwto_{ij,t-1}$	2787	0.052	0.050	0.008	2167	0.057	0.055	0.010	1268	0.085	0.082	0.011
$exwto_{ij,t-1}$	2787	0.057	0.055	0.008	2167	0.063	0.060	0.011	1268	0.096	0.093	0.011
$MR\_bothwto_{ij,t-1}$	2787	0.944	0.947	-0.009	2167	0.928	0.932	-0.010	1268	0.867	0.872	-0.011
$MR\_imwto_{ij,t-1}$	2787	0.061	0.060	0.006	2167	0.069	0.068	0.007	1268	0.102	0.099	0.009
$MR\_exwto_{ij,t-1}$	2787	0.066	0.065	0.006	2167	0.075	0.073	0.009	1268	0.113	0.110	0.008

Note:

(a) Refer to Table 4 footnote for the setup of the difference-in-differences matching estimations. The number of matched pairs for the effect on the treated is indicated by M_1.

(b) SMD $= \frac{\bar{X}_T - \bar{X}_C}{\sqrt{\frac{1}{2}(S_T^2 + S_C^2)}}$, where $\bar{X}_T$ and $\bar{X}_C$ denote the sample mean of the covariate in treated and untreated subjects, respectively, and S_T^2 and S_C^2 denote the sample variance of the covariate in treated and untreated subjects, respectively.

(c) The balance checks are performed for the matched sample under the 100% caliper.

Table A.4: Difference-in-Differences Matching Estimation — Balance Checks

PTA vs. no PTA (control for tariffs)	**b = 5 and a = 1**				**b = 5 and a = 5**				**b = 5 and a = 10**			
Covariate	M_1	Mean Treated	Mean Untreated	SMD	M_1	Mean Treated	Mean Untreated	SMD	M_1	Mean Treated	Mean Untreated	SMD
$\ln trade_{ij,t-5}$	2677	2.712	2.250	0.144	2057	2.655	2.004	0.201	1158	3.165	1.690	0.469
heg_o_{ij}	2677	0.020	0.019	0.005	2057	0.020	0.018	0.011	1158	0.016	0.014	0.014
heg_d_{ij}	2677	0.021	0.019	0.008	2057	0.020	0.018	0.014	1158	0.016	0.014	0.021
$comcol_{ij}$	2677	0.084	0.083	0.003	2057	0.097	0.098	-0.003	1158	0.145	0.145	0.000
$land_{ij}$	2677	0.217	0.209	0.019	2057	0.222	0.225	-0.006	1158	0.304	0.278	0.050
$island_{ij}$	2677	0.332	0.326	0.011	2057	0.323	0.333	-0.019	1158	0.245	0.275	-0.057
$comlang\_ethno_{ij}$	2677	0.235	0.175	0.149	2057	0.264	0.183	0.196	1158	0.337	0.230	0.239
$contig_{ij}$	2677	0.061	0.032	0.138	2057	0.074	0.037	0.161	1158	0.111	0.044	0.251
$smctry_{ij}$	2677	0.032	0.017	0.096	2057	0.042	0.021	0.120	1158	0.063	0.013	0.264
$comleg_{ij}$	2677	0.343	0.327	0.032	2057	0.341	0.333	0.017	1158	0.409	0.379	0.062
$\ln wdist_{ij}$	2677	8.276	8.558	-0.331	2057	8.060	8.532	-0.568	1158	7.700	8.465	-0.972
$\ln Y_{i,t-5}$	2677	11.604	11.630	-0.012	2057	11.420	11.467	-0.021	1158	11.260	11.270	-0.005
$\ln E_{j,t-5}$	2677	11.508	11.434	0.032	2057	11.278	11.162	0.050	1158	11.245	10.987	0.120
$GDPgrowth_{i,t-5}$	2677	0.088	0.090	-0.022	2057	0.077	0.077	0.003	1158	0.035	0.035	-0.001
$GDPgrowth_{j,t-5}$	2677	0.086	0.089	-0.026	2057	0.075	0.076	-0.012	1158	0.036	0.044	-0.078
$UnEmployment_{i,t-5}$	2677	0.066	0.063	0.063	2057	0.069	0.066	0.046	1158	0.068	0.067	0.023
$UnEmployment_{j,t-5}$	2677	0.069	0.069	0.005	2057	0.072	0.072	0.005	1158	0.070	0.069	0.018
$gsp_{ij,t-5}$	2677	0.217	0.216	0.005	2057	0.193	0.191	0.005	1158	0.156	0.151	0.014
$comcur_{ij,t-5}$	2677	0.022	0.023	-0.005	2057	0.027	0.029	-0.012	1158	0.047	0.051	-0.016
$curheg\_o_{ij,t-5}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$curheg\_d_{ij,t-5}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$\ln(1+tariff)_{ij,t-5}$	2677	0.084	0.086	-0.030	2057	0.096	0.096	0.005	1158	0.111	0.110	0.017
$MR\_gsp_{ij,t-5}$	2677	0.301	0.301	0.001	2057	0.305	0.300	0.013	1158	0.341	0.336	0.014
$MR\_comcur_{ij,t-5}$	2677	-0.047	-0.050	0.031	2057	-0.062	-0.062	0.001	1158	-0.082	-0.083	0.019
$MR\_curheg\_o_{ij,t-5}$	2677	0.000	0.000	0.005	2057	0.000	0.000	0.007	1158	0.000	0.000	0.010
$MR\_curheg\_d_{ij,t-5}$	2677	0.000	0.000	0.004	2057	0.000	0.000	0.007	1158	0.000	0.000	0.012
$MR\_heg\_o_{ij,t-5}$	2677	0.008	0.007	0.021	2057	0.008	0.006	0.018	1158	0.007	0.007	-0.003
$MR\_heg\_d_{ij,t-5}$	2677	0.007	0.004	0.039	2057	0.006	0.003	0.040	1158	0.007	0.004	0.038
$MR\_comcol_{ij,t-5}$	2677	0.021	0.021	0.009	2057	0.022	0.022	0.003	1158	0.022	0.021	0.020
$MR\_land_{ij,t-5}$	2677	0.216	0.208	0.019	2057	0.221	0.224	-0.007	1158	0.303	0.277	0.049
$MR\_island_{ij,t-5}$	2677	0.360	0.352	0.015	2057	0.356	0.363	-0.014	1158	0.289	0.312	-0.046
$MR\_comlang\_ethno_{ij,t-5}$	2677	0.165	0.149	0.064	2057	0.151	0.137	0.054	1158	0.147	0.139	0.029
$MR\_contig_{ij,t-5}$	2677	0.010	0.007	0.041	2057	0.010	0.008	0.030	1158	0.013	0.012	0.015
$MR\_smctry_{ij,t-5}$	2677	-0.083	-0.082	-0.025	2057	-0.090	-0.088	-0.057	1158	-0.093	-0.089	-0.110
$MR\_comleg_{ij,t-5}$	2677	0.217	0.219	-0.011	2057	0.217	0.230	-0.076	1158	0.212	0.229	-0.102
$MR\_\ln wdist_{ij,t-5}$	2677	8.776	8.839	-0.142	2057	8.763	8.861	-0.209	1158	8.797	8.927	-0.251
$MR\_\ln(1+tariff)_{ij,t-5}$	2677	0.082	0.085	-0.050	2057	0.093	0.093	-0.006	1158	0.103	0.105	-0.025
$bothwto_{ij,t-5}$	2677	0.845	0.851	-0.016	2057	0.821	0.829	-0.022	1158	0.718	0.732	-0.033
$imwto_{ij,t-5}$	2677	0.063	0.062	0.003	2057	0.071	0.070	0.004	1158	0.111	0.110	0.006
$exwto_{ij,t-5}$	2677	0.070	0.071	-0.003	2057	0.080	0.080	0.000	1158	0.128	0.128	0.000
$MR\_bothwto_{ij,t-5}$	2677	0.915	0.925	-0.026	2057	0.893	0.906	-0.031	1158	0.786	0.809	-0.047
$MR\_imwto_{ij,t-5}$	2677	0.076	0.071	0.021	2057	0.088	0.081	0.025	1158	0.135	0.123	0.037
$MR\_exwto_{ij,t-5}$	2677	0.083	0.079	0.014	2057	0.097	0.091	0.021	1158	0.152	0.141	0.031
$\ln Y_{i,t-4}$	2677	11.676	11.700	-0.012	2057	11.510	11.553	-0.020	1158	11.316	11.318	-0.001
$\ln E_{j,t-4}$	2677	11.576	11.511	0.029	2057	11.365	11.252	0.049	1158	11.301	11.029	0.128
$GDPgrowth_{i,t-4}$	2677	0.074	0.076	-0.018	2057	0.088	0.090	-0.017	1158	0.048	0.049	-0.004
$GDPgrowth_{j,t-4}$	2677	0.071	0.072	-0.008	2057	0.085	0.086	-0.009	1158	0.046	0.042	0.037
$UnEmployment_{i,t-4}$	2677	0.066	0.063	0.063	2057	0.069	0.066	0.046	1158	0.068	0.067	0.023
$UnEmployment_{j,t-4}$	2677	0.069	0.069	0.005	2057	0.072	0.072	0.005	1158	0.070	0.069	0.018
$gsp_{ij,t-4}$	2677	0.217	0.215	0.006	2057	0.193	0.188	0.012	1158	0.156	0.145	0.031
$comcur_{ij,t-4}$	2677	0.022	0.023	-0.005	2057	0.027	0.029	-0.012	1158	0.047	0.051	-0.016
$curheg\_o_{ij,t-4}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$curheg\_d_{ij,t-4}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$\ln(1+tariff)_{ij,t-4}$	2677	0.082	0.086	-0.057	2057	0.093	0.094	-0.008	1158	0.111	0.111	-0.001
$MR\_gsp_{ij,t-4}$	2677	0.298	0.296	0.005	2057	0.303	0.296	0.019	1158	0.341	0.332	0.025
$MR\_comcur_{ij,t-4}$	2677	-0.042	-0.046	0.037	2057	-0.056	-0.056	0.000	1158	-0.078	-0.079	0.017
$MR\_curheg\_o_{ij,t-4}$	2677	0.000	0.000	0.006	2057	0.000	0.000	0.008	1158	0.000	0.000	0.011
$MR\_curheg\_d_{ij,t-4}$	2677	0.000	0.000	0.005	2057	0.000	0.000	0.008	1158	0.000	0.000	0.013
$MR\_heg\_o_{ij,t-4}$	2677	0.008	0.007	0.020	2057	0.008	0.006	0.018	1158	0.006	0.006	-0.003
$MR\_heg\_d_{ij,t-4}$	2677	0.007	0.004	0.036	2057	0.006	0.003	0.039	1158	0.006	0.004	0.036
$MR\_comcol_{ij,t-4}$	2677	0.021	0.021	0.008	2057	0.022	0.022	0.001	1158	0.022	0.021	0.019
$MR\_land_{ij,t-4}$	2677	0.216	0.208	0.019	2057	0.221	0.224	-0.007	1158	0.303	0.277	0.049
$MR\_island_{ij,t-4}$	2677	0.358	0.351	0.015	2057	0.354	0.361	-0.014	1158	0.287	0.310	-0.045
$MR\_comlang\_ethno_{ij,t-4}$	2677	0.165	0.150	0.060	2057	0.152	0.139	0.050	1158	0.146	0.140	0.025
$MR\_contig_{ij,t-4}$	2677	0.010	0.007	0.037	2057	0.009	0.008	0.025	1158	0.012	0.011	0.012
$MR\_smctry_{ij,t-4}$	2677	-0.081	-0.079	-0.028	2057	-0.087	-0.085	-0.059	1158	-0.094	-0.090	-0.108

$MR\_comleg_{ij,t-4}$	2677	0.220	0.222	-0.011	2057	0.221	0.235	-0.079	1158	0.215	0.233	-0.103
$MR\_\ln wdist_{ij,t-4}$	2677	8.777	8.838	-0.138	2057	8.760	8.853	-0.197	1158	8.806	8.930	-0.240
$MR\_\ln(1+tariff)_{ij,t-4}$	2677	0.081	0.085	-0.063	2057	0.091	0.092	-0.023	1158	0.103	0.106	-0.042
$bothwto_{ij,t-4}$	2677	0.860	0.862	-0.006	2057	0.840	0.842	-0.007	1158	0.750	0.754	-0.010
$imwto_{ij,t-4}$	2677	0.060	0.059	0.003	2057	0.067	0.067	0.002	1158	0.104	0.104	0.003
$exwto_{ij,t-4}$	2677	0.066	0.065	0.006	2057	0.075	0.073	0.007	1158	0.119	0.116	0.011
$MR\_bothwto_{ij,t-4}$	2677	0.933	0.935	-0.006	2057	0.917	0.918	-0.003	1158	0.830	0.832	-0.004
$MR\_imwto_{ij,t-4}$	2677	0.068	0.067	0.002	2057	0.077	0.077	0.001	1158	0.118	0.117	0.002
$MR\_exwto_{ij,t-4}$	2677	0.074	0.073	0.005	2057	0.085	0.083	0.006	1158	0.132	0.129	0.009
$\ln Y_{i,t-3}$	2677	11.749	11.775	-0.012	2057	11.592	11.636	-0.021	1158	11.357	11.357	0.000
$\ln E_{j,t-3}$	2677	11.645	11.581	0.028	2057	11.446	11.329	0.051	1158	11.339	11.047	0.137
$GDPgrowth_{i,t-3}$	2677	0.082	0.084	-0.009	2057	0.089	0.091	-0.015	1158	0.048	0.045	0.028
$GDPgrowth_{j,t-3}$	2677	0.081	0.076	0.035	2057	0.087	0.080	0.059	1158	0.046	0.030	0.143
$UnEmployment_{i,t-3}$	2677	0.066	0.063	0.063	2057	0.069	0.066	0.046	1158	0.068	0.067	0.023
$UnEmployment_{j,t-3}$	2677	0.069	0.069	0.005	2057	0.072	0.072	0.005	1158	0.070	0.069	0.018
$gsp_{ij,t-3}$	2677	0.217	0.215	0.006	2057	0.193	0.188	0.012	1158	0.156	0.145	0.031
$comcur_{ij,t-3}$	2677	0.022	0.023	-0.005	2057	0.027	0.029	-0.012	1158	0.047	0.051	-0.016
$curheg\_o_{ij,t-3}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$curheg\_d_{ij,t-3}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$\ln(1+tariff)_{ij,t-3}$	2677	0.077	0.082	-0.076	2057	0.087	0.090	-0.038	1158	0.104	0.106	-0.017
$MR\_gsp_{ij,t-3}$	2677	0.291	0.289	0.005	2057	0.298	0.291	0.019	1158	0.339	0.330	0.023
$MR\_comcur_{ij,t-3}$	2677	-0.039	-0.045	0.057	2057	-0.053	-0.054	0.015	1158	-0.074	-0.078	0.049
$MR\_curheg\_o_{ij,t-3}$	2677	0.000	0.000	0.005	2057	0.000	0.000	0.007	1158	0.000	0.000	0.010
$MR\_curheg\_d_{ij,t-3}$	2677	0.000	0.000	0.004	2057	0.000	0.000	0.007	1158	0.000	0.000	0.013
$MR\_heg\_o_{ij,t-3}$	2677	0.009	0.007	0.020	2057	0.008	0.007	0.018	1158	0.007	0.007	-0.002
$MR\_heg\_d_{ij,t-3}$	2677	0.008	0.005	0.038	2057	0.006	0.003	0.039	1158	0.006	0.004	0.035
$MR\_comcol_{ij,t-3}$	2677	0.022	0.022	0.007	2057	0.023	0.023	0.000	1158	0.022	0.021	0.020
$MR\_land_{ij,t-3}$	2677	0.216	0.208	0.019	2057	0.221	0.224	-0.007	1158	0.303	0.277	0.049
$MR\_island_{ij,t-3}$	2677	0.356	0.349	0.015	2057	0.351	0.358	-0.014	1158	0.284	0.307	-0.046
$MR\_comlang\_ethno_{ij,t-3}$	2677	0.163	0.149	0.060	2057	0.153	0.140	0.052	1158	0.147	0.140	0.028
$MR\_contig_{ij,t-3}$	2677	0.009	0.006	0.037	2057	0.009	0.007	0.024	1158	0.011	0.010	0.009
$MR\_smctry_{ij,t-3}$	2677	-0.079	-0.078	-0.027	2057	-0.085	-0.083	-0.057	1158	-0.094	-0.091	-0.100
$MR\_comleg_{ij,t-3}$	2677	0.222	0.224	-0.011	2057	0.224	0.238	-0.080	1158	0.217	0.235	-0.103
$MR\_\ln wdist_{ij,t-3}$	2677	8.775	8.837	-0.141	2057	8.752	8.847	-0.203	1158	8.801	8.928	-0.249
$MR\_\ln(1+tariff)_{ij,t-3}$	2677	0.076	0.081	-0.079	2057	0.085	0.088	-0.048	1158	0.096	0.100	-0.060
$bothwto_{ij,t-3}$	2677	0.860	0.863	-0.006	2057	0.841	0.843	-0.007	1158	0.751	0.757	-0.014
$imwto_{ij,t-3}$	2677	0.060	0.059	0.003	2057	0.067	0.066	0.002	1158	0.104	0.101	0.009
$exwto_{ij,t-3}$	2677	0.066	0.065	0.006	2057	0.074	0.072	0.007	1158	0.118	0.115	0.011
$MR\_bothwto_{ij,t-3}$	2677	0.933	0.935	-0.006	2057	0.916	0.917	-0.003	1158	0.833	0.836	-0.008
$MR\_imwto_{ij,t-3}$	2677	0.067	0.066	0.002	2057	0.076	0.076	0.001	1158	0.116	0.114	0.006
$MR\_exwto_{ij,t-3}$	2677	0.073	0.072	0.005	2057	0.084	0.083	0.006	1158	0.131	0.128	0.009
$\ln Y_{i,t-2}$	2677	11.824	11.861	-0.017	2057	11.671	11.722	-0.024	1158	11.392	11.387	0.002
$\ln E_{j,t-2}$	2677	11.720	11.661	0.026	2057	11.526	11.411	0.050	1158	11.365	11.075	0.136
$GDPgrowth_{i,t-2}$	2677	0.083	0.094	-0.087	2057	0.088	0.094	-0.049	1158	0.046	0.039	0.056
$GDPgrowth_{j,t-2}$	2677	0.085	0.092	-0.052	2057	0.089	0.092	-0.023	1158	0.045	0.037	0.063
$UnEmployment_{i,t-2}$	2677	0.066	0.063	0.063	2057	0.069	0.066	0.046	1158	0.068	0.067	0.023
$UnEmployment_{j,t-2}$	2677	0.069	0.069	0.005	2057	0.072	0.072	0.005	1158	0.070	0.069	0.018
$gsp_{ij,t-2}$	2677	0.217	0.215	0.006	2057	0.193	0.188	0.012	1158	0.156	0.145	0.031
$comcur_{ij,t-2}$	2677	0.022	0.023	-0.005	2057	0.027	0.029	-0.012	1158	0.047	0.051	-0.016
$curheg\_o_{ij,t-2}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$curheg\_d_{ij,t-2}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$\ln(1+tariff)_{ij,t-2}$	2677	0.075	0.080	-0.078	2057	0.085	0.088	-0.032	1158	0.101	0.104	-0.040
$MR\_gsp_{ij,t-2}$	2677	0.285	0.284	0.002	2057	0.292	0.286	0.016	1158	0.335	0.328	0.019
$MR\_comcur_{ij,t-2}$	2677	-0.038	-0.044	0.058	2057	-0.050	-0.052	0.016	1158	-0.073	-0.077	0.050
$MR\_curheg\_o_{ij,t-2}$	2677	0.000	0.000	0.004	2057	0.000	0.000	0.005	1158	0.000	0.000	0.007
$MR\_curheg\_d_{ij,t-2}$	2677	0.000	0.000	0.003	2057	0.000	0.000	0.006	1158	0.000	0.000	0.011
$MR\_heg\_o_{ij,t-2}$	2677	0.009	0.008	0.020	2057	0.008	0.007	0.017	1158	0.006	0.007	-0.004
$MR\_heg\_d_{ij,t-2}$	2677	0.008	0.005	0.039	2057	0.007	0.004	0.039	1158	0.006	0.003	0.034
$MR\_comcol_{ij,t-2}$	2677	0.023	0.022	0.009	2057	0.023	0.023	0.001	1158	0.022	0.022	0.021
$MR\_land_{ij,t-2}$	2677	0.216	0.208	0.019	2057	0.221	0.224	-0.007	1158	0.303	0.277	0.049
$MR\_island_{ij,t-2}$	2677	0.354	0.346	0.015	2057	0.348	0.355	-0.014	1158	0.281	0.304	-0.047
$MR\_comlang\_ethno_{ij,t-2}$	2677	0.162	0.148	0.059	2057	0.154	0.140	0.054	1158	0.149	0.140	0.031
$MR\_contig_{ij,t-2}$	2677	0.009	0.006	0.034	2057	0.009	0.007	0.023	1158	0.011	0.010	0.012
$MR\_smctry_{ij,t-2}$	2677	-0.077	-0.076	-0.029	2057	-0.083	-0.080	-0.058	1158	-0.093	-0.090	-0.093
$MR\_comleg_{ij,t-2}$	2677	0.225	0.227	-0.010	2057	0.228	0.242	-0.078	1158	0.220	0.238	-0.103
$MR\_\ln wdist_{ij,t-2}$	2677	8.770	8.833	-0.141	2057	8.741	8.837	-0.203	1158	8.788	8.920	-0.252
$MR\_\ln(1+tariff)_{ij,t-2}$	2677	0.075	0.079	-0.081	2057	0.084	0.086	-0.041	1158	0.096	0.100	-0.057
$bothwto_{ij,t-2}$	2677	0.880	0.882	-0.005	2057	0.864	0.865	-0.004	1158	0.790	0.793	-0.006
$imwto_{ij,t-2}$	2677	0.050	0.050	0.002	2057	0.056	0.056	0.000	1158	0.085	0.085	0.000
$exwto_{ij,t-2}$	2677	0.056	0.055	0.005	2057	0.062	0.061	0.006	1158	0.098	0.095	0.009
$MR\_bothwto_{ij,t-2}$	2677	0.949	0.950	-0.004	2057	0.934	0.935	-0.001	1158	0.867	0.868	-0.002
$MR\_imwto_{ij,t-2}$	2677	0.059	0.059	0.001	2057	0.068	0.068	-0.001	1158	0.102	0.102	-0.001
$MR\_exwto_{ij,t-2}$	2677	0.065	0.064	0.004	2057	0.074	0.073	0.005	1158	0.114	0.112	0.007
$\ln Y_{i,t-1}$	2677	11.907	11.947	-0.019	2057	11.761	11.811	-0.023	1158	11.454	11.439	0.007
$\ln E_{j,t-1}$	2677	11.803	11.756	0.021	2057	11.617	11.508	0.047	1158	11.430	11.130	0.140

$GDPgrowth_{i,t-1}$	2677	0.089	0.093	-0.030	2057	0.098	0.097	0.006	1158	0.072	0.061	0.083
$GDPgrowth_{j,t-1}$	2677	0.087	0.097	-0.083	2057	0.096	0.099	-0.033	1158	0.073	0.068	0.039
$UnEmployment_{i,t-1}$	2677	0.066	0.063	0.063	2057	0.069	0.066	0.046	1158	0.068	0.067	0.023
$UnEmployment_{j,t-1}$	2677	0.069	0.069	0.005	2057	0.072	0.072	0.005	1158	0.070	0.069	0.018
$gsp_{ij,t-1}$	2677	0.217	0.215	0.006	2057	0.193	0.188	0.012	1158	0.156	0.145	0.031
$comcur_{ij,t-1}$	2677	0.022	0.023	-0.005	2057	0.027	0.029	-0.012	1158	0.047	0.051	-0.016
$curheg\_o_{ij,t-1}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$curheg\_d_{ij,t-1}$	2677	0.001	0.001	0.000	2057	0.001	0.001	0.000	1158	0.002	0.002	0.000
$\ln(1+tariff)_{ij,t-1}$	2677	0.076	0.080	-0.056	2057	0.087	0.088	-0.012	1158	0.105	0.104	0.006
$MR\_gsp_{ij,t-1}$	2677	0.279	0.279	0.000	2057	0.286	0.281	0.014	1158	0.332	0.325	0.018
$MR\_comcur_{ij,t-1}$	2677	-0.031	-0.039	0.072	2057	-0.040	-0.042	0.026	1158	-0.062	-0.067	0.048
$MR\_curheg\_o_{ij,t-1}$	2677	0.000	0.000	0.004	2057	0.000	0.000	0.006	1158	0.000	0.000	0.007
$MR\_curheg\_d_{ij,t-1}$	2677	0.000	0.000	0.004	2057	0.000	0.000	0.006	1158	0.000	0.000	0.011
$MR\_heg\_o_{ij,t-1}$	2677	0.010	0.008	0.021	2057	0.009	0.007	0.018	1158	0.006	0.006	-0.003
$MR\_heg\_d_{ij,t-1}$	2677	0.008	0.005	0.039	2057	0.007	0.004	0.039	1158	0.006	0.003	0.033
$MR\_comcol_{ij,t-1}$	2677	0.023	0.023	0.009	2057	0.024	0.024	0.002	1158	0.023	0.022	0.021
$MR\_land_{ij,t-1}$	2677	0.216	0.208	0.019	2057	0.221	0.224	-0.007	1158	0.303	0.277	0.049
$MR\_island_{ij,t-1}$	2677	0.353	0.346	0.015	2057	0.347	0.354	-0.015	1158	0.281	0.305	-0.048
$MR\_comlang\_ethno_{ij,t-1}$	2677	0.161	0.147	0.058	2057	0.153	0.140	0.054	1158	0.150	0.141	0.033
$MR\_contig_{ij,t-1}$	2677	0.009	0.007	0.029	2057	0.010	0.008	0.022	1158	0.012	0.010	0.015
$MR\_smctry_{ij,t-1}$	2677	-0.075	-0.074	-0.029	2057	-0.080	-0.077	-0.056	1158	-0.093	-0.090	-0.086
$MR\_comleg_{ij,t-1}$	2677	0.225	0.226	-0.005	2057	0.231	0.243	-0.071	1158	0.221	0.238	-0.097
$MR\_\ln wdist_{ij,t-1}$	2677	8.769	8.833	-0.141	2057	8.735	8.835	-0.210	1158	8.784	8.922	-0.261
$MR\_\ln(1+tariff)_{ij,t-1}$	2677	0.074	0.078	-0.054	2057	0.084	0.085	-0.017	1158	0.097	0.099	-0.042
$bothwto_{ij,t-1}$	2677	0.882	0.883	-0.005	2057	0.867	0.868	-0.004	1158	0.795	0.798	-0.006
$imwto_{ij,t-1}$	2677	0.050	0.049	0.003	2057	0.054	0.054	0.002	1158	0.083	0.082	0.003
$exwto_{ij,t-1}$	2677	0.055	0.054	0.003	2057	0.061	0.060	0.004	1158	0.095	0.093	0.006
$MR\_bothwto_{ij,t-1}$	2677	0.949	0.950	-0.004	2057	0.934	0.934	-0.001	1158	0.871	0.872	-0.002
$MR\_imwto_{ij,t-1}$	2677	0.058	0.058	0.002	2057	0.066	0.066	0.001	1158	0.099	0.099	0.002
$MR\_exwto_{ij,t-1}$	2677	0.064	0.063	0.002	2057	0.073	0.072	0.003	1158	0.111	0.110	0.005

Note:

(a) Refer to Table 4 footnote for the setup of the difference-in-differences matching estimations. The number of matched pairs for the effect on the treated is indicated by M_1.

(b) SMD $= \frac{\bar{X}_T - \bar{X}_C}{\sqrt{\frac{1}{2}(S_T^2 + S_C^2)}}$, where $\bar{X}_T$ and $\bar{X}_C$ denote the sample mean of the covariate in treated and untreated subjects, respectively, and S_T^2 and S_C^2 denote the sample variance of the covariate in treated and untreated subjects, respectively.

(c) The balance checks are performed for the matched sample under the 100% caliper.

Table A.5: Effects of PTA and PTA depths (1980–2015) by development status of the exporter and the importer

	(1)	(2)	(3)		(4)	(5)	(6)
	Bilateral imports (million USD)				Bilateral imports (million USD)		
PTA_exH	0.298***			PTA_imH	0.271***		
	(0.0317)				(0.0372)		
PTA_exL	0.379***			PTA_imL	0.446***		
	(0.0784)				(0.0488)		
nP_X_exH		-6.042***		nP_X_imH		-2.402**	
		(1.1104)				(1.2124)	
nP_X_exL		0.516		nP_X_imL		0.517	
		(0.4086)				(0.3881)	
P_nX_exH		0.000		P_nX_imH		-0.111	
		(0.0693)				(0.0751)	
P_nX_exL		0.291*		P_nX_imL		0.560***	
		(0.1515)				(0.0943)	
P_X_exH		0.309***		P_X_imH		0.303***	
		(0.0318)				(0.0331)	
P_X_exL		0.434***		P_X_imL		0.408***	
		(0.0648)				(0.0545)	
C_nNC_exH			0.098**	C_nNC_imH			0.018
			(0.0480)				(0.0585)
C_nNC_exL			0.329***	C_nNC_imL			0.496***
			(0.1204)				(0.0651)
C_NC_exH			0.341***	C_NC_imH			0.334***
			(0.0362)				(0.0377)
C_NC_exL			0.415***	C_NC_imL			0.398***
			(0.0754)				(0.0636)
No. of Observations	733,176	733,176	733,176	No. of Observations	733,176	733,176	733,176
pseudo R^2	0.9988	0.9988	0.9988	pseudo R^2	0.9988	0.9988	0.9988
Exporter-Year FE	Yes	Yes	Yes	Exporter-Year FE	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Importer-Year FE	Yes	Yes	Yes
Exporter-Importer FE	Yes	Yes	Yes	Exporter-Importer FE	Yes	Yes	Yes

Note: Refer to Table 2 footnote. Based on the same specification, PPML estimator and data, this analysis further differentiates the PTA effects by the development status of the exporter and the importer. Only the effects of PTA-related variables are reported to conserve space.

Table A.6: Effects of PTA (1995–2015) by merchandise / services trade

	(1) total	(2) merchandise	(3) services	(4) total	(5) merchandise	(6) services
gsp	0.076***	0.074**	0.062*	0.019	0.009	0.017
	(0.0280)	(0.0349)	(0.0349)	(0.0256)	(0.0311)	(0.0361)
comcur	0.046**	0.053***	0.095***	0.049***	0.058***	0.097***
	(0.0182)	(0.0182)	(0.0275)	(0.0180)	(0.0176)	(0.0274)
curheg_o	-0.185**	-0.336***	-0.021	-0.152*	-0.301**	-0.001
	(0.0871)	(0.1112)	(0.0944)	(0.0921)	(0.1172)	(0.0966)
curheg_d	-0.226**	-0.569***	-0.227**	-0.233**	-0.572***	-0.225**
	(0.0886)	(0.0940)	(0.0969)	(0.0912)	(0.0987)	(0.0979)
PTA	0.231***	0.274***	0.175***	0.066**	0.085***	0.050*
	(0.0223)	(0.0265)	(0.0232)	(0.0275)	(0.0321)	(0.0273)
log(1+tariff rate)				-3.887***	-4.496***	-2.993***
				(0.4424)	(0.4996)	(0.3814)
No. of Observations	121,296	121,296	121,296	120,541	120,541	120,541
pseudo R^2	0.9994	0.9989	0.9997	0.9995	0.9990	0.9997
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Importer FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Refer to Table 2 footnote. Based on the same PPML estimator, the specification additionally includes controls for tariffs. The data used for this analysis are based on the OECD ICIO Tables, for the period 1995–2015 and 72 economies (excluding ROW). Refer to Online Appendix A.1.1 for the compilation of the tariff data.

Table A.7: Effects of PTA depths on merchandise trade (1995–2015) — Weighted measures of PTA depths

	(1)	(2)	(3)	(4)
gsp	0.054	0.047	0.055	0.056
	(0.0338)	(0.0336)	(0.0340)	(0.0346)
comcur	0.023	0.015	0.054***	0.044**
	(0.0182)	(0.0181)	(0.0195)	(0.0186)
curheg_o	-0.308***	-0.304***	-0.311***	-0.337***
	(0.0908)	(0.0889)	(0.0931)	(0.1131)
curheg_d	-0.568***	-0.565***	-0.564***	-0.552***
	(0.0796)	(0.0784)	(0.0814)	(0.0950)
wt_P	1.126***			
	(0.2392)			
wt_X	0.546***			
	(0.1174)			
wt_C		0.837***		
		(0.1647)		
wt_NC		0.697***	0.917***	0.896***
		(0.1214)	(0.1205)	(0.1181)
wt_B			2.646***	
			(0.5172)	
wt_H			-2.643***	
			(0.8494)	
wt_Pref				5.947***
				(0.9899)
wt_MFN				-1.781***
				(0.4867)
No. of Observations	121,296	121,296	121,296	121,296
pseudo R^2	0.9989	0.9989	0.9989	0.9989
Exporter-Year FE	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes
Exporter-Importer FE	Yes	Yes	Yes	Yes

Note:
(a) This table reports the estimation results of Equation (15), where the PTA indicator is replaced with weighted measures of PTA depths, using PPML on a balanced panel of 72 economies. Intranational (domestic) trade flow observations are included. The construction of the weighted measures of PTA depths is documented in Section 2.1. To reiterate, let $S \in \{P, X, C, NC, B, H, Pref, MFN\}$ denote the subcategory of provisions; refer to Table 1 for the categories of provisions. We calculate each provision p's prevalence, $freq_p$, at the initial year 1980 relative to the number of total bilateral PTA partnerships in 1980, and measure a provision's depth by $\exp(-freq_p)$. For example, a provision that was not included in any PTAs in 1980 has a depth equal to $\exp(0) = 1$. A provision that appeared more frequently in PTAs in 1980 is considered shallower and has a depth less than 1. The depths across the 52 provisions are normalized by $\sum_{p'=1}^{52} \exp(-freq_{p'})$ such that the total weights across 52 provisions equal 1. The measure wt_S$_{ijt}$ equals the sum of the weights across the provisions (under the subcategory S) that are covered by the PTAs between a country pair ij in a year t.
(b) Robust standard errors are clustered at the exporter-importer level and indicated in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.7: Effects of PTA depths on merchandise trade (1995–2015) — Weighted measures of PTA depths (continued)

PTA category	Mean effect		PTA category	Mean effect	
P_nX	0.039	***	C_nNC	0.092	***
	(0.0083)			(0.0181)	
P_X	0.326	***	C_NC	0.359	***
	(0.0210)			(0.0212)	

PTA category	Mean effect		PTA category	Mean effect	
B_nH_nNC	0.062	***			
	(0.0121)				
B_nH_NC	0.232	***	Pref_nMFN_nNC	0.109	***
	(0.0425)			(0.0181)	
B_H_nNC	0.116	***	Pref_MFN_nNC	0.204	***
	(0.0264)			(0.0306)	
B_H_NC	0.359	***	Pref_MFN_NC	0.401	***
	(0.0209)			(0.0226)	

Note:

(a) Refer to Figure 1 for the definition of the PTA categories. The note below documents how the mean effect of each of the PTA categories is calculated. Use the PTA category B_H_NC as an example. The mean effect of PTAs in this category is measured by: $T_{B\_H\_NC} = \frac{1}{n'} \sum_{B\_H\_NC_{ijt}=1} (\hat{\beta}_{\text{wt\_B}} * \text{wt\_B}_{ijt} + \hat{\beta}_{\text{wt\_H}} * \text{wt\_H}_{ijt} + \hat{\beta}_{\text{wt\_NC}} * \text{wt\_NC}_{ijt}) = \hat{\beta}_{\text{wt\_B}} * \overline{\text{wt\_B}} + \hat{\beta}_{\text{wt\_H}} * \overline{\text{wt\_H}} + \hat{\beta}_{\text{wt\_NC}} * \overline{\text{wt\_NC}}$, where $\hat{\beta}_{\text{wt\_S}}$ is the coefficient estimate for wt_S, n' denotes the number of observations where the PTA in force is of type B_H_NC, and $\overline{\text{wt\_S}} \equiv \frac{1}{n'} \sum_{B\_H\_NC_{ijt}=1} \text{wt\_S}_{ijt}$ is the mean weighted coverage of provisions in the subcategory S by PTAs of type B_H_NC. The variance of $T_{B\_H\_NC}$ can be estimated by: $\hat{V}(T_{B\_H\_NC}) = \mathbf{wt\_S}\,\text{COV}(\boldsymbol{\beta}\_S)\,\mathbf{wt\_S'}$, where $\mathbf{wt\_S} \equiv [\overline{\text{wt\_B}}\ \overline{\text{wt\_H}}\ \overline{\text{wt\_NC}}]$, and $\text{COV}(\boldsymbol{\beta}\_S)$ is the variance-covariance matrix estimate of $[\hat{\beta}_{\text{wt\_B}}\ \hat{\beta}_{\text{wt\_H}}\ \hat{\beta}_{\text{wt\_NC}}]$. The mean effect and standard error for the other PTA categories can be derived similarly, using the corresponding subset of the slope coefficient estimates $\hat{\beta}_{\text{wt\_S}}$ from the first panel of Table A.7 and the mean weighted coverage vector $\overline{\text{wt\_S}}$ of the corresponding PTA category.

(b) The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.8: Effects of PTA depths on services trade (1995–2015) — Weighted measures of PTA depths

	(1)	(2)	(3)	(4)
gsp	0.038	0.032	0.040	0.035
	(0.0376)	(0.0382)	(0.0365)	(0.0383)
comcur	0.064**	0.063**	0.081***	0.074***
	(0.0256)	(0.0264)	(0.0251)	(0.0260)
curheg_o	-0.013	-0.012	-0.013	-0.016
	(0.0901)	(0.0900)	(0.0904)	(0.0923)
curheg_d	-0.208**	-0.204**	-0.211**	-0.205**
	(0.0938)	(0.0939)	(0.0937)	(0.0959)
wt_P	0.514**			
	(0.2286)			
wt_X	0.551***			
	(0.1096)			
wt_C		0.439***		
		(0.1538)		
wt_NC		0.627***	0.720***	0.708***
		(0.1095)	(0.0897)	(0.1125)
wt_B			1.251**	
			(0.5108)	
wt_H			-1.087	
			(0.6940)	
wt_Pref				2.286***
				(0.8204)
wt_MFN				-0.530
				(0.4557)
No. of Observations	121,296	121,296	121,296	121,296
pseudo R^2	0.9997	0.9997	0.9997	0.9997
Exporter-Year FE	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes
Exporter-Importer FE	Yes	Yes	Yes	Yes

Note:
(a) This table reports the estimation results of Equation (15), where the PTA indicator is replaced with weighted measures of PTA depths, using PPML on a balanced panel of 72 economies. Intranational (domestic) trade flow observations are included. The construction of the weighted measures of PTA depths is documented in Section 2.1. To reiterate, let $S \in \{P, X, C, NC, B, H, Pref, MFN\}$ denote the subcategory of provisions; refer to Table 1 for the categories of provisions. We calculate each provision p's prevalence, $freq_p$, at the initial year 1980 relative to the number of total bilateral PTA partnerships in 1980, and measure a provision's depth by $\exp(-freq_p)$. For example, a provision that was not included in any PTAs in 1980 has a depth equal to $\exp(0) = 1$. A provision that appeared more frequently in PTAs in 1980 is considered shallower and has a depth less than 1. The depths across the 52 provisions are normalized by $\sum_{p'=1}^{52} \exp(-freq_{p'})$ such that the total weights across 52 provisions equal 1. The measure wt_S_{ijt} equals the sum of the weights across the provisions (under the subcategory S) that are covered by the PTAs between a country pair ij in a year t.
(b) Robust standard errors are clustered at the exporter-importer level and indicated in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.8: Effects of PTA depths on services trade (1995–2015) — Weighted measures of PTA depths (continued)

PTA category	Mean effect		PTA category	Mean effect	
P_nX	0.018	**	C_nNC	0.048	***
	(0.0079)			(0.0169)	
P_X	0.226	***	C_NC	0.251	***
	(0.0194)			(0.0196)	
PTA category	**Mean effect**		**PTA category**	**Mean effect**	
B_nH_nNC	0.029	**			
	(0.0120)				
B_nH_NC	0.114	***	Pref_nMFN_nNC	0.042	***
	(0.0415)			(0.0150)	
B_H_nNC	0.065	***	Pref_MFN_nNC	0.093	***
	(0.0230)			(0.0258)	
B_H_NC	0.254	***	Pref_MFN_NC	0.266	***
	(0.0197)			(0.0197)	

Note:

(a) Refer to Figure 1 for the definition of the PTA categories. The note below documents how the mean effect of each of the PTA categories is calculated. Use the PTA category B_H_NC as an example. The mean effect of PTAs in this category is measured by: $T_{B\_H\_NC} = \frac{1}{n'} \sum_{B\_H\_NC_{ijt}=1} (\hat{\beta}_{\text{wt\_B}} * \text{wt\_B}_{ijt} + \hat{\beta}_{\text{wt\_H}} * \text{wt\_H}_{ijt} + \hat{\beta}_{\text{wt\_NC}} * \text{wt\_NC}_{ijt}) = \hat{\beta}_{\text{wt\_B}} * \overline{\text{wt\_B}} + \hat{\beta}_{\text{wt\_H}} * \overline{\text{wt\_H}} + \hat{\beta}_{\text{wt\_NC}} * \overline{\text{wt\_NC}}$, where $\hat{\beta}_{\text{wt\_S}}$ is the coefficient estimate for wt_S, n' denotes the number of observations where the PTA in force is of type B_H_NC, and $\overline{\text{wt\_S}} \equiv \frac{1}{n'} \sum_{B\_H\_NC_{ijt}=1} \text{wt\_S}_{ijt}$ is the mean weighted coverage of provisions in the subcategory S by PTAs of type B_H_NC. The variance of $T_{B\_H\_NC}$ can be estimated by: $\hat{V}(T_{B\_H\_NC}) = \overline{\textbf{wt\_S}}\, \text{COV}(\boldsymbol{\beta}\_S)\, \overline{\textbf{wt\_S}}'$, where $\overline{\textbf{wt\_S}} \equiv [\overline{\text{wt\_B}}\ \overline{\text{wt\_H}}\ \overline{\text{wt\_NC}}]$, and $\text{COV}(\boldsymbol{\beta}\_S)$ is the variance-covariance matrix estimate of $[\hat{\beta}_{\text{wt\_B}}\ \hat{\beta}_{\text{wt\_H}}\ \hat{\beta}_{\text{wt\_NC}}]$. The mean effect and standard error for the other PTA categories can be derived similarly, using the corresponding subset of the slope coefficient estimates $\hat{\beta}_{\text{wt\_S}}$ from the first panel of Table A.8 and the mean weighted coverage vector $\overline{\text{wt\_S}}$ of the corresponding PTA category.

(b) The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.9: Interaction of PTA and GATT/WTO (based on the 5th-percentile bootstrap GATT/WTO membership effect estimates)

(a) Homogeneous PTA estimate

Effects	PTA status indicator	1980	2015
PTA	0	-0.0102	-0.0442
	1	0.3779	0.5617
	2	0.9743	2.0464
WTO	0	0.6021	1.0994
	1	0.4732	1.8019
	2	1.1874	2.5791
PTA_woWTO	0	-0.0064	-0.0283
	1	0.3645	0.4533
	2	0.8022	1.6505
WTO_woPTA	0	0.6060	1.1156
	1	0.4595	1.6922
	2	1.0145	2.1813
PTA vs.	0	-0.0038	-0.0159
PTA_woWTO	1	0.0134	0.1068
	2	0.1698	0.3832
WTO vs.	0	-0.0038	-0.0159
WTO_woPTA	1	0.0134	0.1068
	2	0.1698	0.3832

(b) PTA estimates differentiated by nP_X, P_nX, P_X

Effects	PTA status indicator	1980	2015
PTA	0	-0.0102	-0.0651
	1	0.6558	0.5846
	2	0.7542	1.5412
WTO	0	0.6021	1.6125
	1	1.0831	2.0854
	2	0.9255	2.2289
PTA_woWTO	0	-0.0063	-0.0484
	1	0.5382	0.4739
	2	0.6436	1.2421
WTO_woPTA	0	0.6060	1.6297
	1	0.9645	1.9727
	2	0.8143	1.9288
PTA vs.	0	-0.0038	-0.0167
PTA_woWTO	1	0.1167	0.1096
	2	0.1091	0.2893
WTO vs.	0	-0.0038	-0.0167
WTO_woPTA	1	0.1167	0.1096
	2	0.1091	0.2893

(c) PTA estimates differentiated by C_nNC, C_NC

Effects	PTA status indicator	1980	2015
PTA	0	-0.0107	-0.0501
	1	0.5294	0.6661
	2	0.8531	1.6658
WTO	0	0.6021	1.0994
	1	0.5372	2.0141
	2	1.1285	2.2979
PTA_woWTO	0	-0.0067	-0.0332
	1	0.4623	0.5381
	2	0.7105	1.3424
WTO_woPTA	0	0.6062	1.1167
	1	0.4695	1.8842
	2	0.9853	1.9741
PTA vs.	0	-0.0040	-0.0169
PTA_woWTO	1	0.0665	0.1264
	2	0.1406	0.3119
WTO vs.	0	-0.0040	-0.0169
WTO_woPTA	1	0.0665	0.1264
	2	0.1406	0.3119

Note:
(1) The quantitative analyses in Panels (a)–(c) are based on the PTA effect estimates in Columns (1)–(3) of Table 2, respectively, and the 5th-percentile bootstrap GATT/WTO membership effect estimates in Table 3, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. Refer to Figures A.3–A.5 footnotes for the setup of the counterfactual analysis of PTAs in Panels (a)–(c), respectively. The welfare effects of WTO are evaluated by comparing the welfare given the observed GATT/WTO membership status relative to the counterfactual scenario in which the GATT/WTO does not exist ($bothwto_{ijt} = 0$, $imwto_{ijt} = 0$, and $exwto_{ijt} = 0$ for all ijt). The table reports in addition the welfare effects of WTO under the scenario in which all PTAs are rescinded (WTO_woPTA), and the welfare effects of PTAs under the scenario without GATT/WTO (PTA_woWTO). The effects reported are the means across countries in the respective grouping for a given year, expressed in percentage points.
(2) In Panel (a), the PTA status classifies countries into three groups, based on the number of PTA partnerships a country has in force in a year: (0) zero, (1) greater than zero but fewer than the median, and (2) greater than or equal to the median across countries of the year.
(3) In Panel (b), the PTA status classifies countries into three groups: (0) no PTA or nP_X, (1) P_nX, and (2) P_X, respectively, in a given year, if the number of a country's trading partnerships that belong to the respective category dominates those of the other categories.
(4) In Panel (c), the PTA status classifies countries into three groups: (0) no PTA, (1) C_nNC, and (2) C_NC, respectively, in a given year, if the number of a country's trading partnerships that belong to the respective category dominates those of the other categories.

Table A.10: Interaction of deep PTA and GATT/WTO (based on the 5th-percentile bootstrap GATT/WTO membership effect estimates)

(b) PTA estimates differentiated by nP_X, P_nX, P_X

Effects	PTA status indicator	1980	2015
deepPTA	0	-0.0057	-0.0405
	1	0.1164	0.1401
	2	0.4447	0.8745
WTO	0	0.6021	1.6125
	1	1.0831	2.0854
	2	0.9255	2.2289
deepPTA_woWTO	0	-0.0036	-0.0306
	1	0.0926	0.1145
	2	0.3805	0.7077
WTO_wo_deepPTA	0	0.6043	1.6228
	1	1.0589	2.0592
	2	0.8605	2.0588
deepPTA vs. deepPTA_woWTO	0	-0.0022	-0.0099
	1	0.0237	0.0254
	2	0.0636	0.1635
WTO vs. WTO_wo_deepPTA	0	-0.0022	-0.0099
	1	0.0237	0.0254
	2	0.0636	0.1635

(c) PTA estimates differentiated by C_nNC, C_NC

Effects	PTA status indicator	1980	2015
deepPTA	0	-0.0051	-0.0258
	1	0.0499	0.1298
	2	0.4236	0.7793
WTO	0	0.6021	1.0994
	1	0.5372	2.0141
	2	1.1285	2.2979
deepPTA_woWTO	0	-0.0031	-0.0180
	1	0.0398	0.1047
	2	0.3540	0.6314
WTO_wo_deepPTA	0	0.6040	1.1074
	1	0.5269	1.9884
	2	1.0580	2.1464
deepPTA vs. deepPTA_woWTO	0	-0.0019	-0.0078
	1	0.0100	0.0250
	2	0.0691	0.1453
WTO vs. WTO_wo_deepPTA	0	-0.0019	-0.0078
	1	0.0100	0.0250
	2	0.0691	0.1453

Note:
(1) The quantitative analyses in Panels (b)–(c) are based on the PTA effect estimates in Columns (2)–(3) of Table 2, respectively, and the 5th-percentile bootstrap GATT/WTO membership effect estimates in Table 3, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. Refer to Figures A.7–A.8 footnotes for the setup of the counterfactual analysis of deep PTAs in terms of P_X and C_NC, respectively. The welfare effects of WTO are evaluated by comparing the welfare given the observed GATT/WTO membership status relative to the counterfactual scenario in which the GATT/WTO does not exist. The table reports in addition the welfare effects of WTO under the scenario in which deep PTAs are reduced to shallow PTAs (WTO_wo_ deepPTA), and the welfare effects of deep PTAs under the scenario without GATT/WTO (deepPTA_woWTO). The effects reported are the means across countries in the respective grouping for a given year, expressed in percentage points.
(2) The PTA status indicators for Panels (b)–(c) are defined in the same way as the corresponding panels in Table A.9.

Table A.11: Interaction of PTA and GATT/WTO (based on the 95th-percentile bootstrap GATT/WTO membership effect estimates)

(a) Homogeneous PTA estimate

Effects	PTA status indicator	1980	2015
PTA	0	-0.0102	-0.0442
	1	0.3779	0.5617
	2	0.9743	2.0464
WTO	0	1.1787	1.7218
	1	1.0614	2.5202
	2	1.9696	3.5632
PTA_woWTO	0	-0.0048	-0.0222
	1	0.3441	0.4112
	2	0.7314	1.5005
WTO_woPTA	0	1.1842	1.7445
	1	1.0272	2.3663
	2	1.7237	3.0056
PTA vs. PTA_woWTO	0	-0.0053	-0.0221
	1	0.0337	0.1486
	2	0.2401	0.5297
WTO vs. WTO_woPTA	0	-0.0053	-0.0221
	1	0.0337	0.1486
	2	0.2401	0.5297

(b) PTA estimates differentiated by nP_X, P_nX, P_X

Effects	PTA status indicator	1980	2015
PTA	0	-0.0102	-0.0651
	1	0.6558	0.5846
	2	0.7542	1.5412
WTO	0	1.1787	2.4116
	1	1.7733	2.9143
	2	1.6478	3.0812
PTA_woWTO	0	-0.0048	-0.0420
	1	0.4877	0.4312
	2	0.5928	1.1289
WTO_woPTA	0	1.1842	2.4356
	1	1.6029	2.7565
	2	1.4844	2.6608
PTA vs. PTA_woWTO	0	-0.0053	-0.0231
	1	0.1669	0.1520
	2	0.1595	0.3997
WTO vs. WTO_woPTA	0	-0.0053	-0.0231
	1	0.1669	0.1520
	2	0.1595	0.3997

(c) PTA estimates differentiated by C_nNC, C_NC

Effects	PTA status indicator	1980	2015
PTA	0	-0.0107	-0.0501
	1	0.5294	0.6661
	2	0.8531	1.6658
WTO	0	1.1787	1.7218
	1	1.1668	2.8207
	2	1.8843	3.1766
PTA_woWTO	0	-0.0051	-0.0265
	1	0.4279	0.4885
	2	0.6492	1.2205
WTO_woPTA	0	1.1845	1.7461
	1	1.0640	2.6387
	2	1.6779	2.7231
PTA vs. PTA_woWTO	0	-0.0056	-0.0236
	1	0.1007	0.1756
	2	0.2014	0.4306
WTO vs. WTO_woPTA	0	-0.0056	-0.0236
	1	0.1007	0.1756
	2	0.2014	0.4306

Note:
(1) The quantitative analyses in Panels (a)–(c) are based on the PTA effect estimates in Columns (1)–(3) of Table 2, respectively, and the 95th-percentile bootstrap GATT/WTO membership effect estimates in Table 3, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. Refer to Figures A.3–A.5 footnotes for the setup of the counterfactual analysis of PTAs in Panels (a)–(c), respectively. The welfare effects of WTO are evaluated by comparing the welfare given the observed GATT/WTO membership status relative to the counterfactual scenario in which the GATT/WTO does not exist ($bothwto_{ijt} = 0$, $imwto_{ijt} = 0$, and $exwto_{ijt} = 0$ for all ijt). The table reports in addition the welfare effects of WTO under the scenario in which all PTAs are rescinded (WTO_woPTA), and the welfare effects of PTAs under the scenario without GATT/WTO (PTA_woWTO). The effects reported are the means across countries in the respective grouping for a given year, expressed in percentage points.
(2) In Panel (a), the PTA status classifies countries into three groups, based on the number of PTA partnerships a country has in force in a year: (0) zero, (1) greater than zero but fewer than the median, and (2) greater than or equal to the median across countries of the year.
(3) In Panel (b), the PTA status classifies countries into three groups: (0) no PTA or nP_X, (1) P_nX, and (2) P_X, respectively, in a given year, if the number of a country's trading partnerships that belong to the respective category dominates those of the other categories.
(4) In Panel (c), the PTA status classifies countries into three groups: (0) no PTA, (1) C_nNC, and (2) C_NC, respectively, in a given year, if the number of a country's trading partnerships that belong to the respective category dominates those of the other categories.

Table A.12: Interaction of deep PTA and GATT/WTO (based on the 95th-percentile bootstrap GATT/WTO membership effect estimates)

(b) PTA estimates differentiated by nP_X, P_nX, P_X

Effects	PTA status indicator	1980	2015
deepPTA	0	-0.0057	-0.0405
	1	0.1164	0.1401
	2	0.4447	0.8745
WTO	0	1.1787	2.4116
	1	1.7733	2.9143
	2	1.6478	3.0812
deepPTA_woWTO	0	-0.0027	-0.0266
	1	0.0842	0.1047
	2	0.3507	0.6445
WTO_wo_deepPTA	0	1.1818	2.4260
	1	1.7404	2.8777
	2	1.5520	2.8428
deepPTA vs. deepPTA_woWTO	0	-0.0030	-0.0139
	1	0.0321	0.0352
	2	0.0933	0.2258
WTO vs. WTO_wo_deepPTA	0	-0.0030	-0.0139
	1	0.0321	0.0352
	2	0.0933	0.2258

(c) PTA estimates differentiated by C_nNC, C_NC

Effects	PTA status indicator	1980	2015
deepPTA	0	-0.0051	-0.0258
	1	0.0499	0.1298
	2	0.4236	0.7793
WTO	0	1.1787	1.7218
	1	1.1668	2.8207
	2	1.8843	3.1766
deepPTA_woWTO	0	-0.0024	-0.0147
	1	0.0364	0.0953
	2	0.3237	0.5755
WTO_wo_deepPTA	0	1.1814	1.7332
	1	1.1530	2.7851
	2	1.7823	2.9643
deepPTA vs. deepPTA_woWTO	0	-0.0027	-0.0111
	1	0.0135	0.0344
	2	0.0993	0.2005
WTO vs. WTO_wo_deepPTA	0	-0.0027	-0.0111
	1	0.0135	0.0344
	2	0.0993	0.2005

Note:
(1) The quantitative analyses in Panels (b)–(c) are based on the PTA effect estimates in Columns (2)–(3) of Table 2, respectively, and the 95th-percentile bootstrap GATT/WTO membership effect estimates in Table 3, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. Refer to Figures A.7–A.8 footnotes for the setup of the counterfactual analysis of deep PTAs in terms of P_X and C_NC, respectively. The welfare effects of WTO are evaluated by comparing the welfare given the observed GATT/WTO membership status relative to the counterfactual scenario in which the GATT/WTO does not exist. The table reports in addition the welfare effects of WTO under the scenario in which deep PTAs are reduced to shallow PTAs (WTO_wo_ deepPTA), and the welfare effects of deep PTAs under the scenario without GATT/WTO (deepPTA_woWTO). The effects reported are the means across countries in the respective grouping for a given year, expressed in percentage points.
(2) The PTA status indicators for Panels (b)–(c) are defined in the same way as the corresponding panels in Table A.11.

Table A.13: Firm entry effects of PTAs (Melitz vs. BKL; mean effects across countries)

Parameters	PTA status	**Year 1980** Melitz	BKL $\kappa = 0.8$	BKL $\kappa = 1$	**Year 2015** Melitz	BKL $\kappa = 0.8$	BKL $\kappa = 1$
1. σ=5, θ=4.5	0	-0.01	0.00	0	-0.02	-0.01	0
	1	0.22	0.08	0	0.32	0.12	0
	2	0.55	0.21	0	1.21	0.45	0
2. $\boldsymbol{\sigma}$=5, $\boldsymbol{\theta}$=5	0	**-0.01**	**0.00**	**0**	**-0.02**	**-0.01**	**0**
(benchmark)	1	**0.19**	**0.08**	**0**	**0.28**	**0.11**	**0**
	2	**0.50**	**0.19**	**0**	**1.10**	**0.40**	**0**
3. σ=5, θ=5.5	0	-0.01	0.00	0	-0.02	-0.01	0
	1	0.18	0.07	0	0.26	0.10	0
	2	0.45	0.18	0	1.00	0.37	0
4. σ=5, θ=6	0	-0.01	0.00	0	-0.02	-0.01	0
	1	0.16	0.06	0	0.24	0.09	0
	2	0.41	0.16	0	0.92	0.34	0
5. σ=5, θ=8	0	0.00	0.00	0	-0.02	-0.01	0
	1	0.12	0.05	0	0.18	0.07	0
	2	0.31	0.12	0	0.69	0.25	0
6. σ=5, θ=10	0	0.00	0.00	0	-0.02	-0.01	0
	1	0.10	0.04	0	0.14	0.05	0
	2	0.25	0.10	0	0.56	0.20	0
7. σ=10, θ=10	0	0.00	0.00	0	-0.01	-0.01	0
	1	0.08	0.03	0	0.11	0.05	0
	2	0.21	0.08	0	0.43	0.16	0

Note:
(a) The quantitative analyses are based on the PTA estimate in Column (1) of Table 2, using the Melitz framework described in Section 5.1 or the BKL framework outlined in Section A.4. This set of analyses evaluates the effects of PTAs on firm entry by comparing outcomes under the observed PTA status relative to the counterfactual scenario in which PTAs do not exist ($PTA_{ijt} = 0$ for all ijt). The effects reported are the means across countries in the respective grouping for a given year, expressed in percentage points.
(b) The PTA status classifies countries into three groups, based on the number of PTA partnerships a country has in force in a year: (0) zero, (1) greater than zero but fewer than the median, and (2) greater than or equal to the median across countries of the year.

Table A.14: Welfare effects of PTAs (Melitz vs. BKL; mean effects across countries)

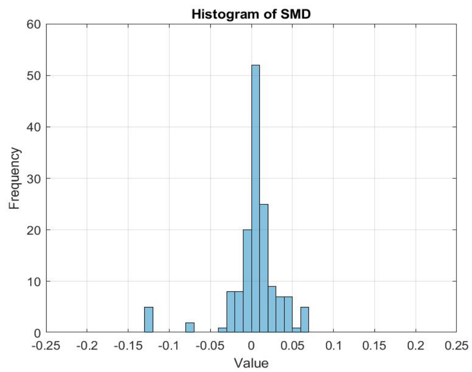
Parameters	PTA status	Year 1980 Melitz	Year 1980 BKL $\kappa = 0.8$	Year 1980 BKL $\kappa = 1$	Year 2015 Melitz	Year 2015 BKL $\kappa = 0.8$	Year 2015 BKL $\kappa = 1$
1. σ=5, θ=4.5	0	-0.0099	-0.0099	-0.0099	-0.0430	-0.0430	-0.0430
	1	0.4204	0.4204	0.4204	0.6270	0.6270	0.6270
	2	1.0819	1.0819	1.0819	2.2696	2.2696	2.2696
2. σ=5, θ=5	0	**-0.0102**	**-0.0102**	**-0.0102**	**-0.0442**	**-0.0442**	**-0.0442**
(benchmark)	1	**0.3779**	**0.3779**	**0.3779**	**0.5617**	**0.5617**	**0.5617**
	2	**0.9743**	**0.9743**	**0.9743**	**2.0464**	**2.0464**	**2.0464**
3. σ=5, θ=5.5	0	-0.0102	-0.0102	-0.0102	-0.0442	-0.0442	-0.0442
	1	0.3431	0.3431	0.3431	0.5086	0.5086	0.5086
	2	0.8862	0.8862	0.8862	1.8631	1.8631	1.8631
4. σ=5, θ=6	0	-0.0101	-0.0101	-0.0101	-0.0436	-0.0436	-0.0436
	1	0.3142	0.3142	0.3142	0.4647	0.4647	0.4647
	2	0.8127	0.8127	0.8127	1.7098	1.7098	1.7098
5. σ=5, θ=8	0	-0.009	-0.009	-0.009	-0.0390	-0.0390	-0.0390
	1	0.2351	0.2351	0.2351	0.3455	0.3455	0.3455
	2	0.6102	0.6102	0.6102	1.2864	1.2864	1.2864
6. σ=5, θ=10	0	-0.0079	-0.0079	-0.0079	-0.0342	-0.0342	-0.0342
	1	0.1878	0.1878	0.1878	0.2749	0.2749	0.2749
	2	0.4884	0.4884	0.4884	1.0310	1.0310	1.0310
7. σ=10, θ=10	0	-0.0068	-0.0068	-0.0068	-0.0253	-0.0253	-0.0253
	1	0.1561	0.1561	0.1561	0.2260	0.2260	0.2260
	2	0.4079	0.4079	0.4079	0.8152	0.8152	0.8152

Note:
(a) The quantitative analyses are based on the PTA estimate in Column (1) of Table 2, using the Melitz framework described in Section 5.1 or the BKL framework outlined in Section A.4. This set of analyses evaluates the effects of PTAs on welfare by comparing outcomes under the observed PTA status relative to the counterfactual scenario in which PTAs do not exist ($PTA_{ijt} = 0$ for all ijt). The effects reported are the means across countries in the respective grouping for a given year, expressed in percentage points.
(b) The PTA status classifies countries into three groups, based on the number of PTA partnerships a country has in force in a year: (0) zero, (1) greater than zero but fewer than the median, and (2) greater than or equal to the median across countries of the year.

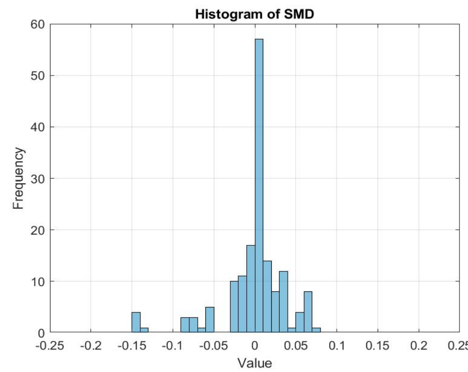
Figure A.1: Difference-in-Differences Matching Estimation — SMD Histograms

Panel A. b = 5 and a = 1

(a) PTA vs. no PTA

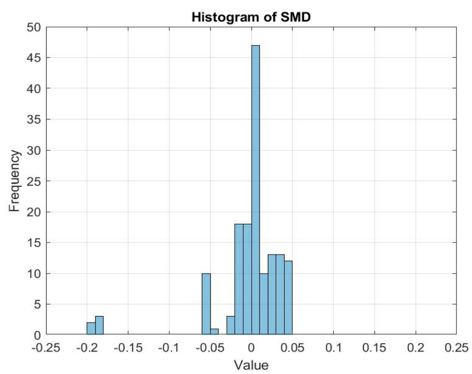


(b) PTA vs. no PTA (control for tariffs)

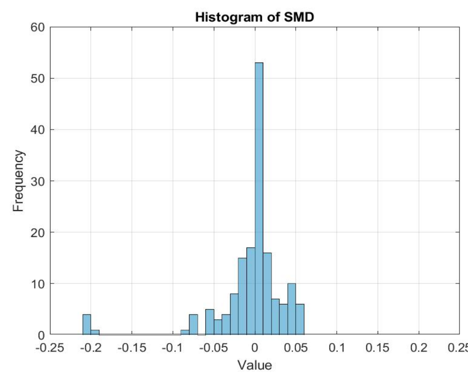


Panel B. b = 5 and a = 5

(a) PTA vs. no PTA

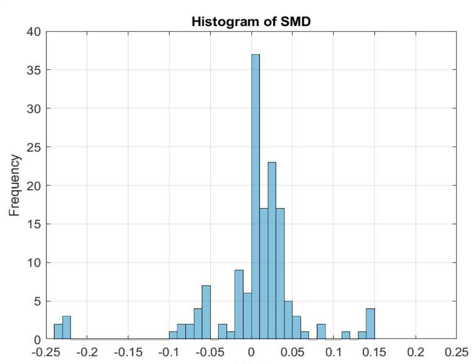


(b) PTA vs. no PTA (control for tariffs)

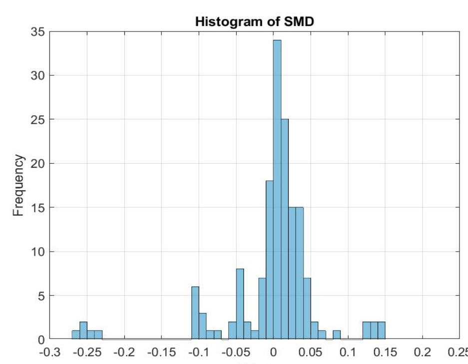


Panel C. b = 5 and a = 10

(a) PTA vs. no PTA



(b) PTA vs. no PTA (control for tariffs)

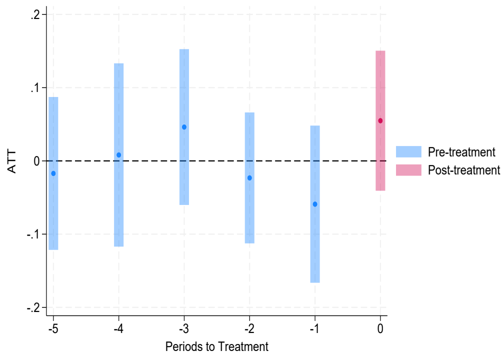


Note: This figure displays the histograms of SMDs for the set of time-variant matching covariates for each matching scenario (cf. Tables A.3–A.4). Refer to Table 4 footnote for the setup of the difference-in-differences matching estimations.

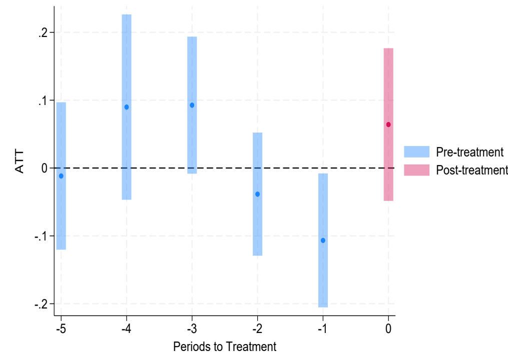
Figure A.2: Difference-in-Differences Matching Estimation — Parallel Pre-Trend Tests

Panel A. b = 5 and a = 1

(a) PTA vs. no PTA

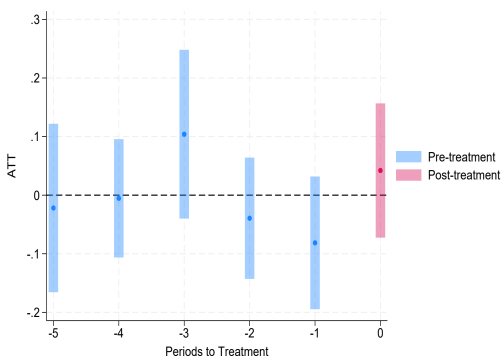


(b) PTA vs. no PTA (control for tariffs)

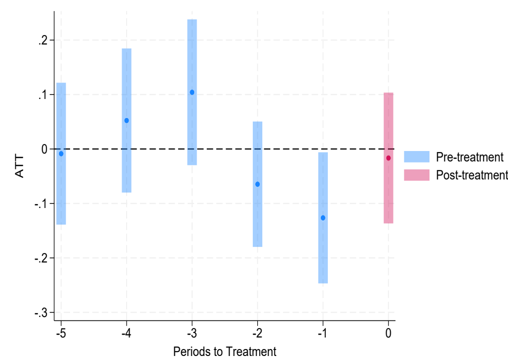


Panel B. b = 5 and a = 5

(a) PTA vs. no PTA

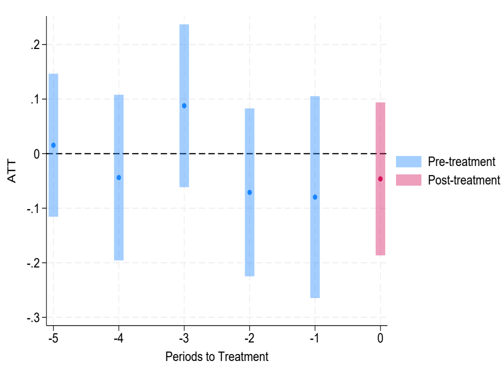


(b) PTA vs. no PTA (control for tariffs)

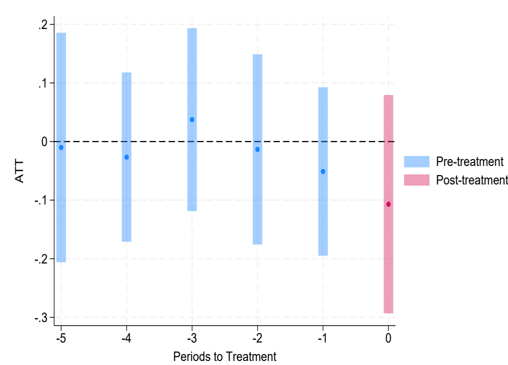


Panel C. b = 5 and a = 10

(a) PTA vs. no PTA

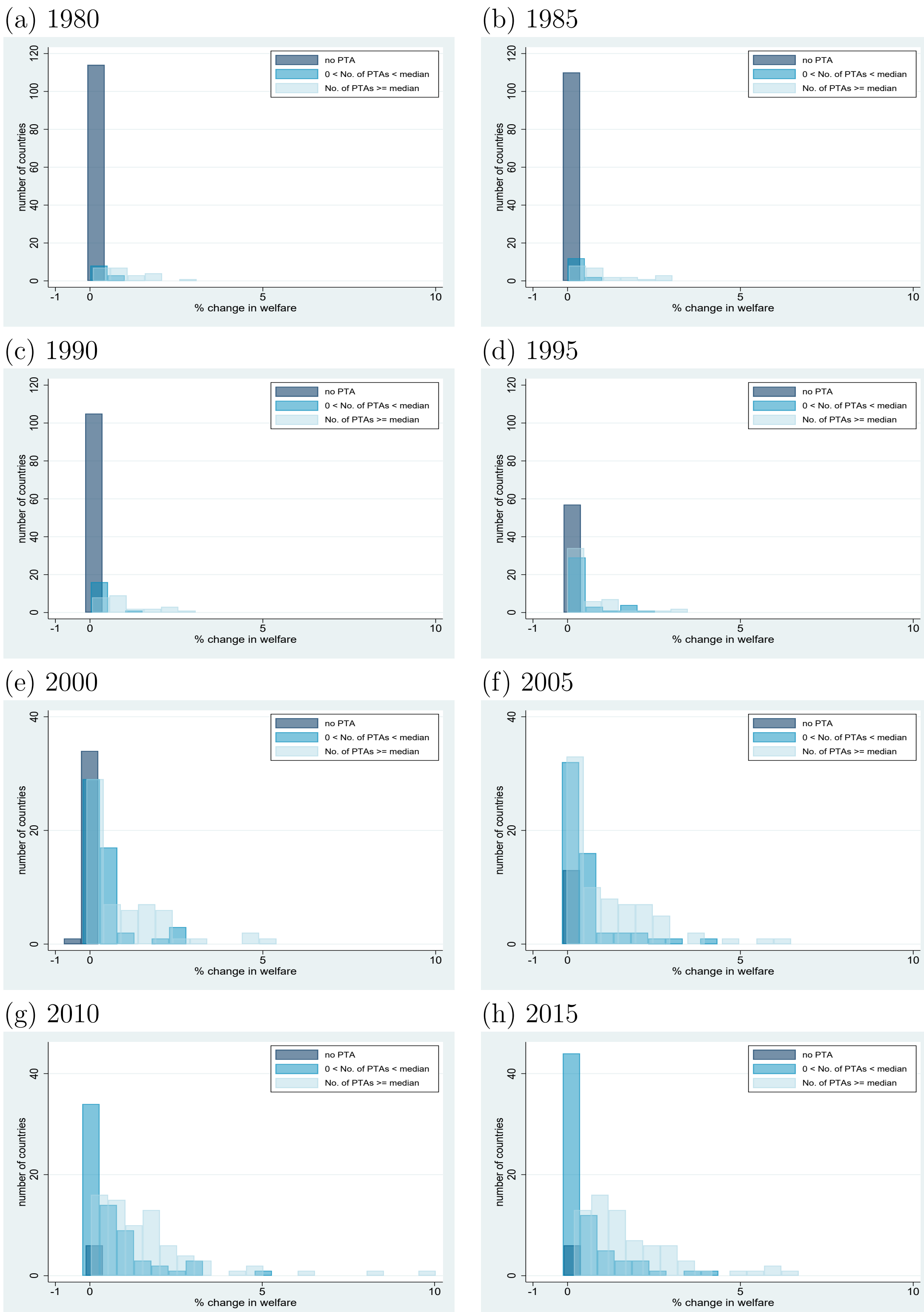


(b) PTA vs. no PTA (control for tariffs)



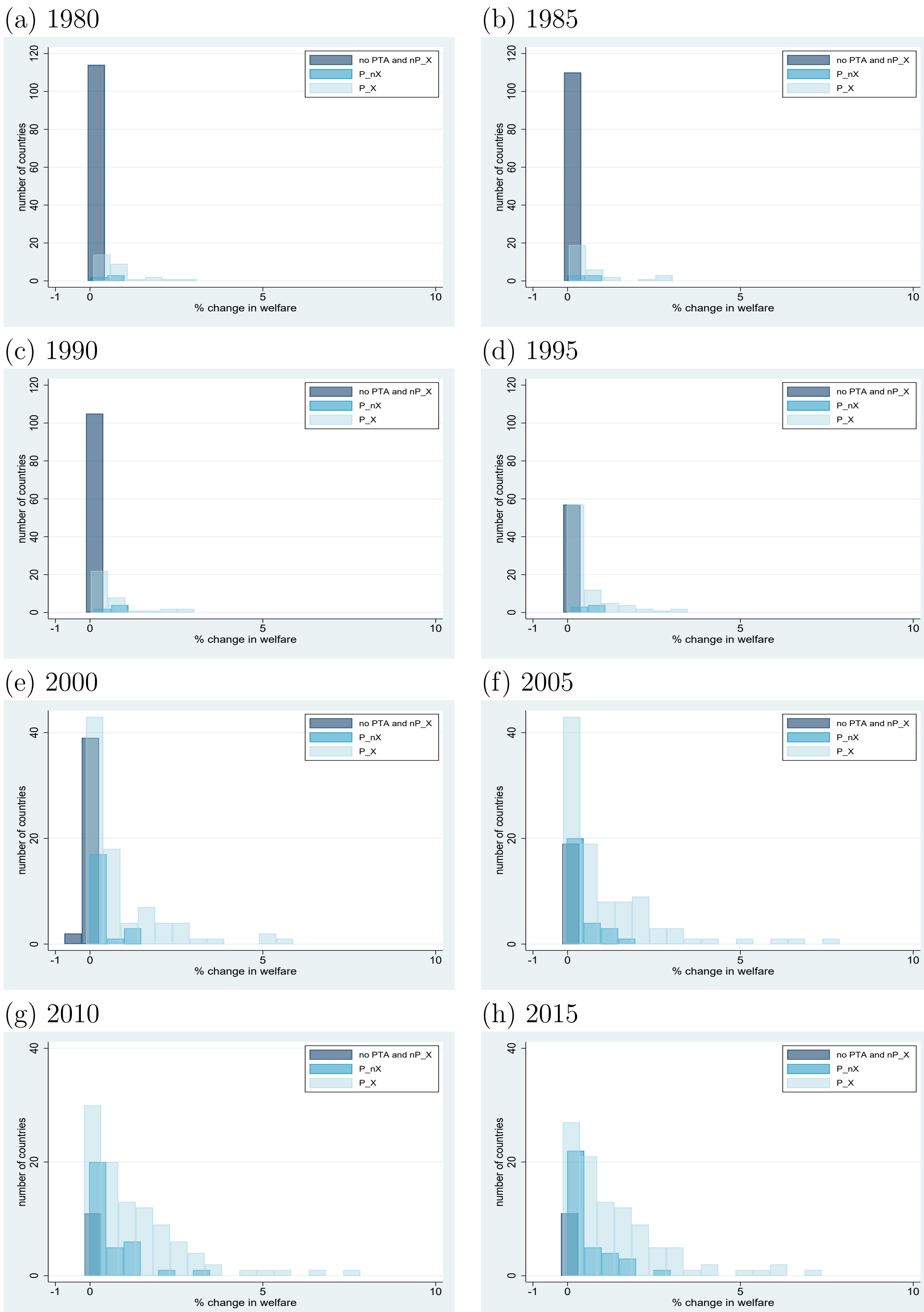
Note: This figure displays the pre-trend test for the matched sample (under the 100% caliper), based on the estimator of Callaway and Sant'Anna (2021). Refer to Table 4 footnote for the setup of the difference-in-differences matching estimations.

Figure A.3: Welfare effects of PTAs



Note: The quantitative analysis is based on the PTA estimate in Column (1) of Table 2, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. This set of analyses evaluates the effects of PTAs by comparing the welfare given the observed PTA status relative to the counterfactual scenario in which PTAs do not exist ($PTA_{ijt} = 0$ for all ijt). Countries are classified into three groups based on the number of PTA partnerships a country has in force in a year: (0) zero, (1) greater than zero but fewer than the median, and (2) greater than or equal to the median across countries of the year. Outliers are omitted.

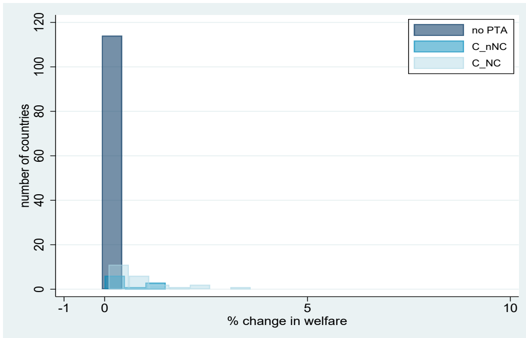
Figure A.4: Welfare effects of PTAs ("WTO+" and "WTO-X")



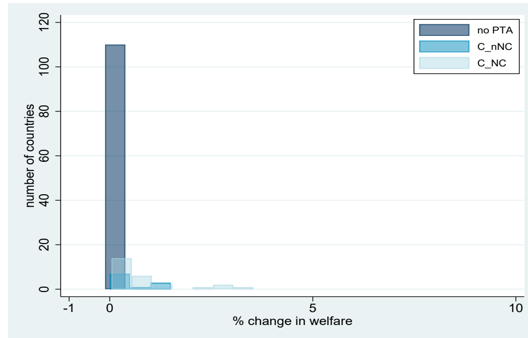
Note: The quantitative analysis is based on the PTA subcategory estimates in Column (2) of Table 2, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. This set of analyses evaluates the effects of PTAs by comparing the welfare given the observed PTA status and depths relative to the counterfactual scenario in which PTAs do not exist. Countries are classified into three groups: (0) no PTA or nP_X, (1) P_nX, and (2) P_X, respectively, in a given year, if the number of a country's trading partnerships that belong to the respective category dominates those of the other categories. Outliers are omitted.

Figure A.5: Welfare effects of PTAs ("Core" and "Non-Core")

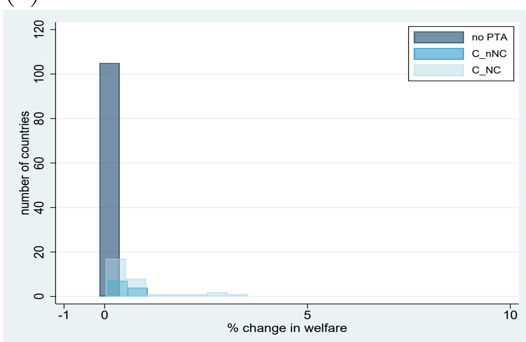
(a) 1980



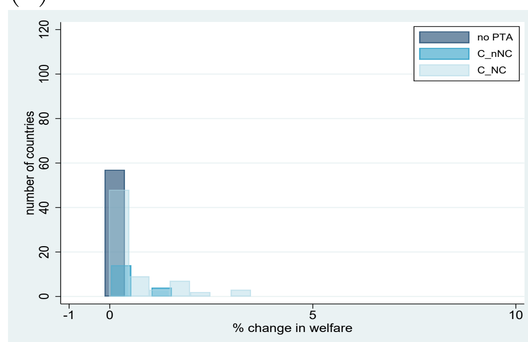
(b) 1985



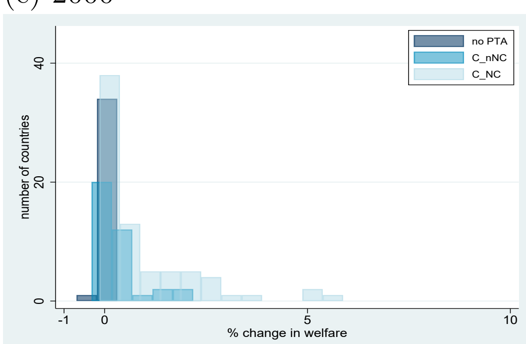
(c) 1990



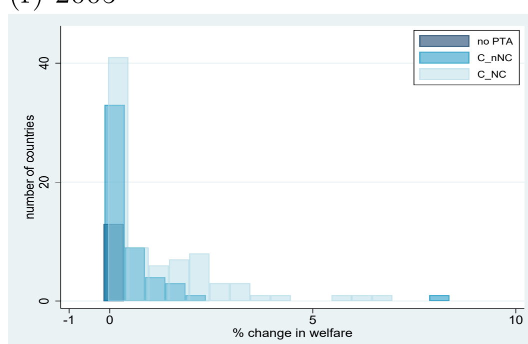
(d) 1995



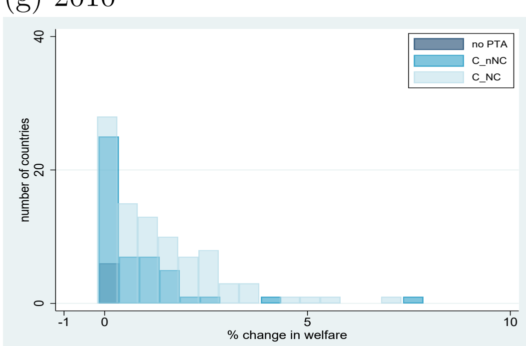
(e) 2000



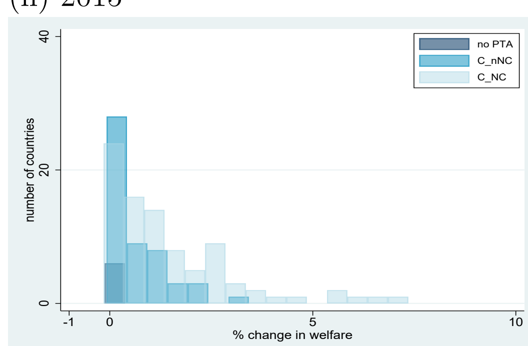
(f) 2005



(g) 2010



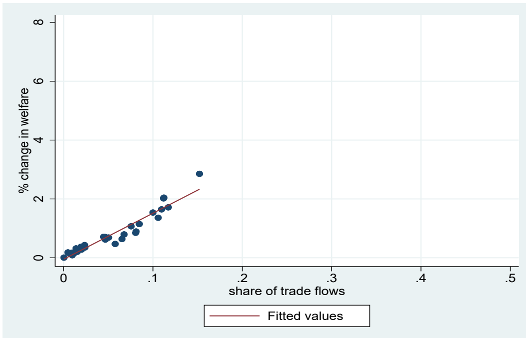
(h) 2015



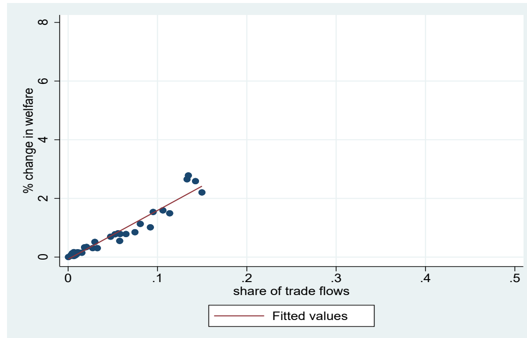
Note: The quantitative analysis is based on the PTA subcategory estimates in Column (3) of Table 2, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. This set of analyses evaluates the effects of PTAs by comparing the welfare given the observed PTA status and depths relative to the counterfactual scenario in which PTAs do not exist. Countries are classified into three groups: (0) no PTA, (1) C_nNC, and (2) C_NC, respectively, in a given year, if the number of a country's trading partnerships that belong to the respective category dominates those of the other categories. Outliers are omitted.

Figure A.6: Welfare effects of PTA in relation to the share of trade flows covered by PTA

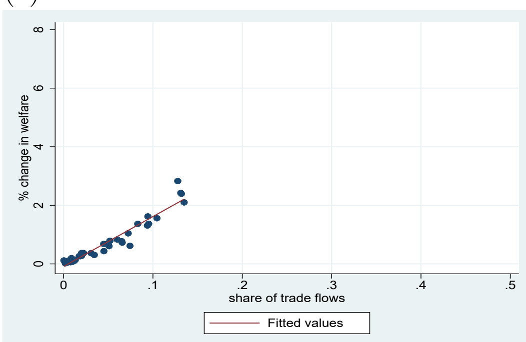
(a) 1980



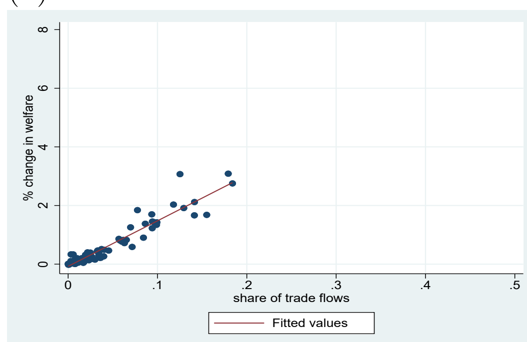
(b) 1985



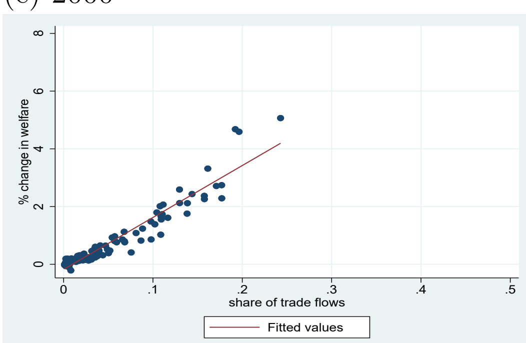
(c) 1990



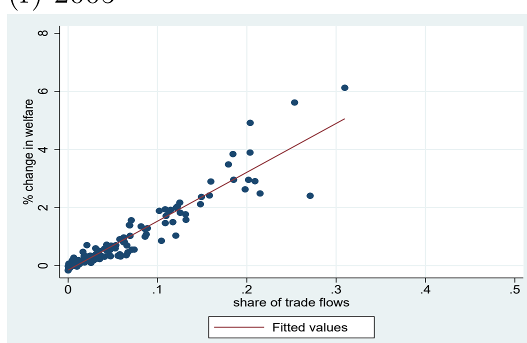
(d) 1995



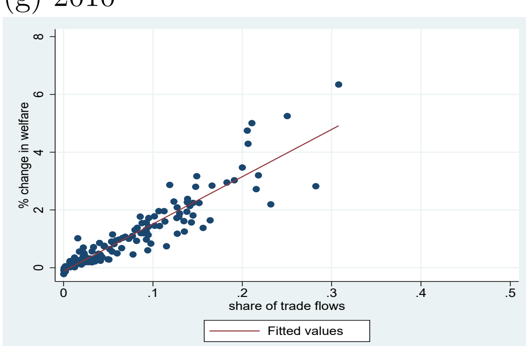
(e) 2000



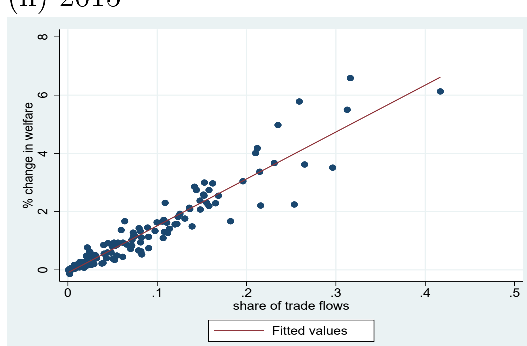
(f) 2005



(g) 2010



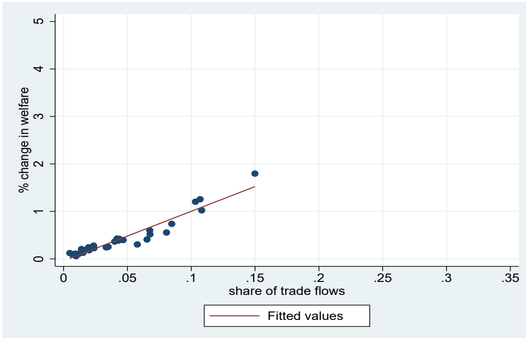
(h) 2015



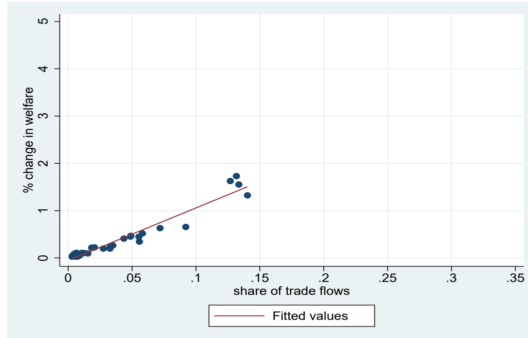
Note: The quantitative analysis is based on the PTA estimate in Column (1) of Table 2, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. This set of analyses examines the correlation between the welfare effects of PTAs and the share of trade flows covered by PTAs at the country level, where the welfare effects of PTAs are evaluated by comparing the welfare given the observed PTA status relative to the counterfactual scenario in which PTAs do not exist. The y-axis indicates the % change in welfare (real output), and the x-axis the share of trade flows covered by PTAs per country ($\sum_i PTA_{ijt} * X_{ijt}/X_{jt}$) for all j at given year t. Outliers are omitted.

Figure A.7: Welfare effects of deep PTA (P_X versus P_nX) in relation to the share of trade flows covered by P_X

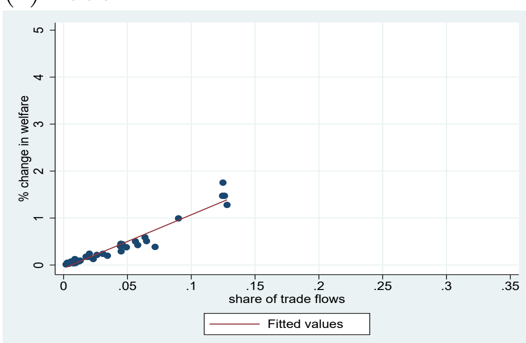
(a) 1980



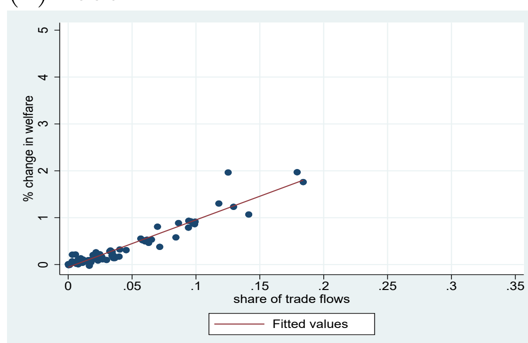
(b) 1985



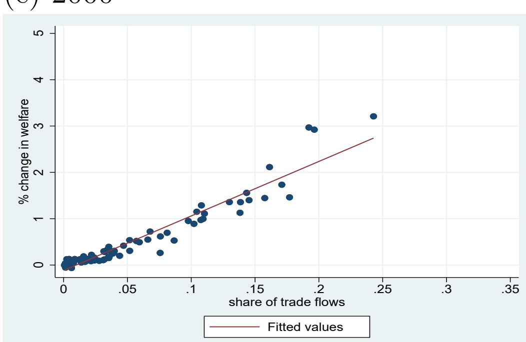
(c) 1990



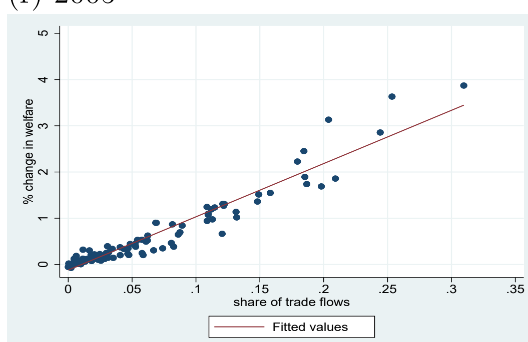
(d) 1995



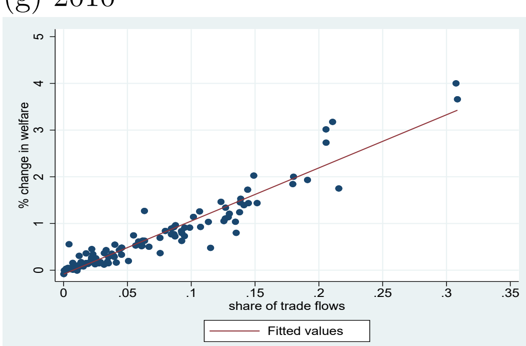
(e) 2000



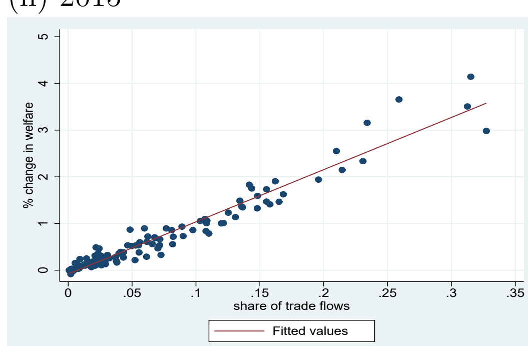
(f) 2005



(g) 2010

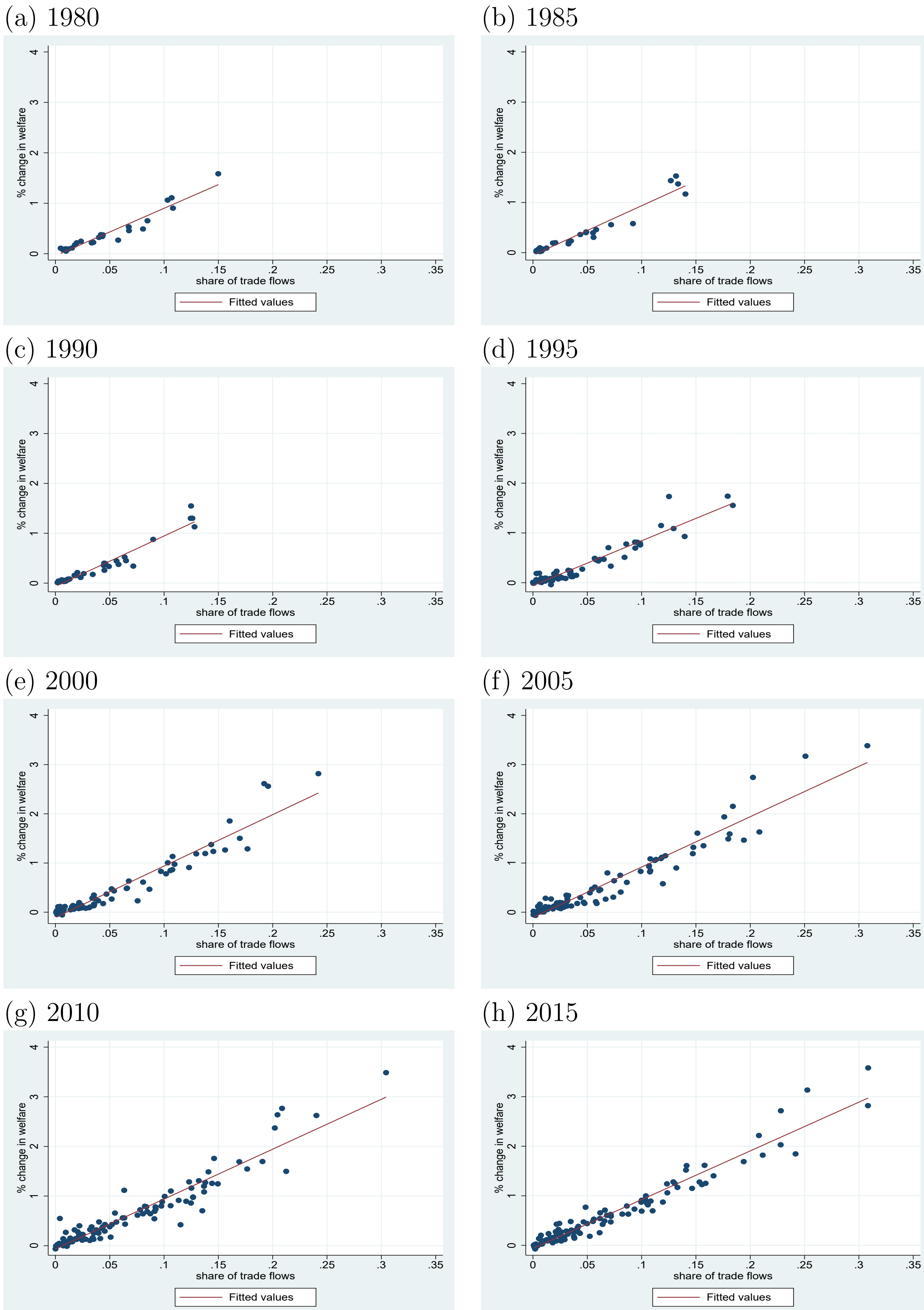


(h) 2015



Note: The quantitative analysis is based on the PTA subcategory estimates in Column (2) of Table 2, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. This set of analyses examines the correlation between the welfare effects of deep PTAs (P_X) and the share of trade flows covered by deep PTAs (P_X) at the country level, where the welfare effects of deep PTAs are evaluated by comparing the welfare given the observed PTA status and depths relative to the counterfactual scenario in which PTAs of type P_X are reduced to type P_nX. The y-axis indicates the % change in welfare (real output), and the x-axis the share of trade flows covered by PTAs of type P_X per country ($\sum_i P\_X_{ijt} * X_{ijt}/X_{jt}$) for all j at given year t. Outliers are omitted.

Figure A.8: Welfare effects of deep PTA (C_NC versus C_nNC) and the share of trade flows covered by C_NC



Note: The quantitative analysis is based on the PTA subcategory estimates in Column (3) of Table 2, using the Melitz framework described in Section 5.1 with parameter values $\sigma = 5$ and $\theta = 5$. This set of analyses examines the correlation between the welfare effects of deep PTAs (C_NC) and the share of trade flows covered by deep PTAs (C_NC) at the country level, where the welfare effects of deep PTAs are evaluated by comparing the welfare given the observed PTA status and depths relative to the counterfactual scenario in which PTAs of type C_NC are reduced to type C_nNC. The y-axis indicates the % change in welfare (real output), and the x-axis the share of trade flows covered by PTAs of type C_NC per country ($\sum_i C\_NC_{ijt} * X_{ijt}/X_{jt}$) for all j at given year t. Outliers are omitted.