The GATT/WTO Welfare Effects: 1950–2015
Online Appendix

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A Math Appendix (Additional Derivations and Proofs)

A.1 AvW Framework

In the AvW framework, goods are differentiated by the country of origin, and buyers in each country j choose imports q_{ij} from country i for all i to maximize

$$Q_j = \left(\sum_i b_i^{(1-\sigma)/\sigma} q_{ij}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)} \quad \text{st.} \quad \sum_i p_{ij} q_{ij} = E_j, \tag{A.1}$$

where b_i is a (dis)taste parameter for goods produced in i, $\sigma > 1$ is the elasticity of substitution across sources of imports, and $p_{ij} \equiv p_i \tau_{ij}(1 + \mathfrak{t}_{ij})$ is the destination price, equal to the exporter's supply price p_i scaled up by the variable trade cost factor τ_{ij} and tariffs. The solution to (A.1) implies a nominal value of exports (inclusive of tariffs) from i to j equal to $X_{ij} = \left(\frac{b_i p_i \tau_{ij}(1+\mathfrak{t}_{ij})}{P_j} \right)^{1-\sigma} E_j$, where $P_j^{1-\sigma} = \sum_i \left[b_i p_i \tau_{ij}(1 + \mathfrak{t}_{ij}) \right]^{1-\sigma}$. The goods market-clearing condition requires that:

$$\begin{aligned} Y_i &= \sum_j M_{ij} \\ &= (b_i p_i)^{1-\sigma} \sum_j (\tau_{ij}/P_j)^{1-\sigma} E_j (1 + \mathfrak{t}_{ij})^{-\sigma}, \end{aligned} \tag{A.2}$$

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where $M_{ij} \equiv X_{ij}/(1+\mathfrak{t}_{ij})$. Using (A.2) to solve for $(b_i p_i)^{1-\sigma}$ and substituting the result in the expression of M_{ij} and P_j, we have:

$$M_{ij} = \frac{Y_i E_j}{Y_w}\left(\frac{\tau_{ij}}{\Pi_i P_j}\right)^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma} \tag{A.3}$$

where

$$\Pi_i^{1-\sigma} \equiv \sum_j (\tau_{ij}/P_j)^{1-\sigma} e_j (1+\mathfrak{t}_{ij})^{-\sigma}, \tag{A.4}$$

$$P_j^{1-\sigma} = \sum_i (\tau_{ij}/\Pi_i)^{1-\sigma} s_i (1+\mathfrak{t}_{ij})^{1-\sigma}. \tag{A.5}$$

The aggregate budget constraint remains the same as (11). In the AvW setup, goods markets are perfectly competitive. We assume that goods are produced one-to-one from the input bundle. This implies that the supplier price in country i is as indicated in (12). Labor-market clearing requires that:

$$w_i L_i = \beta_i Y_i. \tag{A.6}$$

The counterfactual equations corresponding to (A.2) and (A.4)–(A.5) are:

$$\widehat{s}_i = \widehat{c}_i^{1-\sigma}\widehat{\Pi}_i^{1-\sigma}, \tag{A.7}$$

$$\widehat{\Pi}_i^{1-\sigma} = \sum_j \alpha_{ij}\left(\widehat{\tau}_{ij}/\widehat{P}_j\right)^{1-\sigma}\widehat{e}_j\,\widehat{(1+\mathfrak{t}_{ij})}^{-\sigma}, \tag{A.8}$$

$$\widehat{P}_j^{1-\sigma} = \sum_i \lambda_{ij}\left(\widehat{\tau}_{ij}/\widehat{\Pi}_i\right)^{1-\sigma}\widehat{s}_i\,\widehat{(1+\mathfrak{t}_{ij})}^{1-\sigma}, \tag{A.9}$$

while (20)–(22), (24), (26)–(28) introduced in the Melitz framework continue to hold in the AvW framework. Thus, with ten counterfactual equations, we can solve for $\left\{\widehat{c}_i, \widehat{\Pi}_i, \widehat{P}_i, \widehat{s}_i, \widehat{e}_i, \widehat{w}_i, \widehat{Y}_i, \widehat{E}_i, \widehat{T}_i, \widehat{Y}_w\right\}$ for $i = 1, 2, \ldots, N$, given exogenous shocks to $\left\{\widehat{\tau}_{ij}^{1-\sigma}\widehat{(1+\mathfrak{t}_{ij})}^{-\sigma}\right\}$ estimated by the matching procedure, and the information on $\left\{\mathfrak{t}'_{ij}\right\}$, observable variables $\{\alpha_{ij}, \lambda_{ij}, e_i, s_i, \delta_i, Y_i\}$ and parameter values $\{1-\sigma, \beta_i\}$. The welfare equation (29) still holds, while the trade effect is given by:

$$\widehat{M}_{ij} = \frac{\widehat{\tau}_{ij}^{1-\sigma}\,\widehat{(1+\mathfrak{t}_{ij})}^{-\sigma}}{\widehat{\Pi}_i^{1-\sigma}\widehat{P}_j^{1-\sigma}}\,\widehat{s}_i\,\widehat{E}_j. \tag{A.10}$$

Assume that the variable trade cost and tariffs, $\ln\left(\tau_{ijt}^{1-\sigma}(1+\mathfrak{t}_{ijt})^{-\sigma}\right)$, depends on the same set of trade-cost proxies we have identified. This allows us to write:

$$\ln\left(\tau_{ijt}^{1-\sigma}(1+\mathfrak{t}_{ijt})^{-\sigma}\right) = h(bothwto_{ijt}, imwto_{ijt}, \mathbf{Z}_{ijt}). \tag{A.11}$$

Given (A.3) and (A.11), it follows that we will obtain the same matching effect estimates of *bothwto*

and *imwto* in the AvW framework as in the Melitz framework, since the set of controls is the same.

A.2 Krugman Framework

In the Krugman (1980) model with homogeneous firms and CES preferences, the same set of conditions as in AvW continues to hold, except with the following modifications. First, the market-clearing condition in (A.2) is replaced by

$$\begin{aligned} Y_i &= \sum_j M_{ij} \\ &= N_i (p_i)^{1-\sigma} \sum_j (\tau_{ij}/P_j)^{1-\sigma} E_j (1+\mathfrak{t}_{ij})^{-\sigma}, \end{aligned} \tag{A.12}$$

where N_i denotes the number of firms in country i. Second, it is assumed that firms in i need to incur fixed production cost f_i (expressed in terms of input bundle units) in addition to a constant input requirement a_i for each unit of production. Monopolistic competition and CES preferences imply that the supplier price charged by each firm is a constant markup over the marginal cost: $p_i = \frac{\sigma}{\sigma-1} a_i c_i$. Third, free entry implies zero profit in equilibrium, and hence sales equal production costs. Thus, the labor-market clearing condition remains the same as in (A.6). With the use of intermediates, however, the number of firms is no longer constant in contrast with the original model. It is instead:

$$N_i = \frac{Y_i}{\sigma f_i c_i}, \tag{A.13}$$

by the zero profit condition. Since the same set of structural gravity equations (A.3)–(A.5) continues to hold, the estimation remains the same as for the AvW setup. The counterfactual analysis is modified to account for the change in N_i. Specifically, given the market-clearing condition (A.12) and constant markup pricing, we arrive at the same counterfactual condition as (17) in the Melitz framework. Finally, (A.13) implies the same counterfactual condition as (23) in the Melitz framework.

A.3 B&B Approximations in the AvW Framework

By the definition of the MR terms, we have:

$$\begin{aligned} \ln P_j^{1-\sigma} &= \ln \left[\sum_i \left({\tau_{ij}}^{1-\sigma} (1+\mathfrak{t}_{ij})^{1-\sigma} / \Pi_i^{1-\sigma} \right) s_i \right] \\ &= \ln \left[\sum_i (e^{\ln\left({\tau_{ij}}^{1-\sigma} (1+\mathfrak{t}_{ij})^{1-\sigma} \right) - \ln \Pi_i^{1-\sigma}}) s_i \right] \\ &\approx \sum_i \left[\ln \left({\tau_{ij}}^{1-\sigma} (1+\mathfrak{t}_{ij})^{1-\sigma} \right) - \ln \Pi_i^{1-\sigma} \right] s_i, \end{aligned} \tag{A.14}$$

where from the second to the third equation, we have taken the Taylor expansion with respect to $\ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{1-\sigma}\right)$ and $\ln \Pi_i^{1-\sigma}$ around the origin. Similarly, we have:

$$\ln \Pi_i^{1-\sigma} \approx \sum_j \left[\ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) - \ln P_j^{1-\sigma}\right] e_j. \tag{A.15}$$

Using (A.15), we have:

$$\begin{aligned}\sum_i s_i \ln \Pi_i^{1-\sigma} &\approx \sum_i s_i \sum_j \left[\ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) - \ln P_j^{1-\sigma}\right] e_j \\ &= \sum_i \sum_j \left[s_i e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) - s_i e_j \ln P_j^{1-\sigma}\right]. \end{aligned} \tag{A.16}$$

Plugging (A.16) into (A.14), we have:

$$\begin{aligned}\ln P_j^{1-\sigma} &\approx \sum_i s_i \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{1-\sigma}\right) - \sum_i s_i \ln \Pi_i^{1-\sigma} \\ &= \sum_i s_i \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{1-\sigma}\right) - \sum_i \sum_j s_i e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) + \sum_i \sum_j s_i e_j \ln P_j^{1-\sigma} \\ &= \sum_i s_i \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{1-\sigma}\right) - \sum_i \sum_j s_i e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) + \sum_j e_j \ln P_j^{1-\sigma},\end{aligned}$$

which together with (A.15) implies that:

$$\begin{aligned}\ln \Pi_i^{1-\sigma} + \ln P_j^{1-\sigma} &\approx \sum_i s_i \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{1-\sigma}\right) + \sum_j e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) \\ &\quad - \sum_i \sum_j s_i e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) \\ &= \sum_i s_i \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) + \sum_j e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) \\ &\quad - \sum_i \sum_j s_i e_j \ln\left({\tau_{ij}}^{1-\sigma}(1+\mathfrak{t}_{ij})^{-\sigma}\right) + \sum_i s_i \ln(1+\mathfrak{t}_{ij}),\end{aligned}$$

where the first three terms translate into a B&B-approximated multilateral term $\widetilde{z}$ for each of the trade-cost proxies $z \in \{bothwto, imwto, \mathbf{Z}\}$ under log-linear approximation for the trade barrier function $h(\cdot)$, where $\widetilde{z}_{ijt} \equiv \sum_k e_k z_{ikt} + \sum_m s_m z_{mjt} - \sum_m \sum_k s_m e_k z_{mkt}$. For example, in addition to 'distance', the 'B&B-distance' is also included as a control, where 'B&B-distance' corresponds to the weighted average distance of the exporter to the world and that of the importer to the world, net of the weighted average distance of all country pairs in the world. Similar B&B terms are constructed for all the other trade-cost proxies. Note the extra fourth term in the expression $\ln \Pi_i^{1-\sigma} + \ln P_j^{1-\sigma}$, present due to tariffs and not typical in the B&B approximations. For the study to apply to 1950–2015, during which the observations on tariffs $\mathfrak{t}_{ijt}$ are not always available, and adjustment for the extra tariff term is not feasible, we drop the term from the B&B approximations.

A.4 B&B Approximations in the Melitz Framework

Recall that $\chi_i \equiv \sum_j \left({\tau_{ij}}^{-\theta} {f_{ij}}^{-\frac{\theta}{\sigma-1}+1} (1+\mathfrak{t}_{ij})^{-\frac{\sigma\theta}{\sigma-1}} / \zeta_j \right) e_j$ and $\zeta_j = \sum_i \left({\tau_{ij}}^{-\theta} {f_{ij}}^{-\frac{\theta}{\sigma-1}+1} (1+\mathfrak{t}_{ij})^{1-\frac{\sigma\theta}{\sigma-1}} / \chi_i \right) s_i$. The proof is similar to that for the AvW framework, by replacing $\Pi_i^{1-\sigma}$ with χ_i, $P_j^{1-\sigma}$ with ζ_j, and $\left({\tau_{ij}}^{1-\sigma} (1+\mathfrak{t}_{ij})^{-\sigma} \right)$ with $\left({\tau_{ij}}^{-\theta} {f_{ij}}^{-\frac{\theta}{\sigma-1}+1} (1+\mathfrak{t}_{ij})^{-\frac{\sigma\theta}{\sigma-1}} \right)$.

B Empirical Appendix (Additional Tables and Figures)

B.1 Welfare in terms of Real Income and Real Expenditure

In the main text, we report the results based on real wage, because it is comparable across models and feasible to simulate regardless of whether the data on tariffs are available. In this appendix, we provide the parallel results in terms of real income (incorporating tariff revenues): $\widehat{W}_i = \frac{\widehat{w}_i}{\widehat{P}_i} \frac{Y_i}{Y_i+T_i} + \frac{\widehat{T}_i}{\widehat{P}_i} \frac{T_i}{Y_i+T_i}$, and in terms of real expenditure (incorporating trade deficits in addition): $\widehat{W}_i = \widehat{E}_i / \widehat{P}_i$, for the period 1988–2015 when data on tariffs are available.

The results are reported in Tables B.1–B.2 and Figures B.1–B.2. Compare Figure 1 with Figure B.1. We note that the distribution of real income effects for members tends to be a leftward shift relative to that of real wage effects for members. This is due to the negative tariff revenue effects as a result of tariff reductions induced by the GATT/WTO. Given that in this period, the tariff reductions were more significant in later years and for developing members, the leftward shift in welfare (in terms of real income relative to real wages) was correspondingly more pronounced in later years and for developing members. Note however that the results using either measure are necessarily identical based on the model without tariffs, because tariff revenues in income are not taken into account (and hence real income reduces to real wages) in this case. Similar observations can be made, comparing Table 6 and Table B.1.

There appear to have no systematic rankings between the real income and real expenditure effects, comparing Figure B.1 and Figure B.2, or Table B.1 and Table B.2. This likely reflects the fact that trade deficits reflect intertemporal borrowing and lending across countries and do not necessarily correlate with the extents of trade liberalization (reciprocal or unilateral) in general.

B.2 AvW and Krugman Counterfactuals

In this section, we report the counterfactual analysis based on the AvW framework of Section A.1, and alternatively, the Krugman framework of Section A.2, given the estimated effects of *bothwto* and *imwto* from Tables 3 and 4 (that are statistically significant at the 10% level). Figure B.3 and Figure B.4 illustrate the welfare effects of GATT/WTO for these two alternative frameworks, respectively. The patterns of the welfare effects for members and nonmembers across years are qualitatively similar to the Melitz framework, although the magnitudes of the gains (losses) are bigger in the Krugman model and smaller in the AvW model in comparison. For example, in 2015, the mode of the welfare gain for members is +11% for developed countries, but +3% for developing countries (in contrast with +8% and +2% in the AvW framework).

Recall that with the use of intermediates in fixed costs of production, the number of firms is not fixed in the Krugman framework and this adjustment in firm entry introduces an extra margin of gains from trade relative to the AvW framework. In addition, as discussed in Section 2.4, the adjustment in firm entry varies with the gains in real wage monotonically $\widehat{N}_i = \left(\widehat{w}_i/\widehat{P}_i\right)^{1-\beta_i}$. Thus, the larger the initial gain under the AvW framework, the stronger the amplification effect due to firm entry in the Krugman model. These observations are confirmed by the changes in firm entry in the Krugman model in Figure B.5: the distribution of the firm-entry effects in the Krugman model closely follows that of the welfare effects under the AvW framework shown in Figure B.3.

B.3 Robustness Checks and Extended Analysis

Tables B.3, B.4 and B.5 summarize the welfare effects of GATT/WTO across combinations of the parameter values for σ and θ, the matching effect estimates, and under the three alternative economic structures. In particular, they report the median, 75th percentile and 25th percentile of the welfare distributions, respectively. Tables B.6 and B.7 report the effect estimates of *bothwto* and *imwto* based on 100% caliper choice (instead of 40%). Tables B.8 and B.9 report the firm entry and welfare effects when the entry process in the Melitz model is allowed to use input bundles that have higher labor intensity than the input bundles used in the production process. In addition to those reported in Table 7, these two tables provide additional results when the effect estimates of *bothwto* and *imwto* based on 100% caliper choice are used. The findings of these tables are discussed in Section 4.3 in the main text.

Figure B.6 illustrates for years 2005 and 2015 the welfare impact of China's WTO entry across countries in a world map. In addition, Figure B.7 plots the distribution of the welfare impact for developed/developing members and nonmembers across years. Their patterns are discussed in Section 5.3 in the main text.

B.4 Pseudo World: Alternative Setups

As explained in Section B.7 of the main text, to set up the pseudo world for quantitative analysis, we drop countries that do not have GDP data. We also drop countries that do not import from or export to any other countries. Given the set of remaining countries, we construct trade deficits and expenditures as discussed in Section B.3, and drop countries if the constructed expenditure is negative. We also drop countries if the implied internal trade is negative: $X_{ii} = M_{ii} \equiv Y_i - \sum_{j \neq i} M_{ij} < 0$. We iterate the process of constructing trade deficits and expenditures after each round of adjustment in the set of countries until the constructed expenditure and internal trade of all countries are positive. We call this set of countries the pseudo world and calculate the supply and expenditure shares of each country relative to the pseudo world.

Given that the tariff data are available only since 1988, and even then, substantial numbers of missing entries need to be filled in using the procedures proposed in Section B.6 of the main text, thus in setting up the pseudo world, we have chosen to ignore tariff revenues in income and

expenditure (such that $Y_{it} = GDP_{it}/\beta_i$ and $E_{it} = Y_{it}+D_{it}$). The resulting pseudo world is described in Tables 1–2.

In this appendix, we consider two alternative setups for the pseudo world: (i) $Y_{it} = GDP_{it}/\beta_i$ and $E_{it} = Y_{it} + D_{it} + T_{it}$; and (ii) $Y_{it} = (GDP_{it} - T_{it})/\beta_i$ and $E_{it} = Y_{it} + D_{it} + T_{it}$, where T_{it} is set to zero for $t = 1950, \ldots, 1987$ (when tariff data are not available). Given this, it is clear that the set of countries in the pseudo world will be the same as in the benchmark for the period 1950–1987. For the period 1988–2015 when tariff data are available, the use of alternative setup (i) turns out to lead to the same pseudo world as in the benchmark. When based on alternative setup (ii), the pseudo world remains largely the same as in the benchmark (differing by one country in some years and typically a small developing nonmember). Tables B.10–B.11 provide the characterization of the alternative pseudo world.

In Table B.12, we report the matching estimation results based on the two alternative setups. The matching is redone for the last two rounds which span the sub-period when tariff data are available. In alternative setup (i), although the pseudo world is the same as in the benchmark, the measure E_{it} differs, which in turn affects the expenditure share e_{it} used in constructing the B&B approximation for the MR terms. Thus, these two observable characteristics used among others for matching are modified. The results in Table B.12 indicate that the matching estimates are nearly identical to the benchmark (differing in the second decimal points if any). In alternative setup (ii), the pseudo world and the measures (Y_{it}, s_{it}, E_{it}, e_{it}, and B&B MR terms) used as part of observable characteristics for matching have differed from the benchmark. Nonetheless, Table B.12 indicates that the matching estimates remain very similar to the benchmark case. We also repeat the quantitative analysis based on the estimates in Table B.12. The welfare effects (measured by real wage, real income, or real expenditure) across the benchmark and the two alternative setups are very similar to each other. In sum, the approximation (used in the benchmark) by ignoring tariff revenues in setting up the pseudo world and in matching estimations is without loss of empirical generality.

Table B.1: Welfare effects of GATT/WTO (in terms of real income)—tariff effects versus full effects

Scenarios	Member indicator	Year 1988			Year 1994			Year 2000			Year 2015		
		AvW	Krugman	Melitz	AvW	Krugman	Melitz	AvW	Krugman	Melitz	AvW	Krugman	Melitz
Tariff													
1. 25th Percentile	0	1.01	1.47	1.49	0.64	0.98	0.96	0.70	1.06	0.81	0.34	0.74	0.48
	1	0.58	0.99	0.98	0.65	1.06	1.05	0.72	1.33	1.31	0.56	1.03	0.97
2. Median	0	1.86	2.66	2.74	1.47	2.14	2.07	1.43	2.10	2.33	1.12	1.67	1.67
	1	1.51	2.38	2.45	1.87	3.04	3.10	1.83	3.17	3.34	1.50	2.42	2.33
3. 75th Percentile	0	3.50	4.87	4.80	2.41	3.52	3.49	2.38	3.44	3.38	2.60	3.83	3.79
	1	3.24	5.57	5.40	4.95	7.21	7.50	5.10	7.99	8.04	3.30	5.13	4.91
Full Model													
1. 25th Percentile	0	-0.83	-1.06	-0.82	-0.11	-0.12	-0.10	-3.26	-4.22	-2.87	-4.39	-6.11	-4.62
	1	2.17	3.41	2.73	2.43	3.69	2.93	-2.42	-2.15	-2.46	-3.61	-3.41	-3.70
2. Median	0	-0.28	-0.34	-0.25	0.17	0.31	0.27	-1.26	-1.72	-0.85	-2.41	-2.81	-2.05
	1	4.14	6.36	5.11	4.61	7.16	5.62	2.06	3.98	3.09	2.23	3.71	2.99
3. 75th Percentile	0	0.07	0.17	0.28	0.55	0.91	0.76	0.65	0.95	1.11	-1.26	-1.90	-1.32
	1	6.16	9.99	8.19	7.93	12.10	10.00	7.44	11.66	10.13	7.01	11.03	8.79
Model w/o Tariff													
1. 25th Percentile	0	-0.62	-0.83	-0.65	-0.09	-0.11	-0.09	-2.53	-3.37	-2.29	-3.66	-5.21	-4.09
	1	2.18	3.41	2.72	2.84	4.40	3.50	1.51	2.35	1.96	1.77	2.84	2.39
2. Median	0	-0.21	-0.28	-0.18	0.10	0.24	0.21	-1.01	-1.45	-0.63	-2.07	-2.75	-1.76
	1	3.71	5.82	4.64	4.72	7.05	5.86	3.87	6.06	5.69	3.69	5.58	4.66
3. 75th Percentile	0	0.02	0.10	0.16	0.38	0.64	0.58	0.45	0.75	0.96	-1.28	-1.77	-1.10
	1	5.78	8.84	7.02	6.61	10.38	8.24	7.93	12.59	10.49	7.29	11.36	9.39

Note: Based on the AvW, Krugman and Melitz frameworks, respectively, with parameters $\sigma = 5$, $\theta = 5$, and β_i from Caliendo and Parro (2015). The parameter value for θ is relevant only for the Melitz model. This set of analyses evaluates the effect of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Welfare is measured in terms of real income. See Section 2.4 for the three counterfactual setups: tariff (effects due to tariffs only), full model (effects taking into account tariffs and variable/fixed trade costs), and model without tariffs (effects ignoring tariff revenues).

Table B.2: Welfare effects of GATT/WTO (in terms of real expenditure)—tariff effects versus full effects

Scenarios	Member indicator	Year 1988			Year 1994			Year 2000			Year 2015		
		AvW	Krugman	Melitz	AvW	Krugman	Melitz	AvW	Krugman	Melitz	AvW	Krugman	Melitz
Tariff													
1. 25th Percentile	0	0.60	1.02	0.99	0.47	0.78	0.76	0.02	0.44	0.36	0.20	0.43	0.60
	1	0.71	1.06	1.10	0.91	1.42	1.42	1.00	1.69	1.57	0.78	1.22	1.12
2. Median	0	1.79	2.54	2.59	1.12	1.70	1.75	1.27	2.19	2.05	1.17	1.90	1.85
	1	1.72	2.63	2.69	2.06	3.33	3.28	2.31	3.47	3.50	1.78	2.72	2.64
3. 75th Percentile	0	3.69	5.20	5.25	2.51	3.66	3.72	3.64	4.44	4.77	3.03	3.64	2.95
	1	3.54	5.52	5.68	5.24	7.78	8.18	6.00	8.96	8.65	4.06	5.70	5.74
Full Model													
1. 25th Percentile	0	-0.96	-1.16	-0.94	-0.21	-0.11	-0.10	-6.73	-8.01	-5.81	-8.97	-9.63	-7.35
	1	2.21	3.49	2.75	2.90	4.45	3.40	-3.42	-3.35	-3.24	-4.48	-4.66	-4.70
2. Median	0	-0.34	-0.34	-0.25	0.22	0.40	0.36	-2.61	-3.99	-2.60	-4.76	-5.01	-3.39
	1	4.85	7.06	5.65	5.11	7.74	6.17	2.48	4.98	3.37	2.69	3.89	2.96
3. 75th Percentile	0	0.13	0.41	0.42	0.58	1.10	0.94	2.12	2.25	2.49	0.21	-0.79	-0.47
	1	7.24	10.42	8.59	8.48	12.65	10.37	12.04	15.57	12.67	8.79	13.11	10.28
Model w/o Tariff													
1. 25th Percentile	0	-0.81	-0.94	-0.73	-0.19	-0.14	-0.13	-5.95	-6.63	-4.86	-8.88	-9.28	-6.98
	1	2.40	3.65	2.92	3.43	5.18	4.15	0.54	1.54	1.33	0.23	1.47	1.40
2. Median	0	-0.30	-0.27	-0.20	0.14	0.27	0.22	-2.46	-3.50	-2.45	-4.41	-4.76	-3.22
	1	3.88	5.88	4.73	5.55	8.20	6.55	5.89	8.36	6.69	4.22	5.84	4.77
3. 75th Percentile	0	0.07	0.25	0.24	0.48	0.88	0.71	2.02	2.41	2.33	0.61	-0.31	-0.03
	1	6.31	9.61	7.63	8.15	12.30	9.73	13.73	18.42	14.77	9.72	14.07	11.28

Note: Based on the AvW, Krugman and Melitz frameworks, respectively, with parameters $\sigma = 5$, $\theta = 5$, and β_i from Caliendo and Parro (2015). The parameter value for θ is relevant only for the Melitz model. This set of analyses evaluates the effect of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Welfare is measured in terms of real expenditure. See Section 2.4 for the three counterfactual setups: tariff (effects due to tariffs only), full model (effects taking into account tariffs and variable/fixed trade costs), and model without tariffs (effects ignoring tariff revenues).

Table B.3: Welfare effects of GATT/WTO—median effect in terms of real wages

Parameters	Member indicator	Year 1950			Year 2015		
		AvW	Krugman	Melitz	AvW	Krugman	Melitz
1. 40% caliper, σ=5, θ=4.5	0	1.20	1.87	1.69	-2.07	-2.75	-2.17
	1	2.86	4.50	4.07	3.69	5.58	5.01
2. 40% caliper, σ=5, θ=5 (benchmark)	**0**	**1.20**	**1.87**	**1.54**	**-2.07**	**-2.75**	**-1.76**
	1	**2.86**	**4.50**	**3.71**	**3.69**	**5.58**	**4.66**
3. 40% caliper, σ=5, θ=5.5	0	1.20	1.87	1.42	-2.07	-2.75	-1.44
	1	2.86	4.50	3.41	3.69	5.58	4.24
4. 40% caliper, σ=5, θ=6	0	1.20	1.87	1.31	-2.07	-2.75	-1.25
	1	2.86	4.50	3.15	3.69	5.58	3.88
5. 40% caliper, σ=5, θ=8	0	1.20	1.87	1.03	-2.07	-2.75	-0.79
	1	2.86	4.50	2.40	3.69	5.58	2.90
6. 40% caliper, σ=5, θ=10	0	1.20	1.87	0.83	-2.07	-2.75	-0.60
	1	2.86	4.50	1.94	3.69	5.58	2.31
7. 40% caliper, σ=10, θ=10	0	0.55	0.65	0.59	-0.41	-0.47	-0.42
	1	1.26	1.50	1.36	1.65	1.96	1.76
8. 100% caliper, σ=5, θ=4.5	0	1.23	1.91	1.73	-3.54	-5.22	-4.48
	1	2.96	4.64	4.15	3.88	6.06	5.40
9. 100% caliper, σ=5, θ=5	0	1.23	1.91	1.58	-3.54	-5.22	-3.92
	1	2.96	4.64	3.78	3.88	6.06	4.87
10. 100% caliper, σ=5, θ=5.5	0	1.23	1.91	1.45	-3.54	-5.22	-3.49
	1	2.96	4.64	3.47	3.88	6.06	4.43
11. 100% caliper, σ=5, θ=6	0	1.23	1.91	1.34	-3.54	-5.22	-3.14
	1	2.96	4.64	3.20	3.88	6.06	4.07
12. 100% caliper, σ=5, θ=8	0	1.23	1.91	1.03	-3.54	-5.22	-2.19
	1	2.96	4.64	2.45	3.88	6.06	3.11
13. 100% caliper, σ=5, θ=10	0	1.23	1.91	0.83	-3.54	-5.22	-1.65
	1	2.96	4.64	1.97	3.88	6.06	2.48
14. 100% caliper, σ=10, θ=10	0	0.56	0.66	0.60	-0.97	-1.14	-0.96
	1	1.29	1.53	1.39	1.78	2.12	1.90

Note: The parameter value for θ is relevant only for the Melitz model. This set of analyses evaluates the effect of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Welfare is measured in terms of real wages, simulated based on the model without tariffs.

Table B.4: Welfare effects of GATT/WTO—75th percentile effect in terms of real wages

Parameters	Member indicator	Year 1950			Year 2015		
		AvW	Krugman	Melitz	AvW	Krugman	Melitz
1. 40% caliper, σ=5, θ=4.5	0	1.75	2.74	2.45	-1.28	-1.77	-1.37
	1	4.40	6.66	5.99	7.29	11.36	10.35
2. 40% caliper, σ=5, θ=5 (benchmark)	**0**	**1.75**	**2.74**	**2.22**	**-1.28**	**-1.77**	**-1.10**
	1	**4.40**	**6.66**	**5.46**	**7.29**	**11.36**	**9.39**
3. 40% caliper, σ=5, θ=5.5	0	1.75	2.74	2.03	-1.28	-1.77	-0.90
	1	4.40	6.66	4.96	7.29	11.36	8.68
4. 40% caliper, σ=5, θ=6	0	1.75	2.74	1.87	-1.28	-1.77	-0.76
	1	4.40	6.66	4.53	7.29	11.36	8.06
5. 40% caliper, σ=5, θ=8	0	1.75	2.74	1.44	-1.28	-1.77	-0.43
	1	4.40	6.66	3.38	7.29	11.36	6.07
6. 40% caliper, σ=5, θ=10	0	1.75	2.74	1.16	-1.28	-1.77	-0.29
	1	4.40	6.66	2.69	7.29	11.36	4.89
7. 40% caliper, σ=10, θ=10	0	0.82	0.97	0.88	0.09	0.10	0.10
	1	1.85	2.20	1.98	3.19	3.80	3.45
8. 100% caliper, σ=5, θ=4.5	0	1.93	3.01	2.70	-0.78	-1.13	-0.94
	1	4.56	6.91	6.15	7.27	11.44	10.79
9. 100% caliper, σ=5, θ=5	0	1.93	3.01	2.45	-0.78	-1.13	-0.80
	1	4.56	6.91	5.60	7.27	11.44	9.75
10. 100% caliper, σ=5, θ=5.5	0	1.93	3.01	2.24	-0.78	-1.13	-0.70
	1	4.56	6.91	5.12	7.27	11.44	8.84
11. 100% caliper, σ=5, θ=6	0	1.93	3.01	2.06	-0.78	-1.13	-0.62
	1	4.56	6.91	4.68	7.27	11.44	8.12
12. 100% caliper, σ=5, θ=8	0	1.93	3.01	1.56	-0.78	-1.13	-0.42
	1	4.56	6.91	3.49	7.27	11.44	6.07
13. 100% caliper, σ=5, θ=10	0	1.93	3.01	1.26	-0.78	-1.13	-0.32
	1	4.56	6.91	2.78	7.27	11.44	4.84
14. 100% caliper, σ=10, θ=10	0	0.90	1.07	0.97	-0.15	-0.18	-0.16
	1	1.90	2.26	2.04	3.23	3.84	3.47

Note: The parameter value for θ is relevant only for the Melitz model. This set of analyses evaluates the effect of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Welfare is measured in terms of real wages, simulated based on the model without tariffs.

Table B.5: Welfare effects of GATT/WTO—25th percentile effect in terms of real wages

Parameters	Member indicator	Year 1950 AvW	Year 1950 Krugman	Year 1950 Melitz	Year 2015 AvW	Year 2015 Krugman	Year 2015 Melitz
1. 40% caliper, σ=5, θ=4.5	0	0.59	0.99	0.88	-3.66	-5.21	-4.60
	1	1.73	2.54	2.25	1.77	2.84	2.56
2. 40% caliper, σ=5, θ=5 (benchmark)	**0**	**0.59**	**0.99**	**0.80**	**-3.66**	**-5.21**	**-4.09**
	1	**1.73**	**2.54**	**2.02**	**1.77**	**2.84**	**2.39**
3. 40% caliper, σ=5, θ=5.5	0	0.59	0.99	0.73	-3.66	-5.21	-3.62
	1	1.73	2.54	1.83	1.77	2.84	2.18
4. 40% caliper, σ=5, θ=6	0	0.59	0.99	0.67	-3.66	-5.21	-3.24
	1	1.73	2.54	1.68	1.77	2.84	2.00
5. 40% caliper, σ=5, θ=8	0	0.59	0.99	0.51	-3.66	-5.21	-2.28
	1	1.73	2.54	1.26	1.77	2.84	1.53
6. 40% caliper, σ=5, θ=10	0	0.59	0.99	0.41	-3.66	-5.21	-1.76
	1	1.73	2.54	1.02	1.77	2.84	1.24
7. 40% caliper, σ=10, θ=10	0	0.28	0.34	0.31	-0.86	-1.01	-0.89
	1	0.70	0.83	0.74	0.90	1.08	0.97
8. 100% caliper, σ=5, θ=4.5	0	0.77	1.29	1.15	-5.83	-8.27	-7.10
	1	1.98	2.92	2.62	2.24	3.42	3.11
9. 100% caliper, σ=5, θ=5	0	0.77	1.29	1.04	-5.83	-8.27	-6.21
	1	1.98	2.92	2.36	2.24	3.42	2.85
10. 100% caliper, σ=5, θ=5.5	0	0.77	1.29	0.95	-5.83	-8.27	-5.53
	1	1.98	2.92	2.16	2.24	3.42	2.61
11. 100% caliper, σ=5, θ=6	0	0.77	1.29	0.87	-5.83	-8.27	-4.97
	1	1.98	2.92	1.98	2.24	3.42	2.40
12. 100% caliper, σ=5, θ=8	0	0.77	1.29	0.66	-5.83	-8.27	-3.55
	1	1.98	2.92	1.50	2.24	3.42	1.82
13. 100% caliper, σ=5, θ=10	0	0.77	1.29	0.53	-5.83	-8.27	-2.81
	1	1.98	2.92	1.20	2.24	3.42	1.46
14. 100% caliper, σ=10, θ=10	0	0.36	0.44	0.40	-1.63	-1.92	-1.69
	1	0.87	1.02	0.92	0.99	1.18	1.06

Note: The parameter value for θ is relevant only for the Melitz model. This set of analyses evaluates the effect of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Welfare is measured in terms of real wages, simulated based on the model without tariffs.

Table B.6: Development- and round-specific matching estimates of *bothwto* (100% Caliper)

		HH				LH				HL				LL			
		bothwto				**bothwto**				**bothwto**				**bothwto**			
GATT/WTO round	caliper	estimates		95% CI		estimates		95% CI		estimates		95% CI		estimates		95% CI	
Annecy to Torquay	100%	3.54	***	3.34	3.77	2.25	***	1.97	2.48	2.56	***	2.28	2.84	0.33	*	-0.14	0.81
(1950–1951)	M_1	307				253				260				110			
Torquay to Geneva	100%	3.07	***	2.94	3.19	1.48	***	1.28	1.68	2.02	***	1.85	2.20	0.68	***	0.44	0.89
(1952–1956)	M_1	943				834				834				363			
Geneva to Dillon	100%	3.57	***	3.46	3.67	1.80	***	1.62	1.97	2.74	***	2.58	2.90	0.68	***	0.41	0.95
(1957–1961)	M_1	1,103				880				879				329			
Dillon to Kennedy	100%	4.22	***	4.12	4.33	1.59	***	1.50	1.68	2.37	***	2.27	2.46	0.11	**	-0.01	0.23
(1962–1967)	M_1	2,204				2,765				3,054				1,349			
Kennedy to Tokyo	100%	3.15	***	3.05	3.25	1.94	***	1.89	2.00	2.40	***	2.32	2.47	0.49	***	0.42	0.56
(1968–1979)	M_1	5,889				10,513				10,871				9,692			
Tokyo to Uruguay	100%	7.07	***	6.98	7.17	2.16	***	2.10	2.21	2.89	***	2.84	2.95	0.74	***	0.69	0.79
(1980–1994)	M_1	9,988				20,378				21,038				26,789			
after Uruguay	100%	7.74	***	7.67	7.81	3.72	***	3.67	3.77	4.34	***	4.29	4.38	0.17	***	0.14	0.21
(1995–2005)	M_1	13,663				30,299				30,857				52,405			
average	100%	6.22	***	6.17	6.27	2.81	***	2.77	2.84	3.44	***	3.41	3.47	0.38	***	0.35	0.40
(1950–2005)	M_1	34,097				65,922				67,793				91,037			

Note: Based on the matching estimator of Chang and Lee (2011). Significance of the estimates and their confidence intervals are calculated based on permutation tests. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. M_1 indicates the number of treated observations. HH: developed exporting and developed importing country pairs; LH: developing exporting and developed importing country pairs; HL: developed exporting and developing importing country pairs; LL: developing exporting and developing importing country pairs.

Table B.7: Development- and round-specific matching estimates of *imwto* (100% Caliper)

		HH				LH				HL				LL			
GATT/WTO round	caliper	**imwto** estimates		95% CI		**imwto** estimates		95% CI		**imwto** estimates		95% CI		**imwto** estimates		95% CI	
Annecy to Torquay	100%	1.42	***	1.11	1.72	1.87	***	1.57	2.16	0.17		-0.23	0.57	0.10		-0.23	0.46
(1950–1951)	M_1	133				293				64				128			
Torquay to Geneva	100%	1.35	***	1.13	1.55	1.37	***	1.21	1.54	0.17	*	-0.03	0.38	0.08		-0.12	0.30
(1952–1956)	M_1	378				1,130				251				456			
Geneva to Dillon	100%	1.51	***	1.32	1.68	1.31	***	1.19	1.44	0.23	**	-0.01	0.46	0.07		-0.12	0.25
(1957–1961)	M_1	436				1,916				225				581			
Dillon to Kennedy	100%	2.02	***	1.81	2.24	1.74	***	1.65	1.82	-0.06		-0.28	0.16	0.12	**	0.02	0.22
(1962–1967)	M_1	479				3,227				318				1,590			
Kennedy to Tokyo	100%	1.71	***	1.47	1.97	1.64	***	1.58	1.71	0.33	***	0.07	0.57	0.14	***	0.06	0.22
(1968–1979)	M_1	1,225				8,049				919				6,454			
Tokyo to Uruguay	100%	2.55	***	2.37	2.72	1.35	***	1.28	1.42	0.14	**	-0.03	0.30	0.15	***	0.09	0.22
(1980–1994)	M_1	2,681				14,312				2,574				13,561			
after Uruguay	100%	3.25	***	3.05	3.45	3.94	***	3.86	4.01	0.48	***	0.29	0.66	-0.15	***	-0.21	-0.09
(1995–2005)	M_1	1,407				11,885				1,814				15,822			
average	100%	2.35	***	2.26	2.45	2.19	***	2.16	2.23	0.26	***	0.17	0.36	0.02		-0.01	0.06
(1950–2005)	M_1	6,739				40,812				6,165				38,592			

Note: Based on the matching estimator of Chang and Lee (2011). Significance of the estimates and their confidence intervals are calculated based on permutation tests. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. M_1 indicates the number of treated observations. HH: developed exporting and developed importing country pairs; LH: developing exporting and developed importing country pairs; HL: developed exporting and developing importing country pairs; LL: developing exporting and developing importing country pairs.

Table B.8: Firm entry effects of GATT/WTO (Melitz vs BKL; median effect)

Parameters	Member indicator	Year 1950 Melitz	BKL $\kappa = 0.6$	BKL $\kappa = 0.8$	BKL $\kappa = 1$	Year 2015 Melitz	BKL $\kappa = 0.6$	BKL $\kappa = 0.8$	BKL $\kappa = 1$
1. 40% caliper, σ=5, θ=4.5	0	0.99	0.67	0.34	0	-1.28	-0.87	-0.44	0
	1	2.38	1.61	0.80	0	2.90	1.97	0.98	0
2. 40% caliper, σ=5, θ=5 (benchmark)	**0**	**0.90**	**0.61**	**0.31**	**0**	**-1.04**	**-0.71**	**-0.35**	**0**
	1	**2.17**	**1.47**	**0.73**	**0**	**2.64**	**1.84**	**0.91**	**0**
3. 40% caliper, σ=5, θ=5.5	0	0.83	0.56	0.28	0	-0.85	-0.58	-0.29	0
	1	2.00	1.35	0.67	0	2.41	1.67	0.83	0
4. 40% caliper, σ=5, θ=6	0	0.77	0.52	0.26	0	-0.74	-0.50	-0.25	0
	1	1.84	1.25	0.62	0	2.22	1.53	0.76	0
5. 40% caliper, σ=5, θ=8	0	0.60	0.41	0.20	0	-0.46	-0.32	-0.16	0
	1	1.40	0.95	0.48	0	1.68	1.15	0.57	0
6. 40% caliper, σ=5, θ=10	0	0.49	0.33	0.17	0	-0.35	-0.24	-0.12	0
	1	1.12	0.77	0.39	0	1.35	0.92	0.46	0
7. 40% caliper, σ=10, θ=10	0	0.35	0.24	0.12	0	-0.25	-0.17	-0.08	0
	1	0.80	0.54	0.27	0	1.02	0.70	0.35	0
8. 100% caliper, σ=5, θ=4.5	0	1.01	0.69	0.34	0	-2.66	-1.82	-0.91	0
	1	2.43	1.64	0.82	0	3.12	2.13	1.06	0
9. 100% caliper, σ=5, θ=5	0	0.92	0.63	0.31	0	-2.32	-1.59	-0.80	0
	1	2.21	1.50	0.75	0	2.82	1.92	0.96	0
10. 100% caliper, σ=5, θ=5.5	0	0.85	0.58	0.29	0	-2.06	-1.41	-0.71	0
	1	2.03	1.37	0.68	0	2.58	1.75	0.87	0
11. 100% caliper, σ=5, θ=6	0	0.78	0.53	0.27	0	-1.86	-1.27	-0.64	0
	1	1.88	1.27	0.63	0	2.37	1.61	0.80	0
12. 100% caliper, σ=5, θ=8	0	0.60	0.41	0.20	0	-1.29	-0.88	-0.44	0
	1	1.42	0.97	0.48	0	1.79	1.23	0.61	0
13. 100% caliper, σ=5, θ=10	0	0.49	0.33	0.17	0	-0.97	-0.66	-0.33	0
	1	1.13	0.79	0.39	0	1.44	0.99	0.49	0
14. 100% caliper, σ=10, θ=10	0	0.35	0.24	0.12	0	-0.57	-0.39	-0.19	0
	1	0.82	0.55	0.28	0	1.10	0.76	0.38	0

Note: Based on the Melitz or BKL framework. This set of analyses evaluates the effects of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Effects are simulated based on the model without tariffs.

Table B.9: Welfare effects of GATT/WTO (Melitz vs BKL; median effect)

Parameters	Member indicator	Year 1950 Melitz	Year 1950 BKL $\kappa = 0.8$	Year 1950 BKL $\kappa = 1$	Year 2015 Melitz	Year 2015 BKL $\kappa = 0.8$	Year 2015 BKL $\kappa = 1$
1. 40% caliper, σ=5, θ=4.5	0	1.6903	1.6903	1.6903	-2.1656	-2.1656	-2.1656
	1	4.0703	4.0703	4.0703	5.0067	5.0067	5.0067
2. 40% caliper, σ=5, θ=5 (benchmark)	**0**	**1.5416**	**1.5416**	**1.5416**	**-1.7612**	**-1.7612**	**-1.7612**
	1	**3.7111**	**3.7111**	**3.7111**	**4.6578**	**4.6578**	**4.6578**
3. 40% caliper, σ=5, θ=5.5	0	1.4159	1.4159	1.4159	-1.4431	-1.4431	-1.4431
	1	3.4067	3.4067	3.4067	4.2362	4.2362	4.2362
4. 40% caliper, σ=5, θ=6	0	1.3096	1.3096	1.3096	-1.2518	-1.2518	-1.2518
	1	3.1464	3.1464	3.1464	3.8772	3.8772	3.8772
5. 40% caliper, σ=5, θ=8	0	1.0252	1.0252	1.0252	-0.7892	-0.7892	-0.7892
	1	2.4037	2.4037	2.4037	2.8956	2.8956	2.8956
6. 40% caliper, σ=5, θ=10	0	0.8299	0.8299	0.8299	-0.6021	-0.6021	-0.6021
	1	1.9414	1.9414	1.9414	2.3149	2.3149	2.3149
7. 40% caliper, σ=10, θ=10	0	0.5905	0.5905	0.5905	-0.4198	-0.4198	-0.4198
	1	1.3593	1.3593	1.3593	1.7629	1.7629	1.7629
8. 100% caliper, σ=5, θ=4.5	0	1.7291	1.7291	1.7291	-4.4764	-4.4764	-4.4764
	1	4.1491	4.1491	4.1491	5.4019	5.4019	5.4019
9. 100% caliper, σ=5, θ=5	0	1.5772	1.5772	1.5772	-3.9207	-3.9207	-3.9207
	1	3.7811	3.7811	3.7811	4.8695	4.8695	4.8695
10. 100% caliper, σ=5, θ=5.5	0	1.4488	1.4488	1.4488	-3.4882	-3.4882	-3.4882
	1	3.4696	3.4696	3.4696	4.4318	4.4318	4.4318
11. 100% caliper, σ=5, θ=6	0	1.3390	1.3390	1.3390	-3.1418	-3.1418	-3.1418
	1	3.2036	3.2036	3.2036	4.0686	4.0686	4.0686
12. 100% caliper, σ=5, θ=8	0	1.0255	1.0255	1.0255	-2.1935	-2.1935	-2.1935
	1	2.4456	2.4456	2.4456	3.1084	3.1084	3.1084
13. 100% caliper, σ=5, θ=10	0	0.8299	0.8299	0.8299	-1.6512	-1.6512	-1.6512
	1	1.9746	1.9746	1.9746	2.4831	2.4831	2.4831
14. 100% caliper, σ=10, θ=10	0	0.6005	0.6005	0.6005	-0.9643	-0.9643	-0.9643
	1	1.3857	1.3857	1.3857	1.9031	1.9031	1.9031

Note: Based on the Melitz or BKL framework. This set of analyses evaluates the effect of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). Welfare is measured in terms of real wages, simulated based on the model without tariffs.

Table B.10: Characteristics of countries included in the pseudo world—alternative setup

	(a)	(b)	(c)	(d)	(e)
year	No. of countries in the raw data	No. of countries in the pseudo world	GDP share of the pseudo world	Import share of the pseudo world	No. of obs. with positive bilateral imports
1950	50	50	0.760	0.611	1,303
1955	61	59	0.815	0.691	2,038
1960	101	89	0.840	0.802	3,173
1965	117	105	0.864	0.808	4,201
1970	127	119	0.882	0.813	6,144
1975	135	124	0.898	0.829	7,164
1980	142	123	0.908	0.800	7,518
1985	152	152	0.936	0.828	9,682
1990	152	151	0.913	0.828	11,184
1995	170	169	0.937	0.872	15,097
2000	175	174	0.941	0.939	18,322
2005	176	175	0.940	0.940	19,680
2010	174	173	0.987	0.939	20,328
2015	180	179	0.977	0.921	23,043

Note: In this alternative setup, the construction of the pseudo world takes into account the tariff revenues (if data are available) in GDP and in the expenditure such that: $Y_{it} = (GDP_{it} - T_{it})/\beta_i$ and $E_{it} = Y_{it} + D_{it} + T_{it}$. Since tariff data are available only since 1988, the set of countries in the alternative pseudo world does not differ from Table 1 before 1988.

(a) refers to the number of countries: (i) with at least one non-missing bilateral import and one non-missing bilateral export number from DOTS, (ii) with trade cost proxy data, and (iii) with GDP data.

(b) refers to the number of countries in the pseudo world after the iterated adjustment described in Online Appendix B.4 to ensure that every country has positive expenditure and internal trade.

(c) refers to the total GDP of the countries in the pseudo world relative to the world GDP as reported by WDI. In 1950 and 1955, WDI did not report the world GDP; in this case, we calculate the total GDP of the 224 CEPII countries as the approximate world GDP.

(d) refers to the total imports of the countries in the pseudo world relative to the world imports as reported by DOTS.

(e) refers to the number of observations in the pseudo world with positive bilateral imports as reported by DOTS.

Table B.11: Characteristics of countries included in the pseudo world—alternative setup (continued)

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
year	No. of countries in pseudo world	No. of H members	No. of L members	No. of H nonmembers	No. of L nonmembers	Import share of members	Import share of nonmembers	Import share of *bothwto* observations	Import share of *imwto* observations
1950	50	13	13	6	18	0.844	0.156	0.704	0.139
1955	59	16	14	5	24	0.835	0.165	0.698	0.137
1960	89	16	15	7	51	0.810	0.190	0.656	0.154
1965	105	19	37	6	43	0.861	0.139	0.720	0.140
1970	119	23	46	5	45	0.904	0.096	0.806	0.098
1975	124	24	49	10	41	0.893	0.107	0.733	0.159
1980	123	26	47	11	39	0.884	0.116	0.713	0.171
1985	152	25	59	13	55	0.877	0.123	0.750	0.127
1990	151	26	65	9	51	0.943	0.057	0.861	0.082
1995	169	33	83	5	48	0.930	0.070	0.837	0.094
2000	174	37	94	6	37	0.939	0.061	0.829	0.109
2005	175	42	97	6	30	0.964	0.036	0.916	0.049
2010	173	49	94	6	24	0.963	0.037	0.912	0.051
2015	179	53	100	3	23	0.985	0.015	0.974	0.011

Note: Refer to Table B.10 for the alternative setup of the pseudo world.

(a) refers to the number of countries in the pseudo world.

(b) refers to the number of developed GATT/WTO member countries in the pseudo world.

(c) refers to the number of developing GATT/WTO member countries in the pseudo world.

(d) refers to the number of developed nonmember countries in the pseudo world.

(e) refers to the number of developing nonmember countries in the pseudo world.

(f) refers to the total imports of GATT/WTO member countries relative to the total imports of the pseudo world.

(g) refers to the total imports of nonmember countries relative to the total imports of the pseudo world.

(h) refers to the total imports of country pairs where both are GATT/WTO members relative to the total imports of the pseudo world.

(i) refers to the total imports of country pairs where only the importer is a GATT/WTO member relative to the total imports of the pseudo world.

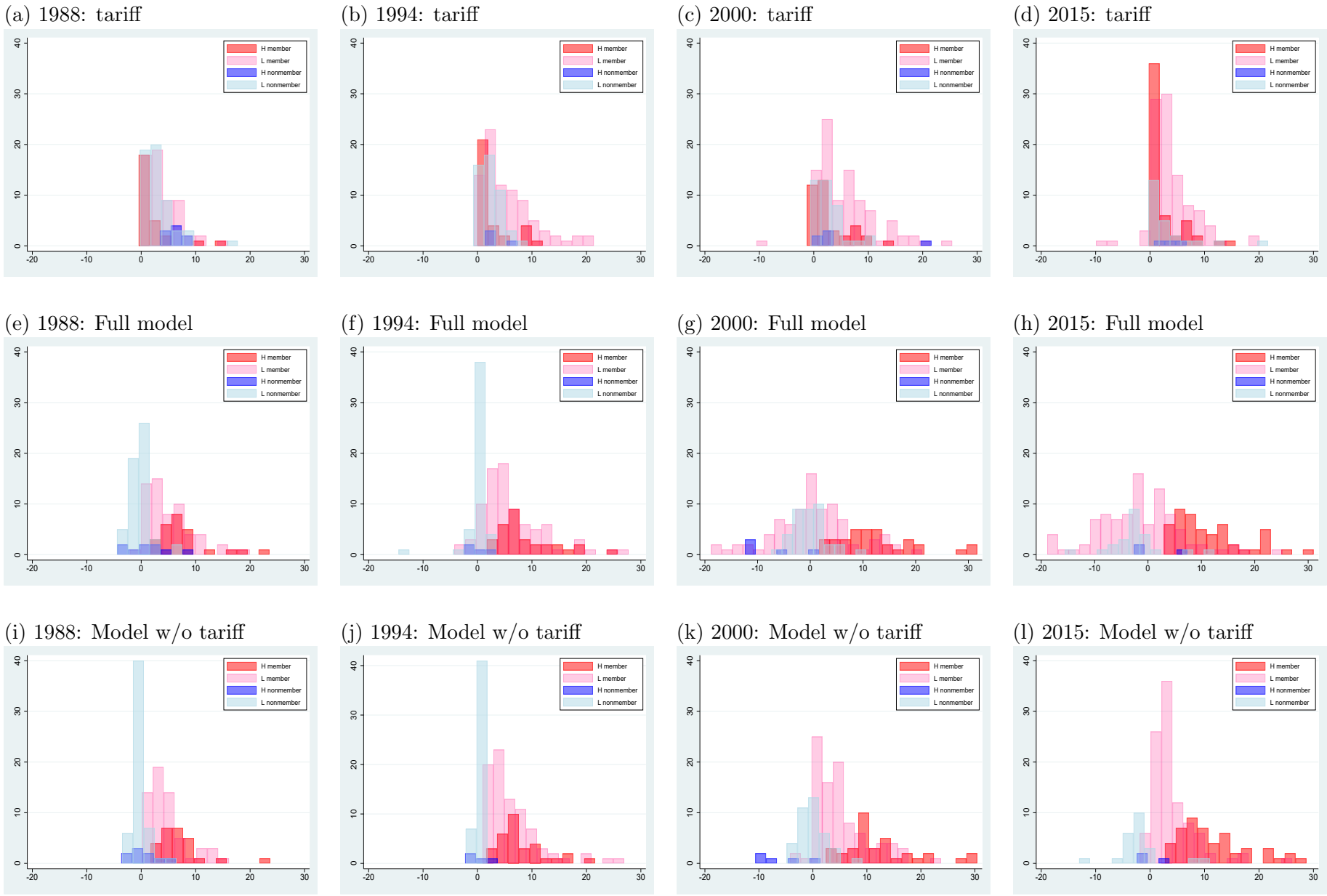
Table B.12: Development- and round-specific matching estimates of *bothwto* and *imwto* (40% Caliper)—alternative setups

		HH				LH				HL				LL			
		bothwto				**bothwto**				**bothwto**				**bothwto**			
GATT/WTO round	caliper	estimates		95% CI		estimates		95% CI		estimates		95% CI		estimates		95% CI	
Alternative Setup 1: $Y_{it} = GDP_{it}/\beta_i$, $E_{it} = Y_{it} + D_{it} + T_{it}$																	
Tokyo to Uruguay	40%	4.09	***	3.97	4.22	2.10	***	2.02	2.17	2.03	***	1.95	2.12	0.81	***	0.74	0.89
(1980–1994)	M_1	9,988				20,378				21,038				26,789			
after Uruguay	40%	6.75	***	6.62	6.87	5.22	***	5.14	5.30	3.43	***	3.35	3.50	0.09	***	0.04	0.15
(1995–2005)	M_1	13,663				30,299				30,857				52,405			
Alternative Setup 2: $Y_{it} = (GDP_{it} - T_{it})/\beta_i$, $E_{it} = Y_{it} + D_{it} + T_{it}$																	
Tokyo to Uruguay	40%	4.09	***	3.97	4.21	2.09	***	2.02	2.17	2.03	***	1.94	2.12	0.82	***	0.75	0.90
(1980–1994)	M_1	9,988				20,378				21,038				26,789			
after Uruguay	40%	6.71	***	6.59	6.83	5.33	***	5.26	5.41	3.37	***	3.29	3.44	0.08	***	0.03	0.14
(1995–2005)	M_1	13,663				30,299				30,857				52,405			

		HH				LH				HL				LL			
		imwto				**imwto**				**imwto**				**imwto**			
GATT/WTO round	caliper	estimates		95% CI		estimates		95% CI		estimates		95% CI		estimates		95% CI	
Alternative Setup 1: $Y_{it} = GDP_{it}/\beta_i$, $E_{it} = Y_{it} + D_{it} + T_{it}$																	
Tokyo to Uruguay	40%	0.63	***	0.34	0.89	0.82	***	0.74	0.91	-0.03		-0.24	0.20	0.03		-0.05	0.12
(1980–1994)	M_1	2,681				14,312				2,574				13,561			
after Uruguay	40%	2.16	***	1.85	2.46	3.93	***	3.81	4.05	0.20	*	-0.07	0.47	-0.30	***	-0.38	-0.21
(1995–2005)	M_1	1,407				11,885				1,814				15,822			
Alternative Setup 2: $Y_{it} = (GDP_{it} - T_{it})/\beta_i$, $E_{it} = Y_{it} + D_{it} + T_{it}$																	
Tokyo to Uruguay	40%	0.61	***	0.32	0.87	0.81	***	0.71	0.91	-0.03		-0.25	0.19	0.04		-0.05	0.12
(1980–1994)	M_1	2,681				14,210				2,574				13,448			
after Uruguay	40%	2.15	***	1.84	2.45	4.12	***	4.00	4.24	0.24	**	-0.03	0.52	-0.30	***	-0.38	-0.22
(1995–2005)	M_1	1,407				11,730				1,814				15,588			

Note: Based on the matching estimator of Chang and Lee (2011). Significance of the estimates and their confidence intervals are calculated based on permutation tests. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. M_1 indicates the number of treated observations. HH: developed exporting and developed importing country pairs; LH: developing exporting and developed importing country pairs; HL: developed exporting and developing importing country pairs; LL: developing exporting and developing importing country pairs.

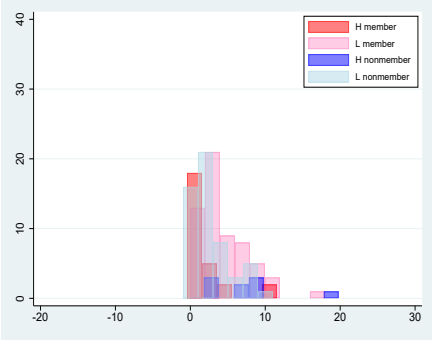
Figure B.1: Welfare effects of GATT/WTO (in terms of real income)—tariff effects versus full effects



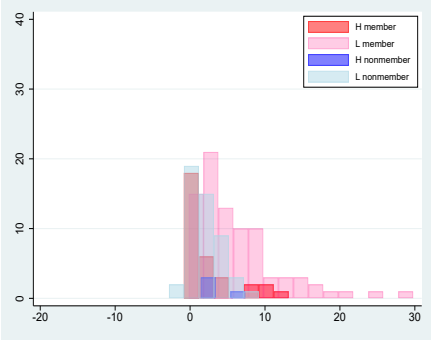
Note: Based on the Melitz framework with parameters $\sigma = 5$, $\theta = 5$, and β_i from Caliendo and Parro (2015). The y-axis indicates the number of countries, and the x-axis the % change in welfare (real income). See Section 2.4 for the three counterfactual setups of: tariff (effects due to tariffs only), full model (effects taking into account tariffs and variable/fixed trade costs), and model without tariffs (effects ignoring tariff revenues).

Figure B.2: Welfare effects of GATT/WTO (in terms of real expenditure)—tariff effects versus full effects

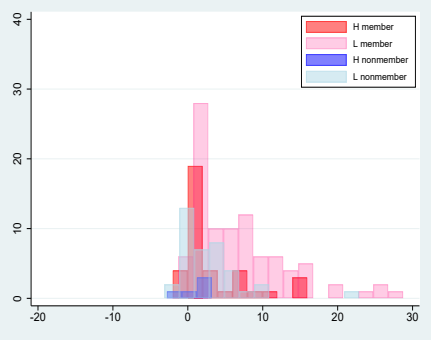
(a) 1988: tariff



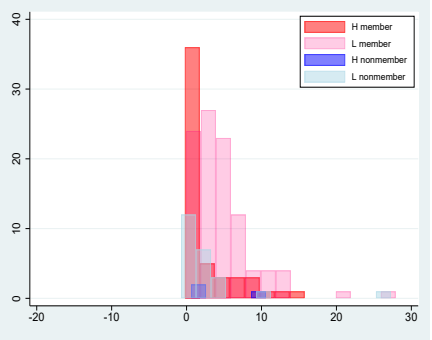
(b) 1994: tariff



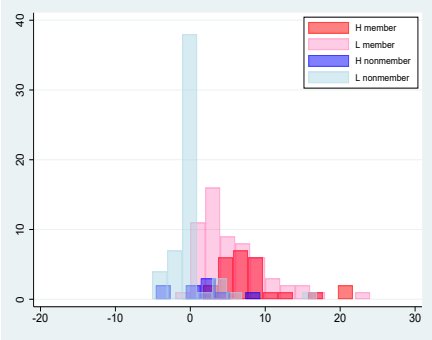
(c) 2000: tariff



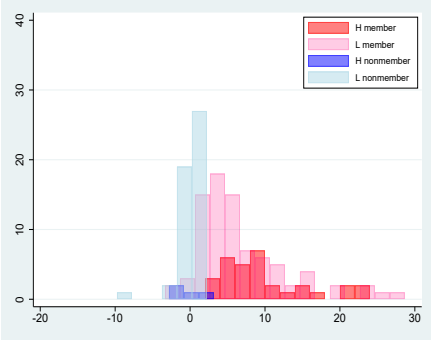
(d) 2015: tariff



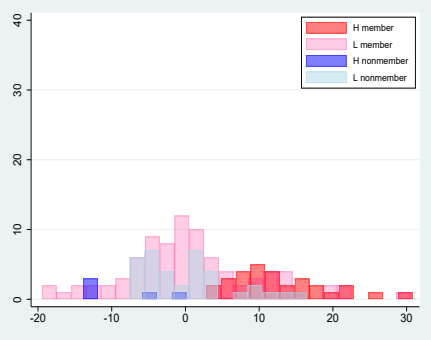
(e) 1988: Full model



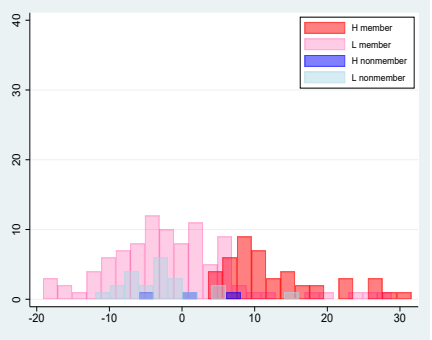
(f) 1994: Full model



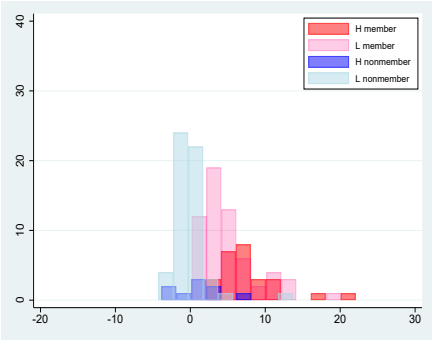
(g) 2000: Full model



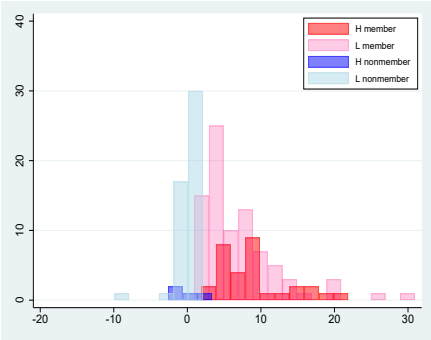
(h) 2015: Full model



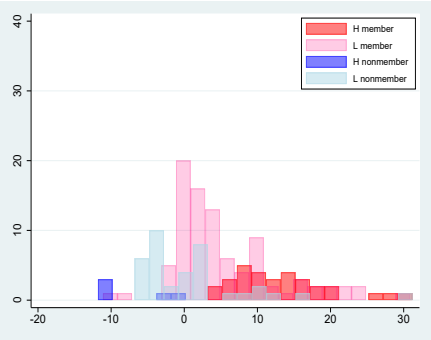
(i) 1988: Model w/o tariff



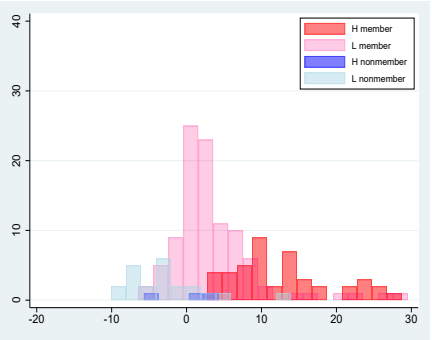
(j) 1994: Model w/o tariff



(k) 2000: Model w/o tariff



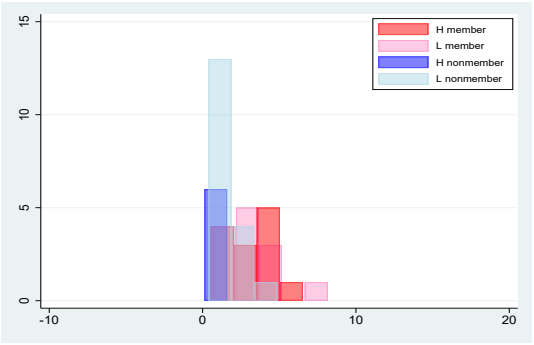
(l) 2015: Model w/o tariff



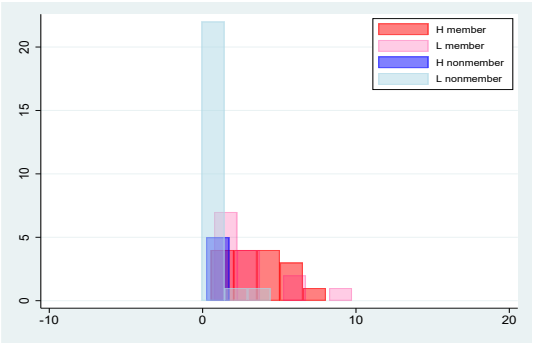
Note: Based on the Melitz framework with parameters $\sigma = 5$, $\theta = 5$, and β_i from Caliendo and Parro (2015). The y-axis indicates the number of countries, and the x-axis the % change in welfare (real expenditure). See Section 2.4 for the three counterfactual setups of: tariff (effects due to tariffs only), full model (effects taking into account tariffs and variable/fixed trade costs), and model without tariffs (effects ignoring tariff revenues).

Figure B.3: Welfare effects of GATT/WTO (the AvW framework)

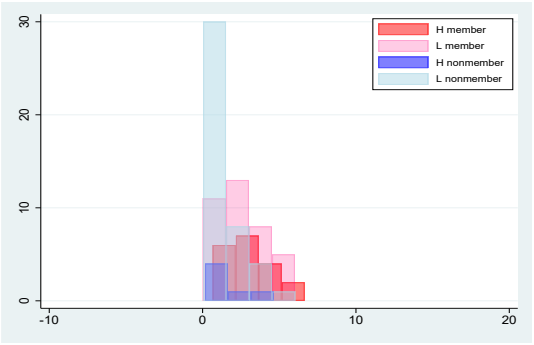
(a) 1950



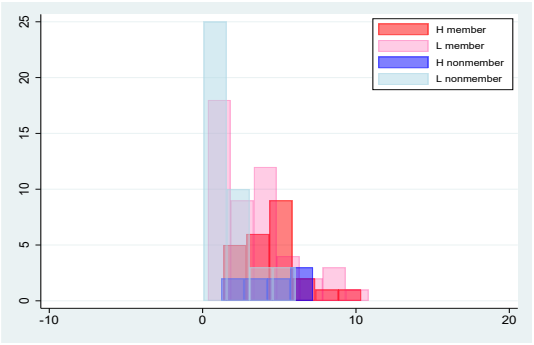
(b) 1955



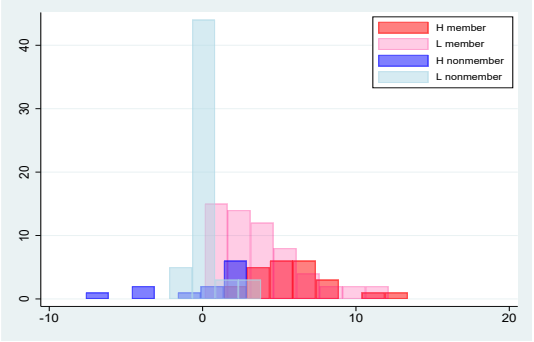
(c) 1965



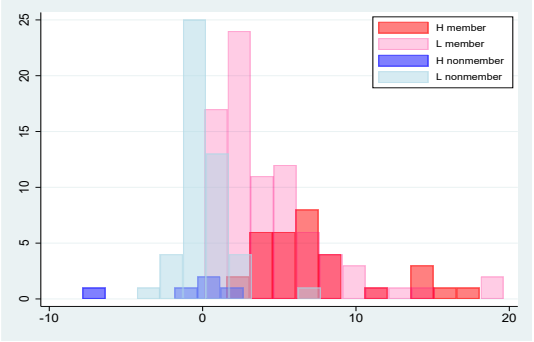
(d) 1975



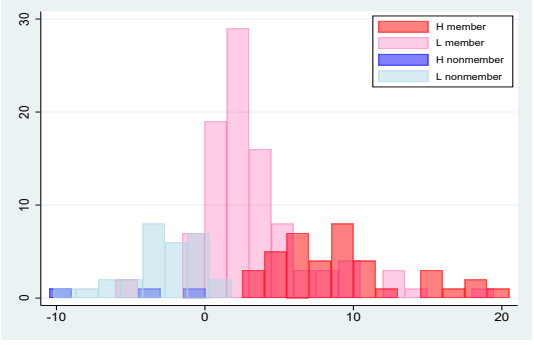
(e) 1985



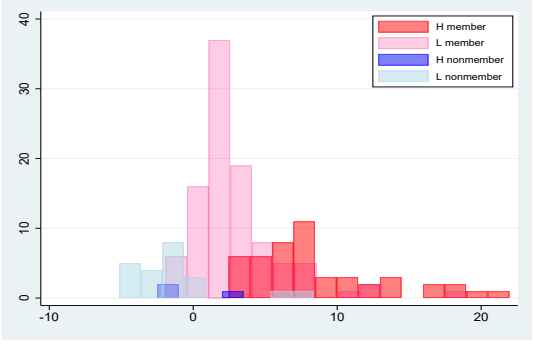
(f) 1995



(g) 2005



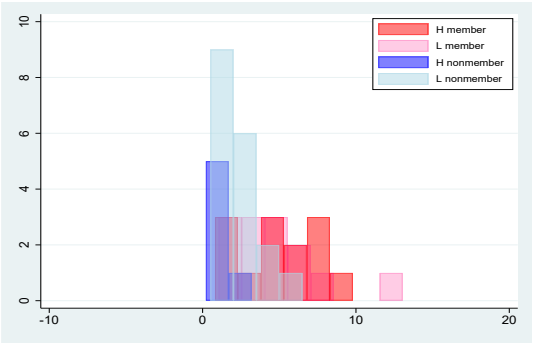
(h) 2015



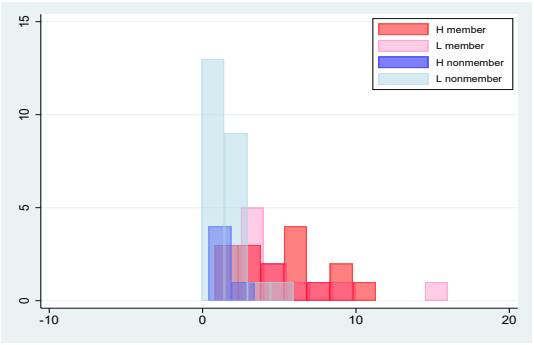
Note: Based on the 40% caliper estimates in Tables 3 and 4 that are significant at 10% level, using the AvW framework with parameters $\sigma = 5$ and β_i from Caliendo and Parro (2015). This set of analyses evaluates the effects of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). The y-axis indicates the number of countries, and the x-axis the % change in welfare (real wages). Outliers are omitted.

Figure B.4: Welfare effects of GATT/WTO (the Krugman framework)

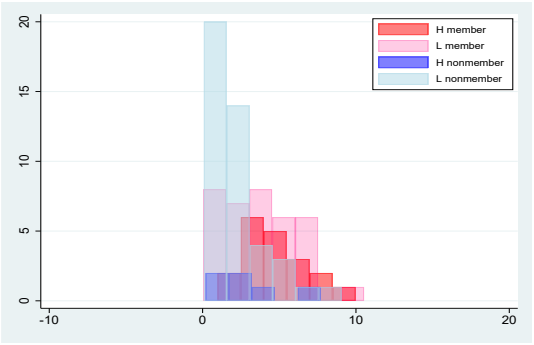
(a) 1950



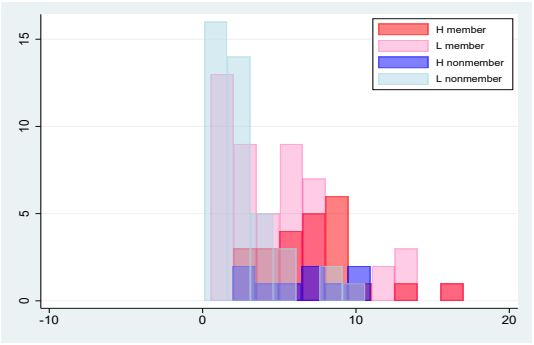
(b) 1955



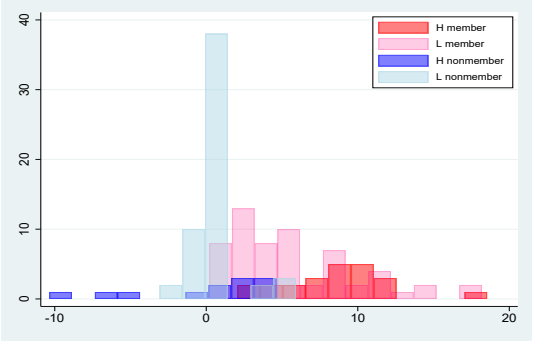
(c) 1965



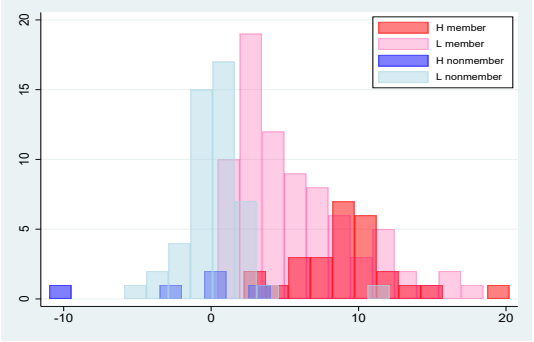
(d) 1975



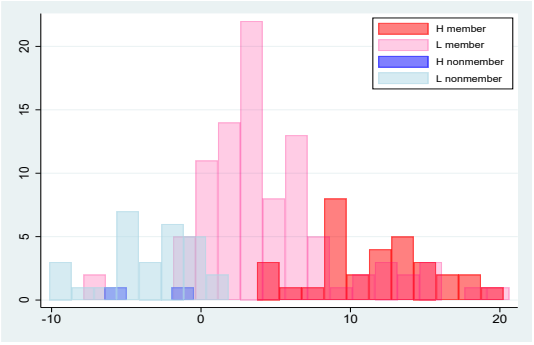
(e) 1985



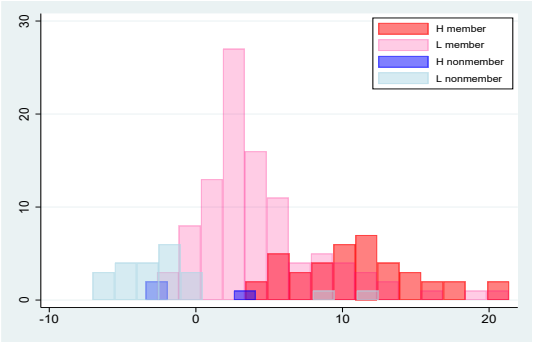
(f) 1995



(g) 2005



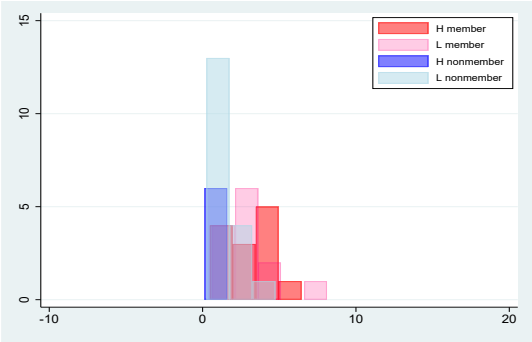
(h) 2015



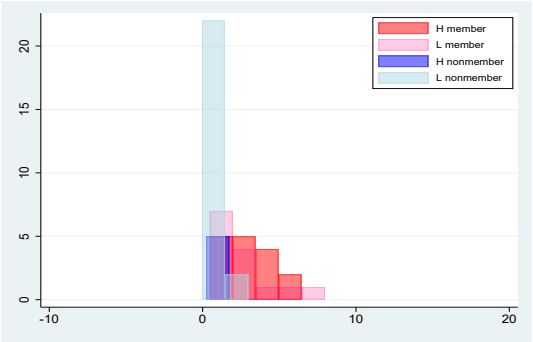
Note: Based on the 40% caliper estimates in Tables 3 and 4 that are significant at 10% level, using the Krugman framework with parameters $\sigma = 5$ and β_i from Caliendo and Parro (2015). This set of analyses evaluates the effects of GATT/WTO given the observed membership status relative to the counterfactual had GATT/WTO not existed ($bothwto = 0$ and $imwto = 0$ for all ijt). The y-axis indicates the number of countries, and the x-axis the % change in welfare (real wages). Outliers are omitted.

Figure B.5: Firm entry effects of GATT/WTO (the Krugman framework)

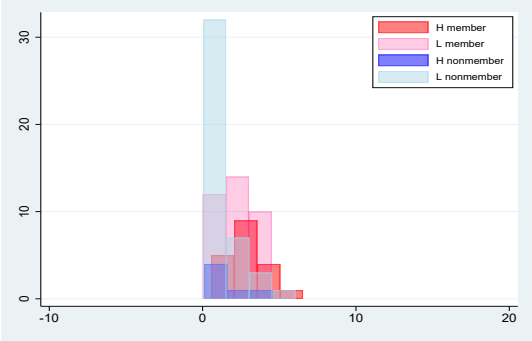
(a) 1950



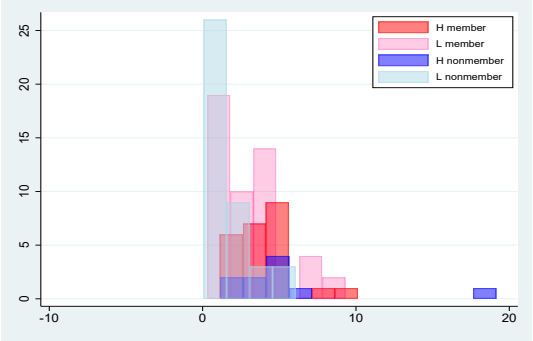
(b) 1955



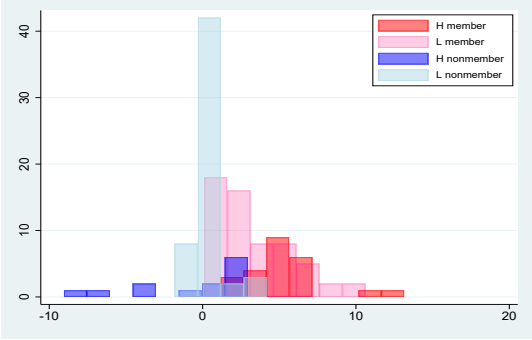
(c) 1965



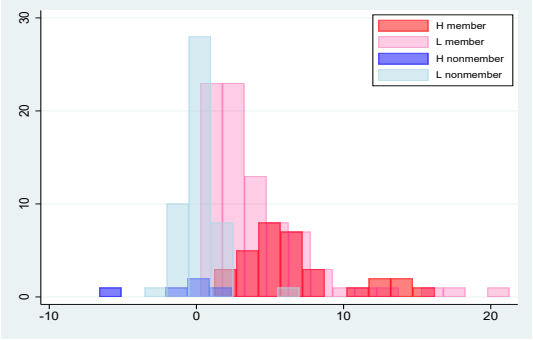
(d) 1975



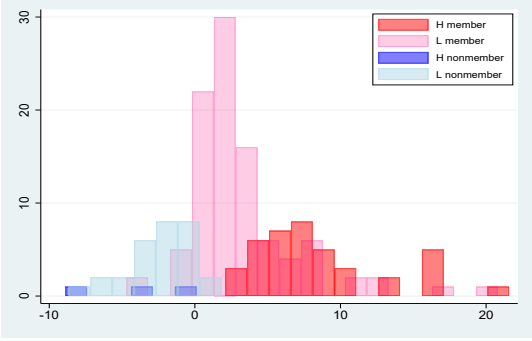
(e) 1985



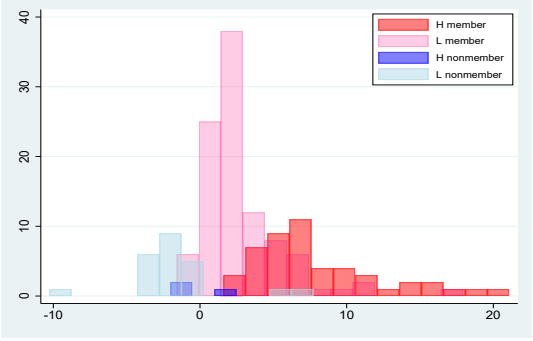
(f) 1995



(g) 2005



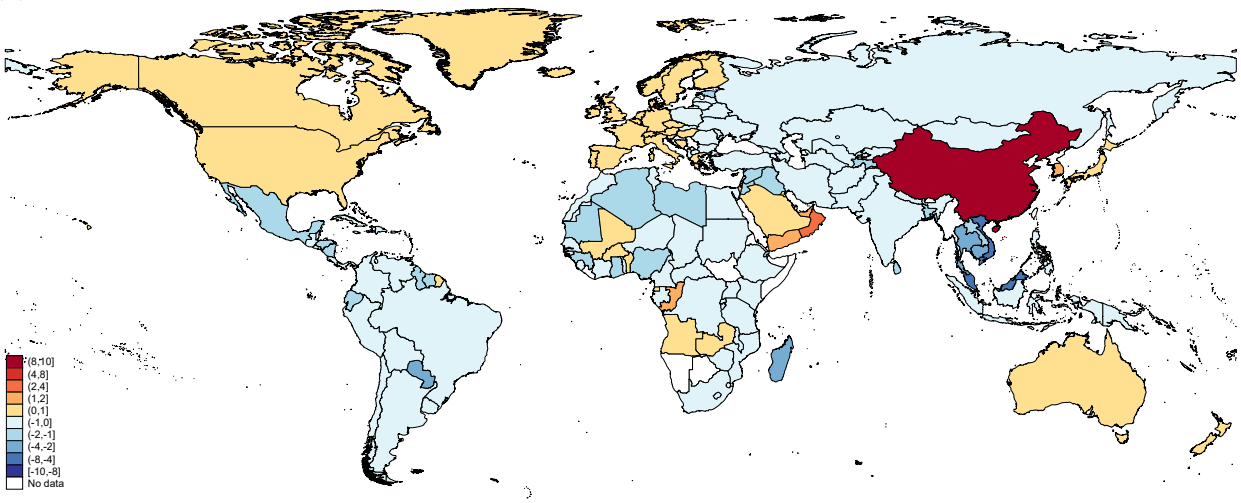
(h) 2015



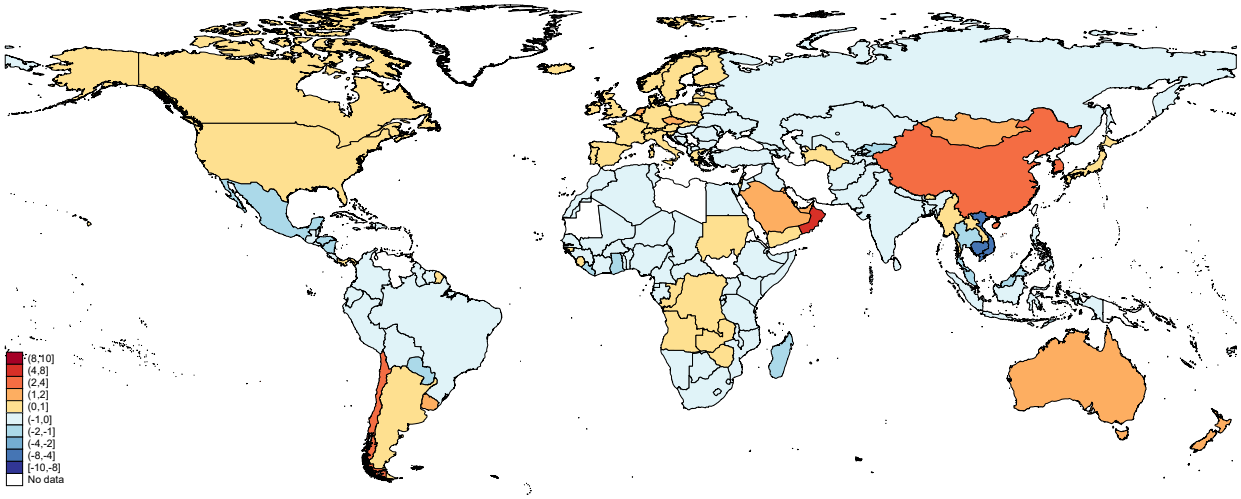
Note: See Figure B.4 footnote. The y-axis indicates the number of countries, and the x-axis the % change in the mass of firm entrants. Outliers are omitted.

Figure B.6: Welfare effects of China's accession to WTO (world map)

(a) 2005

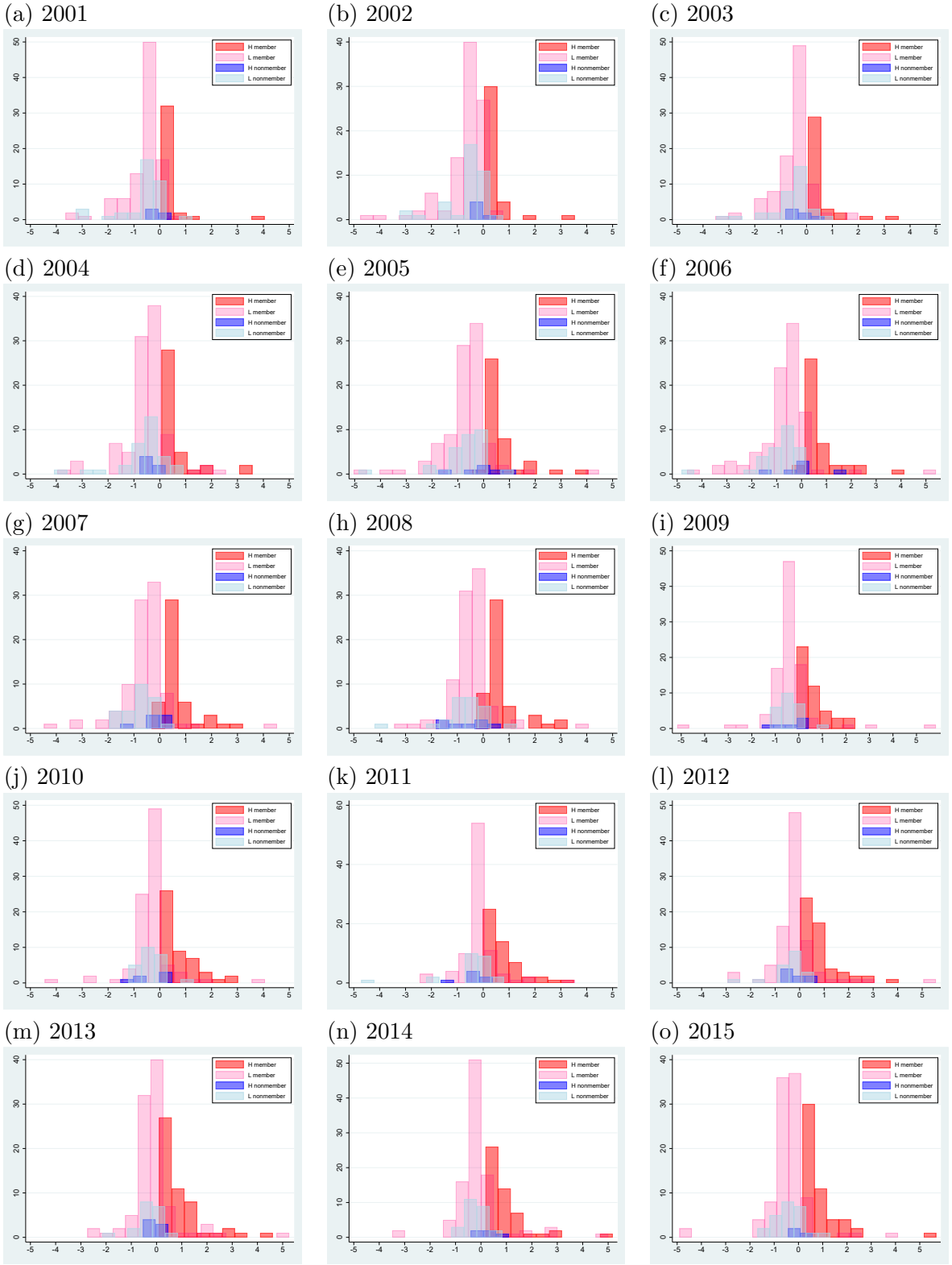


(b) 2015



Note: Based on the 40% caliper estimates in Tables 3 and 4 that are significant at 10% level, using the Melitz framework with parameters $\sigma = 5$, $\theta = 5$, and β_i from Caliendo and Parro (2015). The welfare effect (in terms of real wages) is simulated using the counterfactual had China not entered WTO in 2001.

Figure B.7: Welfare effects of China's accession to WTO (distribution)



Note: Based on the 40% caliper estimates in Tables 3 and 4 that are significant at 10% level, using the Melitz framework with parameters $\sigma = 5$, $\theta = 5$, and β_i from Caliendo and Parro (2015). The welfare effect (in terms of real wages) is simulated using the counterfactual had China not entered WTO in 2001. Outliers are omitted.

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