Multilateral Tariff Bargaining Theory and Practice

The Jones Lecture

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December 10 2018

Introduction

- The GATT/WTO has presided over the largest and most sustained negotiated trade liberalization in history
- It has done so while making extensive use of simultaneous bilateral tariff bargaining, subject to
  - a non-discrimination rule (MFN)
  - principal supplier and reciprocity norms
  - bindings
- These features of the bargaining protocol shape the externalities stemming from bilateral tariff bargains

Introduction

- Yet the WTO faces challenges, evidenced by
  - a now-suspended Doha Round of multilateral trade negotiations
  - an existential threat from President Trump
- What accounts for GATT's success as a bargaining forum?
  - Is this bargaining forum still suited for the modern global economy?

Plan of the Lecture

- An overview of the ToT perspective on the trade negotiation problem
- Explore multilateral trade bargaining through the lens of the ToT theory and
  - I. *Quantitative trade modeling*: "Quantitative Analysis of Multi-Party Tariff Negotiations" (with Kyle Bagwell and Ali Yurukoglu)
  - II. *GATT bargaining records*: "Multilateral Trade Bargaining: A First Look at the GATT Bargaining Records" (with Kyle Bagwell and Ali Yurukoglu)

A ToT Perspective on the Trade Negotiation Problem

- ToT theory provides reason why negotiators would view own-tariff cuts as "concessions" and seek foreign tariff cuts for their exporters
- Two-good two-country competitive general equilibrium trade model
  - gov objectives $W(p(\tau, \widetilde{p}^w), \widetilde{p}^w)$ and $W^*(p^*(\tau^*, \widetilde{p}^w), \widetilde{p}^w)$ satisfying $W_{\widetilde{p}^w} < 0 < W^*_{\widetilde{p}^w}$
  - Nash tariffs satisfy

$$W_p \overset{(+)}{\frac{dp}{d\tau}} + \overset{(-)}{W_{\widetilde{p}^w}} \overset{(-)}{\frac{\partial \widetilde{p}^w}{d\tau}} = 0; \quad W^*_{p^*} \overset{(-)}{\frac{dp^*}{d\tau^*}} + \overset{(+)}{W^*_{\widetilde{p}^w}} \overset{(+)}{\frac{\partial \widetilde{p}^w}{d\tau^*}} = 0$$

- $\Longrightarrow$ $W_p < 0 < W^*_{p^*}$ at Nash tariff choices; own-tariff cut a concession but matched with foreign tariff cut we can both gain

Interdependence in a Multilateral World

- ToT theory also provides a basis for understanding nature of interdependence in a multilateral world
- Two-good three-country competitive general equilibrium trade model
  - home exports y to $*1$ and $*2$ and imports x from $*1$ and $*2$
- Discriminatory home tariffs $\tau^1 \neq \tau^2$ imply that $p^{w1} \neq p^{w2}$ through $p = \tau^1 p^{w1} = \tau^2 p^{w2}$, hence home has distinct ToT with $*1$ and $*2$
- But MFN requires $\tau^1 = \tau^2 \equiv \tau$, hence $p^{w1} = p^{w2} \equiv \tilde{p}^w(\tau, \tau^{*1}, \tau^{*2})$
  - $\Longrightarrow$ gov objectives still $W(p, \tilde{p}^w)$, $W^{*1}(p^{*1}, \tilde{p}^w)$, $W^{*2}(p^{*2}, \tilde{p}^w)$
- Each country's welfare impacted by the tariff choices of the remaining two countries through $\tilde{p}^w(\tau, \tau^{*1}, \tau^{*2})$
  - $\Longrightarrow$ In general a collection of bilateral MFN tariff negotiations represents a setting of bilateral bargaining with externalities

I. Quantitative Trade Modeling

- "Quantitative Analysis of Multi-Party Tariff Negotiations" (with Kyle Bagwell and Ali Yurukoglu)
- In this paper we analyze bilateral tariff bargaining in a multi-country quantitative trade model
- We build on the quantitative trade model of Costinot et al (2011)
  - use the model to explore the properties of alternative tariff bargaining protocols for the GATT Uruguay Round (1986-1994)
  - the last completed GATT/WTO multilateral negotiating round

Model

- Our model consists of two parts
- A model world economy
  - building on the multi-sector version of the Eaton-Kortum model from CDK
  - extended to include tariffs and sector-specific productivity-dispersion parameters as in Caliendo and Parro (2014)
- A model of simultaneous "Nash-in-Nash" (Horn and Wolinsky, 1988) bilateral tariff bargaining
  - Nash-in-Nash commonly employed by the IO literature to characterize division of surplus in bilateral oligopoly settings
  - provides a tractable approach for introducing multi-party tariff negotiations into a quantitative trade model

Model World Economy

- A K-sector N-country Ricardian trade model, with a countably infinite number of varieties indexed by ω within each sector
- Ad valorem import tariffs (possibly discriminatory) t_{ji}^k imposed by country i against imports from j at the sector level
- Utility for a representative consumer in country i

$$u_i = \Pi_{k=1}^{K} (C_i^k)^{\alpha_i^k} \quad \text{with } C_i^k = \left(\sum_{\omega=1}^{\infty} c^k(\omega)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

- Production technology for each variety drawn from a Frechet distribution with CDF

$$F_i^k(z) = \exp\left(-(\frac{z}{z_i^k})^{-\theta_k} \right)$$

where z_i^k is country i's productivity parameter in sector k and θ_k is a sector-specific productivity shape parameter

  - higher $\theta_k \implies$ less within-sector comparative advantage and higher responsiveness of trade to trade costs

Model World Economy

- Iceberg trade costs parameterized by

$$\log d_{ji}^k = \alpha_j + \gamma_i + \beta_{0k} + \beta_{1k} dist_{ji} + \beta_{2k} PTA_{ji} + \beta_3 lang_{ji} + \beta_4 border_{ji} + \sum_{n \in Q} \beta_{5n} Quad_{n,ji}$$

- Price of sector k's variety ω in country i given vector of wages w_i

$$p_i^k(\omega) = \min_{j \in 1,\ldots,N} \frac{w_j}{z_j^k(\omega)} d_{ji}^k (1 + t_{ji}^k)$$

- Equilibrium of the model for given set of tariffs
  - a vector of wages w_i and national incomes E_i such that labor markets clear, trade is balanced and consumers and firms behave optimally

Tariff Bargaining

- We model tariff negotiations in the Uruguay Round as a web of simultaneous bilateral negotiations over vectors of tariffs
- We measure country welfare by real national income, and apply the Nash-in-Nash solution concept
  - each pair of negotiating countries maximizes its Nash product given the actions of the other pairs

Tariff Bargaining

- Let $\pi_i(\mathbf{t})$ be country i's welfare when the world vector of tariffs is $\mathbf{t}$
- When country i negotiates with j, they select the levels of the tariffs that they negotiate $\boldsymbol{\tau}$ to maximize their Nash product $np_{ij}(\boldsymbol{\tau}, \mathbf{t}_{-ij})$

$$\left(\pi_i(\boldsymbol{\tau}, \mathbf{t}_{-ij}) - \pi_i(\boldsymbol{\tau}_0, \mathbf{t}_{-ij})\right)^{\zeta_{ij}} \left(\pi_j(\boldsymbol{\tau}, \mathbf{t}_{-ij}) - \pi_j(\boldsymbol{\tau}_0, \mathbf{t}_{-ij})\right)^{1-\zeta_{ij}}$$

with ζ_{ij} the bargaining power parameter of country i in its bilateral with j and where $\boldsymbol{\tau}_0$ is the disagreement (1990) level of $\boldsymbol{\tau}$

Tariff Bargaining

- We parameterize pairwise bargaining powers according to

$$\zeta_{ij} = \frac{\exp(a_i)}{\exp(a_i) + \exp(a_j)}$$

- An *equilibrium in tariffs* is a vector $\mathbf{t}$ s.t. for each pair ij the tariffs negotiated by this pair maximize $np_{ij}(\boldsymbol{\tau}, \mathbf{t}_{-ij})$ given $\mathbf{t}_{-ij}$
- To reflect the tariff bargaining environment of the Uruguay Round, we introduce three institutional constraints
  - MFN
  - principal supplier rule
  - tariff bindings
- And in addition to tariffs countries bargain over costly transfers

Data

- We aggregate the world economy into
  - the 25 largest countries by GDP in 1990 with the rest of the world aggregated into 5 additional regions; 49 sectors
- Assemble data on 1990 (pre-Uruguay Round) trade flows, production, and tariffs at the country-sector level
  - together with data on a set of gravity variables
- We use the 1990 MFN applied tariffs from TRAINS for the pre-Uruguay Round tariffs, and the 2000 MFN applied tariffs to represent the negotiated tariff outcomes from the Round

Estimation

- We first estimate the taste, productivity and iceberg cost parameters
- The α_i^k can be inferred from the data on expenditure shares directly
- The vectors of productivity and dispersion-of-productivity parameters (z, θ) and iceberg cost parameters (β) are then chosen according to

$$\min_{z,\theta,\beta} G(z,\theta,\beta)' W G(z,\theta,\beta) \quad \text{where}$$

$$G(z,\theta,\beta) = \begin{bmatrix} \frac{x_{ij}^k}{\sum_i x_{ij}^k} - \frac{\hat{x}_{ij}^k(z,\theta,\beta)}{\sum_i \hat{x}_{ij}^k(z,\theta,\beta)} \\ \frac{\sum_{j,k} x_{ij}^k}{\sum_{j,k} x_{USA,j}^k} - \frac{\sum_{j,k} \hat{x}_{ij}^k(z,\theta,\beta)}{\sum_{j,k} \hat{x}_{USA,j}^k(z,\theta,\beta)} \\ \min\left(JS_{ij}(\tau_{ij}^{POST}) - JS_{ij}(\tau_{ij}^0), 0\right) \end{bmatrix}$$

and JS_{ij} is the joint surplus of the negotiating pair ij, τ_{ij}^{POST} is the observed post-Uruguay-Round tariffs, and τ_{ij}^0 is the pre-Uruguay-Round levels of the tariffs being negotiated by the pair ij together with the observed post-Uruguay-Round levels for all other tariffs.

Model Estimates and Benchmarks

- We estimate cost-of-transfers and bargaining parameters by solving

$$\min_{\hat{\kappa},\hat{a}} \Sigma_{i,k} \left(\hat{\tau}_i^k(\hat{\kappa},\hat{a}) - \tau_i^k\right)^2$$

  where $\hat{\tau}_i^k(\kappa, a)$ is the model's prediction for country i's MFN tariff in sector k for a candidate κ and vector a, and τ_i^k is the observed MFN tariff of country i in sector k in the year 2000.
- Trade parameter estimates
  - θ_k: Table 2
  - Estimated average iceberg cost across all sectors and country pairs is 109.0%; 75.3% average-across-sectors incurred iceberg costs
  - z_i^k: Figure 1
- Model benchmarks–welfare change relative to status quo 1990 tariffs
  - autarky, zero trade frictions; free trade, world-welfare maximizing tariffs, Nash tariffs: Table 3

Cost-of-Transfers and Bargaining Parameter Estimates

- We let predicted principal supplier patterns guide our set of bilateral bargains
  - observed v predicted principal supplier patterns: Table 4
  - 12 bargaining pairs involving 6 countries observed; 7 bargaining pairs involving 5 countries predicted
  - 14 major industrialized countries compose our set of bilateral bargains (Canada does not make the cut)
- Cost-of-transfer and bargaining parameter estimates: Table 5
  - transfers were possible but not costless: average cost of transfers is 84.68%, marginal cost of the last unit of utility transferred is 129.06%
  - Japan the strongest bargainer in the Uruguay Round, followed in descending order by the US, South Korea, Australia and the EU

Cost-of-Transfers and Bargaining Parameter Estimates

- Bargaining parameters reflect how evenly the surplus in a bilateral is split *and* slope of bilateral bargaining frontier
  - slope of the bilateral bargaining frontier not always -1: Figures 2 and 3
  - the slope is a function of degree of asymmetries in market power, position of initial tariffs relative to best-response, and third-party spillovers from tariff cuts: Table 6
- Bargaining parameters reflect position of HW disagreement point, *not* 1990 status quo welfares

MFN Tariff Bargaining in the Uruguay Round: Table 7

- About 60% of the variation in 190 tariffs under negotiation in the Uruguay Round explained with 5 parameters
- Small world-wide welfare impacts
  - an order of magnitude smaller than Caliendo et al (2017)
- But large cross-country variation in gains, higher for some emerging/ developing countries, smaller for some industrialized countries
  - not all countries gain, but all countries engaged in bargaining gain
  - Japan gains more than US, Australia and EU, but less that South Korea, despite Japan's stronger bargaining power
- Achieved roughly 1/3 of potential world-wide welfare gains from negotiating over these tariffs, same as all previous rounds together
  - 1/3 of the potential gains in moving from Nash to world welfare maximizing levels for these tariffs remain as "unfinished business"
  - by comparison, Ossa (2014) reports roughly 15% unfinished business

Counterfactuals

- What would have been the outcome of tariff bargains in the Uruguay Round (given existing tariff bindings) if countries had bargained over discriminatory tariff cuts?
- We consider an alternative bargaining protocol under which the MFN requirement and the principal supplier rule are removed
  - HW solution when countries bargain over discriminatory tariff cuts
- We focus primarily on the intensive margin
  - for each country, the set of its tariffs being negotiated is constrained to include only the sectors that were negotiated under MFN
  - and the set of countries negotiating on these tariffs is constrained to include only the countries that it negotiated with under MFN

Counterfactuals

- Average tariffs drop more under discriminatory tariff bargaining
  - limiting comparison to product-and-country pairs also in play under MFN, a drop of 107.35% versus 46.95%
- But world-wide welfare declines relative to MFN tariff bargaining
  - developing/emerging countries (along with South Korea) the biggest losers: Table 7

Interpretation

- We would expect the positive spillovers from the MFN tariff cuts reported in Table 6 to turn negative under discriminatory tariff cuts
  - Table 8: with two exceptions, uniformly negative spillovers
- Drives down levels of negotiated tariffs in discriminatory settings from what these levels would be under MFN
  - in an analysis of Nash-in-Nash tariff bargaining in a three-country two-good GE trade model, Bagwell et al (2017) show that discriminatory tariff bargaining results in over-liberalization: intuition

Interpretation

- Developing/emerging countries are big losers because they are 3^{rd} parties to every bargain in the Uruguay Round
- South Korea a big loser because it no longer benefits via MFN from Japan's strong bargaining power against the EU, the US and Australia
  - Japan the biggest gainer because MFN limits its ability to exploit its strong bargaining power

A Key Point

- The free-rider issue created by the positive third-party externality from the GATT/WTO's MFN requirement is widely emphasized as a shortcoming of the GATT/WTO approach
  - we find that the abandonment of MFN in tariff bargaining would create negative third-party externalities that are even more powerful
  - and that would ultimately lead to tariff bargaining outcomes that are worse from the perspective of world welfare

Takeaway on Uruguay

- Framework for trade negotiations that features
  - comparative advantage and distance driven trade patterns
  - multi-party bilateral bargaining with externalities
  - flexible bargaining parameters
- Findings:
  - MFN performs better for liberalization than discriminatory tariffs
  - Demonstration of method that can be used for other eras and bargaining protocols

II. GATT Bargaining Records

- "Multilateral Trade Bargaining: A First Look at the GATT Bargaining Records" (with Kyle Bagwell and Ali Yurukoglu)

- Detailed negotiation data, recently declassified by the WTO
  - First 5 GATT rounds span 1947-1961, involve more than 1,500 pairs of bargaining countries, resulted in over 70,000 agreed tariff cuts
  - Simultaneous bilateral bargaining between pairs of countries over multiple tariff lines, all subject to MFN
  - Bargaining records include full sequence of formal requests and offers, and outcomes (agreed tariffs or statement of no agreement)

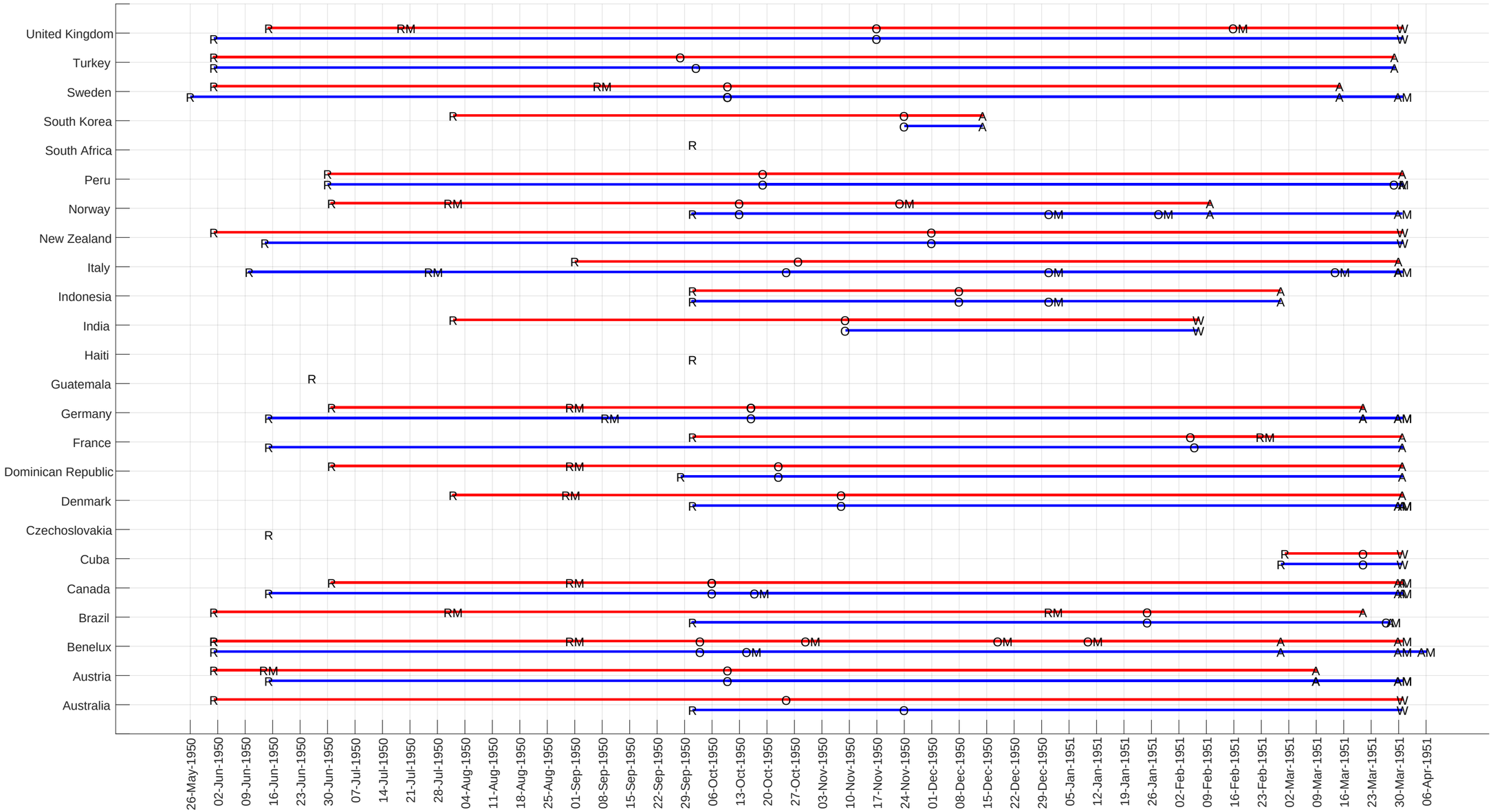
- An initial look at a slice of the GATT bargaining records
  - Focus on Torquay Round (1950-51), where over a 10 month period 299 separate bilateral negotiations among 37 countries covering thousands of tariff-line products took place

The Torquay Bargaining Protocol

- Selective product-by-product MFN tariff bargaining on a bilateral request-offer basis
- The initial (first stage) requests were common knowledge
- The initial (second stage) offers were privately observed between the relevant pairs of countries
- A's initial request of B and A's initial offer to B forms A's initial bargaining proposal to B
    - the initial proposals served as the basis for the start of (third stage) bilateral offer/counteroffer bargaining, the outcome of which became common knowledge at the conclusion of the bilateral
- As outcomes of concluded bilaterals became common knowledge, some ability to make adjustments to previously concluded bilaterals

Stylized Facts

- *The numbers of back-and-forth offers and counteroffers in any bilateral are relatively small, and initial offers often sit dormant on the table for long periods of time and are then finalized with a single modification at the time that other bargains are concluded*
  - Fig 5 and Table 1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	Mean	SD	Min	Max	N
Number of offers per good-country	1.363	0.516	1	5	19560
Number of offers per country	1.787	0.659	1	6	324
Number of requests per good-country	1.021	0.148	1	3	38591
Number of requests per country	1.130	0.370	1	3	437
Conditional on Final agreement					
Number of offers per good-country	1.532	0.546	1	5	13030
Number of offers per country	1.969	0.596	1	6	259
Number of requests per good-country	1.047	0.215	1	3	6974
Number of requests per country	1.191	0.444	1	3	241
Number of weeks from the last offer (O or OM) to the first agreement (A)	11.771	7.405	0.143	26.286	124
Fraction of goods for which agreement was later modified	0.035	0.197	0	2	145

Table 1: Back-and-Forth Offers and Counteroffers in the Torquay Round: This table presents statistics on the amount of back and forth on goods and with negotiating partners over concessions negotiated by all particpating countries in the Torquay Round. Offer statistics reflect averages conditional on at least one offer; Request statistics reflect averages conditional on at least one request.

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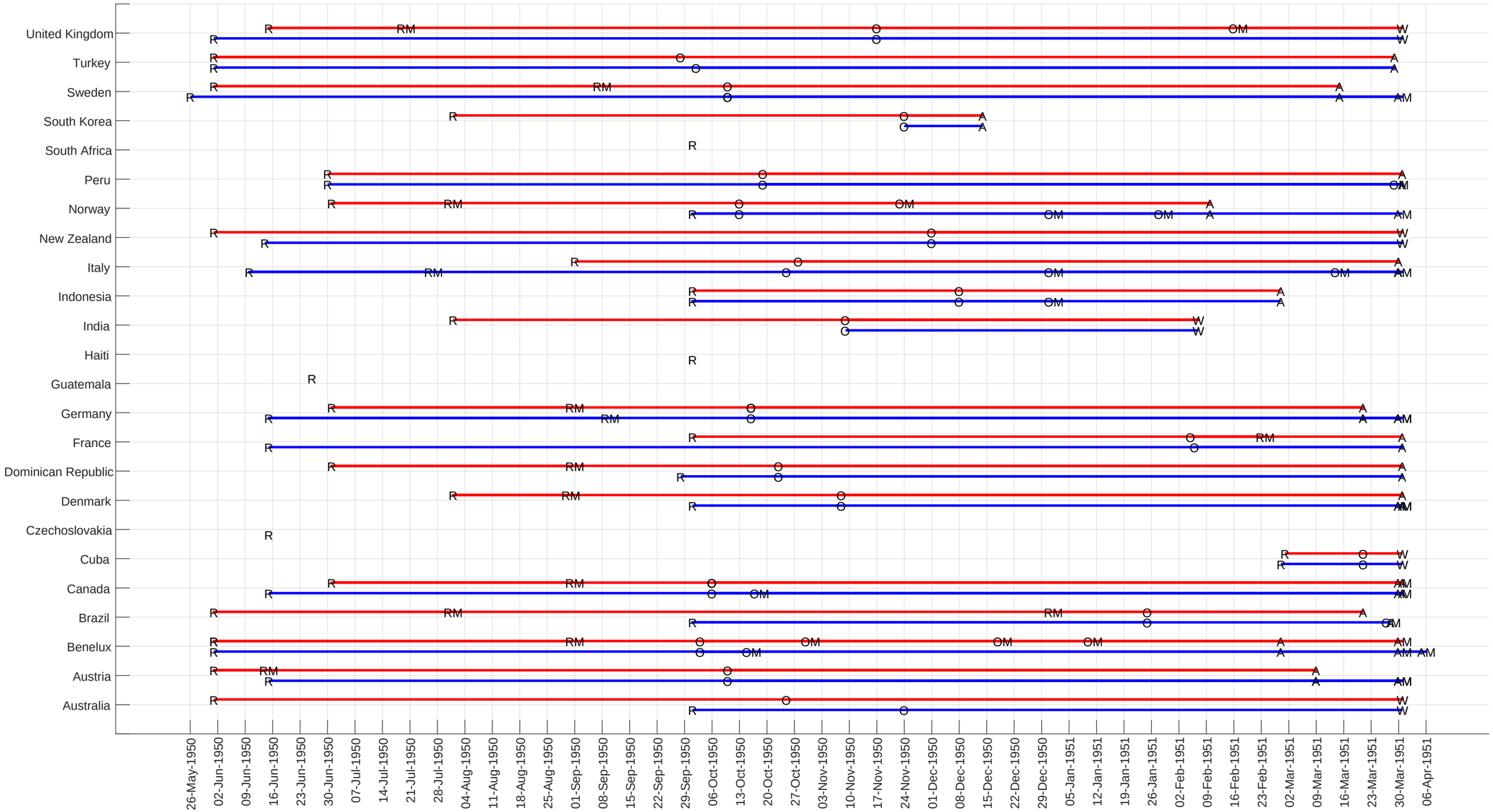
  - Fig 5 and Table 1
- *Once the initial proposals were on the table, the focus of bargaining narrowed to each country's own-tariff-cut offers, and countries responded to imbalances in the outstanding offers primarily by adjusting their offers rather than the requests they had made of others*
  - Fig 5; 82% of the counter-proposals at Torquay modified the offer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  - Fig 5; 82% of the counter-proposals at Torquay modified the offer
- *Offers for given import products were rarely deepened over the course of the negotiations; instead, adjustments typically involved a country "shopping around" its initial tariff-cut offers and ultimately reducing as necessary the depth of its overall (multilateral) offer*
  - Fig 2 and Table 4; Fig 6 and Table 2

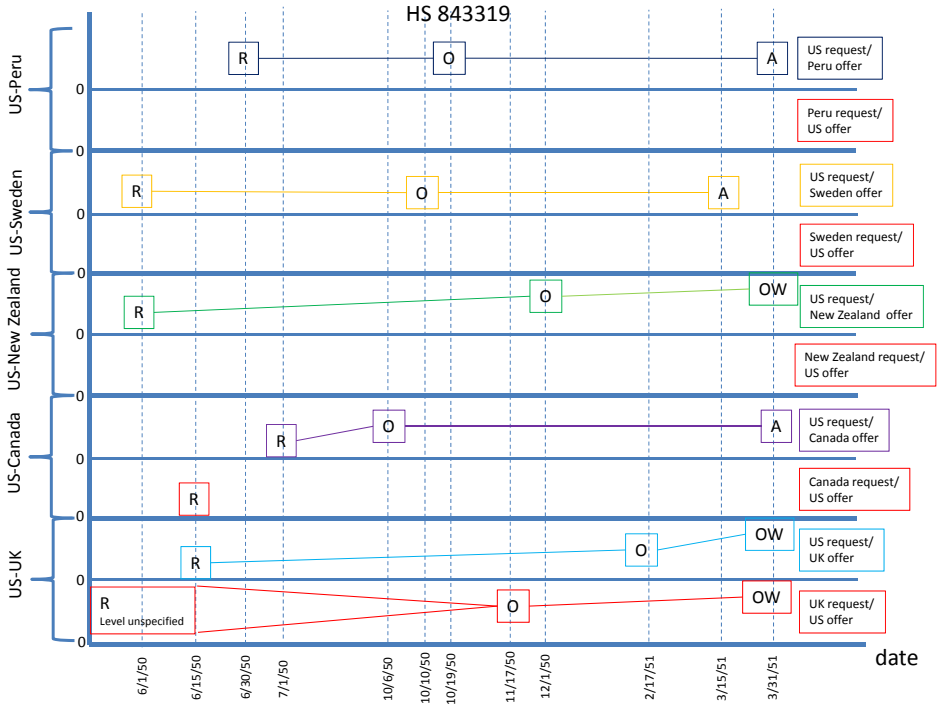

Figure 2: Requests and Offers on Lawn Mowers in US Torquay Bilaterals.

		Sales			Purchases		
		Ad Val	Specific	All	Ad Val	Specific	All
		Country-Specific					
Initial request over existing tariff	Mean	0.529	0.592	0.552	0.529	0.592	0.552
	SD	0.250	0.313	0.276	0.250	0.313	0.276
	Min	0	0	0	0	0	0
	Max	1	1	1	1	1	1
	N	21956	12595	34551	21956	12595	34551
Initial offer over existing tariff	Mean	0.807	0.840	0.820	0.807	0.840	0.820
	SD	0.202	0.221	0.210	0.202	0.221	0.210
	Min	0	0	0	0	0	0
	Max	1	1	1	1	1	1
	N	9781	6805	16586	9781	6805	16586
Final concession over existing tariff	Mean	0.788	0.842	0.811	0.788	0.842	0.811
	SD	0.199	0.228	0.214	0.199	0.228	0.214
	Min	0	0	0	0	0	0
	Max	1	1	1	1	1	1
	N	6247	4665	10912	6247	4665	10912
		Cross-Country					
Initial request over existing tariff	Mean	0.528	0.594	0.554			
	SD	0.252	0.316	0.281			
	Min	0	0	0			
	Max	1	1	1			
	N	16118	10351	26469			
Initial offer over existing tariff	Mean	0.811	0.848	0.827			
	SD	0.203	0.219	0.211			
	Min	0	0	0			
	Max	1	1	1			
	N	7573	5661	13234			
Final offer over existing tariff	Mean	0.799	0.834	0.814			
	SD	0.206	0.236	0.220			
	Min	0	0	0			
	Max	1	1	1			
	N	7549	5477	13026			

Table 4: Initial requests, initial offers and final offers and concessions over existing tariffs for all participating countries in the Torquay Round. "Sales" records requests, offers and final concessions that refer to own tariffs. "Purchases" records requests, offers and final concessions that refer to the tariffs of the bargaining partner. Country-Specific numbers condition on a final agreed concession being reached and refer to a given Seller-Purchaser-HS6. Some goods appear in both the ad valorem and specific columns. Cross-Country numbers refer to a given Seller-HS6.

		Sales			Purchases		
		Ad Val	Specific	All	Ad Val	Specific	All
		Country-Specific					
Initial request over existing tariff	Mean	0.529	0.592	0.552	0.529	0.592	0.552
	SD	0.250	0.313	0.276	0.250	0.313	0.276
	Min	0	0	0	0	0	0
	Max	1	1	1	1	1	1
	N	21956	12595	34551	21956	12595	34551
Initial offer over existing tariff	Mean	0.807	0.840	0.820	0.807	0.840	0.820
	SD	0.202	0.221	0.210	0.202	0.221	0.210
	Min	0	0	0	0	0	0
	Max	1	1	1	1	1	1
	N	9781	6805	16586	9781	6805	16586
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	Min	0	0	0	0	0	0
	Max	1	1	1	1	1	1
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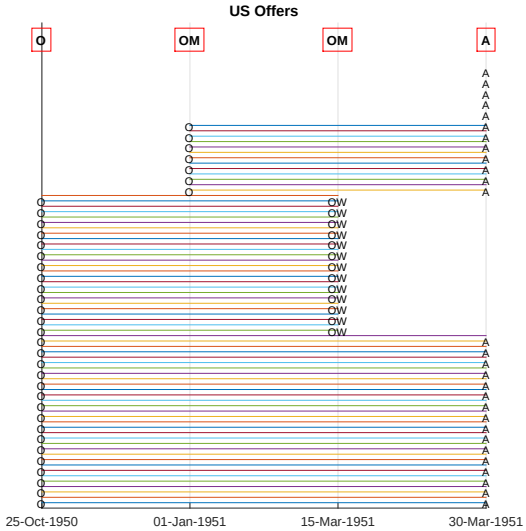

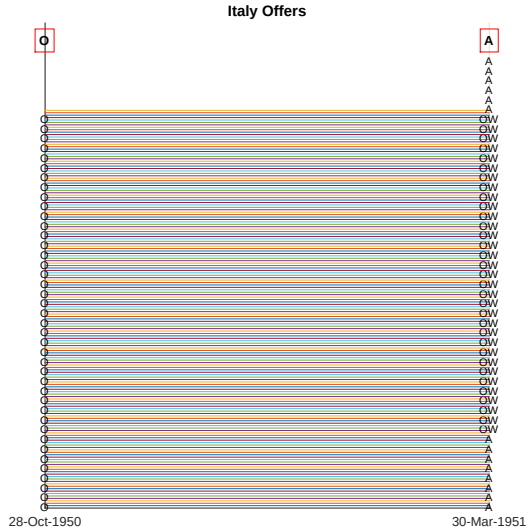

Figure 6: Extensive margin adjustments in US negotiations with Italy.

	By Negotiating Partner						
	Unique	Total	Total/Unique	Mean	SD	Min	Max
Sales							
Number of HS6 requests	29341	38591	1.315	67.232	135.388	0	1259
Number of HS6 request modifications	2202	2302	1.045	4.010	21.699	0	267
Number of HS6 offers	15683	19560	1.247	34.077	98.357	0	1111
Number of HS6 offer modifications	1292	1330	1.029	2.317	20.982	0	337
Number of HS6 offers on requests	11064	10436	0.943	18.181	57.566	0	589
Fraction of HS6 offers on requests	70.55%			31.19%	0.370	0	1
Number of HS6 offers without request	4619	9124	1.975	15.895	49.433	0	554
Fraction of HS6 offers without request	29.45%			25.26%	0.334	0	1
Number of HS6 final concessions	11106	13030	1.173	22.700	77.321	0	917
Number of HS6 final concessions with requests	7944	6974	0.878	12.150	46.615	0	555
Fraction of final concession with request	71.53%			24.36%	0.351	0	1
Number of HS6 final concession without request	3162	6056	1.915	10.551	38.797	0	464
Fraction of final concessions without request	28.47%			20.77%	0.322	0	1
Purchases							
Number of HS6 requests	18836	38591	2.049	67.232	135.388	0	1259
Number of HS6 request modifications	2050	2302	1.123	4.010	21.699	0	267
Number of HS6 offers	12775	19560	1.531	34.077	98.357	0	1111
Number of HS6 offer modifications	1313	1330	1.013	2.317	20.982	0	337
Number of HS6 offers on requests	9224	10436	1.131	18.181	57.566	0	589
Fraction of HS6 offers on requests	58.82%			31.19%	0.370	0	1
Number of HS6 offers without request	3551	9124	2.569	15.895	49.433	0	554
Fraction of HS6 offers without request	22.64%			25.26%	0.334	0	1
Number of HS6 final concessions	9064	13030	1.438	22.700	77.321	0	917
Number of HS6 final concessions with requests	6787	6974	1.028	12.150	46.615	0	555
Fraction of final concession with request	61.11%			24.36%	0.351	0	1
Number of HS6 final concession without request	2277	6056	2.660	10.551	38.797	0	464
Fraction of final concessions without request	20.50%			20.77%	0.322	0	1

Table 2: Sales and Purchases by all participating countries in the Torquay Round. "Sales" records requests, offers and concessions that refer to own tariffs. "Purchases" records requests, offers and concessions that refer to the tariffs of the bargaining partner. "Unique" refers to the number of unique HS6 products across all bargaining partners. "Total" refers to the number of HS6 product-country pairs.

Interpreting Tariff Bargaining at Torquay

- Our stylized facts lend support to two features that are seen by GATT practitioners and legal scholars as hallmarks of the tariff bargaining that occurred in the early GATT rounds
  - a surprising lack of strategic behavior among the participating governments
  - the presence of an important multilateral element to the bilateral bargains

Lack of Strategic Behavior

"...Their requests cannot be higher than their offers and negotiations start from this maximum position: if all requests are granted all the offers will be fulfilled. ... As some of the requests are rejected, some of the offers are withdrawn. This procedure has been raised to a Gatt principle and is not laid down by any rule. It is a convention but one which creates a much better negotiating climate than the opposite trend which was a feature of the classical bilateral negotiations. Then, everyone put forward very low offers with the intention of increasing gradually if the bargaining proved profitable. A country never knew, however, when it had reached the maximum its partner was willing to concede." (Curzon, 1966)

A Multilateral Element

"Multilateral tariff bargaining, as devised at the London Session of the Preparatory Committee in October 1946 and as worked out in practice at Geneva and Annecy, is one of the most remarkable developments in economic relations between nations that has occurred in our time. It has produced a technique whereby governments, in determining the concessions they are prepared to offer, are able to take into account the indirect benefits they may expect to gain as a result of simultaneous negotiations between other countries, and whereby world tariffs may be scaled down within a remarkably short time." (ICITO, 1949)

ToT Theory plus Key GATT Institutional Features

- Consider institutional features that could help account for these stylized facts of GATT tariff bargaining
  - reciprocity
  - MFN

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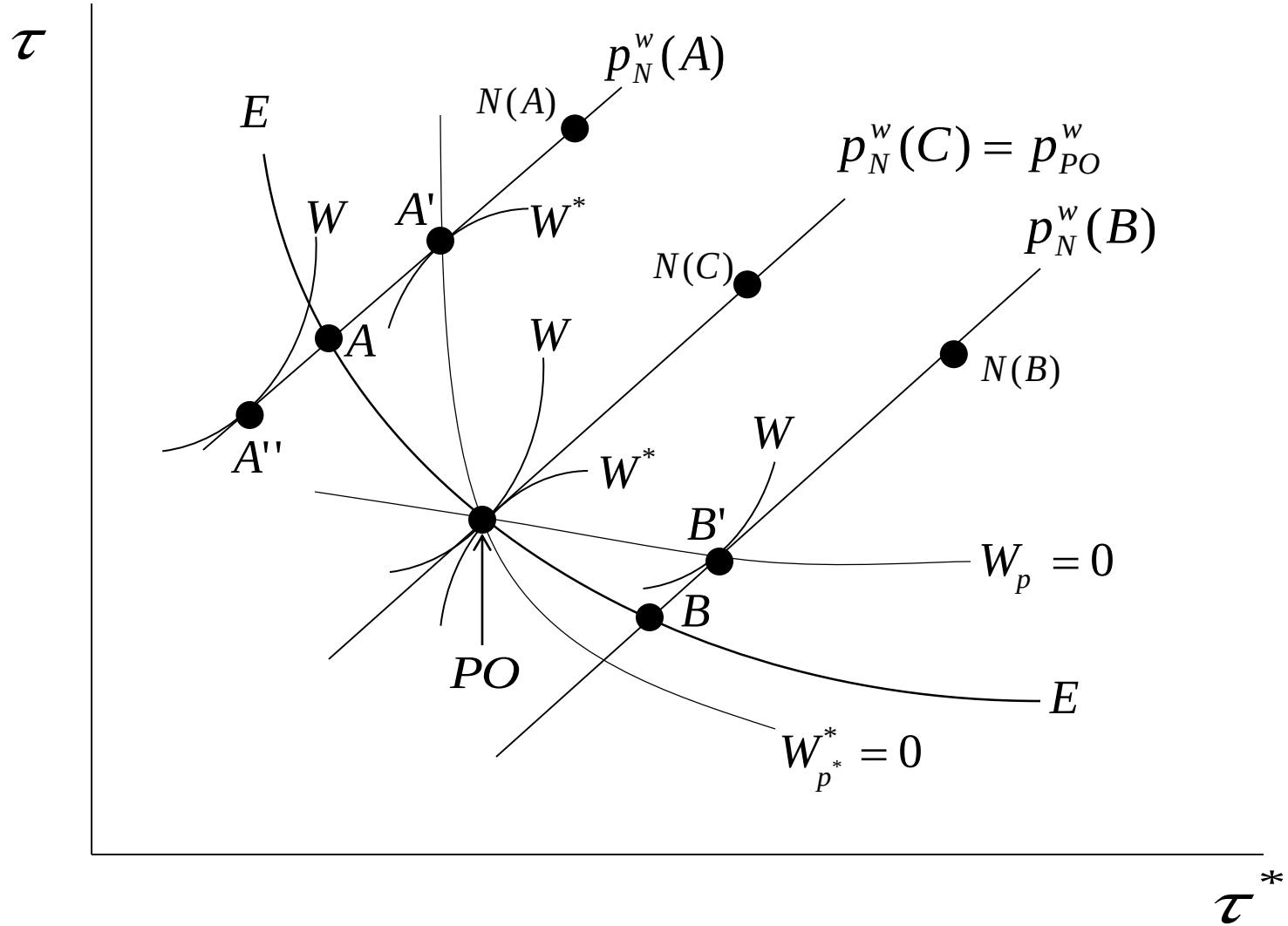
- Consider institutional features that could help account for these stylized facts of GATT tariff bargaining
  - reciprocity
  - MFN
- Strict adherence to reciprocity and MFN together
  - can induce truth-telling on the part of govs


τ
$p_N^w(A)$
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$p_N^w(C) = p_{PO}^w$
W
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A
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$N(B)$
A''
W^*
W
B'
$W_p = 0$
B
PO
E
$W_{p^*}^* = 0$
τ^*

ToT Theory plus Key GATT Institutional Features

- Consider institutional features that could help account for these stylized facts of GATT tariff bargaining
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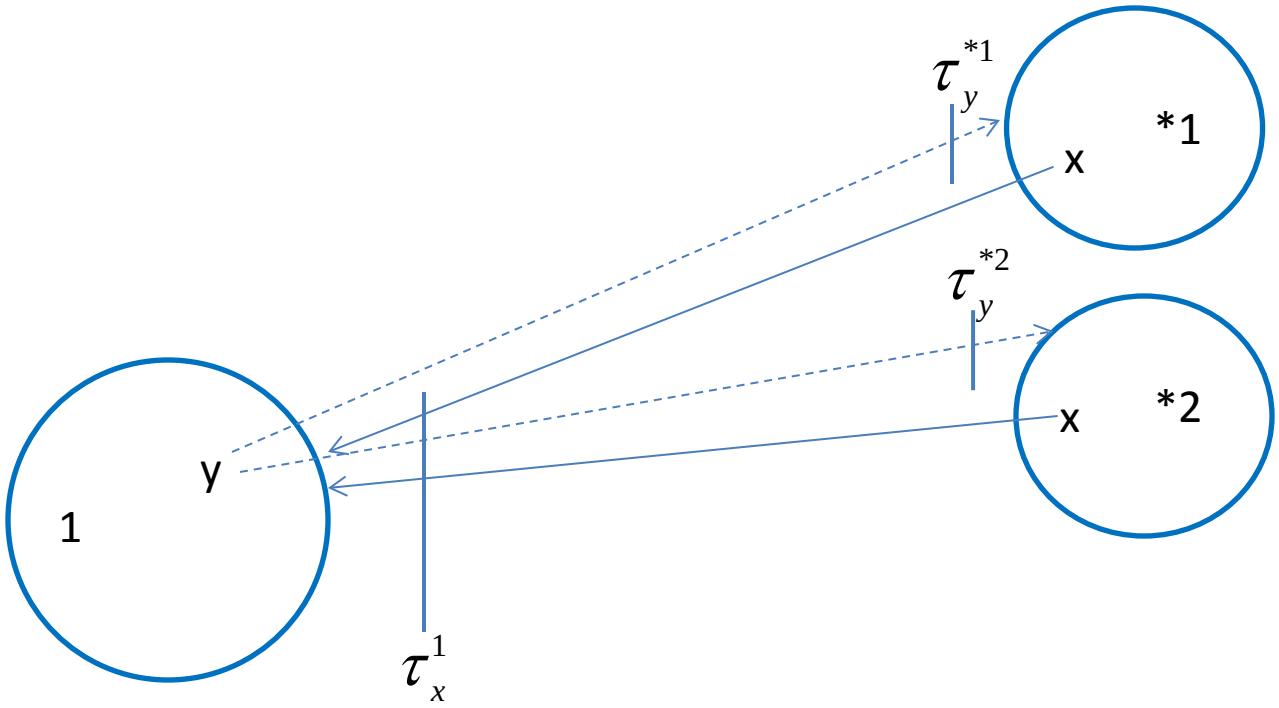
  - MFN
- Strict adherence to reciprocity and MFN together
  - can induce truth-telling on the part of govs
  - and eliminate bargaining externalities across bargaining pairs



Reciprocity and MFN

ToT Theory plus Key GATT Institutional Features

- Consider institutional features that could help account for these stylized facts of GATT tariff bargaining
  - reciprocity
  - MFN
- Strict adherence to reciprocity and MFN together
  - can induce truth-telling on the part of govs
  - and eliminate bargaining externalities across bargaining pairs
- And only multilateral reciprocity, not bilateral reciprocity, required

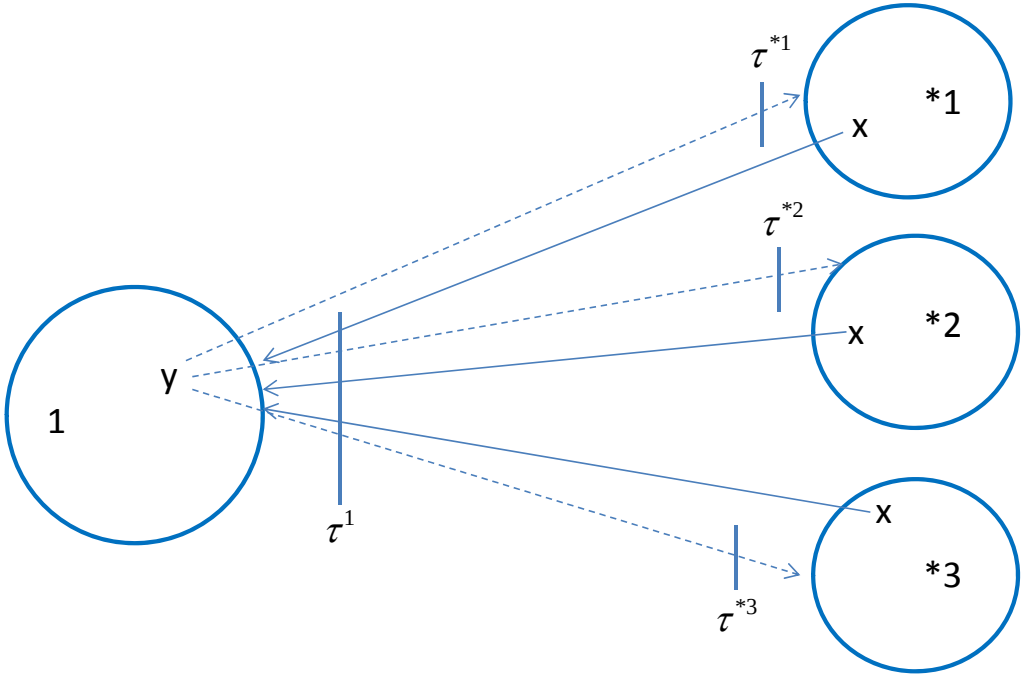
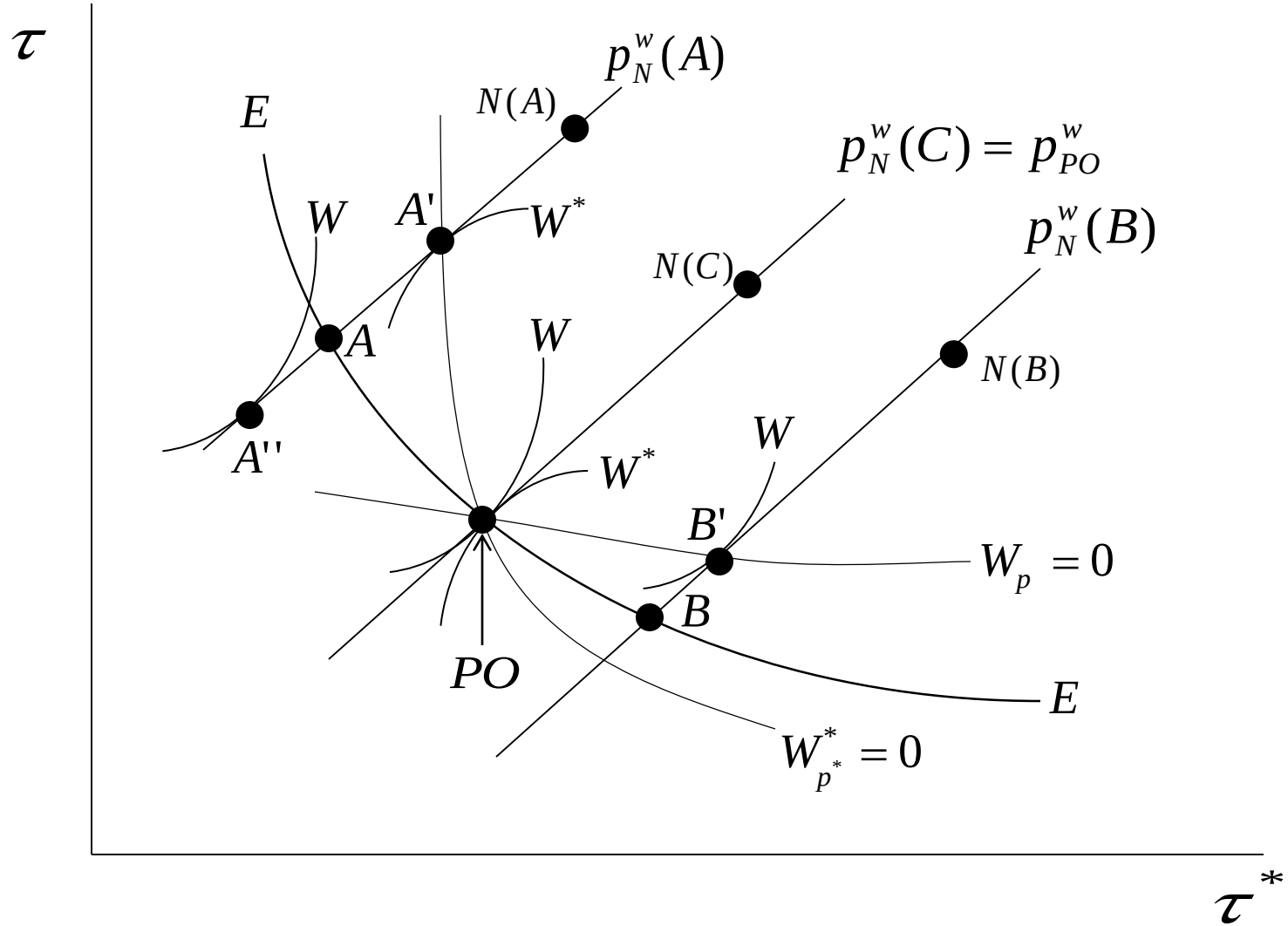


Figure 8: Multilateral Reciprocity

Interpretation of Tariff Bargaining at Torquay

- But simplicity comes at potential cost
  - If GATT bargaining partners are asymmetric
  - strict adherence to reciprocity and MFN implies rationing, prevents govs from reaching the full information efficiency frontier


τ
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$p_N^w(B)$
$N(C)$
A
W
$N(B)$
A''
W^*
W
B'
$W_p = 0$
B
PO
E
$W_{p^*}^* = 0$
τ^*

Interpretation of Tariff Bargaining at Torquay

- But simplicity comes at potential cost
  - If GATT bargaining partners are asymmetric
  - strict adherence to reciprocity and MFN implies rationing, prevents govs from reaching the full information efficiency frontier
- $\therefore$ ToT theory plus strict adherence to multilateral reciprocity and MFN implies
  - a dominant strategy for each gov to offer own-tariff cuts that deliver the import volume it desires at the fixed terms of trade, followed by
  - a phase of multilateral rebalancing to ensure dual requirements of multilateral reciprocity and voluntary exchange are respected
  - Bagwell and Staiger, 2018

Interpretation of Tariff Bargaining at Torquay

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  - Bagwell and Staiger, 2018
- $\Rightarrow$ Through the lens of ToT theory, reciprocity and MFN can be seen as offering pragmatic approach to simplifying tariff bargaining

GATT's Multilateralization of Reciprocity

- The multilateralization of the reciprocity constraint viewed as key innovation of GATT (ICITO, 1949)
- Was the relaxation of bilateral reciprocity afforded by the multilateral nature of the GATT bargaining forum a key to GATT's success?
- Look for indirect evidence
  - exploit unexpected breakdown in US-Commonwealth bilaterals

GATT's Multilateralization of Reciprocity

"The fact that certain of the more important negotiations initiated between existing contracting parties did not result in agreements inevitably had some reactions on other negotiations. If, for example, the other countries engaged in tariff negotiations at Torquay had been sure that substantial concessions were going to be exchanged between the United Kingdom, Australia and New Zealand on the one hand, and the United States on the other, they might have been prepared, in the light of the benefits which they would have enjoyed from the automatic extension of these concessions to them, to go somewhat further in reducing their own tariffs. (ICITO, 1952)"

GATT's Multilateralization of Reciprocity

- If govs expected indirect trade benefits from the MFN tariff cuts negotiated between 3^{rd}-countries to achieve multilateral reciprocity
  - then we should see evidence of efforts to rebalance their bargains when they learned of the collapse of the US-Commonwealth bilaterals
  - whereas no such reaction would be expected if strictly bilateral reciprocity had been demanded and achieved all along
- Two ways to rebalance
  - 3^{rd} countries could retrench on offers to US, UK, Australia and New Zealand, or
  - these four countries could reorient offers directly to 3^{rd} countries

GATT's Multilateralization of Reciprocity

- Did 3^{rd} countries retrench on their offers to the US, UK, Australia and New Zealand once news of the failed bilaterals was out?
  - "News" date 2/18/51
  - Yes, if France is excluded as special: share of product-level offers made to these four countries by the others at Torquay dropped from 40% to 37% after news broke of the failed bilaterals
- Did the failure of the US-Commonwealth bilaterals lead the US, UK, Australia and New Zealand to reorient their offers to 3^{rd} countries?
  - Yes, strong evidence of this. Table 9
- $\therefore$ These four countries re-oriented their offers toward the rest of the participants at Torquay at the same time that the rest of the participants were re-orienting their offers away from these countries

	Probit	Probit	OLS	OLS
OfferPre	0.303**	0.647***	0.068**	0.099***
	(0.148)	(0.161)	(0.032)	(0.031)
Observations	3031	2277	3031	3031
R-squared			0.162	0.563
Country FE	Yes	No	Yes	No
Country Pair FE	No	Yes	No	Yes
HS1 FE	No	Yes	No	Yes
Cluster SE	Yes	Yes	Yes	Yes

Table 9: Regression of whether an HS6 product - country pairing offered by the US, the UK, Australia or New Zealand to countries outside this set was added after 2/18/1951 (after the breakdown of the US-UK, US-Australia and US-New Zealand bilaterals) on whether the product in question had been offered by that country in one of these bilaterals prior to their breakdown. A positive coefficient implies that a product is more likely to be offered by one of these countries to countries outside this set following the breakdown of the US-UK, US-Australia and US-New Zealand bilaterals if that country was offering a concession on this product in one of these bilaterals prior to their breakdown. Standard errors clustered by negotiating partner. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Takeaway on Torquay

- We have identified a set of stylized facts about tariff negotiations which point to two features that are seen as hallmarks of the tariff bargaining that occurred in the early GATT rounds
  - a lack of strategic behavior among the participating governments
  - and an important multilateral element to the bilateral bargains
- We have shown that, when viewed through the lens of the ToT theory, these features can be understood as emerging from a tariff bargaining forum built on the GATT pillars of MFN and multilateral reciprocity
- We have provided the first evidence for the claim that the relaxation of strict bilateral reciprocity facilitated by the GATT multilateral bargaining forum was important to the success of GATT
- As more and more of this data becomes accessible to researchers, we view our initial look at the GATT bargaining data as providing a promising view for the road ahead

Conclusion

- The GATT/WTO has made extensive use of simultaneous bilateral tariff bargaining, subject to
  - a non-discrimination rule (MFN)
  - principal supplier and reciprocity norms
  - bindings
- These features of the bargaining protocol shape the externalities stemming from bilateral tariff bargains
- Our analysis of bilateral tariff bargaining in a multi-country quantitative trade model and our interpretation of evidence from the GATT bargaining records point to
  - the importance of bargaining externalities in multilateral tariff negotiations
  - the importance of the norms and rules that shape these externalities for the determination of tariff bargaining outcomes

Tariff-and-Transfer Bargaining

- We augment the model of tariff bargaining described above to allow countries to also bargain over costly transfers
- A country's welfare is its real national income, now augmented by the net international transfer it receives
  - a direct utility transfer rather than an income transfer, with no general equilibrium effects as a result
  - we do not allow transfers to relax the requirement of a "double coincidence of wants" for viable bargaining pairs
- Let $\Pi_i(\mathbf{t}, \mathbf{m})$ be country i's welfare when the world vector of tariffs is $\mathbf{t}$ and the world vector of net transfers is $\mathbf{m}$

Tariff-and-Transfer Bargaining

- When country i negotiates with j, they select the levels of the tariffs that they negotiate $\boldsymbol{\tau}$ and the net transfer μ_{ij} that i pays to j to maximize their Nash product $NP_{ij}(\boldsymbol{\tau}, \mathbf{t}_{-ij}, \mu_{ij}, \mathbf{m}_{-ij})$

$$\Big(\Pi_i(\boldsymbol{\tau}, \mathbf{t}_{-ij}, \mu_{ij}, \mathbf{m}_{-ij}) - \Pi_i(\boldsymbol{\tau}_0, \mathbf{t}_{-ij}, \mu_0, \mathbf{m}_{-ij})\Big)^{\zeta_{ij}} \cdot \Big(\Pi_j(\boldsymbol{\tau}, \mathbf{t}_{-ij}, \mu_{ij}, \mathbf{m}_{-ij}) - \Pi_j(\boldsymbol{\tau}_0, \mathbf{t}_{-ij}, \mu_0, \mathbf{m}_{-ij})\Big)^{1-\zeta_{ij}}$$

  with $\boldsymbol{\tau}_0$ the disagreement (1990) level of $\boldsymbol{\tau}$ and μ_0 the disagreement level (zero) of μ_{ij}

- If i makes a positive net transfer to its bargaining partners in total (i.e., if $\sum_j \mu_{ij} > 0$), then i pays an additional utility cost $\kappa(\sum_j \mu_{ij})^2$

- An *equilibrium in tariffs and transfers* is a vector $\mathbf{t}$ and a vector $\mathbf{m}$ s.t. for each pair ij the tariffs and transfer negotiated by this pair maximize $NP_{ij}(\boldsymbol{\tau}, \mathbf{t}_{-ij}, \mu_{ij}, \mathbf{m}_{-ij})$ given $\mathbf{t}_{-ij}$ and $\mathbf{m}_{-ij}$

Reciprocity

- Reciprocity in GATT/WTO
  - A change in trade policies from (τ^0, τ^{*0}) to (τ^1, τ^{*1}) satisfies the principle of reciprocity iff it offers a balance of concessions in that

$$\tilde{P}^w(0)[M(1) - M(0)] = E(1) - E(0).$$

  - Fixes the terms of trade (terms of exchange of market access)

- Norm of negotiation (reciprocity going down)
  - Govs make tariff proposals that satisfy reciprocity
  - $\Longrightarrow$ No bargaining over the terms of exchange

- Rule of renegotiation (reciprocity going up)
  - Voluntary exchange: no gov can be forced to import more volume than it proposes at the fixed terms of trade
  - $\Longrightarrow$ No bargaining over the volume of exchange

The French are Special

- A November 8 1950 *New York Times* article ran with the headline

  French Now Seek New Tariff Duties: Torquay Trade Body Amazed as Paris Negates Efforts to Relax Import Curbs

- A March 11 1951 *New York Times* article stated

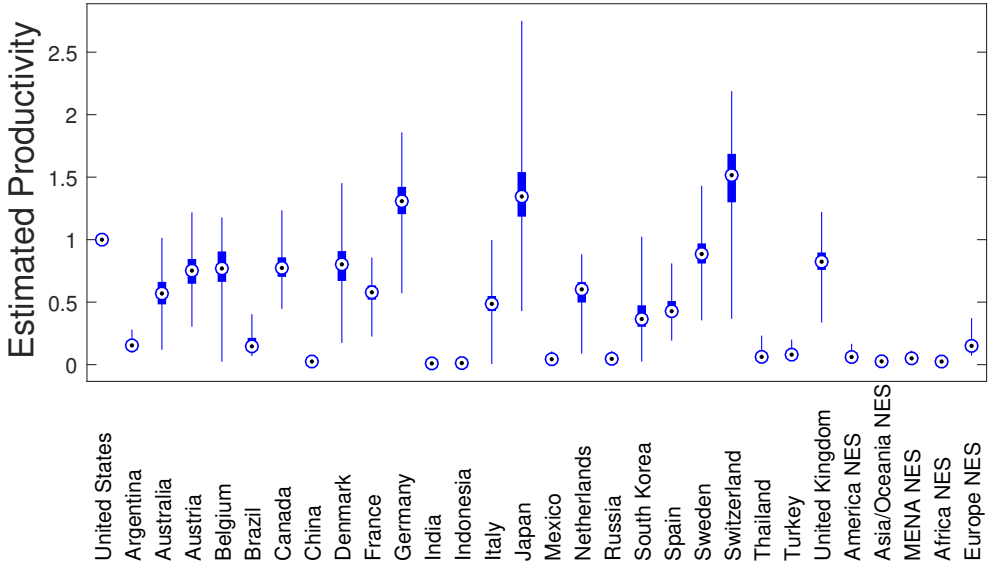
  France, which was frightening all participants in November with the number of items on which she wanted to raise duties (mostly items on which the French granted reductions in the earlier meetings at Geneva and Annecy) has mollified most of her trading partners..., all after prolonged and sometimes acrimonious bargaining in dozens of hotel rooms.

Table 2: θ Estimates by Industry.

Sector	$\hat{\theta}$	SE	Sector	$\hat{\theta}$	SE
Live animals	40.87	2.10	Footwear	8.50	5.12
Misc. Edible	24.44	10.75	Chemical	8.32	5.03
Petroleum	22.38	11.31	Non-metallic mineral manufactures	8.31	8.00
Dairy	21.77	10.22	Crude rubber	8.09	4.73
All others	18.45	9.45	Office machines	8.02	3.42
Cereals	17.16	5.86	Specialized Machinery	7.82	4.15
Feeding stuff	16.94	7.19	Pulp and waste paper	7.77	2.10
Plumbing, heating and lighting	15.86	6.18	Crude materials,n.e.s.	7.74	3.31
Furniture and parts thereof	15.03	7.75	Travel goods and bags	7.67	3.80
Paper manufactures	11.98	10.67	Road vehicles	7.51	4.03
Electrical machinery	11.91	3.91	Meat	7.50	3.64
Wood manufactures	11.82	6.63	Non-ferrous metals	7.42	3.89
Vegetables and fruit	11.78	8.01	Fertilizers	7.32	4.91
Beverages	11.73	1.71	Tobacco	7.15	4.31
Misc manufactures	10.92	4.28	Fabrics	7.07	4.36
Rubber manufactures	10.81	5.49	Organic chemicals	6.99	5.25
Animal oils and fats	10.63	3.29	Iron and steel	6.94	5.87
Coffee, Tea, Spices	10.46	10.30	Scientific instruments	6.91	3.63
Power generating machinery	10.23	4.99	Other transport equipment	6.42	4.13
Inorganic chemicals	10.19	5.42	Seafood	5.67	3.83
Hides and skins	9.44	4.59	Coal	5.38	1.65
Sugar	9.35	3.52	Pharmaceutical	4.36	1.29
Cork and wood	9.07	5.63	Metal Ores	4.13	0.92
Resins	8.94	4.97	Textile fibres	3.98	0.98
Dyeing and tanning	8.78	4.85			

Notes: Non-linear least squares estimates of θ by sector in descending order of estimate.

Figure 1: Productivity Distributions by Country



Notes: For each country, the target is the median estimated productivity across sectors. The box represents the interquartile range. The line represents the full range. Each sector in the US is normalized to a productivity level one.

Table 3: Model Benchmarks

Country	Autarky	Zero Iceberg Costs	Free Trade	Total Welfare Maximizing	Nash
United States	-1.76%	18.82%	0.03%	-1.13%	-0.21%
EU	-5.44%	47.28%	0.00%	-1.62%	-0.01%
Austria	-10.20%	58.09%	0.00%	-2.01%	-0.02%
Belgium	-17.05%	79.49%	-0.04%	-1.63%	0.00%
Denmark	-5.19%	90.64%	-0.02%	-1.47%	-0.01%
France	-4.98%	64.75%	-0.01%	-1.08%	-0.02%
Germany	-2.86%	29.75%	-0.06%	-2.10%	0.03%
Italy	-5.07%	44.12%	-0.05%	-2.08%	0.00%
Netherlands	-11.74%	85.97%	0.05%	-1.77%	-0.02%
Spain	-6.42%	62.85%	0.02%	-1.79%	0.01%
Sweden	-8.92%	51.38%	0.00%	-1.78%	-0.06%
United Kingdom	-4.61%	36.92%	0.15%	-0.86%	-0.07%
Argentina	-1.20%	107.26%	0.11%	0.66%	-0.08%
Australia	-3.31%	103.94%	0.20%	1.67%	0.09%
Brazil	-1.14%	86.00%	0.10%	1.52%	-0.08%
Canada	-6.88%	51.62%	0.07%	0.35%	-0.21%
China	-2.41%	52.99%	0.60%	1.27%	-0.01%
India	-2.44%	89.39%	0.53%	3.16%	0.12%
Indonesia	-2.35%	76.23%	0.34%	0.67%	-0.07%
Japan	-1.81%	23.45%	0.20%	0.85%	0.06%
Mexico	-2.67%	59.80%	0.01%	0.32%	-0.06%
Russia	-3.52%	75.16%	0.21%	0.83%	-0.49%
South Korea	-5.11%	54.65%	0.42%	1.45%	-0.03%
Switzerland	-5.78%	60.00%	-0.05%	-0.12%	0.01%
Thailand	-4.98%	152.18%	0.70%	2.86%	0.04%
Turkey	-3.43%	59.62%	-0.12%	-0.15%	0.05%
America NES	-3.88%	119.63%	0.28%	6.55%	-0.29%
Asia/Oceania NES	-5.58%	58.74%	0.77%	2.39%	-0.41%
MENA NES	-5.45%	94.58%	0.29%	1.13%	-0.90%
Africa NES	-2.20%	55.41%	0.13%	2.58%	-0.19%
Europe NES	-5.46%	43.00%	0.92%	2.95%	-0.61%
Total Welfare	-3.42%	47.26%	0.17%	0.25%	-0.10%

Notes: Estimated model's predicted percentage change in national welfare from estimated 1990 status quo for benchmark scenarios. In column 1, we set iceberg costs for all countries in all sectors to 5000%, effectively shutting down trade across countries. In column 2, we set iceberg costs to zero for all countries in all sectors. In column 3, we set all non-agricultural tariffs for the US, Australia, EU, Japan, and South Korea to zero. These four countries and the EU make up the set of negotiating countries based on principal supplier status according to our estimates. In column 4, we solve for the total welfare maximizing levels of non-agricultural tariffs for the five negotiating countries. In column 5, we compute a Nash equilibrium in non-agricultural tariffs for the five negotiating countries. Tariffs in columns 4 and 5 are non-discriminatory.

Table 4: Principal Supplier Relationships

	US	Argentina	Australia	EU	Brazil	Canada	China	India	Indonesia	Japan	Mexico	Russia	Korea	Switzerland	Thailand
US															
Argentina	12,0														
Australia	[11,2]	0,1													
EU	[25,26]	0,11	[1,21]												
Brazil	9,0	0,0	0,0	11,0											
Canada	0,0	0,0	[1,1]	[30,3]	0,0										
China	4,0	0,0	2,0	15,0	0,0	1,0									
India	8,0	0,0	1,0	21,0	0,0	0,0	0,0								
Indonesia	6,0	0,0	4,0	12,0	0,0	0,0	0,0	0,0							
Japan	[18,5]	0,0	[3,3]	[13,3]	0,0	0,3	0,12	0,2	0,10						
Mexico	35,0	0,0	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0					
Russia	0,0	0,0	1,0	33,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0				
Korea	[13,2]	0,0	[2,1]	[4,2]	0,0	0,1	0,0	0,0	0,2	[17,4]	0,0	0,0			
Switzerland	0,0	0,0	0,0	39,0	0,0	0,0	0,1	0,0	0,0	0,1	0,0	0,0	0,0		
Thailand	7,0	0,0	0,0	13,0	0,0	0,0	0,0	0,0	0,0	14,0	0,0	0,0	2,0	0,0	
Turkey	3,0	0,0	0,0	34,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0

	US	Argentina	Australia	EU	Brazil	Canada	China	India	Indonesia	Japan	Mexico	Russia	Korea	Switzerland	Thailand
USA															
Argentina	17,0														
Australia	[20,1]	0,0													
EU	[30,24]	0,17	0,7												
Brazil	9,0	0,0	0,0	17,0											
Canada	0,0	0,0	1,0	27,0	0,0										
China	3,0	0,0	2,0	19,0	0,0	0,0									
India	3,0	0,0	1,0	25,0	0,0	0,0	0,0								
Indonesia	2,0	0,0	4,0	19,0	0,0	0,0	0,0	0,0							
Japan	[28,9]	0,0	0,8	[7,3]	0,0	0,5	0,11	0,2	0,8						
Mexico	0,0	0,0	2,0	28,0	0,0	0,0	0,0	0,0	0,0	1,0					
Russia	3,0	0,0	0,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0				
Korea	4,0	0,0	[2,2]	[16,2]	0,0	0,0	0,2	0,0	0,0	[14,2]	0,1	0,1			
Switzerland	1,0	0,0	0,0	37,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		
Thailand	3,0	0,0	2,0	21,0	0,0	0,0	0,0	0,0	0,0	7,0	0,0	0,0	0,0	0,0	
Turkey	1,0	0,0	0,0	36,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Notes: The top panel presents principal supplier relationships according to the data. The bottom panel represents principal supplier relationships according to the trade model at the estimated parameter vector. For each cell in the table, the first entry gives the number of products for which the column country is the principal supplier into the row country, and the second entry gives the number of products for which the row country is the principal supplier into the column country. For the numbers in this table, trade with fellow PTA members has been netted out. Square brackets indicate the bilateral relationships where both entries are positive.

Table 5: Bargaining Model Parameter Estimates

Country	Bargaining Parameter	SE
USA	0	-
Australia	-10.981	0.174
EU	-12.017	0.224
Japan	6.841	0.453
South Korea	-3.349	0.928
	Parameter	SE
Cost of Transfers Coefficient	277.613	0.928

Notes: Estimated bargaining parameters (a_i) and coefficient on quadratic transfer cost. The parameter for the US is normalized to 0.

Figure 2: US and EU Welfare Frontier

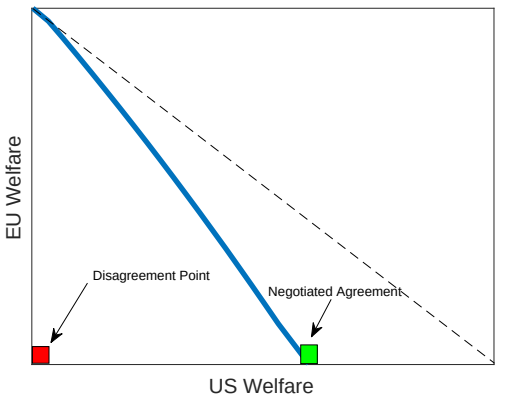
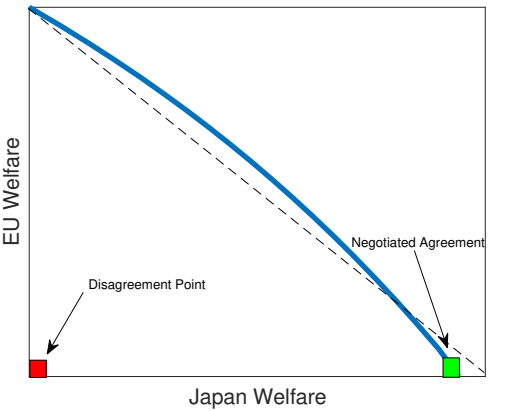


Figure 3: EU and Japan Welfare Frontier



Notes: These curves represents the frontier of feasible welfare pairs for the US-EU bilateral (left panel) and Japan-EU bilateral (right panel) negotiations holding the other pairs fixed at the equilibrium outcomes. The dashed line has slope equal to minus one.

Table 6: Spillover Benefits to Third Parties (MFN Negotiations)

			Tariff Reduction from Agreement			Tariff Reduction from Binding		
Country 1	Country 2	Reducing Country	Δ Welfare Country 1 (1)	Δ Welfare Country 2 (2)	Δ Welfare 3rd Parties (3)	Δ Welfare Country 1 (4)	Δ Welfare Country 2 (5)	Δ Welfare 3rd Parties (6)
US	Aus	US	-1.000	2.677	3.594	-1.000	3.285	4.520
US	Aus	Aus	0.083	-1.000	0.384	0.090	-1.000	0.398
US	EU	US	-1.000	1.557	1.231	-1.000	2.516	2.144
US	EU	EU	0.335	-1.000	1.410	0.405	-1.000	1.728
US	Japan	US	-1.000	1.166	0.712	-1.000	2.240	1.347
US	Japan	Japan	0.501	-1.000	0.460	0.576	-1.000	0.564
Aus	Korea	Aus	-1.000	0.731	3.909	1.000	0.048	0.240
Aus	Korea	Korea	0.786	-1.000	1.015	0.725	-1.000	1.134
EU	Japan	EU	-1.000	0.609	0.677	-1.000	15.438	19.550
EU	Japan	Japan	0.739	-1.000	0.573	1.495	-1.000	1.382
EU	Korea	EU	-1.000	0.513	4.766	1.000	0.160	1.361
EU	Korea	Korea	0.783	-1.000	1.972	0.928	-1.000	2.658
Japan	Korea	Japan	-1.000	0.826	1.555	1.000	0.629	1.103
Japan	Korea	Korea	0.991	-1.000	1.275	5.723	1.000	8.413

Notes: Each row corresponds to a unilateral marginal decrease in tariffs by the "reducing country." The reducing country reduces tariffs on all goods that it negotiates with the partner country in that row. The welfare changes are normalized so that the reducing country has an absolute welfare change equal to one. The first set of welfare columns presents changes in welfare when all tariffs begin from the negotiated agreement. The second set of welfare columns presents changes in welfare when all tariffs begin from 1990 levels.

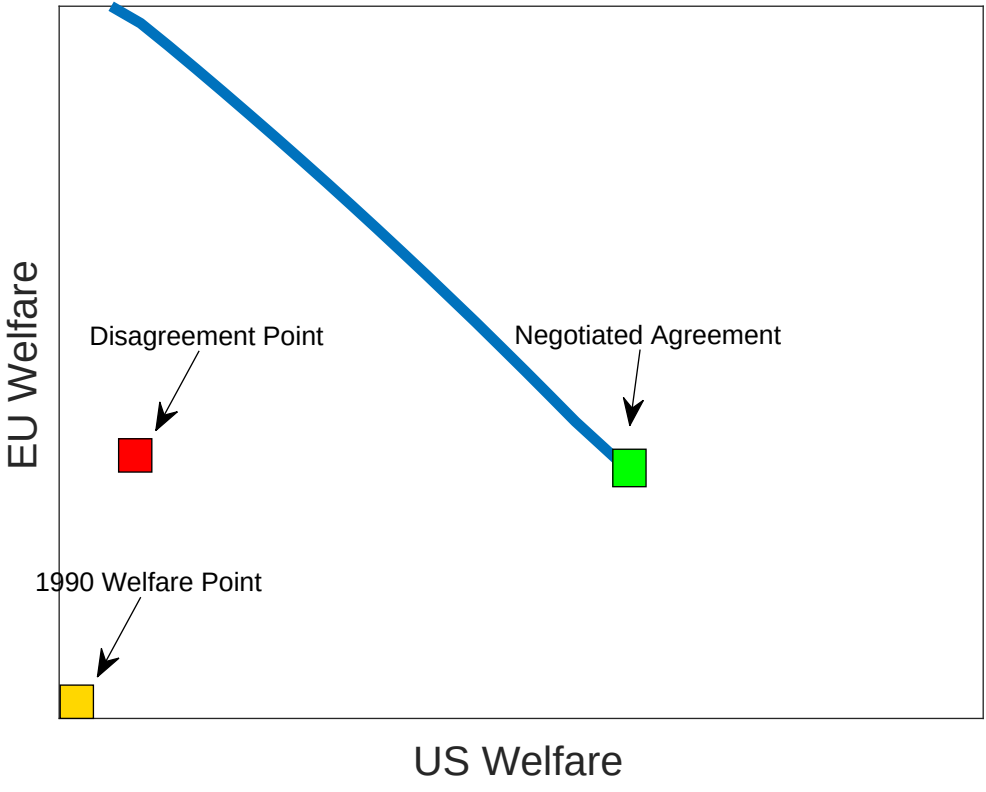

EU Welfare
Disagreement Point
Negotiated Agreement
1990 Welfare Point
US Welfare

Table 7: Estimated Uruguay Round and Counterfactual Outcomes

	MFN		No MFN
	Tariffs		
Average Tariffs	-46.95%		
Weighted Average Tariffs	-54.50%		
	Country Welfare		
		with transfers	with transfers
United States	0.00%	0.04%	
EU	0.04%	0.02%	
Austria	0.07%	0.05%	
Belgium	0.01%	0.00%	
Denmark	0.02%	0.00%	
France	0.03%	0.00%	
Germany	0.00%	-0.01%	
Italy	0.02%	-0.02%	
Netherlands	0.05%	0.03%	
Spain	0.07%	0.02%	
Sweden	0.06%	0.04%	
United Kingdom	0.14%	0.12%	
Argentina	0.05%	0.05%	
Australia	0.08%	0.04%	
Brazil	0.05%	0.05%	
Canada	0.00%	0.00%	
China	0.35%	0.35%	
India	0.31%	0.31%	
Indonesia	0.14%	0.14%	
Japan	0.21%	0.20%	
Mexico	0.00%	0.00%	
Russia	0.07%	0.07%	
South Korea	0.47%	0.43%	
Switzerland	-0.04%	-0.04%	
Thailand	0.42%	0.42%	
Turkey	-0.08%	-0.08%	
America NES	0.11%	0.11%	
Asia/Oceania NES	0.36%	0.36%	
MENA NES	0.06%	0.06%	
Africa NES	0.05%	0.05%	
Europe NES	0.40%	0.40%	
Total Welfare	0.12%	0.11%	

Notes: Each column represents changes in the row relative to the pre-Uruguay tariff levels. The first set of columns represents the Horn-Wolinsky MFN solution at the estimated bargaining parameters. The second set of columns represents the Horn-Wolinsky discriminatory solution at the estimated bargaining parameters.

Table 7: Estimated Uruguay Round and Counterfactual Outcomes

	MFN		No MFN	
	Tariffs			
Average Tariffs	-46.95%		-47.43%	
Weighted Average Tariffs	-54.50%		-48.96%	
	Country Welfare			
		with transfers		with transfers
United States	0.00%	0.04%	0.03%	0.09%
EU	0.04%	0.02%	-0.03%	-0.05%
Austria	0.07%	0.05%	-0.02%	-0.04%
Belgium	0.01%	0.00%	0.00%	-0.01%
Denmark	0.02%	0.00%	-0.04%	-0.05%
France	0.03%	0.00%	0.05%	0.03%
Germany	0.00%	-0.01%	-0.09%	-0.10%
Italy	0.02%	-0.02%	0.01%	-0.02%
Netherlands	0.05%	0.03%	0.02%	0.01%
Spain	0.07%	0.02%	-0.07%	-0.10%
Sweden	0.06%	0.04%	0.02%	0.00%
United Kingdom	0.14%	0.12%	-0.03%	-0.04%
Argentina	0.05%	0.05%	-0.02%	-0.02%
Australia	0.08%	0.04%	0.22%	-0.03%
Brazil	0.05%	0.05%	-0.02%	-0.02%
Canada	0.00%	0.00%	-0.10%	-0.10%
China	0.35%	0.35%	-0.10%	-0.10%
India	0.31%	0.31%	-0.06%	-0.06%
Indonesia	0.14%	0.14%	-0.05%	-0.05%
Japan	0.21%	0.20%	0.29%	0.28%
Mexico	0.00%	0.00%	-0.04%	-0.04%
Russia	0.07%	0.07%	-0.04%	-0.04%
South Korea	0.47%	0.43%	-1.86%	-2.02%
Switzerland	-0.04%	-0.04%	-0.07%	-0.07%
Thailand	0.42%	0.42%	-0.07%	-0.07%
Turkey	-0.08%	-0.08%	-0.06%	-0.06%
America NES	0.11%	0.11%	0.02%	0.02%
Asia/Oceania NES	0.36%	0.36%	-0.16%	-0.16%
MENA NES	0.06%	0.06%	-0.08%	-0.08%
Africa NES	0.05%	0.05%	-0.02%	-0.02%
Europe NES	0.40%	0.40%	-0.12%	-0.12%
Total Welfare	0.12%	0.11%	0.00%	-0.01%

Notes: Each column represents changes in the row relative to the pre-Uruguay tariff levels. The first set of columns represents the Horn-Wolinsky MFN solution at the estimated bargaining parameters. The second set of columns represents the Horn-Wolinsky discriminatory solution at the estimated bargaining parameters.

Table 8: Spillover Benefits to Third Parties (Discriminatory Negotiations)

			Tariff Reduction from Agreement			Tariff Reduction from Binding		
Country 1	Country 2	Reducing Country	Δ Welfare Country 1 (1)	Δ Welfare Country 2 (2)	Δ Welfare 3rd Parties (3)	Δ Welfare Country 1 (4)	Δ Welfare Country 2 (5)	Δ Welfare 3rd Parties (6)
US	Aus	US	-1.000	2.138	-0.270	-1.000	11.018	-1.598
US	Aus	Aus	0.201	-1.000	-0.004	0.312	-1.000	0.011
US	EU	US	-1.000	1.450	-0.538	-1.000	4.588	-1.136
US	EU	EU	0.521	-1.000	-0.060	1.717	-1.000	-0.180
US	Japan	US	-1.000	1.397	-0.197	-1.000	3.619	-0.633
US	Japan	Japan	0.608	-1.000	-0.120	1.004	-1.000	-0.066
Aus	Korea	Aus	-1.000	0.729	-0.720	1.000	1.672	-1.060
Aus	Korea	Korea	1.805	-1.000	-0.345	8.255	-1.000	-1.635
EU	Japan	EU	-1.000	0.941	-0.016	-1.000	4.635	-0.327
EU	Japan	Japan	0.944	-1.000	-0.267	1.596	-1.000	-0.079
EU	Korea	EU	-1.000	0.716	-0.294	-1.000	2.873	0.436
EU	Korea	Korea	1.026	-1.000	-0.985	20.792	-1.000	-2.628
Japan	Korea	Japan	-1.000	1.101	-0.712	-1.000	9.263	-3.009
Japan	Korea	Korea	0.936	-1.000	-0.374	89.785	1.000	-8.289

Notes: Each row corresponds to a unilateral marginal decrease in tariffs by the "reducing country." The reducing country reduces tariffs on all goods that it negotiates with the partner country in that row. The welfare changes are normalized so that the reducing country has an absolute welfare change equal to one. The first set of welfare columns presents changes in welfare from a discriminatory reduction when all tariffs begin from the negotiated agreement. The second set of welfare columns presents changes in welfare from a discriminatory reduction when all tariffs begin from 1990 levels.

Figure 1
Efficient Tariffs

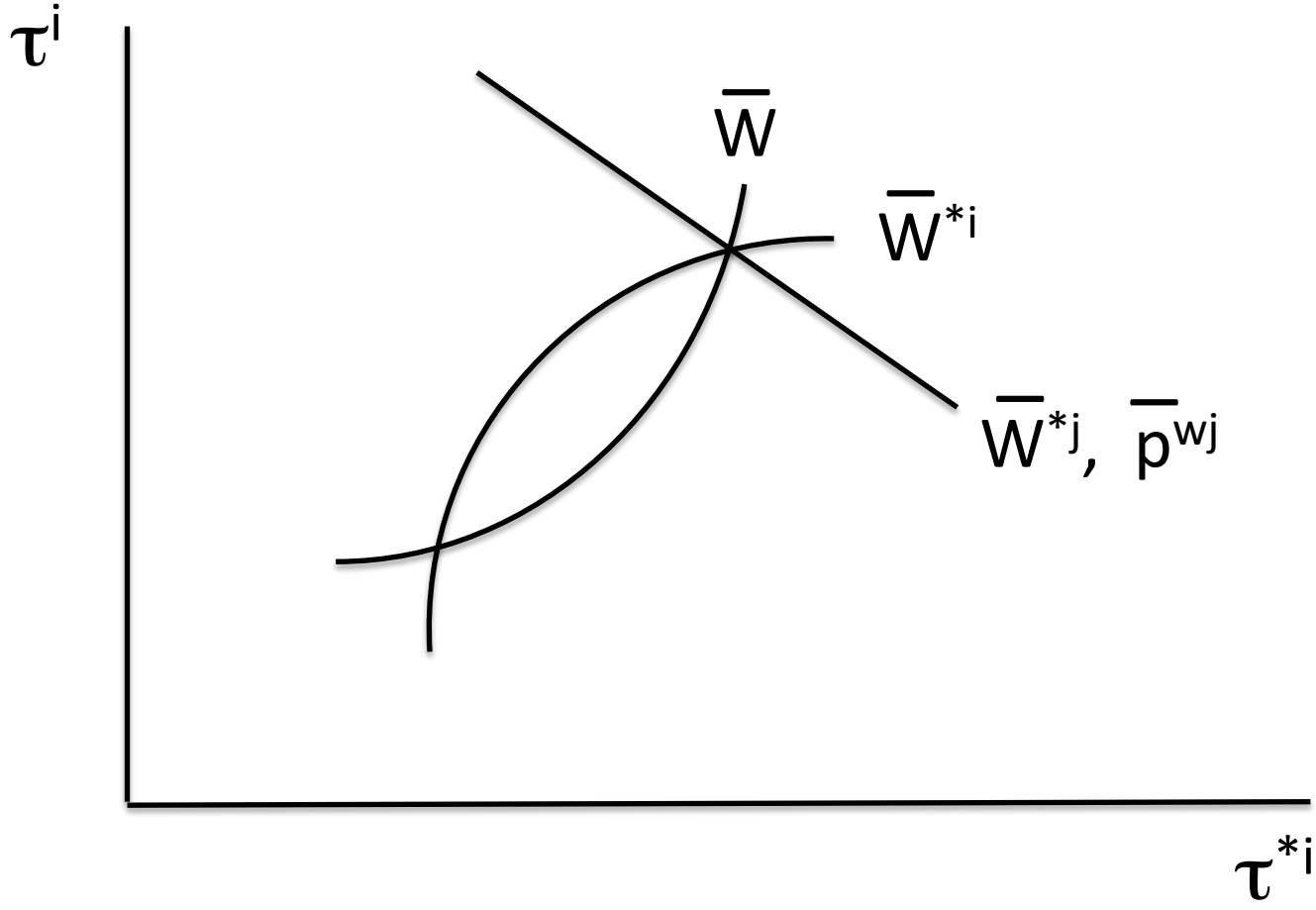


Table 1: Summary Statistics

Country	Pop(M)	Mnfctring V.A. per capita(000)	Import ratio	1990 Average Tariffs	1990 Trade Weighted Tariffs	2000 Average Tariffs	2000 Trade Weighted Tariffs	Largest Trading Partner
USA	249.6	4258.8	0.187	0.045	0.048	0.032	0.043	Canada
Argentina	32.6	768.9	0.017	0.115	0.099	0.142	0.118	USA
Australia	17.1	2546.9	0.096	0.136	0.109	0.069	0.054	Japan
Austria	7.7	3265.8	0.503	0.061	0.066	0.033	0.034	Germany
Belgium	10.0	3428.3	0.386	0.061	0.054	0.033	0.028	Germany
Brazil	149.4	742.1	0.019	0.259	0.169	0.136	0.094	USA
Canada	27.8	3138.7	0.336	0.080	0.081	0.041	0.030	USA
China	1140.9	72.1	0.084	0.102	0.111	0.076	0.071	USA
Denmark	5.1	3596.6	0.213	0.061	0.057	0.033	0.029	Germany
France	56.7	2315.9	0.241	0.061	0.059	0.033	0.030	Germany
Germany	79.4	5421.1	0.228	0.061	0.062	0.033	0.032	France
India	849.5	23.8	0.038	0.772	0.576	0.323	0.238	MENA NES
Indonesia	178.2	61.6	0.058	0.196	0.133	0.076	0.052	Japan
Italy	56.7	2051.8	0.259	0.061	0.052	0.033	0.027	Germany
Japan	123.5	5804.5	0.122	0.053	0.027	0.035	0.019	USA
Mexico	83.2	226.5	0.081	0.118	0.110	0.149	0.124	USA
Netherlands	15.0	2425.4	0.240	0.061	0.057	0.033	0.028	Germany
Russia	148.3	236.1	0.128	0.087	0.056	0.104	0.076	Europe NES
S. Korea	42.9	1875.7	0.176	0.109	0.089	0.083	0.049	USA
Spain	38.8	1815.3	0.410	0.061	0.054	0.033	0.027	France
Sweden	8.6	3731.1	0.383	0.061	0.061	0.033	0.030	Germany
Switzerland	6.7	6255.8	0.299	0.199	0.113	0.063	0.033	Germany
Thailand	54.6	408.7	0.091	0.397	0.317	0.136	0.096	Japan
Turkey	56.2	413.3	0.134	0.079	0.067	0.052	0.034	Germany
UK	57.6	3541.4	0.305	0.061	0.061	0.033	0.031	Germany
America NES	183.1	243.9	0.077	0.119	0.100	0.107	0.087	USA
AsiaPac NES	671.3	104.7	0.207	0.129	0.108	0.068	0.049	USA
MENA NES	207.5	181.9	0.140	0.167	0.151	0.192	0.136	Japan
Africa NES	480.8	48.1	0.041	0.153	0.136	0.118	0.106	USA
Europe NES	207.5	608.7	0.273	0.075	0.059	0.074	0.055	Germany

Notes: Trade and tariff summary statistics at the level aggregation used for the analysis.

Table 9: Product Classification

Product Category	Corresponding SITC rev.2	Description
1	0	Live animals chiefly for food
2	1	Meat and meat preparations
3	2	Dairy products and birds'eggs
4	3	Fish,crustaceans,mollucs,preparations thereof
5	4	Cereals and cereal preparations
6	5,22	Vegetables and fruit; Oil seeds and oleaginous fruit
7	6	Sugar,sugar preparations and honey
8	7	Coffee,tea,cocoa,spices,manufactures thereof
9	8	Feeding stuff for animals,not incl.unmil.cereals
10	9	Miscel.edible products and preparations
11	11	Beverages
12	12	Tobacco and tobacco manufactures
13	21,61	Hides,skins and furskins,raw; Leather, leather manuf., n.e.s.and dressed furskisg
14	23	Crude rubber (including synthetic and reclaimed)
15	24	Cork and wood
16	25	Pulp and waste paper
17	26	Textile fibres (except wool tops) and their wastes
18	27,55,56,57	Crude materials; Essential oils & perfume mat.;toilet-cleansing mat; Fertilizers; Pyrotechnic products
19	28	Metalliferous ores and metal scrap
20	29	Crude animal and vegetable materials,n.e.s.
21	32	Coal,coke and briquettes
22	33,34	Petroleum,petroleum products and related; Gas,natural and manufactured materials
23	41,42,43	Animal oils and fats; Fixed vegetable oils and fats; Animal-vegetable oils-fats,processed,and waxes
24	51	Organic chemicals
25	52	Inorganic chemicals
26	53	Dyeing,tanning and colouring materials
27	54	Medicinal and pharmaceutical products
28	58	Artif.resins,plastic mat.,cellulose esters/ethers
29	59	Chemical materials and products,n.e.s.
30	62	Rubber manufactures,n.e.s.
31	63	Cork and wood manufactures (excl.furniture)
32	64	Paper,paperboard,artic.of paper,paper-pulp/board
33	65	Textile yarn,fabrics,made-upart.,related products
34	66	Non-metallic mineral manufactures,n.e.s.
35	67	Iron and steel
36	68,69	Non-ferrous metals; Manufactures of metal,n.e.s.
37	71	Power generating machinery and equipment
38	72,73,74	Machinery specialized for particular industries; Metalworking machinery; General industrial machinery & equipment,and parts
39	75,76	Office machines & automatic data processing; Telecommunications & sound recording apparatus equip.
40	77	Electrical machinery,apparatus & appliances n.e.s.
41	78	Road vehicles (incl. air cushion vehicles
42	79	Other transport equipment
43	81	Sanitary,plumbing,heating and lighting fixtures
44	82	Furniture and parts thereof
45	83,84	Travel goods,handbags and similair containers; Articles of apparel and clothing accessories
46	85	Footwear
47	87,88	Professional,scientific & controling instruments ; Photographic apparatus,optical goods,watches
48	89	Miscellaneous manufactured articles,n.e.s.
49	90,91,93,94,95,96,97	Others