THE POLITICAL ECONOMY OF TRADE AGREEMENTS:

AN EMPIRICAL INVESTIGATION

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Abstract: More than 300 trade agreements have been signed since 1950. Two leading theoretical answers to explain the phenomenal growth in trade integration and to understand the variation in speed and scope of liberalization in the design of trade agreements have emerged. One is that trade agreements internalize a terms-of-trade externalities (Bagwell and Staiger 1999): without trade agreements, we would live in a world where countries beggar their neighbors with high tariffs. The other is that trade agreements help governments solve their commitment-to-free-trade problems (Maggi and Rodriguez-Clare 2007), which they bring on themselves by acceding to protectionist demands of domestic firms: trade agreements present an opportunity to governments to break free of these ties and liberalize. Together, the two theories form the basis for a clear political-economy theory of trade agreements. The empirical validity of these explanations has not been tested to date. This paper rigorously tests model-driven hypotheses from both theories. A unique data set on Asian and Latin American trade agreements is constructed. Within-variation in tariffs across country-partner dyads for each manufacturing sector over time is used in the context of quasi-experimental methods.

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1. INTRODUCTION

More than 300 preferential trade agreements (PTA) have been signed since 1950 with variation in speed, scope, and design in trade liberalization. To what must we attribute this phenomenal growth in international trade integration? What explains the move to trade liberalization?

Broadly, the economics literature points to two reasons. The first is that trade agreements are liberalizing and welfare-improving in the sense that they solve a terms-of-trade externality through a contract between two countries, or the "trade agreement". Johnson's (1954) analysis of the optimum tariff and retaliation in a world with large countries has been refined by Bagwell and Staiger (1999). In Bagwell and Staiger's view, the need to avoid terms of trade externalities has been the primary impetus for the formation of institutions that govern trade like the GATT/WTO. Without these institutions, countries would exploit their buying power by imposing optimal tariffs on imports would be able to impose a negative externality on their trading partners by forcing suppliers to price their products below the free-trade world price. They expand the applicability of this principle to the formation of trade agreements as well.[1]

The second reason for the flood of trade agreements recognizes that politics plays a key role in the formation of trade policy and that recourse to trade agreement is intrinsically linked to politics. A powerful reason why a government protects domestic producers from foreign competition is that their inefficiency requires domestic producers to be protected to survive. For this some domestic producers pay the government handsomely. For some time, governments are able and willing to "distort" prices by imposing tariffs and other forms of trade protection and accept "compensation" for the welfare loss that its public suffers.[2] Protection is a strong and stable equilibrium of this political game, that is, the tariffs that a government unilaterally

[1] Empirical support for the terms of trade argument is provided in Anderson and Yotov (2011), Arcand, Olarreaga and Zoratto (2011), Broda, Limao and Weinstein (2008) and Ludema and Mayda (2011).

[2] Research has now established, theoretically and empirically, the influence of special interest in the making of trade policy. The theoretical model of Grossman and Helpman (1994) has found strong empirical support in Goldberg and Maggi (1999), Gawande and Bandyopadhay (2000) and a host of related empirical work. Baccini et al. (2011) recently find this is true also in trade agreements.

imposes is politically optimal. In a static framework, or over the short run, there is no reason to change tariffs since factors (e.g. human capital, physical capital) are specific and immobile, and therefore the tariffs compensate the government appropriately for the welfare loss the protection imposes on the public.

What, then, compels a government to give up the ability to be handsomely compensated and liberalize trade by signing trade agreements? Signing trade agreements allow preferential market access to producers in (select) countries to out-compete the same producers who are the source of monetary contributions to the government. Maggi and Rodriguez-Clare (2007, henceforth MR-C) posit that it is because, over the years, protection leads to a severe misallocation of resources, much more than what the government gets compensated. The dynamic misallocation of resources is more than the government can tolerate and as a result, the government uses a trade agreement as an opportunity to correct this misallocation.

But why is there so much resource misallocation? And why is the government not correctly compensated for this by firms that enjoy the rents from being protected? Resource misallocation arises because over the longer run the factors are no longer immobile and "stuck" as they are in the short run, and short run protection does not cause serious misallocation. But over the long run, factors that would have moved elsewhere and been efficiently allocated, remain inefficiently allocated in a sector. The compensation that the government receives from firms, on the other hand, are based on a static calculation of welfare loss that protection imposes, assuming that the factor is immobile and stuck in that sector. The compensation was politically optimal when factors are immobile and cannot be allocated elsewhere. But over the longer run factors are mobile and should be allocated elsewhere in the economy. This dynamic welfare-loss, which can be huge, remains uncompensated. The compensation that the government does receive is sub-optimal so that the government does not want to continue protection to that industry. A trade agreement offers it the opportunity to correct the problem.

The debate about whether trade agreements increase trade is intrinsically linked with the commitment problem. Baier and Bergstrand's (2007) finding that, on average, an FTA approximately doubles two members' bilateral trade after 10 years is indirect testimony to the

trade-restricting ability of special interests in the pre-trade era. The gradual increase in trade also supports that idea inherent in MR-C that liberalization occurs over a period in which industries are allowed to adjust to freer trade. Further, Estevadeordal, Freund and Ornelas (2008) find trade agreements are a prelude to wider multilateral liberalization. Their study of Latin American agreements shows that preferential tariff reduction in a specific sector leads to a reduction in the external (MFN) tariff in that sector.

2. POLITICAL ECONOMY

The essence of the domestic commitment problem in the MR-C model is clear in the context of Grossman and Helpman's (1994) protection-for-sale model. Consider a world in which *n* goods are produced with constant returns to scale technology using sector (i.e. good) *specific* capital. The specificity of the capital plays a key role in creating a policy credibility ("time-consistency") problem, which in turn creates a demand for *commitment* by the government. The government uses trade policy to maximize its objective function, which is a weighted sum of political contributions *C* and public welfare *W*,

$$U_G = aW + C, \qquad (1)$$

where the parameter *a* is the relative weight that a government places on welfare relative to contributions it receives from industry lobbies. *W* and *C* are both functions of trade policy *t*, the vector of tariffs on the *n* goods. To keep it simple, suppose there are no cross-effects in production or consumption (simple forms of interdependence like intermediates goods use may be easily introduced). Then, producers of each good interact independently with the government in determining the politically optimal tariff on their good. Since factors are sector-specific, they are immobile in the short run. If they compete with imports, protection against foreign competition delivers rents to these factors, for which they are willing to make political contributions to their government. The government accepts contributions according to *a* times the amount of loss in welfare from protection. The political economy of trade policy inherent in the objective function (1) is clear: a government with a low *a* trades away welfare for monetary

contribution more cheaply than does a government that places greater value on its public's welfare.

In this protection-for-sale model, the politically optimal tariff for good *i* is determined as:

$$t_i / (1 + t_i) = (1/a) \times (z_i / e_i), \qquad (2)$$

where z_i is sector *i*'s the output-to-import or the inverse import penetration ratio, and e_i is the sector's absolute import demand elasticity. For simplicity we assume that every sector *i* has solved the collective action problem of organizing into a lobby or special interest group with the intent of influencing government's trade policy.

The essence of the *domestic commitment* or policy credibility problem is this. Over the longer run, factors are more mobile and should be allocated elsewhere. If a government withdrew protection, factors that were perfectly mobile, for example, would immediately transition out of the sector and be reallocated to more efficient use, lowering the production distortion. The government is fully informed about the extent of mobility of the factors, and yet is unable to credibly design a free trade policy that would encourage exit to other sectors.[3] To understand why this is so, consider a sector whose factor is perfectly mobile. The reason it stays in a protected sector rather than the sector in which the returns to the factor would be maximized under a free trade is precisely that protection makes the returns (net of political contributions) larger. Anticipating this protection, producers therefore make the (excessive) investment to produce in the sector they expect to be protected. Then they offer a contribution to the government that compensates it for the consumption distortion from providing protection in the form of an import tariff.[4] The government is not compensated for the welfare loss from

[3] If the government were uninformed about the specificity of the factor over the longer run, then it would have to design policy that truthfully revealed the specificity. Then, the commitment problem could worsen. Factors immobile even in the long run, which would otherwise have been a source of political contributions, would be forced to exit and be unable to be reallocated. Efficient reallocation of mobile factors is a source of welfare gain, but exit of immobile factors represents a political cost.

[4] Consumption distortions would be all the distortions *if factors were immobile* and not employable elsewhere, making the politically determined tariff optimal in the sense of no overinvestment.

production distortions (misallocation of resources). But this is sufficient for the government to provide the protection. Thus, the government's *commitment* to free trade is not credible: sectors anticipate protection according to (2) and are given it. The government behaves as if factors are immobile, when in fact they are not.

The bottom line is that, over the long-term, there is excessive investment and capacity in the protected sectors. Had the government the ability to perfectly enforce free trade, it would ensure that sectors with perfectly mobile factors would exit, and sectors with immobile factors would continue to be protected. Without the enforcement mechanism, any talk about free trade is not credible. Lobbies continue to expect that the government will protect, which it does.

A real-world example may bring the extent of the problem home. Consider the 1970s, when U.S. steel and auto industries produced a large part of world output. The entry of Japanese and then Korean and Taiwanese producers had eroded their competitiveness to a point where they were no longer competitive without protection. The decision to protect autos over the short run was to have the sector restructure, downsize, and produce what it was best at. Reagan's protection of the auto industry through voluntary export restraints in the 1980s lasted 8 years. Once protection concluded and the market freed, resources were re-allocated in the US economy and although the auto industry lost market share, it remained competitive in the world market. Now consider the counter-factual, where Reagan's protection had continued to this day. In that scenario, there would be an excess of physical and human capital in the auto sector drawing resources away from sectors in which they would have more productive (short- and long-term) use; college students would be preparing for careers in the auto industry rather than service sectors and information technology where their resources were best allocated. That misallocation would have been massive, and the government would not have been compensated by the auto industry for the dynamic welfare losses imposed by that misallocation.[5] Most developing countries that

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[5] This is quite apart from the fact that US autos would have remained sub-standard, another source of substantial welfare-loss that, if considered in the model, would make the dynamic welfare losses even larger, and protection even less optimal.

started with import-competing substitution in the 1950s have found themselves in this dilemma, which MR-C call the "domestic commitment problem."

So where does the trade agreement fit into all of this? Since the conditions of a trade agreement are perfectly enforceable, the agreement satisfies the government's demand for commitment. The government can now credibly commit to policy that related parties (firms) must believe and the economic actors will as a consequence factor in the trade policy into their key decisions on investment, hiring, and scale of output. The trade agreement supplies the commitment mechanism, since entering into the agreement enforces the terms of the contract and ties the hands of governments, not allowing them any policy discretion outside the terms of the contract.[6] The *terms of the agreement* are themselves determined as the solution to the commitment problem in the MR-C model. These terms of the agreement are the testable implications of the model, which we describe how to test below.

Trade agreements thus satisfy the need to solve the twin problems of the government's policy credibility (the domestic commitment problem just described) and the terms-of-trade (TOT) problem which left unchecked would lead to "optimal" tariffs around the world. The burst in trade agreements since the 1990s is therefore explained by their potential to do so.

Trade agreements are complex contracts between governments.[7] The contractual *terms* may exclude certain sectors from the agreement while specifying which sectors will be open to free

[6] More formally, in the pre-trade agreement era, the timing of the game is as follows: First, investors choose their scale of operation, that is, they allocate their capital and hence output. Then a government and the import competing lobby (in each country) bargain over tariffs and contributions. Since the lobby has the bargaining power, it makes a take-it-or-leave-it offer of a tariff level and a corresponding money contribution. Since the government accepts, the allocation of capital proves to be correct – the government accepts the bid. With the possibility of a trade agreement the timing of the game is changed: First the agreement is selected. Next capital is *reallocated* (for mobile forms) and finally, given the capital allocation and the constraints/terms of the agreement, each government-lobby pair chooses a tariff. Since the agreement is selected before allocation decisions by firms, the government's commitment to free trade is not something the government can renege. The result is that firms with mobile factors now reallocate. Those with immobile factors cannot reallocate and continue to lobby and receive protection.

[7] Inquiries about the "design" of trade agreements are in Baccini et al. (2012), Estrovedral and Sumionen (2011), Gawande, Sanguinetti and Bohara (2001) and Olarreaga and Soloaga (1998).

trade. They may specify a timeline over which one or more sectors will be "phased out" so as to give the sector time to adjust before access to its market is opened to foreign competition. Knowing these terms, an import-competing sector must make a decision of exiting the market or undertaking the necessary investment to stay competitive at world prices. An exporting sector must make decisions about whether and how much to ramp up capacity. Many of these decisions are costly and irreversible. We presume the trade agreement to be self-enforcing and permanent. If it did not reduce or eliminate the discretionary power of governments, it would not serve as a credible commitment device.

In this paper we propose the first empirical test of this idea that trade agreements are a commitment device as well as a means of internalizing the TOT dilemma. Our empirical investigation will provide a test of how two dominant motivations of trade – terms of trade concerns and domestic commitment motivations – play out in actual trade agreements.

3. TESTABLE HYPOTHESES

We begin with the role of terms-of-trade externalities in signing trade agreements (Bagwell and Staiger 1999, 2001; Johnson 1954; Mayer 1981).

Hypothesis 1: A trade agreement internalizes the terms-of-trade externality, that is, liberalizes trade by eliminating the economically optimal tariff.

MR-C's hypotheses about the political economy of trade agreements are the subject of the next two hypotheses.

Hypothesis 2: Trade liberalization is deeper when capital is more mobile.

Rigidity and flexibility of agreements are also examined in Rosendorff (2005) and Bacinni et al. (2012). These studies are relevant since they address flexible measures such as exclusions and phase-outs for certain sectors. Grossman and Helpman (1995a) posit a political economy theory of exclusions, and Grossman and Helpman (1995b) show how tariffs are determined cooperatively between two countries in the presence of special interest politics.

Logic: In its interaction with a sector with immobile capital, it does not make sense for the government to give up the opportunity to receive contributions since there is no excess investment in the sector. By definition, capital employed there cannot be employed elsewhere. Therefore there is no commitment problem, and the only reason to include this sector in a trade agreement is to eliminate the TOT externality. The political component of the pre-trade agreement regime remains intact.[8] Further, if there is no terms-of-trade externality, that sector is simply excluded from the agreement and not liberalized.[9]

Now consider a sector with perfectly mobile capital, so that capital employed is costlessly reallocated elsewhere or from elsewhere to this sector ("elsewhere" is the numeraire good in the 2-good theoretical model). In this case, the government's worry about misallocation is fully realized, and since it cannot unilaterally solve this problem -- its announcement of a future policy of making trade free is not credible – a primary impetus for entering into a trade agreement *is* to solve this commitment problem.

Submitting to a trade agreement in order to solve the commitment problem, therefore results in the greatest tariff cuts in sectors with perfect capital mobility and no cuts in sectors with a immobile capital. For intermediate degrees of capital mobility, tariff cuts range from large cuts where there is a high degree of capital mobility and small cuts in sectors with low capital mobility, since in the former there is much misallocation for which the government remains uncompensated.

Hypothesis 3: Trade liberalization is deeper when governments are more politically motivated, that is, the lower is the parameter a.

[8] This remains true whether it is the lobby that has the bargaining strength (and thus extracts all the surplus) or the government that has the bargaining strength. More on bargaining strength below.

[9] The TOT problem may not be significant if (i) if the country in question is small and has no market power as a buyer – i.e. it faces a perfectly elastic export supply, and (ii) imports are low for other reasons, for example because import-competing protection has eliminated potential imports.

Logic: This hypothesis is important for it clarifies how the TOT motive for a trade agreement is distinct from the commitment motive.[10] The negative relationship between liberalization and *a* is stark in the case of perfectly mobile capital: MR-C show that (i) the TOT component (the economically optimal tariff) is independent of *a*, and (ii) the pre-agreement political tariff varies inversely with *a* – the smaller is *a*, the larger is the political component of the tariff, as is clear from (2). Thus, the political component of the tariff cut in the agreement varies with 1/*a*, while the economic TOT component is brought down to zero independently of *a*.

In general, when politics is important (low *a*), the political tariff is high in the pre-trade agreement phase, regardless of factor mobility. The high political tariff restricts imports, and therefore the TOT motive leads to a small cut because the TOT motive works on the basis of the size of imports. However, the political component of the tariff is larger the smaller is *a*. Unless capital is low or immobile -- in which case there is little or no cut in the political component (Hypothesis 1) -- the solution to the political commitment problem leads to cuts in the political component -- the lower is *a* the greater the cuts.

The discussions following Hypotheses 1 and 2 suggest the following interaction between *a* and factor mobility:

Hypothesis 4.1: Trade liberalization is deeper when capital is highly mobile **and** the parameter *a* is small (politics is important).

Hypothesis 4.2: When capital is less mobile, trade liberalization is TOT motivated and unrelated to *a*.

[10] MR-C describe: "…. the trade agreement may provide governments with the credibility to make unilateral commitments, not only the opportunity to negotiate reciprocal commitments. …the benefits from a trade agreement ...(are) from two sources: first, a country's membership in the agreement … allows (it) to commit unilaterally, thereby solving its credibility problem in the domestic arena; second, the negotiation of reciprocal commitments … takes care of TOT externalities." (MR-C 2007, p.1384). Thus, the role of membership is disentangled from the role of negotiated tariff reductions.

Hypothesis 4.3: Trade liberalization is largely politically motivated when capital is highly mobile and *a* is small.

Hypothesis 4.4: Trade liberalization is mostly TOT motivated when *a* is large.

Hypothesis 4.1 is apparent from the discussion to Hypothesis 2. Hypothesis 4.2 is due to the fact that when *a* is low the political tariff is high in the pre-trade agreement phase, thereby lowering imports, and also the TOT motive which works on the basis of the size of imports. With immobile factors, for example, in the MR-C model the tariff cut varies directly with the level of pre-agreement imports.

Hypothesis 4.3 is a corollary to Hypothesis 4.1. What is different is that it draws attention to the fact that there is little role for TOT motivation when capital is highly mobile and *a* is small. Variables capturing TOT motive should not be relevant in this case, while variables capturing the commitment problem should be especially relevant.

Hypothesis 4.4 draws attention to the fact that there is little role for the commitment problem when *a* is large. Variables capturing commitment problem should not be relevant in this case, while variables capturing TOT motive should be especially relevant.

A new hypothesis about dynamics may be a distinct and lasting contribution of the MR-C model. Even as the government sets itself free of its commitment problem by joining a trade agreement, it facilitates the gradual transition of imperfectly mobile sectors over time. Since reallocation of factors is a costly process and occurs at a different pace across sectors, the government aids this reallocation effort by prolonging protection for sectors that are less mobile or take longer to become mobile. In doing so, it keeps the lobbying game alive in the post-agreement phase. The way this is achieved in the terms of the agreement is a "phase-out" or a gradual liberalization of sectors according to a dynamic tariff schedule which is designed for each sector according to the pace at which each sector is able to exit its capital. Two hypotheses may be advanced.

4. DATA

The theoretical model's predictions are derived in the context of a single sector in which producers compete with imports (plus a non-tradable numeraire sector): the sector's optimal pre-agreement tariff is compared with the optimal post-agreement tariff. MR-C indicate that the model may be extended to a multi-sector framework.[11] Interdependencies such as intermediates use may be incorporated as in Gawande, Krishna and Olarreaga (2012). The model may also be extended to a multi-country framework by assuming that even if trade agreements are temporally clustered, when a country signs a number of agreements with proximate neighbors, they are essentially a number of bilateral contracts with no spillovers.

We design our data to capture these experiments. For sector-oriented hypotheses about capital mobility (e.g. Hypotheses 1) we gather data at the ISIC-R3 (International Standard Industrial Classification – Revision 3) level. For any two countries in a trade agreement, a pre- versus post- trade agreement for an ISIC-R3 sector provides the empirical experiment. We have such bilateral experiments for different partners for the same ISIC-R3 sector. The hypotheses may be tested for each sector individually, and pooling sectors across bilateral partners. Country-oriented hypotheses about a (e.g. Hypotheses 2) may be tested by pooling data to get cross-country variation. Interactions between capital mobility and a require variation across sectors and countries, and pooling provides information for the tests.

4.1 SAMPLE

We collect industry level tariff data for trade agreements signed between 1990 and 2010 by eight Asian countries and eight Latin American countries. The Asian countries are, China, India, Indonesia, Japan, Korea, Malaysia, Nepal, Singapore and Sri Lanka. The Latin American

[11] The model may be extended to more sectors. With no cross-effects in consumption (e.g. negligible proportion of the population organized; separable utility) or production (e.g. all goods are final goods; production is separable), the model's predictions hold. We have to be careful to scale variables so that the cross-sectional experiment approximately satisfies the assumption of no observed heterogeneity (no unobserved heterogeneity is presumed).

countries are Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru and Uruguay. [12] These are our "Reporter" countries.

In all we have data pertaining to 155 bilateral Asian and Latin American trade agreements. The source of tariff data is the World Bank's World Integrated Trade Solution database, or WITS.[13] Pre-agreement tariffs for the Reporter countries as well as their post-agreement tariff schedules with their Partner countries are from the WITS database. The unit of observation is a reporter-partner-sector-year, where sector is defined at the 4-digit ISIC –R3 level: which includes 155 sectors for each Reporter-Partner dyad. The data are annual, spanning the period 1990-2010.[14]

The choice of regions provides rich variation across countries and partners. Since many are developing countries, their multilateral GATT/WTO tariff bindings allow enough discretion to allow preferential tariffs to partners in their bilateral agreements. The economically optimal tariffs are likely to vary greatly across countries and sectors: some optimal tariffs will be small and others large, providing the variation needed to test hypotheses. Instead of examining all the dyads (country-pairs) in the world, our decision to focus on Latin America and Asia are also dictated by practical reasons. These are large databases and time-consuming to construct carefully. Further, Asia and Latin American countries have been active FTA-makers and many are emerging from long periods of protectionism, so the data will provide a fertile ground to test commitment as well as TOT motives. While advanced countries like the European Union have contributed to the proliferation of trade agreements, utilizing country level data for the EU would be complicated since much of the decision-making takes place at the EU level.

[12] Our definition of trade agreements includes international agreements that deal with trade that involve tariff commitments, including bilateral, minilateral/regional trade agreements. Economic partnerships and framework conventions that involve no tariff commitments are excluded.

[13] http://wits.worldbank.org/WITS/

[14] The data are also available at the more disaggregated Harmonized Systems (HS) 6-digit level. Since ISIC classifies according to the principal industry of origin of products, while HS classifies at the detailed trading level, the ISIC system suits the testing of hypotheses better. The predictions focus on industry measures of factor mobility and of market power.

4.2 Dependent Variable

The primary dependent variable is the applied tariff at the level of Reporter-Partner-Sector. The primary tariff of interest is the applied rate for each Reporter-Partner dyads at the ISIC (rev. 3) industry level over time. Preferential rates are incorporated into this measure as the applied rates on imports from TA member countries are reduced. Thus, applied rates gauge the extent of liberalization commitment their actual implementation of commitment.

4.3 Key Independent Variables: Mobility, Commitment , TOT Externality

Mobility

Constructing measures of factor mobility is a challenging task. We measure human capital mobility using employment data from the United Nations Industrial Development Organization (UNIDO) database (now referred to as the INDSTAT database).[15] For sector i in a given country, Wacziarg and Wallack (2004) and Mukherjee, Li and Smith (2009) propose mobility measures based on variations of the formula:

$$\text{MOB}_t = \frac{(E_i^t - E_i^{t-1})/E_i^{t-1}}{(\sum_{i=1}^{N} E_i^t - \sum_{i=1}^{N} E_i^{t-1})/\sum_{i=1}^{N} E_i^{t-1}},$$

where t indexes time (year) and E measures employment. The numerator measures the annual percent change in sector s jobs: job transitions out of the sector make the numerator negative. The denominator normalizes by percent change in employment in the economy for the same period.[16]

[15] http://www.esds.ac.uk/international/support/user_guides/unido/indstat.asp. The alternative measure of capital mobility is the change in capital investment. However, the data for gross fixed capital formation in UNIDO are very sparse to get at the long run mobility measure.

[16] Mobility of physical capital using investment spending data suffer significant missing data problems in the UNIDO database.

We construct mobility measures using a regression strategy. For a specific country, for example the United States, consider the model:

$$\ln(EMP_{it}) = \alpha \ln(EMP_{i,t-1}) + \sum \beta_i \ln(TOTEMP_t) + \nu_i + e_{it}\,, \qquad (1)$$

where EMP_{it} is employment in 4-digit ISIC sector i in year t, and $TOTEMP_t$ is total manufacturing employment in year t. The model incorporates dynamics by including the lagged dependent variable. Industry-fixed effects that do not vary over time, are captured in ν_i. Hence, the coefficient estimates are based on within-industry (time-series) variation. Total manufacturing employment is calculated as the sum of the employment across the ISIC sectors. We avoid jumps in the data caused by years during which data for more sectors are reported than were previously (owing to better data collection or a new mandate to increase the coverage in data collection).

The measure of mobility for sector i is β_i, interpreted as the percent change in industry i's employment for a one percent increase in total manufacturing employment in the country. It is therefore essentially what (1) attempts to measure, while giving clarity to where (1) is coming from. The measures based on (2) control for an important effect which (1) fails to do: dynamics incorporated in the lagged dependent variable.

Mobility is essentially a long-run concept about an enduring feature of an industry, and movements of labor that are short-term in nature do not capture the concept, or at least add noise to it. One way of capturing long-term labor movements is via an error correction model (ECM), which separates out the short-term from the long-term impacts of shocks:

$$\Delta\ln(EMP_{it}) = (\varphi\text{-}1) \ln(EMP_{i,t-1}) + \sum \beta LR_i \ln(TOTEMP_{t-1}) + \sum \beta SR_i \Delta\ln(TOTEMP_t) + \nu_i + e_{it} \qquad (2)$$

where Δ is the difference operator: $\Delta X_{i,t} = X_{i,t} - X_{i,t-1}$. The ECM regresses the first difference of log employment on (i) lagged log employment, (ii) lagged log aggregate manufacturing employment, and (iii) the first difference of log aggregate manufacturing employment, and industry-fixed effects. The immediate (short-run or SR) impact of a 100 percent aggregate shock is a βSR_i per cent change in industry i's employment. The long-run (LR) impact of the 100

percent aggregate shock is a βLR_i per cent change in industry *i*'s employment. One can test for the appropriate number of lags over which the adjustment to the shock occurs (by including the first difference of lagged log aggregate manufacturing employment and testing the statistical significance of its coefficient). For our purpose, βLR_i is the more appropriate measure of mobility since it measure the long-run effect of the shock. If over the long run an industry returns to its original state, then βLR_i is zero. In the case of US manufacturing, negative aggregate shocks in the 1970s, and 1980s permanently shrank manufacturing sectors, rendering $\beta LR_i > 0$.

COMMITMENT

Theoretically, how much a government cares about welfare is the source of the commitment problem. We measure this concept using the parameter *a* in the government's objective (1) and plays a key role in determining the political component of tariffs as in equation (2) in the pre-trade agreement phase. For over 50 countries these have been estimated by Gawande, Krishna and Olarreaga (2009, 2012), and are applied here.

TERMS OF TRADE EXTERNALITY

The optimal tariff that a country may impose on imports of good *i* is inversely proportional to the export supply elasticity it faces. If the export supply is perfectly elastic, (horizontal) then the importing country is too small to influence the exporter's price and hence the terms of trade. If export supply is inelastic then a tariff serves to reduce imports, forcing the exporter to reduce their price and improve the importing country's TOT. Constructing export supply elasticities of non-member countries of the WTO, Broda, Limao and Weinstein (2008) affirm the existence of a significant TOT externality between members and non-members, indicating that if it were not for agreements like the WTO that encourage countries to internalize TOT externalities, the optimal tariff would be widely used by large importers. Nicita, Olarreaga, and Silva (2013) have estimated export supply elasticities for a number of countries and products at the HS-6 digit level.

They cover all the countries in our sample. We use these as our measure of the extent of the TOT externality problem.[17]

5. Econometric Testing

5.1 Quasi-Experiment

The theoretical model's predictions are derived in the context of a single sector in which producers compete with imports (plus a non-tradable numeraire sector): the sector's optimal pre-agreement tariff is compared with the optimal post-agreement tariff.

In the theory, the trade agreement comes as a surprise to factor-owners and forms the empirical basis for the experiment. For any Reporter-Partner in our sample, the pre- versus post- trade agreement for an ISIC-R3 sector provides a quasi-experiment. Given numerous trade agreements and tariff information over time, there are many such quasi-experimental control and treatment sets.

Many of the hypotheses require country variation as well as sectoral variation in the data since they deal with the country-level parameter *a* and sector-level capital mobility. The theory may be extended to more sectors under simplifying assumptions. With no cross-effects in consumption (e.g. negligible proportion of the population organized; separable utility) and production (e.g. all goods are final goods; production is separable), the same predictions hold cross-sectionally as well.

Some comments are necessary before these predictions are taken to real world-data. First, the model considers each sector to be symmetric is size and elasticity. When pooling across sectors, variables must be scaled to maintain the assumption of no observed heterogeneity. Although the extent of the TOT externality depends on import volume, the inverse supply elasticity formula avoids the need to use scale variables such as import volume.

[17] We are grateful to the authors for generously providing their estimates.

5.2 ECONOMETRIC MODEL AND TESTING

Hypotheses 1-4 are tested using the following econometric model:

$$Y_{rpit} = \alpha\, Y_{rpi,t-1} + \gamma\, A_{rpt} + \gamma 1\, IES_{ri} + \gamma 2\, MOB_{ri} + \gamma 3\, a_r + \tau 1(IES_{ri} \times A_{rpt}) + \tau 2(MOB_{ri} \times A_{rpt}) + \tau 3(a_r \times A_{rpt}) + e_{rpit} \quad (3)$$

where r indexes Reporter country, p the Partner country, i indexes the ISIC industry and t indexes year. The dependent variable Y is the applied tariff rate; A is the trade agreement indicator: $A_{rpt} = 0$ if no agreement between Reporter r and Partner p exists in year t and $A_{rpt} = 1$ if an agreement is in effect in year t. A_{rpt} essentially separates the "treatment" from the "control" observations in the quasi-experiment. The error term e is assumed to satisfy normality and be spatially (across partners and sectors) uncorrelated conditional on the regressors. The lagged dependent variable captures dynamics; the inclusion has the effect of making the errors serially uncorrelated. The effect of the trade agreement is captured by the coefficient γ on $A_{rpt;}$ $\gamma < 0$ indicates the liberalizing impact of agreement, since $\partial Y / \partial A$ indicates the tariff cut as A changes from 0 to 1.

The key variables are politics (a), capital mobility (MOB) and terms-of-trade externality measured by the inverse export supply elasticity (IES). In the specification, a is measured at the country level for the Reporter, while MOB and IES are measured for each sector i for the Reporter country.[18]

Hypothesis 1 is tested as the null hypothesis: $\tau 1 < 0$. That is, the larger is the optimal tariff the deeper is the tariff cut in the post-agreement phase, or $\partial^2 Y / \partial A\, \partial IES < 0$. Hypothesis 2 is tested as the null hypothesis: $\tau 2 < 0$. That is, when MOB is high the tariff cut is deeper in the post-

[18] It is possible to introduce time variation into a, but MR-C caution that the source of their results are not shifts in a but the interaction of a and factor mobility. It is possible to introduce sector-variation in a but in the Grossman-Helpman model a describes the politics in a country and special assumptions are needed to justify sectorally different a's in the same country.

agreement phase, or $\partial^2 Y/ \partial A\, \partial MOB < 0$. Hypothesis 3 is tested as the null hypothesis: $\tau 3>0$. That is, when a is low the tariff cut is deeper in the post-agreement phase, or $(\partial^2 Y/ \partial A\, \partial a)> 0$.

The variation in the data determines the specification. For example, politics a_r is measured at the Reporter country level, and therefore the model does not admit any fixed effects. All standard errors are clustered at the dyad level because detailed tariff schedules have strong partner-specific characteristics in the pre-agreement period. Not recognizing this clustering can understate standard errors and inflate *t*-statistics of coefficient estimates.

In order to test Hypotheses 4.1-4.4, the baseline model is extended to include interactions of upper and lower quantiles of a, MOB and IES. Using '75' to denote the upper quartile and '25'to denote lower quartile indicators of these variables, the model with interactions is:

$$
\begin{aligned}
Y_{rpit} = {} & \alpha\, Y_{rpi,t-1} + \gamma\, A_{rpt} + \gamma 1\, IES_{ri} + \gamma 2\, MOB_{ri} + \gamma 3\, a_r \\
& + \tau 1(IES_{ri} \times A_{rpt}) + \tau 2(MOB_{ri} \times A_{rpt}) + \tau 3(a_r \times A_{rpt}) \\
& + \tau 4(a25_r \times MOB75_{ri} \times A_{rpt}) \\
& + \tau 5(MOB25_{ir} \times IES_{ri} \times A_{rpt}) + \tau 6(MOB25_{ir} \times A_{rpt}) \\
& + \tau 7(MOB75_{ir} \times IES_{ri} \times A_{rpt}) \\
& + \tau 8(a75_r \times IES_{ri} \times A_{rpt}) + \tau 9(a75_r \times A_{rpt}) + e_{rpit} \qquad (4)
\end{aligned}
$$

Hypothesis 4.1 is a test of the hypothesis $\tau 4<0$: the combination of a low a and high capital mobility (i.e. when $a25=1$ and MOB75=1) results in deeper tariff cuts. Hypothesis 4.2 is a joint test of the hypothesis $\tau 5<0$ and $\tau 6=0$: when capital is less mobile (MOB25=1) tariff cuts are TOT motivated and not politically motivated. Hypothesis 4.3 is a joint test of the hypothesis $\tau 4<0$ and $\tau 7=0$, that is, to Hypothesis 4.1 it adds the insignificance of the TOT motive when capital mobility is high (MOB75=0). Hypothesis 4.4 is a joint test of the hypothesis $\tau 8<0$ and $\tau 9=0$, that is, when the government is a welfare maximize ($a75=1$) tariff cuts are TOT-motivated ($\tau 8<0$) and not politically motivated ($\tau 9=0$).

6. RESULTS

For each Reporter country, the Table 1 indicates the mean applied tariff in the pre- and post-agreement periods, where the each Reporter mean is taken across partners, ISIC industries, and years. The pre-agreement (simple) mean tariff for Argentina is 11.16%, declining to 9.96% after the Mercosur FTA. Tariffs remained high against non-Mercosur partners, and there remained products that were excluded from the FTA. Brazil's mean pre-agreement tariff is actually lower than the mean post-agreement tariff – tariffs against non-member countries actually increased in the post-agreement era. Chile's mean tariff declines from a pre-agreement average of 9.03% to a post-agreement average of 5.95%. China registers a spectacular decrease of close to 12 percentage points, as does India whose post-agreement era mean tariff is *halved* to 22.05 percentage points. In Indonesia the decrease was 11 percentage points. Korea's post-agreement mean tariff actually increases (but not significantly in weighted average terms). It is not unconditional that a trade agreements liberalize unconditionally. Certainly, partners who are members of the pact benefit, but non-members may or may not benefit.

Table 2 provides statistics, by Reporter country, on the three key variables in the model: government's welfare weight a, mobility measures, and market power of importers measured by the inverse elasticity $1/e_x$. Two measures for a, from Gawande, Krishna and Olarreaga (GKO 2009) and from Arcand, Olarreaga, and Zoratto (AOZ 2011) are used. AOZ's a's are scaled to lie between 0 and 1, while there are no such constraints on GKO's a's. The GKO measures vary range from a low of 0.93 for Sri Lanka to a high of 400 for Singapore – indicating that Singapore's government cares a lot about its citizens' welfare while Sri Lanka's government is prone to the lobbying by industry and is willing to sell tariffs cheaply. The simple correlation of the two measures across the 16 Reporters is low (=0.31) because of the influence of large values like Singapore's a. We therefore use the log of GKO measures in our models, which is more correlated with the AZO measure (=0.57).

The two mobility measures in Table 2 are a long-term measure (Mobility1) from the ECM in (2), and a short-term measure (Mobility2) from the regression model (1). The highest labor mobility is in countries such as China, Indonesia, and Nepal, all of whom have been experiencing

increases in their total employment with commensurate growth in manufacturing sectors. Even during growth years, India's manufacturing employment show low mobility due to labor market distortions. A true test of mobility occurs during manufacturing employment declines, as labor moves into services as is the experience of rich countries. Our Asia sample has yet to be tested on this accord, with Korea and Japan the most prominent examples of where such an experiment may begin (as more of their manufacturing capital is sent overseas). The Latin American countries Uruguay, Peru, Mexico, Ecuador, Argentina, and Brazil have low labor mobility – their negative Mobility1 estimates indicate that even when total manufacturing employment is shrinking, employment in many manufacturing sectors remains the same.[19]

The market power measures based on export elasticity estimates from Nicita et al. (2013) are informative and intuitive. In theory, the optimal tariff is equal to these means. Therefore, the optimal tariff for Argentina in manufacturing is 2.5%. Intuitively, the optimal tariff should be higher for large countries that can use their market power to lower an exporter's price. This is evident in the data. Large importers like China, Japan, Korea, Mexico, and Singapore have higher optimal tariffs: the optimal tariff is 11.1% for China, 14.6% for Japan, and 14.1% for Singapore. Import weighted averages of $1/e_x$ (and their sd) are in the final two columns. According to the import weighted inverse elasticity, the optimal tariff for China is 20.7%!

Before we test our hypotheses, Table 3 indicates the treatment (post-agreement) and the control (pre-agreement) dyads in our sample. An aspect of the data that could be improved is that the much of the available data are in the ISIC Revision 3 era that starts after 1995. Since many of the Latin American trade agreements started before that period, the Latin American control group is small, and the treatment group is large. Despite this, we think the estimates still inform the hypotheses.[20] The Asian trade agreements, on the other hand, are newer trade agreements and so have a substantial control group sample. We now turn to testing the hypotheses.

[19] We note that in Table 2 high mobility measures also have high standard deviations. These indicate that there is a healthy variation of mobility measures across ISIC sectors. When these coefficients are low, the standard deviations are also low, indicating that these really are measures of low mobility because there is not much movement in estimates across sectors.

[20] One of the improvements that we plan to do in the future is to use the revision 2 system – which existed before 1996 – so that we can populate the control group more significantly.

Table 3 tests Hypotheses 1-4. The first column of Table 3 tests the terms of trade hypotheses by itself. The second column isolates the government welfare-weight hypothesis. Column 3 isolates the mobility hypothesis. Column 4 combines the politics hypotheses, which includes both *a* and mobility in one model. Column 5 is the main result in Table 4, based on model (3) that allows testing the terms of trade and politics hypotheses in one regression model.

In all models, the coefficients of interest are the treatment effects, that is, the interaction of the trade agreement dummy with the variables of interest. In the first column, the TOT treatment effect is the coefficient on ($A \times 1/e_x$). This is negative as predicted. However, it is statistically insignificant. It should be noted that the Bagwell-Staiger idea that terms of trade dominate all other considerations for trade liberalizations is valid for multilateral negotiations as well. These rounds started in the 1960s during the Kennedy Round and later in the Tokyo and Uruguay Rounds, well before our data. Therefore, to a large extent, the substantial reduction in tariffs in the multilateral rounds should have already diminished the terms of trade motive for later agreements. Therefore it is not fair to reject the terms of trade motive for trade agreements due to the statistical insignificance of the TOT treatment effect. The negative coefficient, however imprecisely measured, is encouraging for the TOT hypothesis, as we will see in the pooled model.

The second model provides strong affirmation of Hypothesis 2 from the statistically significant coefficient on $A \times \ln(a)$: a lower government weight on welfare leads to a greater post-agreement tariff reduction. The third model strongly affirms the mobility hypothesis from the negative and statistically significant coefficient on A×Mobility1. Combining the two political variables (i.e. the model of politics) continues to indicate their joint significance. Indeed, the coefficient estimates are not very different from their isolated estimates.

The fourth model contains the main result. All four hypotheses are tested in in one model and each of the treatment effects is statistically precisely measured and has the predicted sign. The negative coefficient on ($A \times 1/e_x$) indicates that higher pre-agreement tariffs due to greater market power are whittled down most by the agreement. The negative coefficient of -1.275 on ($A \times 1/e_x$)

is remarkable for the fact that tariffs had already been reduced via three rounds of multilateral negotiations. Yet, even after those rounds, the terms of trade impact is strongly evident in our trade agreement data.

The hypothesis about politics continues to remain statistically and politically significant. The negative on coefficient on A×ln(a) is estimated at 0.462, indicating that with a 100% change in ln(a) (i.e. Δln(a)=1, less than one standard deviation in the sample), comes a reduction its tariff in the post-agreement era by 0.462 percentage points.

Finally, the coefficient on A×Mobility1 is estimated to be -0.977, which is politically large magnitude. The trade agreement lowers tariffs most where mobility is high. This is in agreement with the theory, according to which, high mobility sectors are easiest for the government to set free (not protect any more) because resources in these sectors are less costly to reallocate. This is what we see in the data.

The last three columns provide estimates from the same regression models but with the short-term mobility measure Mobility2.

This section incomplete

7. CONCLUSION

We point to non-theory-driven hypotheses that we propose as a companion paper to this one. The following additional hypotheses are based on a broader interpretation of MR-C. The key principle we rely on is that the demand for commitment to free trade is greater (and hence using the TA to commit greater) if misallocation is greater than the rents a government can extract.

1. Where a government's bargaining strength vis-à-vis lobbies is low, there will be more demand for commitment. Conversely, where the government's bargaining strength is high, lesser demand for commitment is expected due to the rents from the political game. What determines the bargaining strength? MR-C (1998) suggest institutions such as democracy. The rationale is that transparency in democracies reduces policymakers' bargaining strength and also by allowing policymakers a long-run view. Median voters may reward politicians by re-electing them if they satisfy the median voter over the long run. In our companion paper, we plan to expand on this idea by asking: What if median voter is uninformed? What about other imperfections of democracies? Do autocracies like China have greater bargaining strength than democracies when negotiating a trade agreement?
2. In the same companion paper we also investigate a related hypothesis about political competition in free trade agreements (MR-C 1998, p. 596). If intermediates and final goods producers engage in political competition, and the government is able to get more rents (that is, bargaining strength is >0) then downstream sectors may be protected and upstream unprotected.

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Table 1: Pre- and post-Agreement Applied Tariffs

	Unweighted				Import-Weighted	
	Pre-Agreement		Post-Agreement		Pre TA	Post-TA
Reporter	*N*	Mean	*N*	Mean	Mean	Mean
Argentina	129	11.16	5015	9.96	7.83	4.73
Brazil	152	11.41	5354	13.35	4.80	11.20
Chile	4781	9.03	7092	5.95	6.98	4.86
China	1666	29.27	609	17.43	15.70	7.29
Colombia	205	10.67	3546	11.06	5.79	8.63
Ecuador	99	11.19	3596	9.56	4.46	5.04
India	780	45.09	128	22.05	22.35	7.18
Indonesia	780	18.10	228	7.22	7.83	2.29
Japan	2297	2.21	151	1.59	1.44	1.54
Korea	961	13.73	109	20.29	10.46	10.99
Mexico	1238	16.41	5180	11.96	12.39	6.92
Nepal	80	19.66	29	16.60	19.51	11.49
Peru	69	10.36	2918	8.85	8.84	6.43
Singapore	756	0.09	435	0.00	0.23	0.00
Sri Lanka	655	24.02	132	18.00	17.56	13.05
Uruguay	49	10.01	2103	9.72	9.38	5.85

Table 2: Statistics, by Reporter, of Key Independent Variables

	Govt.'s Welfare Weight : *a*		*Mobility measures*				*Inverse elasticity* : $1/\varepsilon_X$			
	Source:	Source:	**Mobility1**		**Mobility2**		**Unweighted**		**Import-Wtd.**	
Reporter	**GKO (2009)**	**AOZ (2011)**	mean	sd	mean	sd	mean	sd	mean	sd
Argentina	5.25	0.963	−0.123	0.246	−0.012	0.035	0.025	0.022	0.026	0.024
Brazil	24.91	0.980	−0.031	0.714	0.008	0.297	0.051	0.107	0.082	0.180
Chile	4.83	0.905	0.182	0.314	0.043	0.062	0.022	0.039	0.013	0.013
China	8.33	0.962	1.130	0.566	0.268	0.144	0.111	0.234	0.207	0.273
Colombia	7.88	0.945	0.085	0.249	0.020	0.066	0.015	0.011	0.015	0.010
Ecuador	1.23	0.764	−0.068	0.656	−0.007	0.232	0.013	0.042	0.013	0.013
India	2.72	0.901	0.295	0.449	0.054	0.080	0.025	0.045	0.049	0.030
Indonesia	2.62	0.875	1.327	2.188	0.152	0.111	0.036	0.052	0.045	0.047
Japan	37.81	0.988	0.018	0.103	0.000	0.020	0.146	0.104	0.114	0.043
Korea	16.15	0.974	0.088	0.293	0.034	0.100	0.065	0.088	0.075	0.084
Mexico	1.29	0.757	−0.096	0.285	0.007	0.056	0.089	0.109	0.082	0.067
Nepal	0.06	0.915	1.420	1.821	0.769	1.026	0.024	0.029	0.010	0.014
Peru	4.85	0.885	−0.312	0.352	−0.096	0.084	0.011	0.010	0.014	0.009
Singapore	404	0.992	0.034	0.435	0.018	0.111	0.141	0.537	0.119	0.409
Sri Lanka	0.93	0.620	0.254	0.499	0.160	0.645	0.011	0.019	0.019	0.022
Uruguay	3.62	0.883	−0.465	0.384	−0.105	0.086	0.012	0.031	0.012	0.012

Table 3: Dyads: Control and Treament Samples

		Control (A=0)			Treatment (A=1)					Control (A=0)			Treatment (A=1)		
Reporter	Partner	*N*	Start Year	End Year	*N*	Start Year	End Year	Reporter	Partner	*N*	Start Year	End Year	*N*	Start Year	End Year
Argentina	Paraguay				545	1992	2009	China	Korea	447	1992	2000	235	2001	2010
Argentina	Brazil				964	1992	2009	China	Pakistan	219	1992	2005	53	2006	2010
Argentina	Chile				909	1992	2009	China	New Zealar	491	1992	2007	41	2009	2010
Argentina	Venezuela				457	1992	2009	China	Lao PDR	37	1992	2001	41	2003	2010
Argentina	Colombia				563	1992	2009	China	Chile	25	1992	1994	196	1996	2010
Argentina	Uruguay				827	1992	2009	China	Macao	340	1992	2001	136	2003	2010
Argentina	Peru				558	1992	2009	China	India				511	1992	2010
Argentina	Ecuador				361	1992	2009	China	Bangladesh	76	1992	2000	90	2001	2010
Argentina	Bolivia				457	1992	2009	Colombia	Venezuela				656	1991	2009
Argentina	Mexico				803	1992	2009	Colombia	Uruguay				189	1991	2009
Argentina	Cuba	133	1992	2009				Colombia	Bolivia				161	1991	2009
Brazil	Bolivia				305	1989	2009	Colombia	Cuba	139	1991	2009			
Brazil	Chile				853	1989	2009	Colombia	Peru				556	1991	2009
Brazil	Peru				418	1989	2009	Colombia	Ecuador				596	1991	2009
Brazil	Venezuela				574	1989	2009	Colombia	Brazil				682	1991	2009
Brazil	Ecuador				318	1989	2009	Colombia	Argentina				571	1991	2009
Brazil	Paraguay				558	1989	2009	Colombia	Mexico				658	1991	2009
Brazil	Mexico				851	1989	2009	Colombia	Paraguay				68	1991	2009
Brazil	Argentina				1153	1989	2009	Colombia	Chile				540	1991	2009
Brazil	Cuba	164	1989	2009				Ecuador	Bolivia				199	1993	2009
Brazil	Uruguay				950	1989	2009	Ecuador	Argentina				572	1993	2009
Brazil	Colombia				618	1989	2009	Ecuador	Colombia				700	1993	2009
Chile	Paraguay				331	1992	2009	Ecuador	Uruguay				272	1993	2009
Chile	Brazil				886	1992	2009	Ecuador	Brazil				612	1993	2009
Chile	Brunei	4	2001	2008				Ecuador	Peru				632	1993	2009
Chile	Costa Rica	85	1992	1998	289	1999	2009	Ecuador	Chile				667	1993	2009
Chile	Argentina				926	1992	2009	Ecuador	Venezuela				553	1993	2009
Chile	Venezuela				555	1992	2009	Ecuador	Cuba	109	1993	2009			
Chile	Mexico	235	1992	1997	565	1998	2009	Ecuador	Paraguay				83	1993	2009
Chile	Panama	358	1992	2005	146	2006	2009	Ecuador	Mexico				587	1993	2009
Chile	Canada	192	1992	1995	638	1997	2009	India	Bhutan	6	1990	1992	22	1997	2007
Chile	Bolivia				507	1992	2009	India	Nepal	5	1990	1990	107	1992	2007
Chile	India	411	1992	2005	183	2006	2009	India	Korea	254	1990	2008			
Chile	Korea	438	1992	2002	300	2004	2009	India	Lao PDR				3	2004	2007
Chile	El Salvador	69	1992	2002	110	2004	2009	India	Egypt	70	1990	2008			
Chile	China	179	1992	1995	638	1997	2009	India	China				234	1990	2008
Chile	Australia	551	1992	2007	98	2008	2009	India	Bangladesh	7	1990	1992	67	1997	2007
Chile	Peru				795	1992	2009	India	Singapore	176	1990	2001	98	2004	2008
Chile	Uruguay				641	1992	2009	India	Yugoslavia	37	1992	2008			
Chile	Cuba	142	1992	2009				India	Thailand	120	1990	2001	113	2004	2008
Chile	Ecuador				530	1992	2009	India	Sri Lanka	20	1990	1992	125	1997	2008
Chile	Japan	639	1992	2006	156	2007	2009	India	Chile	39	1990	2005	20	2007	2008
Chile	Singapore	315	1992	2004	196	2005	2009	India	Maldives	7	1999	2007			
Chile	United Stat	942	1992	2009				India	Pakistan	5	1990	1992	76	1997	2008
Chile	Colombia				706	1992	2009	Indonesia	Philippines	50	1989	1990	138	1993	2001
Chile	New Zealar	344	1992	2004	189	2005	2009	Indonesia	Japan	406	1989	2005	78	2007	2009
China	Sri Lanka	131	1992	2000	142	2001	2010	Indonesia	Brunei				7	1999	2001

Table 1 (….Contd.): Dyads: Control and Treament Samples

		Control (A=0)			Treatment (A=1)		
Reporter	Partner	*N*	Start Year	End Year	*N*	Start Year	End Year
Indonesia	Singapore	111	1989	1990	273	1993	2009
Indonesia	Malaysia	90	1989	1990	240	1993	2009
Indonesia	Thailand	84	1989	1990	257	1993	2009
Japan	Mexico	275	1988	2003	103	2004	2009
Japan	Malaysia	428	1988	2009			
Japan	Philippines	404	1988	2005	83	2006	2009
Japan	Indonesia	401	1988	2006	54	2007	2009
Japan	Thailand	415	1988	2006	64	2007	2009
Japan	Chile	195	1988	2006	29	2007	2009
Japan	Brunei	60	1988	2006	9	2007	2009
Korea	Bangladesh	44	1988	1999	70	2002	2009
Korea	Singapore	290	1988	2004	88	2006	2009
Korea	China	229	1989	1999	142	2002	2009
Korea	Sri Lanka	90	1988	1999	92	2002	2009
Korea	India	182	1988	1999	117	2002	2009
Korea	Lao PDR	1	1996	1996	10	2006	2009
Korea	Chile	72	1988	2002	51	2004	2009
Mexico	Nicaragua	27	1991	1997	194	1998	2009
Mexico	Argentina				638	1991	2009
Mexico	Bolivia				152	1991	2009
Mexico	Brazil				682	1991	2009
Mexico	Canada	52	1991	1991	722	1995	2009
Mexico	Costa Rica	24	1991	1991	467	1995	2009
Mexico	Japan	537	1991	2004	210	2005	2009
Mexico	Paraguay				97	1991	2009
Mexico	Uruguay				407	1991	2009
Mexico	Chile				622	1991	2009
Mexico	Ecuador				367	1991	2009
Mexico	Cuba	333	1991	2009			
Mexico	Peru				476	1991	2009
Mexico	Colombia				591	1991	2009
Mexico	United Stat	56	1991	1991	726	1995	2009
Mexico	Israel	190	1991	1999	373	2000	2009
Mexico	Venezuela				521	1991	2009
Nepal	Sri Lanka				15	1994	2010
Nepal	Bhutan				7	1994	2010
Nepal	India				117	1994	2010
Nepal	Pakistan	40	1994	2010			
Nepal	Bangladesh	30	1994	2010			
Peru	Chile				626	1994	2009
Peru	Argentina				570	1994	2009
Peru	Brazil				614	1994	2009
Peru	Cuba	72	1994	2009			
Peru	Paraguay				95	1994	2009
Peru	Uruguay				259	1994	2009
Peru	Ecuador				485	1994	2009
Peru	Colombia				536	1994	2009
Peru	Venezuela				360	1994	2009
Peru	Mexico				555	1994	2009
Peru	Bolivia				341	1994	2009
Singapore	Malaysia	56	1989	1989	225	1995	2009
Singapore	Philippines	44	1989	1989	224	1995	2009
Singapore	Indonesia				166	2003	2009
Singapore	New Zealar	67	1989	1995	209	2001	2009
Singapore	Brunei	27	1989	1989	139	1995	2009
Singapore	Panama	34	1989	2005	16	2006	2009
Singapore	Chile	89	1989	2009			
Singapore	India	174	1989	2004	105	2005	2009
Singapore	Thailand	52	1989	1989	232	1995	2009
Singapore	Korea	223	1989	2005	84	2006	2009
Singapore	Jordan	34	1989	2003	33	2004	2009
Sri Lanka	Korea	183	1990	2000	141	2001	2010
Sri Lanka	Bangladesh	42	1990	2000	43	2001	2010
Sri Lanka	Nepal				18	1993	2010
Sri Lanka	China	202	1990	2000	127	2001	2010
Sri Lanka	Pakistan	154	1990	2001	68	2004	2010
Sri Lanka	India	42	1990	1990	220	1993	2010
Sri Lanka	Maldives	142	1990	2010			
Sri Lanka	Bhutan				1	1999	1999
Uruguay	Peru				240	1994	2009
Uruguay	Mexico				519	1994	2009
Uruguay	Chile				633	1994	2009
Uruguay	Argentina				759	1994	2009
Uruguay	Colombia				262	1994	2009
Uruguay	Brazil				736	1994	2009
Uruguay	Venezuela				191	1994	2009
Uruguay	Bolivia				118	1994	2009
Uruguay	Ecuador				118	1995	2009
Uruguay	Cuba	51	1994	2009			
Uruguay	Paraguay				304	1994	2009

Table 4: Core Models (OLS)

Dependent variable: *Applied Tariffs:*

	(1) $1/\varepsilon_X$	(2) a	(3) $mob\,1$	(4) $a + mob1$	(5) $1/\varepsilon_X + a + mob\,1$	(6) $mob2$	(7) $a + mob\,2$	(8) $1/\varepsilon_X + a + mob\,2$
$Tariff_{t-1}$	0.766***	0.763***	0.764***	0.761***	0.762***	0.762***	0.759***	0.760***
Lagged dependent variable	[0.0234]	[0.0237]	[0.0225]	[0.0228]	[0.0229]	[0.0232]	[0.0234]	[0.0235]
A	−0.483*	−1.492***	−0.294	−1.181***	−1.159***	−0.237	−1.192**	−1.152**
Trade Agreement Indicator	[0.249]	[0.427]	[0.247]	[0.447]	[0.440]	[0.253]	[0.463]	[0.456]
$1/\varepsilon_X$	−0.403				0.439			0.420
Inverse Export Elasticity (IES)	[0.567]				[0.416]			[0.415]
$\ln(a)$		−0.618***		−0.573***	−0.591***		−0.587***	−0.599***
(logged) Govt. Weight on Welfare		[0.160]		[0.160]	[0.166]		[0.166]	[0.172]
Mobility1			0.813***	0.789***	0.815***			
Labor Mobility (est. by ECM)			[0.252]	[0.250]	[0.253]			
Mobility2						3.583***	3.309***	3.405***
Labor Mobility (est. by OLS)						[1.160]	[1.149]	[1.223]
A × $1/\varepsilon_X$	−0.456				−1.275**			−1.223**
	[0.615]				[0.539]			[0.512]
A × $\ln(a)$		0.491***		0.437**	0.462**		0.462**	0.477**
		[0.177]		[0.177]	[0.183]		[0.184]	[0.190]
A × Mobility1			−0.995***	−0.955***	−0.977***			
			[0.268]	[0.264]	[0.267]			
A × Mobility2						−4.115***	−3.827***	−3.922***
						[1.225]	[1.204]	[1.275]
Constant	2.223***	3.418***	1.981***	3.112***	3.123***	1.972***	3.151***	3.152***
	[0.329]	[0.530]	[0.309]	[0.529]	[0.528]	[0.316]	[0.549]	[0.548]
N	43797	44812	44416	44416	43450	44812	44812	43797
Adj. R^2	0.640	0.640	0.645	0.645	0.646	0.640	0.640	0.641

Notes:

1. Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1
2. Standard errors clustered by dyad.
3. ε_X from Nicita, Olarreaga and Silva (2013); a from Gawande, Krishna and Olarreaga (2009).
4. Mobility1 estimated from UNIDO employment data using Error-Correction Model (long-run measure) and Mobility2 using OLS.