

# Do We Really Know that the WTO Increases Trade?

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## Executive Summary

No.

### Abstract

This paper estimates the effect on international trade of multilateral trade agreements: the World Trade Organization (WTO), its predecessor the Generalized Agreement on Tariffs and Trade (GATT), and the Generalized System of Preferences (GSP) extended from rich countries to developing countries. I use a standard “gravity” model of bilateral merchandise trade and a large panel data set covering over fifty years and 175 countries. An extensive search reveals little evidence that countries joining or belonging to the GATT/WTO have very different trade patterns than outsiders. The GSP does seem to have a strong effect, and is associated with an approximate doubling of trade.

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## **1: Heresy**

Economists disagree about a lot, but not everything. Almost all of us think that international trade should be free.<sup>1</sup> Accordingly, the multilateral organization charged with freeing trade – the World Trade Organization (WTO) – is probably the most popular international institution inside the profession, certainly compared with its obvious rivals, the IMF and the World Bank. This makes much of the furor over the WTO unfathomable to most of us. But should we – and the protestors – really care about the WTO at all? Do we really know that the WTO and its predecessor the General Agreement on Tariffs and Trade (GATT) have actually promoted trade?

Maybe not. While theory, casual empiricism, and strong statements abound, there is, to my knowledge, no compelling empirical evidence showing that the GATT/WTO has actually encouraged trade. In this paper, I provide the first comprehensive econometric study of the effect of the postwar multilateral agreements on trade. It turns out that membership in the GATT/WTO is *not* associated with substantially enhanced trade, once standard factors have been taken into account. To be more precise, countries acceding or belonging to the GATT/WTO do not have significantly different trade patterns than non-members. Not all multilateral institutions have been ineffectual; I find that the Generalized System of Preferences (GSP) extended from the North to developing countries approximately doubles trade. Thus the data and methodology clearly *can* deliver strong results. I conclude that we currently do not have strong empirical evidence that the GATT/WTO has systematically played a strong role in encouraging trade.

## **Plain Vanilla**

To make my argument as persuasive as possible I use widely accepted techniques, a conventional empirical methodology, and two standard data sets. I also examine the sensitivity of my results extensively. I do not attempt to provide any novelty in terms of data, theory, or methodology. Thus, any interest in this paper lies solely in its results; by design, there is no other innovation.<sup>2</sup>

The next section of the paper provides motivation, while sections 3 and 4 present the methodology and data set respectively. A graphical event study of accession to the GATT/WTO is presented in section 5. The main results are discussed in section 6, followed by sensitivity analysis. The paper closes with suggestions for future work, and some interpretation.

## **2: A Person of Straw?**

Does anyone believe that the multilateral trading system boosts trade? The WTO, for one. It states that its “overriding objective is to help trade flow smoothly, freely, fairly and predictably.”<sup>3</sup> And it believes that the system has been working. The WTO trumpeted the fiftieth anniversary of the multilateral trading system in 1998 affirming “... The achievements of the system are well worth celebrating. Since the General Agreement on Tariffs and Trade began operating from Geneva in 1948, world merchandise trade has increased 16 fold ... world trade now grows roughly three times faster than merchandise output ... this advance ranks among the great international economic achievements of the post-world war era ...”<sup>4</sup> Further, “The past 50 years have seen an exceptional growth in world trade. Merchandise exports grew on average by 6% annually. Total trade in 2000 was 22-times the level of 1950. GATT and the WTO have helped to create a strong and prosperous trading system contributing to unprecedented growth.”<sup>5</sup>

While some (mostly non-economists) might disagree with the view that trade *should* be freed by the multilateral system, it is hard to find dissent with the view that trade *has* been liberalized by the system. For instance, the *Economist* declared in 1999 “For five decades the world’s multilateral trade-liberalising machinery ... has, in all likelihood, done more to attack global poverty and advance living standards right across the planet than any other man-made device ... such is the power of trade.”<sup>6</sup> There are innumerable estimates of the effect of this or that GATT round on country x or industry y; all implicitly assume that the multilateral trading system matters. Similarly, much hoopla surrounds the accession of countries to the WTO, as the system extracts concessions from joiners to benefit current members.<sup>7</sup>

### **3: Nerdy Stuff**

Quantifying the effects of the multilateral system on trade seems a worthy objective. Luckily, it is also feasible.

To estimate the effect of multilateral trade agreements on international trade, I rely on the standard “gravity” model of bilateral trade, which explains (the natural logarithm of) trade with (the logs of) the distance between the countries and their joint income. I augment the basic gravity equation with a number of extra conditioning variables that affect trade, in order to account for as many extraneous factors as possible. These include: culture (e.g., whether a pair of countries share a common language), geography (e.g., whether none, one or both are landlocked), and history (e.g., whether one colonized the other).

My empirical strategy is to control for as many “natural” causes of trade as possible, and search for effects of multilateral agreements in the residual. Once other factors have been taken into account, I compare trade patterns for countries in the GATT/WTO with those outside the

system. I search for this effect using variation across countries (since not all countries are in the system) and time (since membership of the GATT/WTO has grown). If the GATT/WTO has a large effect on trade, I expect members to have significantly higher trade than outsiders.

For those unfamiliar with the gravity model, it is a completely conventional device used to estimate the effects of a variety of phenomena on international trade. Unusually for economics, it is also a successful model, in two senses. First, the estimated effects of distance and output (the traditional gravity effects) are sensible, economically and statistically significant, and reasonably consistent across studies. Second, the gravity model explains most of the variation in international trade. That is, the model seems reliable and fits the data well. A fine track for this train.<sup>8</sup>

The exact specification of the gravity model used below is:

$$\begin{aligned} \ln(X_{ijt}) = & \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \ln(Y_i Y_j)_t + \beta_3 \ln(Y_i Y_j / \text{Pop}_i \text{Pop}_j)_t + \beta_4 \text{Lang}_{ij} + \beta_5 \text{Cont}_{ij} \\ & + \beta_6 \text{Land}_{ij} + \beta_7 \text{Island}_{ij} + \beta_8 \ln(\text{Area}_i \text{Area}_j) + \beta_9 \text{ComCol}_{ij} + \beta_{10} \text{CurCol}_{ijt} \\ & + \beta_{11} \text{Colony}_{ij} + \beta_{12} \text{ComNat}_{ij} + \beta_{13} \text{CU}_{ijt} + \beta_{14} \text{FTA}_{ijt} + \sum_t \phi_t T_t \\ & + \gamma_1 \text{Bothin}_{ijt} + \gamma_2 \text{Onein}_{ijt} + \gamma_3 \text{GSP}_{ijt} + \epsilon_{ijt} \end{aligned}$$

where  $i$  and  $j$  denotes trading partners,  $t$  denotes time, and the variables are defined as:

- $X_{ijt}$  denotes the average value of real bilateral trade between  $i$  and  $j$  at time  $t$ ,
- $Y$  is real GDP,
- $\text{Pop}$  is population,
- $D$  is the distance between  $i$  and  $j$ ,
- $\text{Lang}$  is a binary “dummy” variable which is unity if  $i$  and  $j$  have a common language and zero otherwise,
- $\text{Cont}$  is a binary variable which is unity if  $i$  and  $j$  share a land border,

- Landl is the number of landlocked countries in the country-pair (0, 1, or 2).
- Island is the number of island nations in the pair (0, 1, or 2),
- Area is the area of the country (in square kilometers),
- ComCol is a binary variable which is unity if i and j were ever colonies after 1945 with the same colonizer,
- CurCol is a binary variable which is unity if i is a colony of j at time t or *vice versa*,
- Colony is a binary variable which is unity if i ever colonized j or *vice versa*,
- ComNat is a binary variable which is unity if i and j remained part of the same nation during the sample (e.g., France and Guadeloupe),
- CU is a binary variable which is unity if i and j use the same currency at time t,
- FTA is a binary variable which is unity if i and j both belong to the same regional trade agreement,
- $\{T_t\}$  is a comprehensive set of time “fixed effects”,
- $\beta$  and  $\phi$  are vectors of nuisance coefficients,
- Both $_{ijt}$  is a binary variable which is unity if both i and j are GATT/WTO members at t,
- One $_{ijt}$  is a binary variable which is unity if either i or j is a GATT/WTO member at t,
- GSP $_{ijt}$  is a binary variable which is unity if i was a GSP beneficiary of j or *vice versa* at t, and
- $\epsilon_{ij}$  represents the omitted other influences on bilateral trade, assumed to be well behaved.

The parameters of interest to me are  $\gamma_1$ ,  $\gamma_2$ , and  $\gamma_3$ . The first coefficient is the most interesting; it measures the effect on international trade if both countries are GATT/WTO members. The second coefficient measures the trade effect if one country is a member and the other is not. If trade is *created* when both countries are in the GATT/WTO  $\gamma_1$  should be positive; if trade is *diverted* from non-members, then  $\gamma_2$  may be negative.<sup>9</sup>  $\gamma_3$  measures the effect of the GSP on trade.

I estimate the gravity model using ordinary least squares, computing standard errors that are robust to clustering by country-pairs. I also include a comprehensive set of year-specific “fixed” effects to account for such factors as the value of the dollar, the global business cycle,

the extent of globalization, oil shocks, and so forth. Since the data set is a (country-pair x time) panel I also use “random effects” (GLS) and “fixed effects” (“within”) estimators as robustness checks (unless otherwise noted, fixed- and random-effects are always country-pair specific).

#### **4: Blah, blah, blah**

The trade data for the regressand comes from the “Direction of Trade” (DoT) CD-ROM data set developed by the International Monetary Fund (IMF). It covers bilateral merchandise trade between 178 IMF trading entities between 1948 and 1999 (with gaps); a list of the countries is included in appendix 2. (Not all the trading entities are “countries” in the traditional sense of the word; I use the word simply for convenience.) I include all countries for which the Fund provides data, so that almost all global trade is covered.<sup>10</sup> Bilateral trade on FOB exports and CIF imports is recorded in American dollars; I deflate trade by the American CPI for all urban consumers (1982-1984=100; taken from [www.freelunch.com](http://www.freelunch.com)). An average value of bilateral trade between a pair of countries is created by averaging all of the (four possible) measures potentially available (exports from i to j, imports into j from i, and so forth). It is well known that trade has grown quickly since the Second World War, and that is reflected in this data set. From 1948 through the end of the sample in 1999, global trade increased on average by over eight percent annually.<sup>11</sup>

Population and real GDP data (in constant American dollars) have been obtained from standard sources: the Penn World Table, the World Bank’s *World Development Indicators*, and the IMF’s *International Financial Statistics*.<sup>12</sup>

I exploit the CIA’s *World Factbook* for a number of country-specific variables.<sup>13</sup> These include: latitude and longitude, land area, landlocked and island status, physically contiguous

neighbors, language, colonizers, and dates of independence. I use these to create great-circle distance and the other controls.

I add information on whether the pair of countries was involved in a currency union, using Glick-Rose (2002).<sup>14</sup> I obtain data from the World Trade Organization to create an indicator of regional trade agreements, and include: ASEAN, EEC/EC/EU; US-Israel FTA; NAFTA; CARICOM; PATCRA; ANZCERTA; CACM, SPARTECA, and Mercosur.<sup>15</sup> I initially assume that all RTAs have the same effect on trade, but relax this assumption below.

### **The Unusual Suspects**

To all this, I add the key variables of GATT/WTO membership. The website of the WTO provides dates for accession of its members to the GATT/WTO.<sup>16</sup> Thirty-two trading entities were either founding members (technically “contracting parties”) of the GATT or were covered because of their relationship with a founding member (e.g., French Polynesia and Bermuda).<sup>17</sup> These countries began the sample in 1948 covered by the GATT, and include many large important countries (e.g., Belgium, Brazil, Canada, India, the Netherlands, South Africa, the United Kingdom, and the United States). From the outset, most international trade has been conducted by GATT/WTO members.<sup>18</sup>

After GATT’s creation, outsiders joined over time. For instance, Italy and Sweden were among the nine countries that acceded in 1950, Germany joined in 1951 (along with Austria, Peru, and Turkey), and Japan joined in 1955. By 1960, 50 countries were covered by the GATT; by 1970 the number had risen to 90, and by 1990 to 112.<sup>19</sup> As of July 2002, there were a total of 144 members of the WTO; there were also a number (29) of WTO “observers” who are required to begin negotiations for WTO membership within five years (including Algeria, Andorra,



Russia, and Saudi Arabia). In addition, a number of countries (e.g., Afghanistan, Iraq, Liberia, and Syria) are neither members nor observers of the WTO.

The GATT conducted eight “rounds” of multilateral trade negotiations before it was subsumed by the World Trade Organization (WTO) in 1995: Geneva (concluded in 1947); Annecy (1949); Torquay (1951); Geneva (1956); Dillon (1961); Kennedy (1967); Tokyo (1979); and Uruguay (1994). In most of my work I maintain the hypothesis that the effect of the GATT/WTO on trade does not vary over time, but again I examine the importance of this assumption below.

The last (and least important) coefficient of interest to me concerns the impact of the much-derided Generalized System of Preferences (GSP) on Trade. The UN publishes *Operation and Effects of the Generalized System of Preferences* at intervals; these booklets contain information on which countries extend trade concessions to which developing country beneficiaries under the GSP. I have obtained this pamphlet for 1974, 1979, and 1984 and use this information to construct bilateral time-varying GSP relationships.<sup>20</sup>

Descriptive statistics on the variables are available in appendix 1. It shows that the key GATT/WTO and GSP variables are not highly correlated with most of the gravity variables. The only exception is the GSP dummy, which is positively correlated with both real GDP variables, as one might expect (given that richer countries are those that extend the GSP concessions). In other words, multicollinearity is not a problem for the coefficients of interest.<sup>21</sup>

## **5: A Thousand Words**

A preliminary look at the data leads one to believe that entry into the GATT/WTO has a strong positive effect on trade. Figure 1 is a set of graphical “event studies” which look at

bilateral trade around the dates of GATT/WTO entry. The top left-hand diagram examines the natural logarithm of real bilateral trade in the five years before, during (marked by the vertical line), and after entry; it considers trade between a new entrant and non-members. The middle line (with circles) shows the mean level of trade, while the two other lines show a confidence interval of plus and minus two standard deviations. The diagram in the top right-hand corner is the analogue showing trade between a country joining the GATT/WTO and other members.

The two graphs deliver the same message. While trade is stagnant or even falling slightly in the five years before entry into the multilateral trade system, it seems to begin rising coincident with entry and continue rising for at least five years. This increase in trade is both economically and statistically significant.

Nevertheless, it is important to note that the variable portrayed in the top pair of graphics is the unadjusted log of real trade. The graphics at the bottom of Figure 1 are analogues that plot the residual from the gravity equation of trade. That is, I regress the log of real trade on the gravity variables (with the exception of GATT/WTO and GSP membership) and plot the residuals, as before, around the time of GATT/WTO accession (more details on the regressions are provided below). The residuals are always insignificantly different from zero and do not rise significantly with entry into the GATT/WTO. That is, countries joining the GATT/WTO neither have significantly different trade from non-members, nor do they experience increases in trade, holding other factors constant.

### **If It's Worth Saying Once**

Figure 2 is an analogous event study, which examines *aggregate* openness (that is, exports plus imports divided by GDP) instead of (the log of) *bilateral* trade. I use data from the

Penn World Table mark 6, which covers the years from 1950 through 1998. During this period, 104 countries joined the GATT/WTO. Yet aggregate openness did not vary significantly from the five years preceding GATT/WTO entry through the five years after accession, as can be seen from the top left graphic in Figure 2. The other three diagrams in the figure are analogous event studies, which plot the residuals once openness has been regressed on the natural logarithms of both real GDP and real GDP per capita.<sup>22</sup> Since the data set is a panel with data for a number of countries and years, I show the residuals from: a) a standard regression; b) a regression which includes a comprehensive set of (49) year-specific fixed effects; and c) a regression which includes (158) country-specific fixed effects. There is little evidence that GATT/WTO entry has a strong significant effect on the ratio of aggregate trade to GDP in any of the graphics.

More evidence of the weak relationship between aggregate openness and GATT/WTO membership can be found in the appendix graphics A1 through A4. These are simple time-series plots of openness against time, for 98 countries that joined the GATT/WTO between 1950 and 1998 (the span of the PWT6 data set); a vertical line marks entry into the GATT/WTO.<sup>23</sup> It is possible to find cases where entry is followed by a gradual rise in openness (e.g., Argentina and Austria). But it is also possible to find cases where entry is followed by a fall in openness (e.g., Belize and Botswana), or where little happens (e.g., Denmark and the Dominican Republic).<sup>24</sup>

## **6: The Sexy Part**

The event studies of the previous section provide little evidence that membership in the GATT/WTO stimulates trade. But while the visual evidence is intriguing, it may not be completely persuasive. In this section I use standard regression analysis to isolate the effects of

the multilateral trading system on trade. It turns out that using this extra econometric firepower delivers the same (non-)result.

Table 1 contains benchmark regression results. My default specification is the augmented gravity model, estimated with ordinary least squares, year fixed effects, and robust standard errors over the full sample. This specification (labeled “Default”) appears at the extreme left of Table 1.

The good news is that the model works well. Countries that are farther apart trade less, while economically larger and richer countries trade more.<sup>25</sup> These traditional gravity effects are not only large but economically sensible in size, highly statistically significant, and in line with estimates from the literature. Countries belonging to the same regional trade association trade more, as do countries sharing a language, or land border. Landlocked countries trade less, as do physically larger countries. A shared colonial history encourages trade. (Heck, even the notorious currency union effect has an economically and statistically significant effect.) These effects are sensible and explain almost two-thirds of the variation in bilateral trade. Thus, the gravity equation seems to have done a good job in explaining most of the reasons why international trade varies across almost a quarter-million observations.

Above and beyond these gravity effects, does membership in the GATT/WTO have any substantial effect on trade? No. The dummy variables for one or both of the countries being GATT/WTO members both have small *negative* coefficients. Neither is statistically different from zero at conventional significance levels. No reasonable person believes that membership in the GATT or WTO actually reduces trade, so I prefer to interpret the negative coefficients as a mystery rather than an indictment. Still, by way of contrast, extension of the GSP from one country to another seems to have a large positive effect on trade. Since the regressand is the

natural logarithm of real trade, the GSP is estimated to raise trade over one hundred percent (since  $\exp(.86) - 1 \approx 136\%$ )! That is, the data manifestly *can* yield positive effects.<sup>26</sup>

The rest of Table 1 contains a set of robustness checks, presented in columns to the right of the default. The first perturbation drops all data from industrial countries.<sup>27</sup> The second uses only data after 1970. Finally, I add country-specific fixed effects to the benchmark equation at the extreme left of the table.<sup>28</sup> The key result – that membership in the GATT/WTP is associated with an economically and statistically insignificant increase in trade – seems robust. Indeed, six of the eight coefficients are actually negative (though usually insignificantly so). The *largest* coefficient in Table 1 indicates that a pair of countries both in the GATT traded only ( $\exp(.15) - 1 \approx 16\%$ ) more than a pair of countries outside the GATT. This is small compared to other effects (e.g., regional trade associations), the long-term growth of trade, intuition, and the hype surrounding the GATT/WTO.

To summarize, I have been unable to find evidence that membership in the GATT/WTO has had a strong positive effect on international trade. But since the GSP *is* associated with an approximate doubling of trade, it seems that the data (rather than the methodology) are delivering the negative message. Some aspects of the multilateral trading system seem to matter; but not the obvious ones.

## **7: Raising Deflector Shields**

Regressions can be run in a number of ways. If my results were the result of a peculiar or idiosyncratic methodology, they would be suspect. I now go to some pains to show that they are not particularly sensitive to reasonable perturbations in my methodology.

Table 1 pools data across years, as I exploit both time-series and cross-sectional variation in the data set. I present purely cross-sectional evidence in Table 2. In particular, I tabulate the estimates of  $\{\gamma_1, \gamma_2, \gamma_3\}$  when the gravity equation is estimated on individual years at five-year intervals. (The gravity regressors are of course included in the regression; they are simply not tabulated to avoid clutter.) It is certainly possible to find positive significant effects of GATT/WTO membership on trade, if one looks carefully; the data from the 1950s show positive and significant effects of GATT membership. However, these coefficients shrink in the 1960s with the large expansion of the GATT and turn negative in the 1970s. The effects are also small in the 1980s and unstable in the 1990s.

A different issue is whether the effects of GATT/WTO membership have varied over time. The GATT conducted eight multilateral rounds of trade liberalization; the conclusions of the rounds seem obvious break points (I check for dynamics later since trade barrier reductions may be phased in slowly). Accordingly, in Table 3 I split both  $\gamma_1$  and  $\gamma_2$  into eight pieces, one for each GATT round. Thus the top row of coefficients shows the effect of GATT membership for 1948 (that is, prior to the conclusion of the Annecy round); the second set shows the effect from the Annecy round through the period prior to the conclusion of the Torquay round, and so forth. There is clearly (statistically and economically) significant variation in the coefficients across trade rounds. Nevertheless, it is striking that the only economically large effects are estimated for the first one or two rounds, and most of these are statistically insignificant. Cognoscenti may prefer the fixed-effects estimation shown at the right of the table that focus even more exclusively on time-series variation, since any features which are constant over time for a pair of countries (such as geography, culture, and history) are taken out. Yet these “within” estimates are economically moderate, often insignificant and sometimes negative.

Do the effects of the system vary systematically by region or income class? The answer is yes ... but there is still little evidence that belonging to the GATT/WTO really matters. Table 4 repeats the default estimates of the key parameters in the top row, and then tabulates estimates for nine different cuts of the sample. I consider five different regional groupings and four different income groupings. Thus the “South Asia” row tabulates  $\{\gamma_1, \gamma_2, \gamma_3\}$  when the equation is estimated over observations which include at least one observation from a South Asian country. Analogous estimates for four other regions and four income groupings follow.<sup>29</sup> The results are easy to summarize. The GSP estimates remain economically and statistically significant throughout; but GATT/WTO membership seems to have a negligible (often negative) effect. The only exception is trade for South Asia, where the GATT/WTO effect is economically large but statistically marginal.

### **More for Dweebs**

Further sensitivity analysis is presented in Table 5, which tabulates estimates of  $\{\gamma_1, \gamma_2, \gamma_3\}$  for sixteen slices of the sample. The first pair of experiments splits the pooled data set into halves by time. I next divide the sample by country groupings, and include only data for: a) industrial countries; b) non-African countries; c) countries outside Latin America and the Caribbean; d) non-OPEC countries; and e) observations which exclude regional trade agreements.<sup>30</sup> I then successively drop the poorest quarter of the data set (as gauged by real GDP per capita), and the smallest quarter of the data set (as gauged by total real GDP). I also drop the observations with the largest outlying residuals.<sup>31</sup> Finally I report results for bilateral trade between each of the G-7 countries and the rest of the world.<sup>32</sup>

Only one of these perturbations has any important positive effect on the key coefficients. In particular, when I restrict the sample of countries to the industrial countries only, GATT/WTO membership has a somewhat important effect on trade. My estimate indicates that a pair of industrial GATT/WTO members trades about 60% ( $\approx \exp(.47) - 1$ ) more than an otherwise-identical pair of non-members. This result is not of overwhelming statistical significance, and even its economic importance is less than dramatic.<sup>33</sup>

Having messed with the sample, I fiddle with the model in Table 6. First, I add quadratic gravity terms as nuisance variables, since some authors have found these terms important. Next I drop the set of year dummies. I also record the coefficients when each of the ten regional trade agreements is allowed to have its own separate effect on trade.<sup>34</sup> In a separate experiment I attempt to provide a sharper test for trade creation and diversion by adding a control for third-country trade. In particular, I include (the log of) aggregate trade from either country to the rest of the world (excluding the bilateral trade between the pair).<sup>35</sup>

Another set of robustness checks concern the estimation technique. First, I re-estimate everything using five-year averages in place of annual observations. I then tabulate the results of panel estimators that treat country-pairs as both random- and fixed-effects (there are two sets of estimates; one without year effects, and another with year effects).<sup>36</sup> I also employ the trendy “treatment” estimator developed by Heckman and co-authors. There are two sets of maximum likelihood estimates presented. The first compares trade when both countries are GATT/WTO members to the case where neither is; the second compares trade between non-members and the case where just one of the countries is a GATT/WTO member.<sup>37</sup> These estimates are of particular interest since small poor countries are less likely to trade and also less likely to be GATT/WTO members.<sup>38</sup> The treatment methodology attempts to correct for this selection bias,



yet it delivers even more negative results. I then tabulate coefficients estimated from weighted least squares (using real GDP as weights), a robust median estimator, and a Tobit estimator (since trade cannot be negative).<sup>39</sup>

The final checks in Table 6 consist in adding a lag of the dependent variable in two different ways: OLS with year effects, and the Arellano-Bond panel GMM estimator.<sup>40</sup> Adding the lagged dependent variable with OLS has little effect on the primary coefficients of interest, which remain negative. Nevertheless, the lagged dependent variable itself is highly significant with a coefficient of .81.<sup>41</sup> This leads one to suspect that dynamic effects could be important. After all, effective entry into the multilateral trading system may take time. Still, it is striking that none of the robustness checks of Table 6 deliver economically substantial effects of the GATT or WTO on trade.

I incorporate dynamics in a number of other ways in Table 7. First, to the basic model I add in the extreme left, a set of dummy variables which are unity if either *i* or *j* entered the GATT/WTO five, ten, fifteen, or twenty years ago. The coefficients are positive and significant, possibly indicating a delayed effect of membership on trade, consistent with the notion that the effects of membership are slowly phased in. On the other hand, this may simply indicate highly persistent serially correlated disturbances. Indeed so; the Prais-Winsten estimates in the second column show small effects of the GATT/WTO both contemporaneously and (in the next column) including lags, so long as the (considerable) serial correlation is accounted for. The right-hand side of the table shows that the same results are true if one uses country-pair random effects estimators, a simple robustness check. That is, once autoregressive errors (or a lagged dependent variable) are incorporated, the effects of GATT/WTO membership are small both

contemporaneously and after taking into account lags. It seems that dynamic considerations do not reveal an economically substantive role for the GATT/WTO.<sup>42</sup>

### **Only for Geeks**

A few issues are worth addressing which are even more technical.

There is little *measurement error* with respect to the date of a country's formal accession to the GATT/WTO.<sup>43</sup> *Reverse causality* is not the problem that it ordinarily is in such exercises.<sup>44</sup> Countries may join the WTO/GATT in order to increase trade, but that would tend to bias the key coefficients *upwards*. Still, both issues can in principle be handled with instrumental variable estimators ... so long as the latter are available. The difficulty in practice is finding variables that are correlated with bilateral GATT/WTO membership. I have experimented with two sets of instrumental variables: 1) measures of democracy and polity, and 2) measures of freedom, civil rights and political rights.<sup>45</sup> I use the sets of instrumental variables a) both separately and together, b) on both the entire panel and on individual cross-sections, and c) in two different functional forms (the log of product of the countries' values, and the simple sum of the values). Still, essentially all the results are poor. In particular, estimates of the key parameters are implausibly large in absolute value, often negative, and statistically marginal. The issue is primarily poor fit in the first stage; my dummy variables for GATT/WTO membership are poorly correlated with the instrumental variables. Since this topic is only of academic interest, I relegate the results to Appendix 4; others may choose to pursue this further.

*Missing data* is a potential problem. There are two distinct issues: 1) missing trade data (since trade cannot be less than zero); and 2) missing regressor data, primarily GDP. The first issue has been the subject of more research, and has already been discussed. The second issue

may be more important in practice; small poor countries typically have their trade recorded but are less likely to have national accounts data. Without GDP data, these observations are dropped from the regression analysis, seriously reducing the sample size in a non-random way.<sup>46</sup>

Econometrics has developed a number of techniques including various ways of interpolating or estimating missing data (e.g., Gourieroux and Monfort, 1981; surveys are provided by Griliches, 1986 and Little, 1992). These typically improve the efficiency of the parameters of interest, while sometimes introducing bias; my strategy of working with non-randomly selected data does not introduce bias so long as the selection is based on an independent variable (Wooldridge, 2000 p. 299). Given my interest in the point estimates I do not find these estimators compelling, but it seems a reasonable topic for future research.

I conclude that my key findings are robust. Membership in the GATT/WTO seems not to have an economically or statistically significant effect on trade, while the GSP encourages trade.

### **Alright Already**

Is it possible to understand why economists have assumed that the GATT has been so important in encouraging trade? It is possible to shed a little light on the issue by stripping down the regression model. Table 8 contains the benchmark pooled results at the extreme left-hand side, taken directly from Table 1. I then drop the augmenting regressors in the next column (i.e., I set  $\beta_4 - \beta_{14}$  to zero), leaving only a stripped-down gravity model. This barely alters the key coefficients (or the fit of the model). But if I drop the essential gravity variables – distance and output – from the model, I *can* estimate a highly significant positive effect of GATT/WTO membership on trade. In particular, the estimates show that a pair of members share 345% ( $\approx \exp(1.24)$ ) the level of trade of a pair of non-members. The difference between this huge

effect and the small (negative) effect of the benchmark result is analogous to the difference between the substantial trend visible in the top part of Figure 1 and the negligible effect in the bottom of the same graphic. That is, the GATT/WTO seems to have a huge effect on trade if one does not hold other things constant; the multilateral trade regime matters, *ceteris non paribus*. *Simply taking into account standard gravity effects essentially eradicates any large effect of the GATT/WTO on bilateral trade.*<sup>47</sup>

This paper reports 83 sets of estimates of the parameters of interest, including 80 estimates of  $\gamma_1$ , the effect of GATT/WTO membership (by both countries) on trade.<sup>48</sup> The mean estimate across these 80  $\gamma_1$  estimates is .05; the median is .02; 39 of the estimates are negative, while only four are greater than .69 (implying that GATT/WTO membership doubles trade), none reliably so.<sup>49</sup> These seem small compared to both conventional gravity effects (such as the effect of regional trade agreements), and to the considerable growth in trade (both absolute and relative to income). Fifty-seven (or 71%) of the associated t-statistics are insignificant at conventional confidence levels, in a setting where t-ratios commonly exceed 5 and often twenty. My interpretation: the regression analysis is saying (albeit with the whisper associated with negative results) that there is little evidence that GATT/WTO membership has a substantial positive effect on trade.<sup>50</sup>

## **8: The Next Generation**

I have estimated the effect of the multilateral system on trade in a number of ways. Others may wish to boldly go further.

All the work above has focused on total trade. It is possible that GATT/WTO accession has different effects on exports and imports.<sup>51</sup> Alternatively, decomposing trade by industry may

be interesting since the multilateral trade system has been less successful at liberalizing trade in e.g., agriculture, textiles. Investigating the impact of the multilateral system on trade in services is also a potential subject for future work. The key issue here is data availability. The OECD has just released bilateral data, but it only covers basically rich countries for 1999-2000. Finally, examining capital flows and the prices of both output and input factors may be revealing.

*De jure* accession to the multilateral system may not be the same as *de facto* accession. Implicit accession may either *lead* formal accession (if countries wish to gain from freer trade before joining or ingratiate themselves with the GATT/WTO to smooth accession) or *lag* it (if implementing GATT/WTO rules takes time). I cannot currently quantify *de facto* accession and have been unable to find important dynamic effects, but others may be more able.

I have found little persuasive evidence that trade between GATT/WTO members and non-members is lower than might otherwise be expected. Instead  $\gamma_2$  is, on the whole, basically zero. The glass is half-full: it looks like there is not potentially harmful trade diversion. Cold comfort, given the dearth of indications of beneficial trade creation.<sup>52</sup> Still, a more structural approach may bring sharper results, as well as being of intrinsic interest. Of course, structure often comes at the expense of generality, since most models are rejected and data on trade determinants are hard to find for most countries.<sup>53</sup>

Do other parts of the multilateral international economic order matter? The most obvious question to ask is whether membership in the IMF affects my results. After all, the Fund was created in part to facilitate trade.<sup>54</sup> I added a pair of dummies for membership in the IMF, analogous to those used for GATT/WTO membership; the results are tabulated in the extreme right of Table 8.<sup>55</sup> Clearly controlling for IMF membership does not affect my conclusion. It is

also interesting that membership in the Fund seems not to facilitate trade, at least on superficial examination. This may be a topic worth pursuing.<sup>56,57</sup>

Of course the most interesting issue that remains is *why* the GATT/WTO doesn't seem to have had much of an impact on trade. It is natural to ask whether GATT/WTO members have systematically lower trade barriers. The answer seems to be negative; see Rose (2002). There are at least two possible reasons. The first is that the GATT/WTO has not typically forced most countries to lower trade barriers, especially developing countries that have received "special and differential treatment." The second reason is that members of the WTO seem to extend most-favored nation status unilaterally to countries outside the system, even though they are under no WTO formal obligation to do so.<sup>58</sup> Still, one should be aware of the well-known difficulties associated with measuring the stance of trade policy (Pritchett, 1996; Rodriguez and Rodrik, 2000). In appendix 6 I add tariff rates to the benchmark equation.<sup>59</sup> Tariffs rates have an economically and statistically significant negative effect on trade (as seems sensible), and the other gravity estimates are hardly changed ..., as is the insignificance of GATT/WTO membership.<sup>60</sup> Appendix 7 delivers the same conclusion with four other measures of trade policy: two indices from the *Index of Economic Freedom*, a measure of price distortions, and black market premia. Ongoing research (Rose, 2002) indicates that the negative effect of GATT/WTO membership on trade may appear because membership simply has little effect on trade policy. For now, I note that my result is consistent with the extant econometric literature ... since it *is* the literature.

## **Parting Shots**

Perhaps the GATT has not had much of an effect on trade ... but the WTO will. Perhaps. After all, the contracting parties to the *ad hoc* and provisional GATT signed legal documents about goods trade only to the extent that they were consistent with pre-existing national legislation.<sup>61</sup> Members of the WTO use a more wide-reaching permanent framework to resolve disputes about trade in goods, services, and intellectual property. Time will tell.

Perhaps the GATT and WTO have large effects on income or welfare but only through mechanisms other than trade. Perhaps. But if so, this seems like news to us all.

Perhaps the GATT and WTO have acted as an international public good, freeing trade for all countries independent of whether they are members or not. Perhaps; one can't use data to test this hypothesis, since there is no data for the counter-factual GATT-free world.<sup>62</sup> But membership *seems* to be a big deal. Why should anyone care whether China is in the WTO if membership is irrelevant? It's not conventional to view the multilateral trade system as a GloboCop for all countries, *independent of membership*. Still, this story can't be tested (at least not without an implausible structure) so it can't be rejected either. Even if one believes that the GATT/WTO acts as an immeasurable trade-promoting externality, we don't *know* that the multilateral system has stimulated trade.

Why has trade grown faster than income, if not because of the GATT/WTO? Who knows? But there are plenty of other candidates. Higher rates of productivity in tradables, falling transport costs, regional trade associations, converging tastes, the shift from primary products towards manufacturing and services, growing international liquidity, and changing endowments are all possibilities. But that's a different topic altogether.

My quantitative examination indicates that there is little reason to believe that the GATT/WTO has had a dramatic effect on trade. In particular, once standard gravity effects have

been taken into account, bilateral trade cannot be strongly and dependably linked to membership in the WTO or its predecessor the GATT. Since the GSP and other gravity effects have economically and statistically significant influences, this weak finding does not seem to be the result of my methodology or data set, both of which are common. I conclude that it is surprisingly hard to demonstrate convincingly that the GATT and the WTO have dramatically encouraged trade. One should not conclude the GATT and WTO have not increased trade (although I wish it was easier to see in the data). Rather, since common sense and conventional wisdom accord an important role to the GATT/WTO in creating trade, I prefer to view this negative result as an interesting mystery.



**Table 1: Benchmark Results**

	<b>Default</b>	<b>No Industrial Countries</b>	<b>Post '70</b>	<b>With Country Effects</b>
<b>Both in GATT/WTO</b>	-.04 (.05)	-.21 (.07)	-.08 (.07)	.15 (.05)
<b>One in GATT/WTO</b>	-.06 (.05)	-.20 (.06)	-.09 (.07)	.05 (.04)
<b>GSP</b>	.86 (.03)	.04 (.10)	.84 (.03)	.70 (.03)
<b>Log Distance</b>	-1.12 (.02)	-1.23 (.03)	-1.22 (.02)	-1.31 (.02)
<b>Log product Real GDP</b>	.92 (.01)	.96 (.02)	.95 (.01)	.16 (.05)
<b>Log product Real GDP p/c</b>	.32 (.01)	.20 (.02)	.32 (.02)	.54 (.05)
<b>Regional FTA</b>	1.20 (.11)	1.50 (.15)	1.10 (.12)	.94 (.13)
<b>Currency Union</b>	1.12 (.12)	1.00 (.15)	1.23 (.15)	1.19 (.12)
<b>Common Language</b>	.31 (.04)	.10 (.06)	.35 (.04)	.27 (.04)
<b>Land Border</b>	.53 (.11)	.72 (.12)	.69 (.12)	.28 (.11)
<b>Number Landlocked</b>	-.27 (.03)	-.28 (.05)	-.31 (.03)	-1.54 (.32)
<b>Number Islands</b>	.04 (.04)	-.14 (.06)	.03 (.04)	-.87 (.19)
<b>Log product Land Area</b>	-.10 (.01)	-.17 (.01)	-.10 (.01)	.38 (.03)
<b>Common Colonizer</b>	.58 (.07)	.73 (.07)	.52 (.07)	.60 (.06)
<b>Currently Colonized</b>	1.08 (.23)		1.12 (.41)	.72 (.26)
<b>Ever Colony</b>	1.16 (.12)	-.42 (.57)	1.28 (.12)	1.27 (.11)
<b>Common Country</b>	-.02 (1.08)		-.32 (1.04)	.31 (.58)
<b>Observations</b>	234,597	114,615	183,328	234,597
<b>R<sup>2</sup></b>	.65	.47	.65	.70
<b>RMSE</b>	1.98	2.36	2.10	1.82

Regressand: log real trade.

OLS with year effects (intercepts not reported).

Robust standard errors (clustering by country-pairs) in parentheses.

**Table 2: Cross-Sectional Analysis**

	<b>Both in GATT/WTO</b>	<b>One in GATT/WTO</b>	<b>GSP</b>
<b>1950</b>	.59 (.12)	.21 (.09)	
<b>1955</b>	.64 (.11)	.30 (.09)	
<b>1960</b>	.40 (.10)	.07 (.07)	
<b>1965</b>	.23 (.07)	.13 (.07)	
<b>1970</b>	-.15 (.10)	-.04 (.10)	.40 (.23)
<b>1975</b>	-.33 (.11)	-.16 (.11)	.92 (.05)
<b>1980</b>	-.09 (.11)	.02 (.11)	.90 (.05)
<b>1985</b>	.18 (.15)	.15 (.16)	.80 (.06)
<b>1990</b>	.58 (.20)	.43 (.21)	.76 (.05)
<b>1995</b>	-.50 (.21)	-.66 (.21)	.59 (.05)

Regressand: log real trade.

OLS with intercept not reported.

Robust standard errors in parentheses.

Regressors included but with unrecorded coefficients: regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country.

**Table 3: Allowing the Effects to vary over GATT rounds**

	<b>OLS, Year Effects</b>	<b>OLS, Year Effects</b>	<b>Fixed Country-Pair Effects</b>	<b>Fixed Country-Pair Effects</b>
<b>GATT Regime</b>	<b>Both in GATT/WTO</b>	<b>One in GATT/WTO</b>	<b>Both in GATT/WTO</b>	<b>One in GATT/WTO</b>
<b>Before Annecy Round (1949)</b>	1.17 (.62)	.43 (.56)	.76 (.35)	.08 (.25)
<b>Annecy to Torquay Round (1951)</b>	.26 (.12)	.14 (.09)	.34 (.09)	.11 (.06)
<b>Torquay to Geneva Round (1956)</b>	.12 (.10)	.14 (.09)	.35 (.04)	.14 (.03)
<b>Torquay to Dillon Round (1961)</b>	-.02 (.09)	.03 (.07)	.24 (.04)	.10 (.03)
<b>Dillon to Kennedy Round (1967)</b>	-.09 (.06)	-.05 (.06)	.26 (.03)	.11 (.02)
<b>Kennedy to Tokyo Round (1979)</b>	-.14 (.07)	-.05 (.07)	.06 (.02)	.04 (.02)
<b>Tokyo to Uruguay Round (1994)</b>	.19 (.09)	.05 (.09)	-.07 (.02)	-.09 (.02)
<b>After Uruguay Round</b>	-.85 (.12)	-.80 (.12)	.18 (.02)	.14 (.03)

Regressand: log real trade.

OLS with year effects, robust standard errors (clustering by country-pairs) in parentheses; or fixed effects.

Regressors not recorded: GSP; regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country; intercepts.

**Table 4: Allowing the Effects to vary by Region and Income Class**

	<b>Both in GATT/WTO</b>	<b>One in GATT/WTO</b>	<b>GSP</b>
<b>Default</b>	-.04 (.05)	-.06 (.05)	.86 (.03)
<b>South Asia</b>	.93 (.40)	.67 (.39)	.86 (.11)
<b>East Asia</b>	.02 (.12)	-.13 (.10)	.60 (.10)
<b>Sub-Saharan Africa</b>	-.29 (.10)	-.28 (.09)	.97 (.06)
<b>Middle-East or North Africa</b>	-.16 (.12)	-.01 (.08)	1.05 (.09)
<b>Latin America or Caribbean</b>	.10 (.08)	.13 (.07)	.93 (.06)
<b>High Income</b>	-.26 (.09)	-.20 (.08)	.48 (.04)
<b>Middle Income</b>	-.05 (.06)	-.04 (.05)	.92 (.04)
<b>Low Income</b>	-.38 (.08)	-.36 (.08)	1.11 (.05)
<b>Least Developed</b>	-.34 (.11)	-.21 (.10)	1.09 (.07)

Regressand: log real trade. OLS with year effects (intercepts not reported).

Robust standard errors (clustering by country-pairs) in parentheses.

Regressors not recorded: regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country.

**Table 5: Sample Sensitivity Analysis**

	<b>Both in GATT/WTO</b>	<b>One in GATT/WTO</b>	<b>GSP</b>
<b>Data before 1980</b>	.01 (.05)	.01 (.05)	.88 (.04)
<b>Data after 1979</b>	-.04 (.08)	-.08 (.08)	.81 (.04)
<b>Only Industrial Countries</b>	.47 (.22)	.19 (.22)	-.40 (.09)
<b>No African Countries</b>	-.06 (.07)	-.08 (.06)	.70 (.04)
<b>No Latin or Caribbean countries</b>	-.10 (.06)	-.16 (.06)	.64 (.04)
<b>No OPEC Countries</b>	-.17 (.06)	-.17 (.06)	.80 (.03)
<b>No RTA Observations</b>	-.05 (.05)	-.07 (.05)	.84 (.03)
<b>Without Poorest Quartile of real GDP p/c</b>	.15 (.07)	.14 (.06)	.73 (.03)
<b>Without Smallest Quartile of real GDP</b>	.21 (.06)	.16 (.06)	.69 (.03)
<b>Without 3s Outliers</b>	-.07 (.05)	-.07 (.04)	.79 (.03)
<b>Only Canadian Observations</b>	-.00 (.13)		.32 (.15)
<b>Only American Observations</b>	.05 (.11)		.27 (.14)
<b>Only British Observations</b>	.15 (.10)		-.13 (.13)
<b>Only French Observations</b>	.20 (.09)		.31 (.14)
<b>Only Italian Observations</b>	.02 (.10)		.11 (.14)
<b>Only German Observations</b>	-.14 (.26)	-.18 (.23)	-.13 (.14)
<b>Only Japanese Observations</b>	-.39 (.36)	-.40 (.31)	.32 (.15)

Regressand: log real trade. OLS with year effects (intercepts not reported) unless noted.

Robust standard errors (clustering by country-pairs) in parentheses.

Regressors not recorded: regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country.

**Table 6: Estimation Sensitivity Analysis**

	<b>Both in GATT/WTO</b>	<b>One in GATT/WTO</b>	<b>GSP</b>
<b>With Quadratic Gravity terms</b>	-.02 (.05)	-.02 (.05)	.86 (.03)
<b>Without Year Effects</b>	-.53 (.06)	-.33 (.05)	.47 (.03)
<b>Dis-aggregated Regional Trade Agreements</b>	-.03 (.05)	-.06 (.05)	.83 (.03)
<b>Controlling for Aggregate Third-Country Trade</b>	-.08 (.05)	-.16 (.05)	.50 (.03)
<b>5-yr averages</b>	-.06 (.06)	-.07 (.05)	.89 (.03)
<b>Random Effects (GLS) Estimator</b>	-.07 (.02)	-.06 (.02)	.04 (.01)
<b>Fixed Effects (Within) Estimator</b>	.15 (.02)	.05 (.02)	.11 (.01)
<b>Random Effects (GLS) Estimator with Years</b>	.11 (.02)	.03 (.02)	.30 (.01)
<b>Fixed Effects (Within) Estimator with Years</b>	.13 (.02)	.06 (.02)	.18 (.01)
<b>Treatment MLE : Both members vs. neither</b>	-.20 (.07)		.74 (.04)
<b>Treatment MLE : One member vs. neither</b>		-.26 (.07)	1.19 (.05)
<b>Median Regression</b>	-.51 (.02)	-.30 (.02)	.27 (.01)
<b>Weighted Least Squares</b>	-.03 (.05)	-.05 (.05)	.84 (.03)
<b>Tobit</b>	-.64 (.02)	-.41 (.02)	.58 (.01)
<b>With Lagged Dependent Variable</b>	-.03 (.01)	-.02 (.01)	.10 (.01)
<b>Arellano-Bond Dynamic Panel</b>	.12 (.04)	.02 (.04)	.35 (.02)

Regressand: log real trade. OLS with year effects (intercepts not reported) unless noted.

Robust standard errors (clustering by country-pairs) in parentheses.

Regressors not recorded: regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country.

**Table 7: Dynamic Analysis**

Estimator	OLS	Prais-Winsten	Prais-Winsten	Random Effects	Random Effects	Random Effects
<b>Residual Autocorrelation Coefficient</b>		.83	.83		.66	.66
<b>Both in GATT/WTO</b>	-.07 (.05)	.09 (.03)	.09 (.04)	.11 (.02)	.13 (.03)	.13 (.03)
<b>One in GATT/WTO</b>	-.07 (.05)	.03 (.03)	.03 (.03)	.03 (.02)	.04 (.03)	.04 (.02)
<b>Accession 5 years ago</b>	.22 (.03)		.00 (.01)	-.04 (.02)		-.02 (.02)
<b>Accession 10 years ago</b>	.43 (.03)		.04 (.01)	.08 (.03)		.04 (.02)
<b>Accession 15 years ago</b>	.47 (.03)		.01 (.01)	.10 (.03)		.00 (.02)
<b>Accession 20 years ago</b>	.66 (.03)		.04 (.01)	.22 (.03)		.05 (.02)

Regressand: log real trade.

Standard errors in parentheses (robust for OLS and Prais -Winsten).

Regressors included but with unrecorded coefficients: regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; common country; year effects.

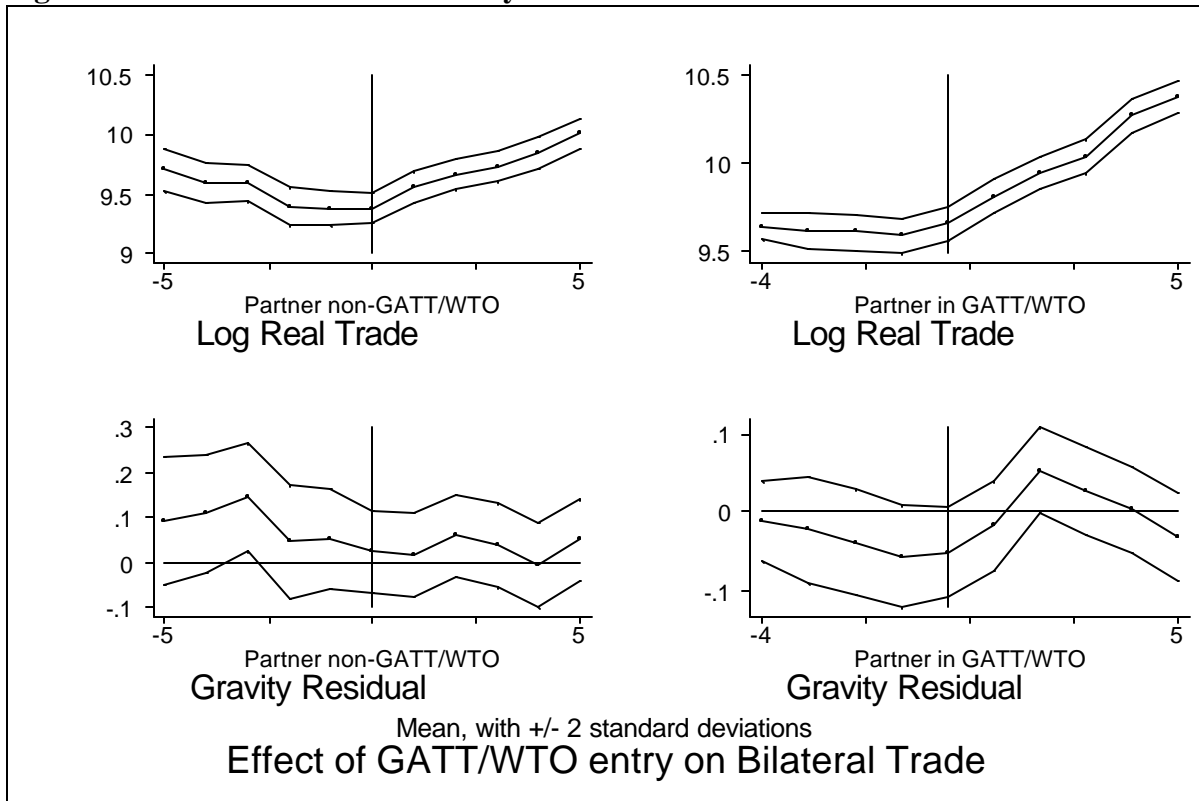
**Table 8: Perturbations of the Gravity Model**

<b>Both in GATT/WTO</b>	-.04 (.05)	.14 (.05)	1.23 (.08)			.02 (.05)
<b>One in GATT/WTO</b>	-.06 (.05)	-.02 (.05)	.46 (.07)			-.02 (.05)
<b>GSP</b>	.86 (.03)	.74 (.03)	2.17 (.07)	.86 (.03)	.88 (.03)	.85 (.03)
<b>Neither in GATT/WTO</b>				.05 (.05)		
<b>1 Founder of GATT</b>					.22 (.04)	
<b>2 Founders of GATT</b>					.46 (.10)	
<b>Min. Years In GATT/WTO</b>					.001 (.001)	
<b>Max. Years In GATT/WTO</b>					-.007 (.002)	
<b>Both in IMF</b>						-.59 (.10)
<b>One in IMF</b>						-.36 (.10)
<b>Log Distance</b>	-1.12 (.02)	-1.27 (.02)		-1.12 (.02)	-1.13 (.02)	-1.12 (.02)
<b>Log product Real GDP</b>	.92 (.01)	.79 (.01)		.92 (.01)	.91 (.01)	.92 (.01)
<b>Log product Real GDP p/c</b>	.32 (.01)	.45 (.01)		.32 (.01)	.32 (.01)	.32 (.01)
<b>Regional FTA</b>	1.20 (.11)			1.20 (.11)	1.18 (.11)	1.20 (.11)
<b>Currency Union</b>	1.12 (.12)			1.12 (.12)	1.11 (.12)	1.11 (.12)
<b>Common Language</b>	.31 (.04)			.31 (.04)	.29 (.04)	.32 (.04)
<b>Land Border</b>	.52 (.11)			.52 (.11)	.52 (.11)	.53 (.11)
<b>Number Landlocked</b>	-.27 (.03)			-.27 (.03)	-.27 (.03)	-.29 (.03)
<b>Number Islands</b>	.04 (.04)			.04 (.04)	.00 (.04)	.04 (.04)
<b>Log product Land Area</b>	-.10 (.01)			-.10 (.01)	-.10 (.01)	-.10 (.01)
<b>Common Colonizer</b>	.58 (.07)			.59 (.07)	.57 (.07)	.59 (.07)
<b>Currently Colonized</b>	1.08 (.23)			1.08 (.23)	.85 (.26)	.92 (.23)
<b>Ever Colony</b>	1.16 (.12)			1.16 (.12)	1.11 (.12)	1.17 (.12)
<b>Common Country</b>	-.02 (1.08)			-.02 (1.08)	-.07 (1.10)	.17 (1.08)
<b>R<sup>2</sup></b>	.65	.63	.12	.65	.65	.65
<b>RMSE</b>	1.98	2.04	3.13	1.98	1.98	1.98

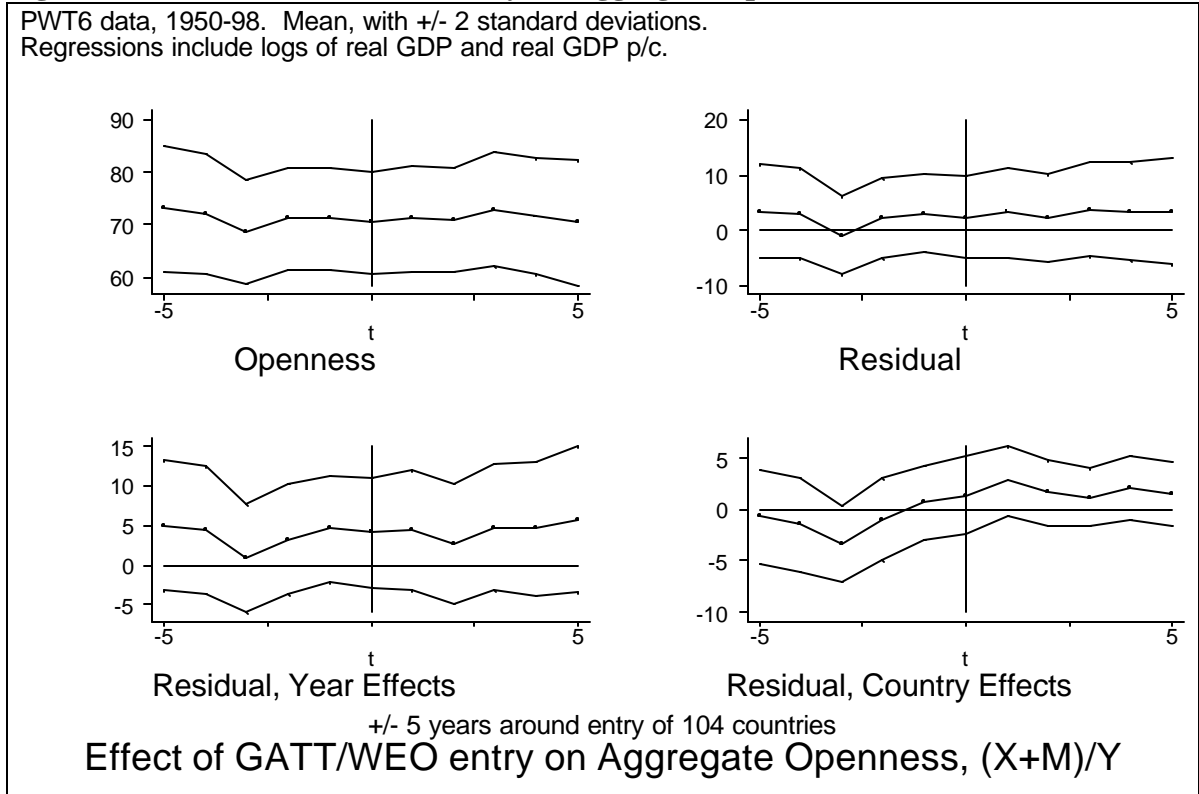
Regressand: log real trade. OLS with year effects (intercepts not reported). 234,597 observations.  
Robust standard errors (clustering by country-pairs) in parentheses.



**Figure 1: Effect of GATT/WTO entry on Bilateral Trade**



**Figure 2: Effect of GATT/WTO entry on Aggregate Openness**



## Appendix 1: Descriptive Statistics

	Mean	Standard Deviation	Correlation with Both in GATT/WTO	Correlation with One in GATT/WTO	Correlation with GSP
<b>Log Real Trade</b>	10.06	3.34	.12	-.08	.24
<b>Both in GATT/WTO</b>	.49	.50	1.	-.83	.16
<b>One in GATT/WTO</b>	.42	.49	-.83	1.	-.06
<b>GSP</b>	.23	.42	.16	-.06	1.
<b>Log Distance</b>	8.16	.81	.04	.02	.14
<b>Log product Real GDP</b>	47.88	2.68	.19	-.10	.27
<b>Log product Real GDP p/c</b>	16.03	1.50	.13	-.05	.35
<b>Regional FTA</b>	.01	.12	.03	-.04	-.03
<b>Currency Union</b>	.01	.12	.04	-.04	-.06
<b>Common Language</b>	.22	.42	.04	-.07	-.06
<b>Land Border</b>	.03	.17	-.02	-.02	-.09
<b>Number Landlocked</b>	.25	.47	.01	-.01	.03
<b>Number Islands</b>	.34	.54	.04	-.02	.00
<b>Log product Land Area</b>	24.21	3.28	-.02	.02	.04
<b>Common Colonizer</b>	.10	.30	.02	-.03	-.18
<b>Currently Colonized</b>	.002	.04	.04	-.04	-.01
<b>Ever Colony</b>	.02	.14	.04	-.03	.08
<b>Common Country</b>	.0003	.02	.02	-.01	-.00

234,597 observations.

## Appendix 2: Trading Entities in Sample

(Date of GATT/WTO accession for countries entering before 2000)

Albania	Ghana (1957)	Panama (1997)
Algeria	Greece (1950)	Papua N. Guinea (1994)
Angola (1994)	Grenada (1994)	Paraguay (1994)
Antigua and Barbuda (1987)	Guatemala (1991)	Peru (1951)
Argentina (1967)	Guinea (1994)	Philippines (1979)
Armenia	Guinea-Bissau (1994)	Poland (1967)
Australia (1948)	Guyana (1966)	Portugal (1962)
Austria (1951)	Haiti (1950)	Qatar (1994)
Azerbaijan	Honduras (1994)	Reunion
Bahamas	Hong Kong (1986)	Romania (1971)
Bahrain (1993)	Hungary (1973)	Russia
Bangladesh (1972)	Iceland (1968)	Rwanda (1966)
Barbados (1967)	India (1948)	Samoa
Belarus	Indonesia (1950)	Sao Tome & Principe
Belgium (1948)	Iran	Saudi Arabia
Belize (1983)	Iraq	Senegal (1963)
Benin (1963)	Ireland (1967)	Seychelles
Bermuda	Israel (1962)	Sierra Leone (1961)
Bhutan	Italy (1950)	Singapore (1973)
Bolivia (1990)	Jamaica (1963)	Slovak Republic (1993)
Botswana (1987)	Japan (1955)	Slovenia (1994)
Brazil (1948)	Jordan	Solomon Islands (1994)
Bulgaria (1996)	Kazakhstan	Somalia
Burkina Faso (1963)	Kenya (1964)	South Africa (1948)
Burma(Myanmar) (1948)	Kiribati	Spain (1963)
Burundi (1965)	Korea, South (R) (1967)	Sri Lanka (1948)
Cambodia	Kuwait (1963)	St. Kitts & Nevis (1994)
Cameroon (1963)	Kyrgyz Republic (1998)	St. Lucia (1993)
Canada (1948)	Lao People's Dem. Rep.	St. Vincent & Gren.(1993)
Cape Verde	Latvia (1999)	Sudan
Central African Rep. (1963)	Lebanon	Suriname (1978)
Chad (1963)	Lesotho (1988)	Swaziland (1993)
Chile (1949)	Liberia	Sweden (1950)
China	Libya	Switzerland (1966)
Colombia (1981)	Lithuania	Syria
Comoros	Luxembourg (1948)	Tajikistan
Congo, Dem. Rep. of (Zaire) (1971)	Macedonia	Tanzania (1961)
Congo, Rep. (1963)	Madagascar (1963)	Thailand (1982)
Costa Rica (1990)	Malawi (1964)	Togo (1964)
Cote D'Ivoire (Ivory Coast) (1963)	Malaysia (1957)	Tonga
Croatia	Maldives (1983)	Trinidad & Tobago (1962)
Cyprus (1963)	Mali (1993)	Tunisia (1990)
Czech Republic (1993)	Malta (1964)	Turkey (1951)
Denmark (1950)	Mauritania (1963)	Turkmenistan
Djibouti (1994)	Mauritius (1970)	Uganda (1962)
Dominica (1993)	Mexico (1986)	Ukraine
Dominican Rep. (1950)	Moldova	United Arab Emirates (1994)
Ecuador (1996)	Mongolia (1997)	United Kingdom (1948)
Egypt (1970)	Morocco (1987)	United States (1948)
El Salvador (1991)	Mozambique (1992)	Uruguay (1953)
Equatorial Guinea	Namibia (1992)	Uzbekistan
Estonia (1999)	Nepal	Vanuatu
Ethiopia	Netherlands (1948)	Venezuela (1990)
Fiji (1993)	New Zealand (1948)	Vietnam
Finland (1950)	Nicaragua (1950)	Yemen, Republic of
France (1948)	Niger (1963)	Yugoslavia, Socialist Fed. R. (1966)
Gabon (1963)	Nigeria (1960)	Zambia (1982)
Gambia (1965)	Norway (1948)	Zimbabwe (1948)
Georgia	Oman	
Germany (1951)	Pakistan (1948)	

### Appendix 3a: Aggregate Openness and the GATT/WTO

	Member of GATT/WTO	Log Real GDP per capita	Log population	Remoteness	R <sup>2</sup>
	-.11 (.02)				.12
	-.01 (.01)	.13 (.01)	-.22 (.004)	-1.86 (.39)	.53
<b>With Extra Controls*</b>	-.00 (.01)	.13 (.01)	-.16 (.006)	-.51 (.44)	.56
<b>Without year Effects</b>	-.01 (.02)				.00
<b>Without year Effects</b>	.032 (.014)	.16 (.01)	-.21 (.003)	-5.92 (.34)	.47
<b>Without year Effects, Extra Controls*</b>	.006 (.015)	.15 (.01)	-.14 (.006)	-4.96 (.39)	.51
<b>Level of Openness</b>	-5.95 (1.12)				.08
<b>Level of Openness</b>	-.21 (.92)	9.61 (.52)	-12.63 (.26)	82.5 (33.2)	.40
<b>Level of Openness, Extra Controls*</b>	-.58 (1.01)	9.65 (.50)	-4.59 (.59)	243 (36)	.48
<b>Remoteness using levels</b>	.00 (.01)	.12 (.01)	-.22 (.004)	-1547. (390)	.53

Regressand: log of openness (i.e., ratio of exports plus imports to GDP in percent) unless noted.

Data from PWT6; 158 countries, 1950-1998; 5499 observations unless noted.

OLS with year effects (intercepts not reported).

Robust standard errors in parentheses.

\* “Extra Controls” are: a) currency union dummy; b) dependency dummy; c) log of area; d) island dummy; and e) landlocked dummy. Extra controls reduce observations to 4803.

### Appendix 3b: Aggregate Openness, Tariffs, and the GATT/WTO

	Member of GATT/WTO	Log Real GDP per capita	Log population	Remoteness	Tariffs	R <sup>2</sup>
	-.02 (.02)	.06 (.01)	-.23 (.01)	-1.52 (.58)	-.010 (.001)	.51
<b>Without year Effects</b>	-.03 (.02)	.07 (.01)	-.22 (.01)	-3.32 (.53)	-.010 (.001)	.49
<b>Level of Openness</b>	.79 (1.66)	4.65 (.75)	-15 (.6)	125 (61)	-.64 (.10)	.36

Regressand: log of openness (i.e., ratio of exports plus imports to GDP in percent).

Data from PWT6; 158 countries, 1970-1998; 2099 observations.

OLS with year effects (intercepts not reported).

Robust standard errors in parentheses.

Tariffs are import duties as percentage of imports, taken from WDI 2002.

#### Appendix 4: Instrumental Variable Estimates of the GATT/WTO Effect

			IV Estimate $g_1$	IV Estimate $g_2$	$R^2$ from First-Stage	$R^2$ from First-Stage
	Functional Form of IVs	Instrumental Variables	Both in GATT/WTO	One in GATT/WTO	Both in GATT/WTO	One in GATT/WTO
Whole Sample	Log product	1: Democracy, Polity	8.4 (3.5)	14 (6.4)	.18	.08
Whole Sample	Log product	2: Freedom, Civil, Political Rights	-12.4 (5.9)	-21 (9.2)	.14	.07
Whole Sample	Log product	1 + 2 (Dem'y, Pol'y, Free., Civil, Pol'l)	-15.0 (7.5)	-24 (11.5)	.18	.09
Whole Sample	Sum	1: Democracy, Polity	9.3 (5.4)	16 (10.1)	.17	.07
Whole Sample	Sum	2: Freedom, Civil, Political Rights	-7.2 (3.0)	-12.6 (4.4)	.14	.07
Whole Sample	Sum	1 + 2 (Dem'y, Pol'y, Free., Civil, Pol'l)	-7.0 (2.8)	-12.0 (4.2)	.17	.09
1950	Log products	1: Democracy, Polity	3.1 (3.5)	11.6 (28)	.26	.03
1960	Log products	1: Democracy, Polity	52 (2000)	-150 (6,000)	.21	.03
1970	Log products	1: Democracy, Polity	1.1 (4.9)	-.4 (9.9)	.10	.03
1980	Log products	1: Democracy, Polity	-43 (300)	-70 (500)	.16	.06
1990	Log products	1: Democracy, Polity	900 (60,000)	13,000 (87,000)	.17	.10

Regressand: log real trade.

IV: robust standard errors (clustering by country-pairs) in parentheses.

Instrumental variables: Set 1: log product (sum) of two countries'; a) democracy, and b) polity scores. Set 2: log product (sum) of two countries'; a) political rights; b) civil rights; c) freedom scores.

Regressors not recorded: GSP; regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country; year intercepts .

### Appendix 5: The Effect of WTO/GATT Membership on Exporters and Importers

	<b>Both in GATT/WTO</b>	<b>Only Exporter in GATT/WTO</b>	<b>Only Importer in GATT/WTO</b>	<b>GSP</b>
<b>OLS</b>	.01 (.05)	.01 (.05)	-.12 (.05)	.76 (.03)
<b>OLS with equal GDP exporter and importer coefficients</b>	.01 (.05)	.12 (.05)	-.25 (.05)	.76 (.03)
<b>Fixed Effects</b>	.07 (.02)	.06 (.02)	-.06 (.02)	.17 (.01)
<b>Random Effects</b>	.06 (.02)	.02 (.02)	-.10 (.02)	.27 (.01)

Regressand: log real exports from one country to the other. 387,780 observations.

Robust standard errors (clustering by country-pairs) in parentheses.

Regressors not recorded: regional FTA; currency union; log distance; log exporter real GDP; log exporter real GDP p/c; log importer real GDP; log importer real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; common country; and year effects.

### Appendix 6: Adding Tariffs to the Benchmark Model

<b>Both in GATT/WTO</b>	.09 (.11)	.05 (.11)	.08 (.11)	.06 (.11)
<b>One in GATT/WTO</b>	.02 (.11)	.00 (.11)	.03 (.11)	.01 (.11)
<b>GSP</b>	.68 (.04)	.68 (.04)	.66 (.04)	.54 (.04)
<b>Log Distance</b>	-1.24 (.03)	-1.24 (.03)	-1.25 (.03)	-1.22 (.03)
<b>Log product Real GDP</b>	.94 (.01)	.94 (.01)	.94 (.01)	.91 (.01)
<b>Log product Real GDP p/c</b>	.45 (.02)	.42 (.02)	.47 (.02)	.39 (.02)
<b>Regional FTA</b>	.58 (.13)	.54 (.13)	.84 (.15)	.57 (.18)
<b>Currency Union</b>	1.24 (.19)	1.21 (.19)	1.17 (.20)	1.19 (.19)
<b>Common Language</b>	.41 (.05)	.42 (.05)	.43 (.05)	.53 (.05)
<b>Land Border</b>	.46 (.14)	.47 (.14)	.51 (.15)	.51 (.15)
<b>Number Landlocked</b>	-.16 (.04)	-.19 (.04)	-.12 (.04)	-.15 (.04)
<b>Number Islands</b>	.06 (.05)	.07 (.05)	.07 (.05)	.20 (.05)
<b>Log product Land Area</b>	-.08 (.01)	-.07 (.01)	-.07 (.01)	-.04 (.01)
<b>Common Colonizer</b>	.54 (.09)	.59 (.09)	.58 (.09)	.61 (.09)
<b>Currently Colonized</b>	.69 (1.30)	.63 (1.31)	1.06 (1.16)	.81 (1.20)
<b>Ever Colony</b>	1.04 (.12)	1.04 (.12)	1.10 (.13)	.90 (.13)
<b>Sum of Tariffs</b>		-.0053 (.0009)		
<b>Log product Of Tariffs</b>				-.14 (.01)
<b>Observations</b>	78,254	78,254	69,859	69,859
<b>R<sup>2</sup></b>	.71	.71	.69	.69
<b>RMSE</b>	1.86	1.85	1.90	1.89

Regressand: log real trade. OLS with year effects (intercepts not reported).

Robust standard errors (clustering by country-pairs) in parentheses.

Tariffs are import duties as percentage of imports, taken from WDI 2002.

### Appendix 7: Other Measures of Trade Policy in the Benchmark Model

<b>Both in GATT/WTO</b>	-.39 (.14)	-.76 (.14)	-.46 (.13)	.11 (.20)	.15 (.20)	-.10 (.12)	-.09 (.12)
<b>One in GATT/WTO</b>	-.55 (.14)	-.77 (.14)	-.57 (.14)	-.12 (.16)	-.14 (.15)	-.16 (.11)	-.15 (.11)
<b>GSP</b>	.52 (.04)	.46 (.03)	.48 (.04)	N/a	N/a	.10 (.11)	.12 (.11)
<b>Sum of Economic Freedom Indices</b>		-.76 (.03)					
<b>Sum of IEF Trade Policy sub-indices</b>			-.23 (.01)				
<b>Sum of Dollar's Price Distortions</b>					1.52 (.35)		
<b>Sum of Black Market Premia</b>							-.11 (.04)
<b>Observations</b>	21,935	21,935	21,935	7,412	7,412	26,912	26,912

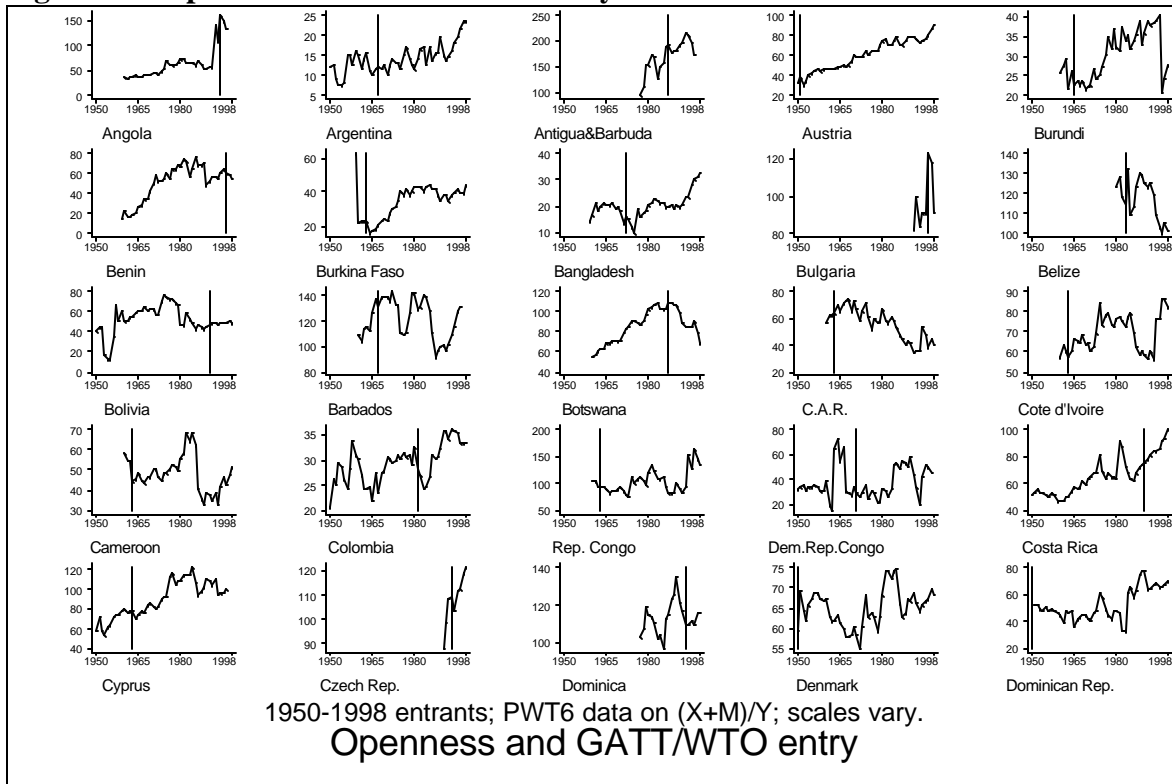
Regressand: log real trade. OLS with year effects (intercepts not reported).

Robust standard errors (clustering by country-pairs) in parentheses.

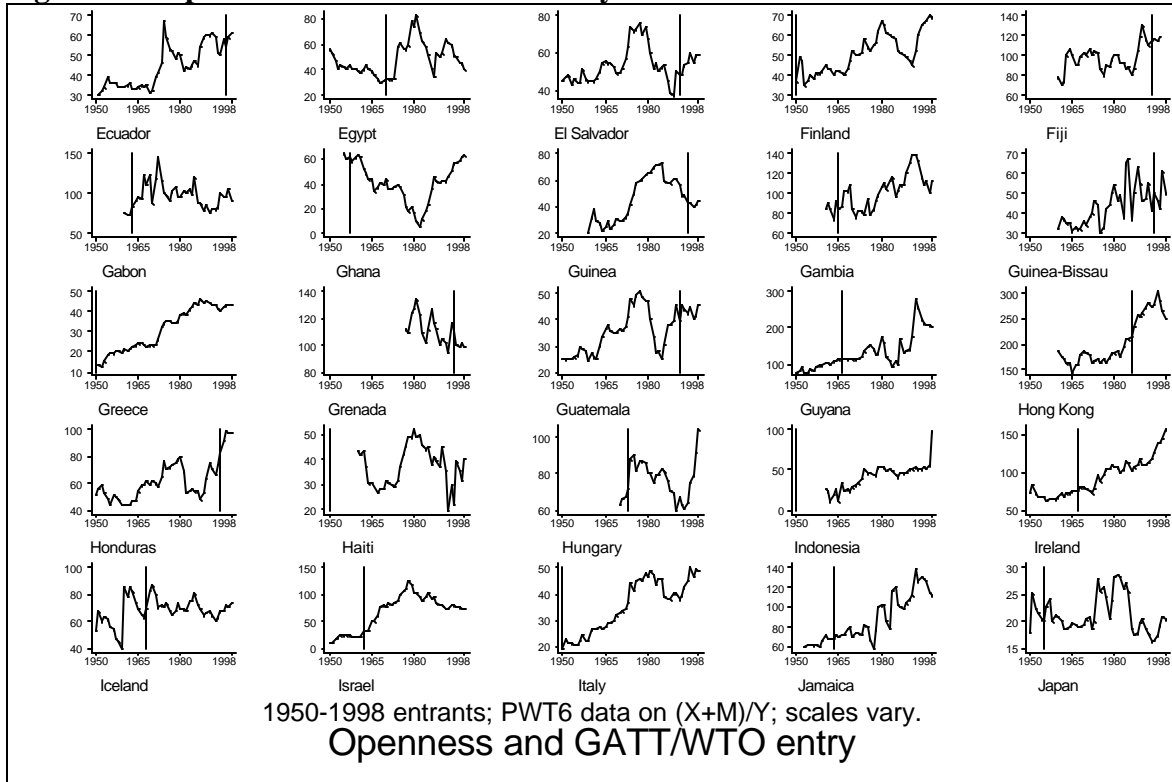
Regressors not recorded: regional FTA; currency union; log distance; log product real GDP; log product real GDP p/c; common language; land border; number landlocked; number islands; log product land area; common colonizer; currently colonized; ever colony; and common country.



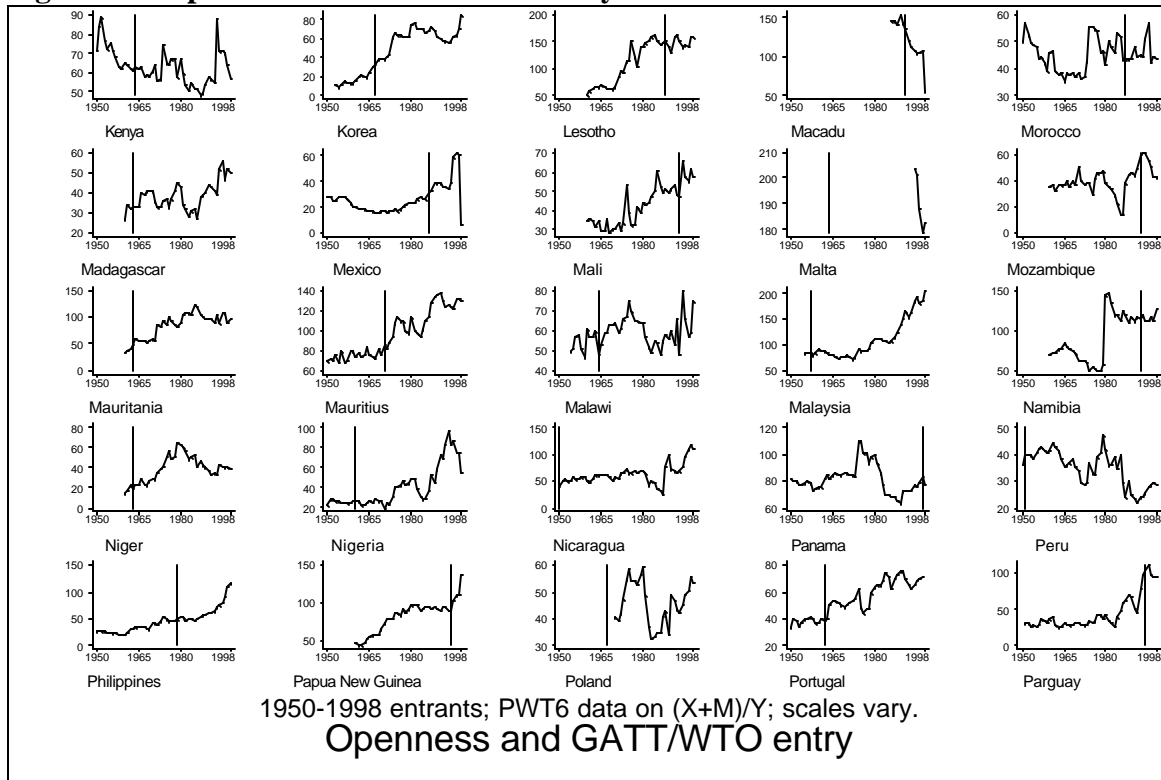
**Figure A1: Openness and GATT/WTO entry**



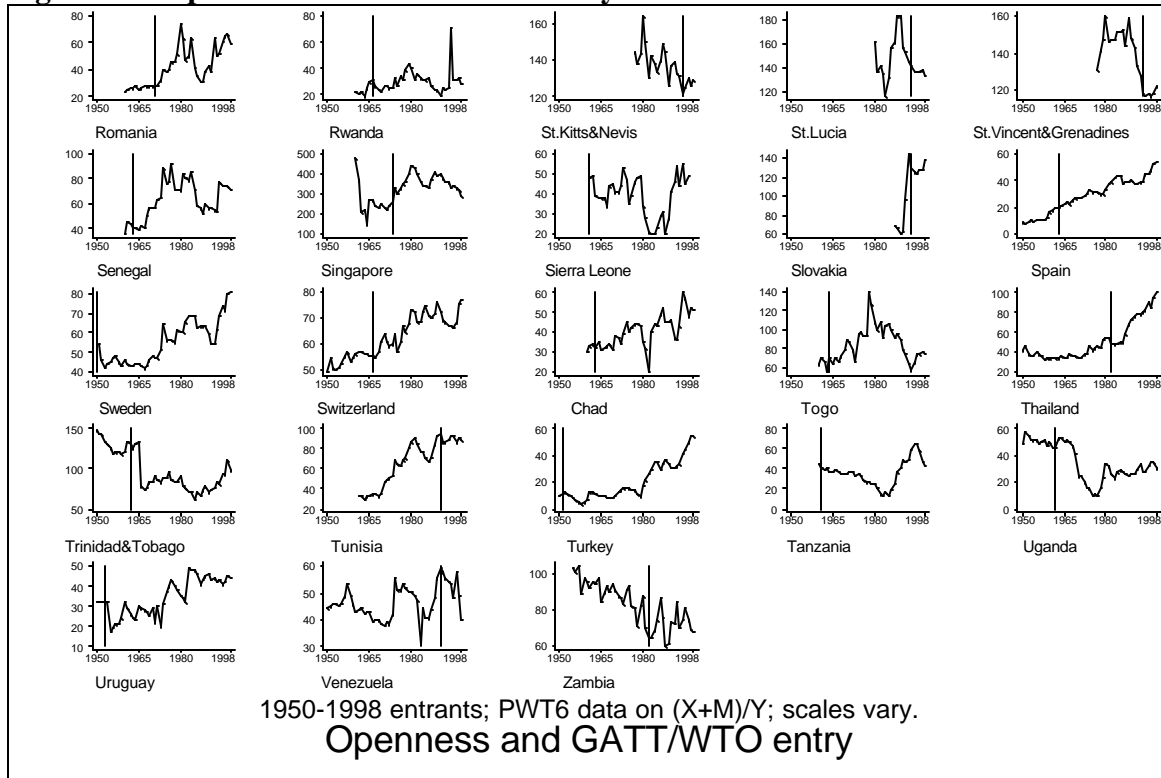
**Figure A2: Openness and GATT/WTO entry**



**Figure A3: Openness and GATT/WTO entry**



**Figure A4: Openness and GATT/WTO entry**



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## Endnotes

<sup>1</sup> Kearl et. al. (1979, p. 30) show that 97% of economists surveyed in 1976 agreed (generally or with provisions) that “Tariffs and import quotas reduce general economic welfare.” Alston et. al. (1992, p. 204) show that 93% agreed with this statement in 1990.

<sup>2</sup> For the record; I am a mainstream economist with no anti-trade or anti-WTO agenda. Ask my colleagues if you don’t believe me.

<sup>3</sup> Taken from [http://www.wto.org/wto/english/thewto\\_e/whatis\\_e/inbrief\\_e/inbr02\\_e.htm](http://www.wto.org/wto/english/thewto_e/whatis_e/inbrief_e/inbr02_e.htm)

<sup>4</sup> Press brief available at [http://www.wto.org/wto/english/thewto\\_e/minist\\_e/min96\\_e/chrono.htm](http://www.wto.org/wto/english/thewto_e/minist_e/min96_e/chrono.htm)

<sup>5</sup> Taken from [http://www.wto.org/english/thewto\\_e/whatis\\_e/inbrief\\_e/inbr01\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/inbrief_e/inbr01_e.htm). Alternatively, the WTO at [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/fact4\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/fact4_e.htm) states “GATT was provisional with a limited field of action, but its success over 47 years in promoting and securing the liberalization of much of world trade is incontestable. Continual reductions in tariffs alone helped spur very high rates of world trade growth ...” Finally, the agreement establishing the WTO states that its objective is “... expanding the production of and trade in goods and services, ... by entering into reciprocal and mutually advantageous arrangements directed to the substantial reduction of tariffs and other barriers to trade ...”, available at [http://www.wto.org/english/docs\\_e/legal\\_e/04-wto.pdf](http://www.wto.org/english/docs_e/legal_e/04-wto.pdf)

<sup>6</sup> *Economist*, December 2, 1999.

<sup>7</sup> For instance, the WTO itself states that the bilateral accession negotiations “... constitute the most critical element of the accessions process as Members want to ensure that acceding governments grant concessions which are comparable to the concessions that they will be benefiting from in the markets of Members. The resulting market-access commitments of acceding governments can be considered to be the payment for the entry ticket into the WTO.” See [http://www.wto.org/english/thewto\\_e/whatis\\_e/eol/e/wto08/wto8\\_53.htm#note3](http://www.wto.org/english/thewto_e/whatis_e/eol/e/wto08/wto8_53.htm#note3). Alternatively, the WTO describes the second step of the accession process as “Work out with us individually what you have to offer” and states “In other words, the talks determine the benefits (in the form of export opportunities and guarantees) other WTO members can expect when the new member joins.” See [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/org3\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/org3_e.htm).

<sup>8</sup> One recent empirical reference is Frankel (1997). Theoretical discussions can be found in Deardorff (1998) and Anderson and van Wincoop (2002).

<sup>9</sup> One of GATT’s most important principles was *nondiscrimination*, embodied in both the obligation to provide *national treatment* to imports and the extension of unconditional *most favored nation* (MFN) status to other members (exceptions to MFN were permissible through e.g., the GSP and regional trade agreements). While members often extend MFN to non-members, they are under no obligation to do so.

<sup>10</sup> Though I am forced to drop observations from the regression analysis if they have no usable data for e.g., output. The only omissions of any importance are: a) Taiwan; and b) some centrally planned economies (though there is extensive coverage of e.g., Poland, Hungary, and Romania both before and after 1989).

<sup>11</sup> Expressed alternatively, fifty countries have Penn World Table 6 data available for both 1950 and 1998. During this period, these countries experienced growth in their average ratios of exports plus imports to GDP from 47% to 74%.

<sup>12</sup> I use the Glick-Rose data set practice (and indeed their data set through 1997); wherever possible, I use “World Development Indicators” data (taken from the World Bank’s WDI 2000 CD-ROM except for 1998-99 which is taken from WDI 2002). When the data are unavailable from the World Bank, I fill in missing observations with comparables from the Penn World Table Mark 5.6, and (when all else fails), from the IMF’s “International Financial Statistics” (converting national currency GDP figures into dollars at the current dollar exchange rate). The series have been checked and corrected for errors.

<sup>13</sup> Available at <http://www.odci.gov/cia/publications/factbook/index.html>

<sup>14</sup> Following Glick-Rose, “currency union” means essentially that money was interchangeable between the two countries at a 1:1 par for an extended period of time, so that there was no need to convert prices. The basic source for currency union data is the IMF’s *Schedule of Par Values* and issues of the IMF’s *Annual Report on Exchange Rate Arrangements and Exchange Restrictions*. I supplement this with information from annual copies of *The Statesman’s Yearbook*.

<sup>15</sup> Available at [http://www.wto.org/english/tratop\\_e/region\\_e/region\\_e.htm](http://www.wto.org/english/tratop_e/region_e/region_e.htm). If the proliferation of regional trade agreements was facilitated by the GATT, part of the related trade boost should be attributed to the GATT.

<sup>16</sup> Available at [http://www.wto.org/english/thewto\\_e/gattmem\\_e.htm](http://www.wto.org/english/thewto_e/gattmem_e.htm)

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<sup>17</sup> Both the GATT and the WTO allow independent customs territories to join; for instance, Hong Kong joined the GATT in 1986 and Macao in 1991.

<sup>18</sup> In 1948, 78% of global trade in the data set was conducted strictly between GATT members. This dipped to 56% in 1950, before rising to 65% in 1960, 79% in 1970, 70% in 1980, 88% in 1990, and 86% in 1999. These fractions are over-estimates since my data set does not include Taiwan and a few members of the second world.

<sup>19</sup> A number of countries have also left the GATT when their governments were overthrown, including the founding members China, Cuba, and Czechoslovakia.

<sup>20</sup> Most countries (e.g., those in the EEC, Austria, Finland, Japan, Norway, Sweden, and Switzerland) began to extend GSP concessions in 1971, though there were exceptions. The USSR began to extend GSP preferences in 1965; Australia in 1966; Bulgaria, Czechoslovakia, Hungary, and New Zealand in 1972; Canada in 1974; and Poland and the US in 1976. Unfortunately, I do not have information on bilateral GSP concessions on an annual basis, and Stefano Inama at UNCTAD has informed me that no such data set currently exists. I therefore construct the variable by extending 1974 GSP preferences back to the original extension of the GSP, and forward to 1976; I extend 1979 preferences to cover the period from 1977 through 1981; and the 1984 preferences are used to cover the period from 1982 through the end of the sample (adding the entrants into the EC/EU as they joined).

<sup>21</sup> The correlations tabulated in Appendix 1 are simple. Nevertheless, they deliver the right message; a multiple regression of “bothin” on the other variables (including year effects) yields an  $R^2$  of only .13, while the analogue for “onein” is only .05.

<sup>22</sup> It is well known that richer countries tend to be more open, while larger countries tend to be less open. I verify this in Appendix 3a with simple regression techniques. These also include “remoteness” which is defined for country  $i$  as the inverse of the mean of log real GDP for country  $j$  divided by the log of distance between  $i$  and  $j$ . That is,  $remoteness_{it} = J/\sum_j Y_{j,t}/D_{ij}$  where  $Y_{j,t}$  is the log of real GDP for  $j$  at  $t$ , and  $D_{ij}$  is the log distance between  $i$  and  $j$ . Appendix 3b adds the tariff measure discussed below.

<sup>23</sup> I omit plots for six countries that lack time-series PWT6 data: Bahrain, Djibouti, Kuwait, Mongolia, Qatar, and Swaziland.

<sup>24</sup> In the absence of a consensus model for aggregate openness, I stick to the bilateral gravity model for my regression analysis below. Still, simple regression of aggregate openness on GATT/WTO membership delivers negative results, as shown in Appendix 3; aggregate openness is essentially uncorrelated with GATT/WTO membership.

<sup>25</sup> It is worth noting that the coefficients for GDP and GDP per capita sum to more than one, so that an increase in GDP per capita holding population constant will raise trade more than proportionately.

<sup>26</sup> The year fixed effects are small, and fall with time, beginning at around  $-25$  in 1948 and falling gradually to  $-28$  by the end of the sample.

<sup>27</sup> I follow the IMF in defining countries as “industrial” if they have an IFS country code less than 200. No, the GSP coefficient is not a mistake; some (non-industrial) Eastern European countries extended GSP preferences.

<sup>28</sup> This is a potentially important check, given the results of Anderson and van Wincoop (2002).

<sup>29</sup> Dummy variables for regional (e.g., South Asia) and income (e.g., Low Income) groupings were created using the lists in the World Bank’s *World Development Indicators* CD-ROM.

<sup>30</sup> Industrial countries are again defined as those with IFS country codes of less than 200; some of these countries received GSP preferences.

<sup>31</sup> In particular, I drop observations with estimated residuals that lie more than three standard deviations from zero, which amounts to about one percent of the sample. I have also used different thresholds with similar results.

<sup>32</sup> Canada, France, the UK and the USA were founding GATT members, while there is no Italian data before its GATT entry in 1950. Thus both  $\gamma_1$  and  $\gamma_2$  can be estimated only for Japan and Germany, while the other five regressions really compare both countries being in against the alternative of only one country being inside the system.

<sup>33</sup> The t-statistic is 2.11, significant at the 4% significance level.

Parenthetically, the moderately positive evidence for industrial countries is a piece in a continuing but inconsistent and vague pattern. There is also weak evidence that dropping small and poor countries delivers bigger results, and that the effects of the GATT were larger at the beginning of the sample when the institution was (even) more dominated by the industrial countries. Further, founding members of the GATT have had their trade grow more than later entrants. The last column of Table 8 contains dummy variables for one or both countries being GATT founders (in practice, contracting partners in 1948 or 1949). The coefficients for both variables are positive and significant, though again not overwhelmingly so. By way of contrast, for later entrants, the maximum number of years that the parties had both been in the GATT/WTO has a slight negative effect on trade, while the minimum

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number of years both countries had been members has essentially no effect on trade. Perhaps the GATT was the hand servant of its (mostly rich) creators? The evidence is weak, but it seems to be an angle worth pursuing. Subramanian and Wei (2003) have ongoing work in this vein, and argue that restricting the sample to industrial countries delivers consistently positive results, especially with fixed effects estimation. These results are strengthened further if one excludes agriculture and textiles, areas where the GATT/WTO has not made much progress. That is, the GATT/WTO has worked well, so long as one selectively ignores most countries in the world (developing countries) and the much protectionism. Even cynics will agree that the system has performed admirably, if one excludes its failures.

<sup>34</sup> It is worth highlighting the fact that regional trade associations seem typically to have a much larger effect than the multilateral GATT/WTO system; nine of the ten RTAs have point estimates greater than .7 (all are statistically significant), indicating that trade at least doubles with membership. Curiously, the outlier is the EEC/EC/EU.

<sup>35</sup> Adding interactions between the gravity regressors and my key GATT/WTO dummy variable does not change any conclusions. For instance, adding an interaction between (the log of the product of real) GDP and the dummy for both countries being GATT/WTO members delivers a coefficient of .08 with a standard error of .01; but the coefficient on joint membership falls to -3.93. Since the sample average of GDP is 47.88, the net average effect on trade of joint GATT/WTO membership is  $(.08*47.88)-3.93 = -.1$ , and results for other interactions are similar.

<sup>36</sup> Both between and within effects (treated by OLS estimates as equal) are of interest, since we are interested in the effect of membership both across time and across countries. The between estimate of the effect of GATT/WTO membership is around -.1 with a standard error of .07.

<sup>37</sup> Throughout, I use the full set of gravity variables as both determinants of treatment assignment and as regressors in the trade equation.

<sup>38</sup> Indeed, the first stage shows that countries inside the GATT/WTO have significantly higher output.

<sup>39</sup> I do the last by replacing the smallest five percent of the sample trade observations by zero (altering the threshold from 5% has no substantive effect).

<sup>40</sup> The Arellano-Bond estimates use data only from 1960 through 1999 for computational reasons.

<sup>41</sup> Thus the long-run effects are around five times the tabulated coefficients. The AB estimate for the lagged dependent variable is around .35.

<sup>42</sup> I have also added *leads* of GATT/WTO accession with similarly weak results.

<sup>43</sup> I have substituted the *de facto* dates of GATT accession (listed inside the front cover of the GATT's *International Trade*, though I only have them from 1970 onwards) in place of actual GATT accession, without changing any results.

<sup>44</sup> I ignore the (somewhat fanciful) possibility that WTO entry leads to an equi-proportionate increase in both trade and income. Frankel (1997) finds no evidence of simultaneity bias in income in the gravity model, and the profession has yet to deliver its final verdict on the relationship between trade and growth. In any case, the latter is a time-series relationship, but most of the explanatory power of the gravity model stems from the cross-section.

<sup>45</sup> The data sources are: 1) The *Polity IV Project on Political Regime Characteristic and Transitions, 1800-1999* available at <http://www.bsos.umd.edu/ciddm/inscr/polity>, and 2) Freedom House's Country Ratings from their *Annual Survey of Freedom* 1972-73 to 1999-00, available at <http://www.freedomhouse.org/ratings/>

<sup>46</sup> There are approximately 327,000 country-pair x year annual observations on trade, so almost 100,000 observations are dropped because of missing output data.

<sup>47</sup> The most important effect is income; the effect of GATT/WTO membership jumps as soon as the (log of the product of the two countries') GDP is excluded from the equation.

<sup>48</sup> Even excluding the 32 in the appendices...

<sup>49</sup> The largest estimate of  $\gamma_1$  is in Table 8, but excludes all gravity controls by design. The remaining three are not significant at the .01 confidence level.

<sup>50</sup> One can also compute "meta-estimates" across the coefficient estimates. The meta-fixed effect estimate of  $\gamma_1$  is -.01, while the random effect meta-estimate is .03 (the latter is insignificantly different from zero). By way of contrast, the meta-fixed and random estimates for  $\gamma_3$  are .38 and .63, both economically and statistically significant.

<sup>51</sup> A quick investigation yields little on these lines; the results are tabulated in Appendix 5. The data set used in these calculations is much larger and is hence available only for one year upon receipt of a formatted CD-R or CD-RW along with a self-addressed stamped mailer and an e-address.

<sup>52</sup> My estimates of  $\gamma_1$  and  $\gamma_2$  are highly correlated across experiments, and rarely of opposite sign.

<sup>53</sup> There might even be a structural model of trade in which the WTO has an effect on participants' trade barriers without stimulating their trade relative to outsiders. But I haven't been able to formalize it.

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<sup>54</sup> Article I section (ii) of the IMF's *Articles of Agreement* states that its purpose is "To facilitate the expansion and balanced growth of international trade ..."

<sup>55</sup> Country data is taken from <http://www.imf.org/external/np/tre/tad/exfin1.cfm>

<sup>56</sup> On the one hand, the result seems robust in my data set; for instance, fixed effect estimators deliver the same results. But don't get over-excited. Over 88% of my observations record trade between two members of the Fund (and another 11% for trade between one Fund member and a non-member). Accounting more completely for the trade of countries outside the Fund would be important for those interested in this issue (especially given that the data set stems from the Fund!). This would mainly mean including the "second world" which is not an easy task. Parenthetically, World Bank members must also be Fund members.

<sup>57</sup> The OECD was created in part to foster trade, so it is also interesting to examine the effects of OECD membership on trade. When comparable dummy variables for OECD membership are added to the default equation, they have economically and statistically large positive effects (about an 80% boost of trade if both countries are in the OECD, and about 50% if one country is in the OECD), while lowering the effect of GATT/WTO membership on trade from its default level. The contrast of the effects of the OECD, IMF, and GATT/WTO seems like another issue worth pursuing.

<sup>58</sup> For instance, in 2003 only four countries (Cuba, Laos, North Korea, and Yugoslavia) do not have normal trade relations (the equivalent of MFN status) with the United States.

<sup>59</sup> These are taken from the 2002 *WDI* and are expressed as a percentage of imports. This is one of the few measures of trade policy not condemned by Rodriguez and Rodrik.

<sup>60</sup> The simple correlation of "bothin" with the sum of tariffs is only -.13, while the correlation with the log of the tariff product is only -.11.

<sup>61</sup> Further, the GATT built in a large number of devices to allow countries (technically "contracting parties") to pursue their own policies. For instance, article VI of the GATT allowed countries to respond to dumping; article XII allowed a response for balance of payments considerations; article XVIII allowed protectionism for developing countries; there were opt-outs in articles XIX through XXI for a variety of reasons including public morals, health, security, and so forth; article XXXV allowed particular countries simply to ignore other members of the GATT; and there was a procedure to waive obligations in article XXV. That is, there was plenty of room for countries to be in GATT *de jure* without adhering to the spirit of the agreement.

<sup>62</sup> And of course in this case we still wouldn't *know* that the multilateral system has stimulated trade; it would be an untestable article of faith.