



The effect of WTO on the extensive and the intensive margins of trade



Pushan Dutt^{a,*}, Ilian Mihov^{a,b,1}, Timothy Van Zandt^{b,c,2}

^a INSEAD, 1 Ayer Rajah Avenue, Singapore 138676, Singapore

^b CEPR

^c INSEAD, Boulevard de Constance, 77305 Fontainebleau CEDEX, France

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ABSTRACT

We use 6-digit bilateral trade data to document the effect of WTO/GATT membership on the extensive and intensive product margins of trade. We construct gravity equations for the two product margins motivated by Chaney (2008). The empirical results show that standard gravity variables provide good explanatory power for bilateral trade on both margins. Importantly, we show that the impact of the WTO is concentrated almost exclusively on the extensive product margin of trade, i.e. trade in goods that were not previously traded. In our preferred specification, WTO membership increases the extensive margin of exports by 25%. At the same time, WTO membership has a negative impact on the intensive margin. Based on novel comparative statics results about how fixed and variable trade costs impact the product margins of trade, our results suggest that WTO membership works by reducing primarily the fixed rather than the variable costs of trade.

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1. Introduction

Since its inception in 1948, the General Agreement on Tariffs and Trade (GATT) has formulated and implemented the rules of world trade. The biggest overhaul of trading rules took place in the 1980s through the Uruguay Round of talks, and eventually led to the creation of the World Trade Organization in 1995. The agenda of the GATT/WTO has been to promote trade, reduce trade barriers through rounds of trade talks, and provide a venue for settling trade disputes.

However, its raison d'être as the promoter of world trade was cast in doubt by Rose (2004a), who found a negligible impact of WTO membership on the volume of bilateral trade flows. That paper spawned multiple follow-up attempts to validate or overturn Rose's surprising result. For instance, Subramanian and Wei (2007) show that the impact of GATT/WTO depends on what the country does with its membership, with whom it negotiates, and which products the negotiation covers.

Developing countries (e.g., India) enjoyed special exemptions in particular sectors (e.g., textiles) from the liberalization of trade; once these exceptions are accounted for, the WTO does promote trade. Tomz et al. (2007) argue that many countries are mistakenly classified as outside the GATT, even though they were de facto members with similar rights and obligations. They show that not counting such countries as GATT members systematically underestimates the effect of GATT on trade flows. Liu (2009) highlights the sample selection bias in the traditional gravity formulation: many country pairs exhibit zero trade, which the traditional formulation ignores by examining only strictly positive trade flows. Accounting for this, he finds a strong role for the WTO in initiating trade between non-trading countries—the so-called partner-level extensive margin of trade, as opposed to the partner-level intensive margin (increases in trade between partners that already trade with one another). Felbermayr and Kohler (2006) also emphasize the decomposition of the expansion of trade into partner-level extensive and intensive margins.³ Helpman et al. (2008) argue that the puzzle is reconciled with an accurate theory-driven specification of the gravity equation. Using unidirectional trade data along with exporter and importer fixed effects reveals a statistically significant positive effect of

* Corresponding author. Tel.: +65 6799 5498.

E-mail addresses: Pushan.Dutt@insead.edu (P. Dutt), Ilian.Mihov@insead.edu (I. Mihov), timothy.van-zandt@insead.edu (T. Van Zandt).

¹ Tel.: +65 6799 5434.

² Tel.: +33 1 6072 4856.

³ Throughout this paper, the terms “extensive margin” and “intensive margin”, when used without a qualifier, refer to the product-level margins.

WTO membership on trade volumes. Eicher and Henn (2011) argue the opposite—that accounting for multilateral trade resistance terms via time-varying exporter and importer fixed effects suffices to negate WTO trade effects.⁴

Even if we believe that the WTO raises trade volumes, there still remains the question of whether the effect of the WTO is through liberalization of trade policies. Rose (2004b) questions the importance of trade liberalization by showing that few, if any, measures of trade policy correlate significantly with WTO membership. Furthermore, he reports that trade liberalization lags WTO entry by many years and that membership imposes few trade policy changes amongst many members, especially among developing countries who remain closed to trade for years following GATT/WTO membership. In contrast, Bagwell and Staiger (2001) argue that GATT/WTO is not merely about tariff concessions and rules for tariff policies. Rather, “the central purpose of WTO rules is to create a negotiating forum where member governments can voluntarily exchange market access commitments, with the assurance that the property rights over negotiated market access commitments are secure against unilateral government infringement.” In other words, GATT/WTO membership provides assurance of market access—that once foreign products enter a domestic market they will be accorded the same treatment as domestic products, and most importantly, governments will not take policy actions to undermine the promised market access. From this perspective, WTO membership creates certainty about market access and is more akin to a reduction in the fixed costs of trade.

Our paper attempts to clarify the role of the WTO by examining the effect of WTO membership on the extensive and intensive margins of trade. For the interpretation of our results, we turn to recent theory. A large number of trade models have emphasized the importance of firm-level productivity differences in trade patterns. These models arose out of empirical work showing striking firm-level differences in trading behavior (see Bernard and Bradford Jensen, 1995, 1999, 2004; Clerides et al., 1998; Aw et al., 2000; Eaton et al., 2004). Incorporating such firm-level heterogeneity into trade models leads first of all to a decomposition of trade expansion into an increase in the average exports by firms that are already exporters (the firm-level intensive margin) and the number of exporters selling in the destination market (the firm-level extensive margin). When firms produce differentiated products, these firm-level margins translate into product-level margins, which are the subject of our empirical study.

Multiple theoretical papers have then analyzed the consequences of trade liberalization, in terms of reduction of fixed and variable costs of trade, on these margins (Eaton and Kortum, 2002; Melitz, 2003; Bernard et al., 2003; Chaney, 2008). By examining the effect of WTO membership on these margins, we are able to evaluate whether the WTO works via a reduction in fixed costs or variable costs of trade. In order to link the predictions of these models to our empirical analysis, in an Appendix, we set up a variation of the model in Chaney (2008) that allows us to study its comparative statics more generally than under Chaney's assumption that productivities are Pareto distributed.

Not surprisingly, a reduction in either fixed or variable costs leads to more entry into a bilateral export market and thus increases the extensive margin. Thus, if there is any hope of distinguishing between reductions in fixed and variable costs, it must be through their effect on the intensive margin.

A reduction in fixed costs typically reduces the intensive margin: the increase in entry, without any change in prices, leads to a dilution of the market shares of the incumbent firms, and the average exports per firm

is brought down even further by the fact that the entrants are less productive and sell less than the incumbents.⁵

Does then, a reduction in variable costs instead increase the intensive margin? Incumbent firms see their revenues rise, but there is entry by firms with lower productivities and hence lowers sales than the incumbents. When productivities and hence revenues follow a Pareto distribution, the average does not change: this is Lawless (2010)'s result that the intensive margin is unaffected by a change in variable costs. We consider how this knife-edge result is likely to be perturbed for other distributions. For some plausible assumptions, such as a perturbation of the Pareto distribution that places an upper bound on firm productivity (that is, a lower bound on marginal costs), a drop in variable costs leads to an increase in the intensive margin. Sun et al. (2011) conclude that the Pareto distribution with unbounded productivities is a poor fit for the distribution of Chinese firms. Even more compellingly, this comparative statics arises if instead we introduce heterogeneity of fixed costs. For example, if lower-productivity firms have not only higher variable costs but also higher fixed costs, then again the intensive margin rises when variable costs fall.

In Section 2, as motivation we graph growth in trade in products that were already traded from 1962 to 1970 versus trade in newly traded products. This is a simple plot of time series. In Section 3, we perform two decompositions of the traditional gravity equation into an extensive and intensive product margin, which we use for our econometric analysis. The first, which is our baseline definition and which is linked to our theoretical model, decomposes the volume of bilateral exports into the number of products multiplied by average export per product (see Hillberry and Hummels, 2008; Bernard et al., 2007). The second follows the methodology of Feenstra and Kee (2008). The Feenstra–Kee extensive margin of exports for a country pair measures the fraction of goods sold by the exporter in the destination but weighs each product by its importance in world exports to this destination, averaged over time. The Feenstra–Kee intensive margin is the market share of the exporter in the importer's total spending on the products the exporter sells there. The volume of bilateral exports equals the product of the two margins as a fraction of total imports in the destination country. Section 4 details the data sources and describes the other independent variables commonly used in the gravity equation specification. We use COMTRADE HS-6 data to decompose the total volume of trade into the extensive and intensive margins and examine how membership in the GATT/WTO influences these two margins of trade.

In Section 5, across gravity-based specifications for these margins, we show that the effect of WTO membership is mainly along the extensive product margin. In the most demanding specification (with time-varying importer and exporter fixed effects and country-pair effects) we find that the WTO raises the extensive margin by 25%. In contrast, regardless of the specification, WTO has a negative impact on the intensive margin of exports, reducing the intensive margin by 7%. This suggests that WTO membership works as a reduction of fixed rather than variable costs. We also find that the gravity specification is a good fit for explaining variations in the two margins, accounting for more than 75% of the variation in the margins in the most demanding specification. We perform a series of robustness checks to ensure that our main result is not too sensitive to reasonable variations in the specification. Importantly, we pay special attention to the zeros in the bilateral trade matrices, which if ignored will lead to biased results due to a sample selection bias and a heterogeneity bias, as emphasized by Helpman et al. (2008).

Our paper makes three contributions. First, it shows that the effect of WTO membership is mainly on the extensive margin and that it reduces

⁴ They question the hierarchical coding of trade preferences in Subramanian and Wei (2007) that attributes all trade creation to preferential trading arrangements (PTA). That is, if country pair are members of both a PTA and members of the WTO, the PTA dummy takes the value 1 while the WTO dummy takes the value 0.

⁵ This holds as long as the described mechanism is not undone by what is likely to be weak general equilibrium effect: the decrease in the fixed costs of the firms in the origin country increases their total profits; some of these profits could accrue to households in the destination country, with this extra income generating additional sales for each product sold there.

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