

# Trade Policy, Trade Costs, and Developing Country Trade

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December 2008



## Abstract

This paper briefly reviews new indices of trade restrictiveness and trade facilitation that have been developed at the World Bank. The paper also compares the trade impact of different types of trade restrictions applied at the border with the effects of domestic policies that affect trade costs. Based on a gravity regression framework, the analysis suggests that tariffs and non-tariff measures continue to be a significant source of trade restrictiveness for low-income countries despite preferential access programs. This is because the value of trade preferences is quite limited: a new measure of

the relative preference margin developed in the paper reveals that this is very low for most country-pairs. Most countries with very good (duty-free) access to a market generally have competitors that have the same degree of access. The empirical analysis suggests that measures to improve logistics performance and facilitate trade are likely to have the greatest positive effects in expanding developing country trade, increasing the trade impacts of lowering remaining border barriers by a factor of two or more.

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This paper—a product of the Trade Team, Development Research Group—is part of a larger effort in the department to assess the impacts of trade costs and border policies on the trade performance of developing countries. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at [bhoekman@worldbank.org](mailto:bhoekman@worldbank.org) and [alessandro.nicita@unctad.org](mailto:alessandro.nicita@unctad.org).

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# **Trade Policy, Trade Costs, and Developing Country Trade\***

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JEL codes: F13

Keywords: Tariffs, nontariff measures, trade facilitation, logistics, economic development, Doha Round

\* We are grateful to Alan Deardorff, Simon Evenett, and Ben Shepherd for comments on an earlier draft. The views expressed are personal and should not be attributed to the World Bank.

## **Introduction**

The trade policy literature has for many years emphasized the importance of taking into account the impact of nontariff measures (NTMs) in addition to tariffs – see, e.g., Deardorff and Stern (1998). Recent research on trade and development has emphasized the magnitude of the trade costs associated with administrative red tape and entry barriers, informed by the emergence of new datasets such as the OECD’s Product Market regulation database, the World Bank’s “Doing Business” indicators and Logistics Performance Index (LPI), as well as firm-level surveys of the prevailing investment climate and business environment.

In this paper we review prevailing trade policies and assess their impacts on developing country trade. The objective is to compare the impact of border barriers (tariffs, adjusted for bilateral preferences, and NTMs) with other sources of trade costs. We limit attention to the impacts of policies as opposed to the cost raising effects of differences in infrastructure quality, as our interest is to explore the relative impacts on trade volumes of different sources of policy-induced trade costs.

The plan of the paper is as follows. Section 1 summarizes the current pattern of tariff protection and the aggregate of all NTMs captured in the UNCTAD database (WITS). Section 2 discusses how we take into account the extensive system of preferential trade that has been put in place by OECD countries as well as the numerous preferential trade agreements concluded between subsets of WTO members. Section 3 discusses some of the components of the aggregate NTM measure, as well as regulatory policies not included in the NTM database: the “trading across borders” component of the World Bank’s Doing Business report, and the Logistics Performance Index. Section 4 presents the results of an empirical assessment of the relative trade impacts of alternative types of policies and the possible trade effects of convergence by developing countries to the average levels of border protection and trade facilitation performance levels prevailing in middle-income countries. Section 5 concludes.

### **1. Trade Policies**

Ad valorem tariffs are the most widely used policy instruments to restrict trade, with specific duties – taxes that are levied on units (kilograms, liters, alcohol content, etc.)

rather than on import values – often used for agricultural products. Statutory tariffs may be complemented by ad-hoc surcharges and surtaxes on a temporary basis, e.g., to cover budget deficits or to protect specific domestic industries.

The use of NTMs has been increasing both in terms of the number of products covered and the number of countries utilizing them. NTMs include quantitative restrictions, technical product regulations, anti-dumping and countervailing measures and discretionary licensing. Although some of these measures, such as product standards, are not necessarily protectionist in intent – indeed, often they will not be –they all affect the cost of trading and thus affect trade volumes. NTMs are more prevalent in high and middle income countries which tend to have lower ad valorem average tariffs (Figure 1).

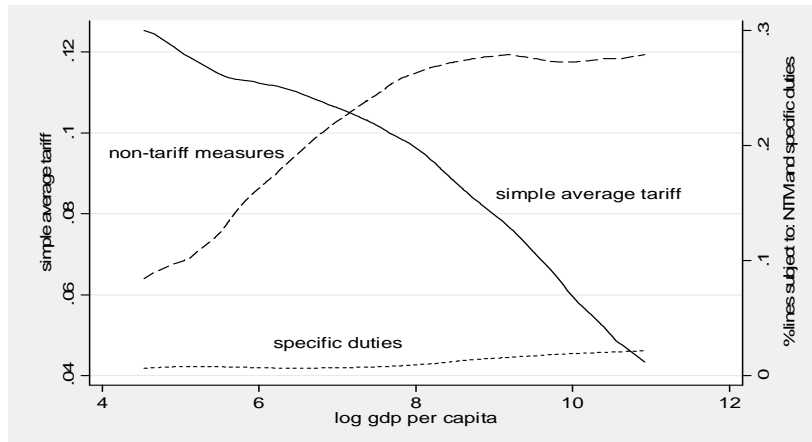
In this paper we use two indices of trade restrictiveness: the tariff trade restrictiveness index (TTRI) and the overall trade restrictiveness index (OTRI) (Kee, Nicita and Olarreaga, 2008a; World Bank and IMF, 2008). Both the TTRI and the OTRI are a measure of the uniform tariff equivalent implied by observed trade policies affecting a country’s imports – that is, they represent the ad-valorem tariff that would be needed to generate the observed level of trade. The difference between the TTRI and OTRI is that the OTRI includes the effect of both tariff and NTMs, while the TTRI captures only tariffs, both ad valorem and the ad valorem equivalents of specific tariffs.<sup>1</sup> These indices are superior to more commonly used indicators such as average tariffs or NTM frequency and coverage ratios as they take into account the elasticity of import demand with respect to prices. In calculating the indices more weight is given to products for which demand is more responsive to changes in prices (so that smaller movements in prices produce larger shifts in imports).

The prevailing average TTRI and OTRI across countries is plotted in Figures 2 and 3. Trade policies are generally more restrictive in lower-income countries, reflecting both lower tariffs in higher-income economies and the fact that their imports are highly skewed toward manufactures, which face relatively low barriers.

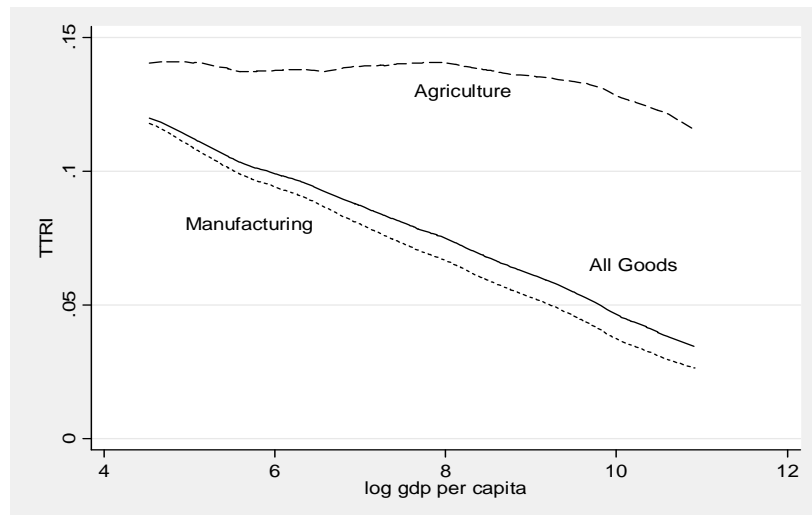
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<sup>1</sup> The inclusion of NTMs in the OTRI is done through estimation of ad-valorem tariff equivalents. Both the TTR and the OTRI provide a measure of the uniform tariff equivalent of observed policies that is needed to generate the observed level of trade for a country. See Kee, Nicita, and Olarreaga (2008a) for details.

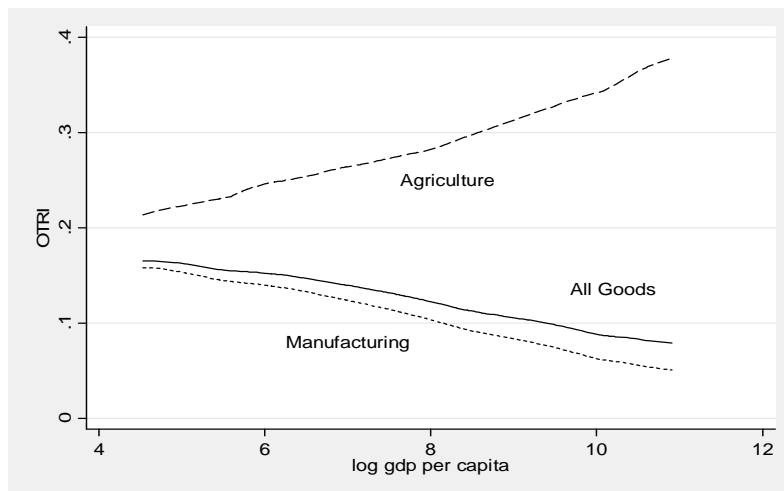
**Figure 1: Use of tariffs, specific duties and NTMs (% of HS6digit lines)**



**Figure 2: TTRI and GDP per capita, 2006 (polynomial locally-weighted regression)**



**Figure 3: OTRI and GDP per capita, 2006 (polynomial locally-weighted regression)**



Agricultural trade is much more restricted than manufacturing, both in terms of the TTRI and the OTRI, especially in high income countries. This reflects both higher tariffs and greater use of NTMs in agricultural trade. A comparison of Figures 2 and 3 reveals that NTMs contribute substantially to the set of policies restricting global trade, especially in agriculture. Differences in the OTRI and TTRI are also evident across geographic regions (Table 1). In general, East Asian, Central Asian and East European countries are less restrictive, while countries in South Asia and the Middle East and North Africa are more restrictive. This pattern is similar for the TTRI and the OTRI, and for agriculture and manufacturing.

**Table 1: OTRI and TTRI by developing country region**

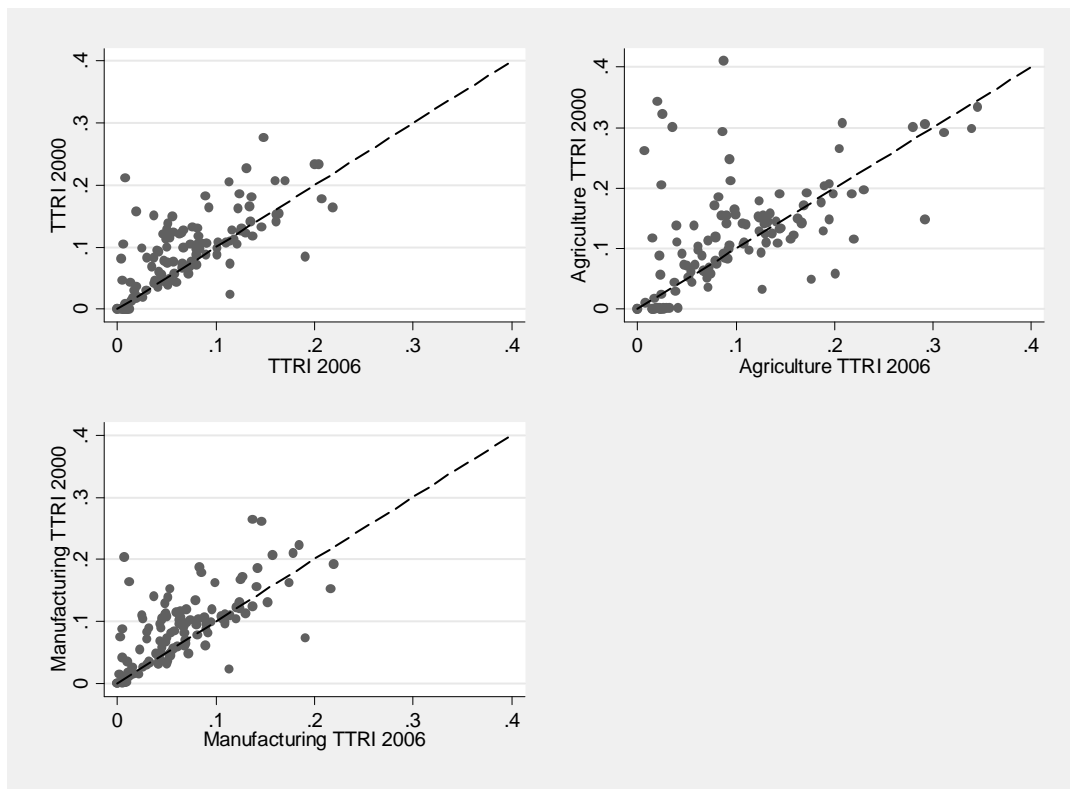
Region (dev. countries only)	Total Trade	Agriculture	Manufacturing
East Asia	<b>11.3%</b>	<b>26.6%</b>	<b>10.4%</b>
	5.0%	8.7%	4.8%
Europe and Central Asia	<b>10.1%</b>	<b>25.9%</b>	<b>9.0%</b>
	4.5%	10.3%	4.0%
Latin America	<b>15.0%</b>	<b>28.1%</b>	<b>13.8%</b>
	5.4%	6.6%	5.3%
Middle East and N Africa.	<b>21.6%</b>	<b>32.3%</b>	<b>19.4%</b>
	11.9%	12.1%	11.8%
South Asia	<b>19.5%</b>	<b>46.4%</b>	<b>18.2%</b>
	14.0%	31.4%	13.2%
Sub-Saharan Africa	<b>14.4%</b>	<b>24.9%</b>	<b>12.9%</b>
	8.4%	13.8%	7.6%

*Source:* Own calculations.

As a result of unilateral reforms and bilateral and regional agreements, global trade has been substantially liberalized in recent years. Figure 4 presents scatter plots of the TTRI for the years 2000 and 2006. While liberalization has been substantial in most countries, tariff reduction has centered more on manufacturing than agricultural products. Agricultural trade restrictiveness increased for some countries between 2000 and 2006.<sup>2</sup> The TTRI has declined both for all country groups. Middle-income economies have seen the largest decline, including in agriculture. By region, countries in East Asia and Latin America (Sub-Saharan Africa) have reduced tariffs the most (least).

<sup>2</sup> As NTM data has not been updated recently, the change in the OTRI is not reported.

**Figure 4: TTRI 2000 and 2006**



## **2. Market Access and the Effect of Trade Preferences**

The effect of trade policies on exporters' access to markets differs across trading partners and geographic regions. The average restrictiveness that exporters face in a particular market depends not just on tariffs and NTMs but on the composition of exports and the extent and incidence of preferential access regimes. Table 2 reports levels of restrictiveness from a market access perspective, using the market access versions of the TTRI and the OTRI. These measure the restrictiveness of policies confronting exporters from in each geographic region and country group. Upper middle income countries generally enjoy better market access in both developing and developed countries. This is largely due to the composition of exports from these countries, which are skewed toward manufacturing. Low income countries face more restrictive market access conditions because their exports are more biased toward agriculture.



**Table 2 – Market Access TTRI and OTRI**

Importing Countries	Exporting Countries									
	High Income	Upper Middle Income	Lower Middle Income	Low Income	East Asia	E. Europe Cent. Asia	Latin America	Mid. East N. Africa	South Asia	Sub-Saharan Africa
High Income	<b>6.3</b>	<b>5.7</b>	<b>7.9</b>	<b>9.1</b>	<b>8.3</b>	<b>5.1</b>	<b>7.0</b>	<b>4.3</b>	<b>10.4</b>	<b>4.4</b>
	<i>2.4</i>	<i>1.2</i>	<i>2.5</i>	<i>2.4</i>	<i>2.6</i>	<i>1.1</i>	<i>1.5</i>	<i>0.8</i>	<i>3.1</i>	<i>0.7</i>
<i>QUAD</i>	<b>6.3</b>	<b>5.2</b>	<b>8.6</b>	<b>10.6</b>	<b>8.9</b>	<b>5.2</b>	<b>6.9</b>	<b>4.4</b>	<b>13.6</b>	<b>4.5</b>
	<i>2.1</i>	<i>0.9</i>	<i>2.5</i>	<i>2.5</i>	<i>2.7</i>	<i>0.8</i>	<i>1.2</i>	<i>0.5</i>	<i>3.3</i>	<i>0.5</i>
Upper Middle	<b>15.6</b>	<b>11.8</b>	<b>15.8</b>	<b>14.7</b>	<b>19.2</b>	<b>10.2</b>	<b>13.6</b>	<b>6.0</b>	<b>14.3</b>	<b>5.9</b>
	<i>5.6</i>	<i>3.8</i>	<i>5.6</i>	<i>5.7</i>	<i>7.2</i>	<i>4.4</i>	<i>2.6</i>	<i>2.5</i>	<i>6.6</i>	<i>3.5</i>
Lower Middle	<b>12.4</b>	<b>11.1</b>	<b>12.9</b>	<b>9.4</b>	<b>13.6</b>	<b>11.2</b>	<b>12.6</b>	<b>6.7</b>	<b>9.9</b>	<b>4.0</b>
	<i>7.1</i>	<i>4.8</i>	<i>6.7</i>	<i>5.1</i>	<i>6.6</i>	<i>6.2</i>	<i>5.1</i>	<i>2.8</i>	<i>6.2</i>	<i>2.7</i>
Low Income	<b>18.2</b>	<b>14.3</b>	<b>19.5</b>	<b>25.4</b>	<b>22.2</b>	<b>17.7</b>	<b>15.9</b>	<b>16.3</b>	<b>16.2</b>	<b>16.3</b>
	<i>10.9</i>	<i>8.1</i>	<i>12.2</i>	<i>12.9</i>	<i>13.8</i>	<i>6.2</i>	<i>9.0</i>	<i>10.0</i>	<i>10.4</i>	<i>12.2</i>

*Source:* Own calculations. MA-OTRI in bold; MA-TTRI in italics.

Across developing country regions, South Asia faces the most restrictive market access, due to export composition (agriculture, textiles and apparel) and because it has relatively limited preferential access. Sub-Saharan countries have the best market access, especially in high income countries, reflecting again export composition (minerals, primary products, plantation agriculture), as well as low or zero tariffs in many high income countries. By far the highest levels of market access barriers apply to South-South trade flows. Sub-Saharan African countries confront TTRIs and OTRIs in low-income countries that are 3 to 4 times higher than those that apply in middle- and high-income markets.

Comparing the MA-TTRI and the MA-OTRI suggests that NTMs are generally more important in restricting trade than tariffs: their measured ad-valorem equivalent is much higher than existing tariffs. Standards, licensing and similar regulatory instruments typically affect all products entering a market regardless of their origin, so that the impact of NTMs is relatively similar across trading partners. Tariffs, conversely, are generally negotiated on a bilateral basis, thus giving some trading partners a substantial advantage

in market access. With the increase in reciprocal and nonreciprocal preferential agreements, almost all trade flows today are affected by some sort of tariff preference. This is particularly true for high-income countries, where market access is affected by increasing number of such agreements.

The proliferation of preferential trade arrangements makes it important to properly measure the preferential margins confronting countries in assessing the relative market access conditions confronting exporters. This is done in the TTRI and OTRI in a direct way, as the calculations take into account the bilateral market access conditions that apply. But what matters for a given country, however, is the *relative* preference (the relative market access conditions), not just the absolute level of prevailing barriers at the border.

Commonly used measures of preference margins compare the preferential tariff to the MFN rate. This will overestimate the relative preference enjoyed by countries as in most instances other countries will also have preferential access. In practice it is possible that preferential rates granted to a particular country, although lower than MFN, still penalize it relative to other countries that benefit from an even lower or zero tariffs. To calculate the relative preferential margin the focus needs to be on the average advantage – in tariff percentage points – that a given basket of goods enjoys when exported from country A as compared to when it originates in other countries.

To clarify with an example, in what follows we calculate the relative preferential margin that Mexico enjoys in the US by using as the counterfactual the average tariff for Mexico's export bundle if this were to originate in other countries. The relative preferential margin is the difference between the bilateral trade-weighted preferential tariff imposed by the US on Mexico and that counterfactual. There are two set of weights when calculating this margin: first, the counterfactual, which is a weighted average of tariffs imposed on all other (potential) exporters to the US; and second, the preferential margin, which is an average constructed across many tariff lines.

To measure the counterfactual, we first calculate the trade-weighted average tariff at the tariff line level that an importer (the US) imposes on all other countries except the country for which the preferential margin is calculated (Mexico). This is done by using (US) bilateral imports as weights, so as to take into account the supply capacity of (US)

trading partners. We then aggregate across tariff lines using (Mexican) exports (to the US) to take care of differences in product composition across partners.<sup>3</sup>

A simpler alternative measure would be to compare the (US) import weighted average tariff imposed on a country (Mexico) with that imposed on all other countries.<sup>4</sup> This approach uses total imports (by the US) at the HS 6 digit level as weights. A problem with this method is that it disregards product composition: if Mexico's export bundle to the US is not representative of the composition of US imports (e.g., Mexican exports to the US are mainly agricultural, while US imports mainly manufacturing), using exclusively US imports as weights in the calculation of the counterfactual would likely lead to biased results.<sup>5</sup>

A further complication arises in the aggregation across tariff lines. A proper aggregation would take into account that imports of some goods are more responsive to changes in prices than others. In theory, imports that are less sensitive to prices (inelastic) should be given less weight as tariffs change – as they would have little effect on overall volumes of trade.<sup>6</sup> To correct for this, HS six digit product lines are aggregated using the import demand elasticities.<sup>7</sup>

The relative preferential margin for exports from country  $j$  is then calculated as:

$$RPR_j = \frac{\sum_k \sum_{hs} imp_{k,hs}^j \varepsilon_{k,hs} t_{k,hs}^j}{\sum_k \sum_{hs} imp_{k,hs}^j \varepsilon_{k,hs}} - \frac{\sum_k \sum_{hs} imp_{k,hs}^j \varepsilon_{k,hs} \sum_v \frac{imp_{v,hs}^k t_{v,hs}^k}{imp_{v,hs}^k}}{\sum_k \sum_{hs} imp_{k,hs}^j \varepsilon_{k,hs}}, \quad v \neq j$$

where,  $imp$  are imports,  $\varepsilon$  is the import demand elasticity,  $t$  is the tariff,  $k$  indexes importers,  $hs$  are HS 6 digit categories, and  $v$  are exporters competing with country  $j$  in exporting to country  $k$ . This equation is simply the MA-TTRI of country  $j$  minus the

<sup>3</sup> As trade flows are generally reported at the six digit level of the Harmonized System (HS), this indicator is constructed at the HS 6 digit level instead of the tariff line level.

<sup>4</sup> This is the approach taken by Low, Piermartini and Richter (2008).

<sup>5</sup> This simpler methodology would be consistent with a framework where export composition is a function of the structure of the tariff of the importing country (everything else equal, exports would concentrate in product lines with lower tariffs), however, as the intent is to assess the preferential margin applied on the existing structure of trade, the measure controlling for product composition is to be preferred. Also, export composition is more likely to be determined by other factors affecting comparative advantage, such as level of development, land quality, climate, geography and labor force skills.

<sup>6</sup> Complicating the framework even more, one should take into account substitution possibilities across similar products originating in different countries. For simplicity, we abstract from this and assume that substitution elasticities are equal to one.

<sup>7</sup> See Kee, Nicita and Olarreaga (2008b) for the methodology used to estimate import demand elasticities.

counterfactual given by an equivalent MA-TTRI but calculated on the basis of tariffs applied to competitors of country *j*. This index can be calculated bilaterally (Mexico’s relative preferences in the US market) or at the country level (Mexico’s overall level of relative preferences for its exports relative to all its export markets). In the latter case all bilateral trade flows of a particular country are considered.

This measure of preference margin can be positive or negative, depending on the advantage or disadvantage of the country with respect to other exporters. Table 3 reports relative preferential margins averaged by region. All regions have positive relative preferential margins with themselves. This indicates the importance of regional trade agreements. The most “effective” regional agreements in terms of preferences are in Latin America, where countries enjoy a relative preferential margin of about 3 percent. Latin America both enjoys and provides a substantial preferential margin to the USA and Canada, reflecting trade agreements with the US and within the region (MERCOSUR, etc.). This is mirrored by the negative preference that countries outside Latin America face when they export to that region.

**Table 3: Relative Preference Margins, 2006 (percentage points)**

Importers	East Asia	East Europe Central Asia	Latin America	Middle East and North Africa	Sout Asia	Sub-Saharan Africa	High Income Countries
East Asia	0.2	-0.1	-0.1	0.0	0.0	0.0	0.0
East Europe Central Asia	0.0	0.5	-0.4	0.4	-0.2	0.0	-0.2
Latin America	-2.5	-1.9	3.0	-0.5	-2.1	-1.2	1.7
Middle East and North Africa	-0.3	-0.2	-0.2	0.9	-0.2	0.1	0.0
Sout Asia	-0.2	-0.1	0.0	-0.3	2.0	-0.1	-0.1
Sub-Saharan Africa	-0.1	0.0	-0.1	0.0	-0.1	0.3	-0.1
High Income Countries	-0.5	0.4	0.7	0.2	-0.5	0.1	0.1
Australia and New Zealand	-0.2	-0.6	-0.3	-0.1	-0.2	0.1	0.1
Canada	-1.0	-0.8	1.7	0.0	1.8	0.0	1.0
European Union	0.1	1.1	1.0	0.6	-0.7	0.5	-0.5
Japan	0.3	0.0	0.1	0.0	0.7	0.1	-0.1
USA	-0.7	0.0	1.0	-0.1	0.2	0.1	0.0

Relative preference margins, whether positive or negative, are much smaller for other regions. Countries in Sub-Saharan Africa, for example, enjoy a relative preferential margin of only about 0.5 percent in the EU, as they compete both among themselves and other countries to which the EU provides preferences (Eastern Europe, North Africa and Latin America). Relative preferential margins are mostly negative for East Asian states.

Country-specific estimates of the relative preference margin for a number of Sub-Saharan countries are reported in Table 4. Bilateral preferences are significant in only a few cases, and in a few instances they actually negative, putting the countries concerned in a situation similar to that applying to East Asian economies. Only Madagascar has significant preferential margins – greater than 2 percentage points – in more than two markets. Most countries have meaningful preferential margins in only one or two markets, and many do not have margins that meet the 2 percentage point threshold. Taking into account that the empirical literature on the ‘tariff equivalent’ of rules of origin finds that these average some 3 to 4 percent, these calculations suggest that the value of preferential programs is quite limited.

**Table 4: Relative Preference Margins for African countries, 2006** (percentage point)

African Exporter	Australia	Canada	European Union	Japan	USA	Other High Income
ANGOLA	4.7	0.0	0.0	0.0	0.1	0.0
BENIN	0.0	2.7	0.0	0.2	0.2	0.0
BURKINA FASO	4.2	1.0	0.6	0.0	0.4	0.3
CENT.AFR.REP	1.9	0.6	0.1	0.1	0.0	0.0
COTE DIVOIRE	0.0	0.0	0.4	0.0	0.0	0.2
CAMEROON	0.0	-0.2	0.4	0.0	1.2	0.3
CONGO	0.0	0.0	0.1	0.1	0.3	0.0
ETHIOPIA	0.1	0.3	0.5	0.1	0.0	0.8
GHANA	-0.1	0.1	0.9	0.0	0.4	0.6
KENYA	0.0	-0.5	1.2	0.1	-0.9	0.7
MADAGASCAR	1.4	7.5	3.9	0.8	-1.0	2.9
MALI	1.9	1.6	0.4	2.8	0.2	0.3
MOZAMBIQUE	0.5	0.2	4.5	0.5	-0.2	2.8
MAURITANIA	0.4	4.4	0.4	6.9	0.0	0.2
MALAWI	0.0	0.3	0.0	0.0	-3.0	0.0
NIGER	2.3	0.5	0.0	0.4	2.0	0.0
NIGERIA	-0.3	0.0	0.1	0.0	0.1	0.0
RWANDA	4.2	0.1	0.0	0.2	0.1	0.0
SUDAN	1.3	0.0	0.1	0.0	0.0	0.0
SENEGAL	1.4	0.6	2.3	3.0	0.2	1.0
CHAD	4.6	0.8	0.1	0.0	0.2	0.0
TOGO	0.0	0.1	0.3	0.3	1.4	0.1
TANZANIA	0.2	0.0	1.1	0.0	0.3	2.3
UGANDA	0.0	0.2	1.5	0.2	0.0	1.2
ZAMBIA	0.4	0.8	0.1	0.8	0.6	-0.3
ZIMBABWE	-0.1	0.0	0.6	0.0	0.0	0.3

### 3. Complementing NTMs with Other Trade Costs

The foregoing discussion of the trade restrictiveness of policies illustrates that NTMs are the major source of barriers to trade but that tariffs also remain important, especially in developing countries. A question to which we return below is what is more important, NTMs or tariffs for a given developing country or region. Given low relative preferences, remaining MFN tariffs could have bigger effects than some of the NTMs, especially for South-South trade flows. But the average magnitude of NTMs in higher-income countries clearly suggests that action to reduce their trade-impeding effects could have high payoffs.

The NTMs included in the indicators discussed above are only a subset of the policies that result in impediments to trade. Internal trade and transactions costs may be of equal if not greater importance in reducing volumes of trade. Many of these trade costs reflect the domestic economic environment: the legal and regulatory framework, the efficiency of infrastructure services and related regulation, customs clearance procedures, administrative red tape, etc. For OECD countries there is a substantial amount of information on the extent of product market regulation (e.g., Nicoletti and Scarpetta 2003), but such comparable data do not exist for developing country regulatory regimes. However, there data available for a large number of developing countries on the performance of logistics services and on the internal costs associated with shipping goods from the factory gate to the port, and from ports to retail outlets. The first is captured by the Logistics Performance Index (World Bank 2007) and complementary indicators of trade facilitation (Helble, Shepherd, and Wilson 2007); the second is covered by the Doing Business database (World Bank, 2008). All of these indicators capture dimensions of prevailing domestic regulatory regimes that affect trade.

The *Doing Business* “cost of trading” measures the fees associated with completing the procedures to export or import a 20-foot container, measured in U.S. dollars (Djankov, Freund and Cong, 2006). These include costs for documents, administrative fees for customs clearance and technical control, terminal handling charges and inland transport. The cost measure does not include tariffs or trade taxes. Only official costs are recorded. The indicator is part of the *Doing Business* trading across borders index, which compiles the number of documents, the cost and the time

necessary for procedural requirements for exporting and importing a standardized cargo of goods by ocean transport. Local freight forwarders, shipping lines, customs brokers and port officials provide information on required documents and cost as well as the time to complete each procedure. Inland transport costs are based on distance to the shipping port. The methodology, surveys and data are available at <http://www.doingbusiness.org>.

The *Logistics Performance Index* (LPI) provides a snapshot of the supply chain performance of countries. Based on a worldwide survey of global freight forwarders and express carriers, the LPI measures the logistics friendliness of the countries surveyed. Feedback from the survey is supplemented with data on the performance of key components of the logistics chain. In this paper only two components of the LPI are used: indicators of the efficiency of customs and a measure of access to (choice of) and affordability of international shipment. A higher LPI score implies a better quality logistics environment. The underlying methodology of the LPI and data are available at <http://www.worldbank.org/lpi>.

The *Trade Facilitation Index* (TFI) is based on secondary sources: McArthur and Sachs (2002); IMD's World Competitiveness Yearbook 2000; and Kaufmann, Kraay and Zoido-Lobaton (2002). The TFI focuses on the following four areas of performance: port efficiency, customs environment, regulatory environment, service-sector infrastructure. Port efficiency is designed to measure the quality of port infrastructure, both maritime and airports. The customs environment measures direct customs clearance costs as well as the administrative transparency of customs processes. The regulatory environment measures an economy's approach to regulation. The service-sector infrastructure variable measures the extent to which an economy has the necessary domestic infrastructure for e-business transactions and employs information networks to improve efficiency. For the purpose of this paper only the customs and regulatory environment parts of this index are considered, with a higher score indicating better performance. For a more detailed description of the Trade Facilitation Index see Wilson, Mann, and Otsuki (2003).

Table 5 reports the average of these indices by income country groups. Developing countries generally have weaker trade facilitation performance than higher-income economies.

**Table 5: Measures of domestic trade costs (averages by country group)**

	High Income	Middle income	Low income
LPI (score)	3.9	3.0	2.8
DB import (US\$)	813.6	1024.2	1212.0
DB export (US\$)	774.4	867.2	949.3
Trade Facilitation (score)	6.1	4.2	3.7

#### 4. An Empirical Assessment

In this section we use a gravity model framework to assess the impacts of border barriers and differences in trade costs and regulatory policies on merchandise trade flows. In a nutshell, the gravity model predicts bilateral trade flows based on the economic sizes of and distance between two countries. Country specific trade costs are captured by country fixed effects or multilateral resistance terms. The literature has recently focused more on quantifying domestic costs of trading. These additional trade costs have been generally measured by the inclusion of specific variables (generally a measure of infrastructures such as roads, railways, phone lines, etc).

Recent studies find that domestic institutions and infrastructure determine volumes of trade across countries (Limão and Venables, 2001; Wilson, Mann, and Otsuki, 2003; Anderson and Marcouiller, 2002; Francois and Manchin, 2007). In general, the literature supports the hypothesis that domestic trade costs and the economic environment are significant determinants of the volume of trade between countries. What follows builds on the existing literature using gravity models to investigate the importance of trade and related regulatory policies on trade flows. In addition to the TTRI and the NTM component of the OTRI (defined as the difference between the OTRI and the TTRI), we use the three indicators discussed above.

To capture the effect of traditional trade policies we use the TTRI and the difference between the OTRI and the TTRI (which captures the effect of NTMs). As this is calculated at the bilateral level, this will also soak up any variance due to the presence



of preferential trade agreements.<sup>8</sup> We use a traditional cross-section gravity model that includes time invariant trade impediments (distance, adjacency, common language, access to the sea) as well as trade policy and regulatory/trade cost variables. The multilateral resistance term (Anderson and Van Wincoop, 2003) is proxied by “remoteness” variables following Baier and Bergstrand (2007). This methodology produces consistent estimates and, contrary to using country fixed effects, allows the estimation of the effect of domestic factors such as logistics and red tape. The gravity equation is estimated using Poisson pseudo maximum likelihood (PPML). This produces consistent estimates in the presence of heteroskedasticity and is more robust to truncation (Silva and Tenreyro, 2006).

The dataset covers 104 importers and 115 exporters. All data are for 2006. In a few cases where 2006 data were not available, 2005 or 2004 data has been used. Trade data are from WITS (COMTRADE), GDP data from the World Development Indicators, gravity type variables are obtained from the Trade Production and Protection database (Nicita and Olarreaga, 2007), and trade policy data from the OTRI database (Kee, Nicita and Olarreaga 2008a,b). Finally, data on the LPI and domestic trade costs were obtained from the LPI and the Doing Business websites.

Table 6 reports the estimated coefficients for a series of specifications with and without the domestic trade costs terms. Trade flows occur across about 90 percent of countries in the sample; estimation results are provided only for the regressions run without zero trade observations. The PPML results are robust to truncation – results including zero trade bilateral flows are quite similar to those reported in the table. Compared to standard OLS, the results of the PPML estimator are similar in sign, but the magnitude of coefficient estimates varies.

The results are typical of those of other gravity equation models. Distance is an important determinant of bilateral trade, as are a common border and common language. Landlocked countries tend to trade less, especially in terms of exports, although estimated coefficients are not statistically significant. Larger and more populous countries tend to trade more. Trade policies (tariffs and NTMs) are statistically significant determinants of

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<sup>8</sup> Alternatively, the effect of trade policy could be captured by the TTRI computed on a MFN basis plus an additional term capturing the relative preferential margin.

trade volumes. On average, a reduction in the TTRI of 10 percent would increase trade volumes a little more than 2 percent, while NTMs add another 1.8 percent.<sup>9</sup>

**Table 6. Gravity Equation Results (Poisson Pseudo ML Estimator)**  
(Dependent Variable = Value of Imports)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance	-0.865 *** (0.048)	-0.826 *** (0.045)	-0.794 *** (0.045)	-0.803 *** (0.043)	-0.768 *** (0.042)	-0.836 *** (0.044)	-0.784 *** (0.042)	-0.820 *** (0.043)
GDP Importer (log)	0.759 *** (0.029)	0.821 *** (0.040)	0.595 *** (0.049)	0.782 *** (0.036)	0.746 *** (0.065)	0.853 *** (0.046)	0.799 *** (0.062)	0.621 *** (0.061)
GDP Exporter (log)	0.771 *** (0.021)	0.737 *** (0.029)	0.592 *** (0.043)	0.714 *** (0.029)	0.586 *** (0.055)	0.736 *** (0.029)	0.599 *** (0.055)	0.518 *** (0.085)
Population Importer (log)	0.072 ** (0.039)	0.068 ** (0.039)	0.220 *** (0.046)	0.061 * (0.033)	0.091 * (0.047)	0.037 (0.043)	0.037 (0.047)	0.250 *** (0.059)
Population Exporter (log)	0.064 ** (0.030)	0.142 ** (0.058)	0.202 *** (0.042)	0.126 *** (0.042)	0.237 *** (0.058)	0.127 * (0.056)	0.210 ** (0.058)	0.325 *** (0.103)
Remoteness Importer (log)	1.069 *** (0.136)	1.210 *** (0.162)	0.969 *** (0.114)	1.003 *** (0.139)	0.969 *** (0.131)	1.218 *** (0.177)	0.946 *** (0.151)	1.055 *** (0.147)
Remoteness Exporter (log)	1.404 *** (0.132)	1.397 *** (0.130)	1.211 *** (0.124)	1.173 *** (0.127)	1.117 *** (0.128)	1.358 *** (0.127)	1.090 *** (0.126)	1.221 *** (0.136)
Landlock Importer	-0.098 (0.104)	-0.028 (0.130)	-0.096 (0.100)	0.023 (0.127)	0.009 (0.124)	-0.010 (0.125)	0.027 (0.123)	0.070 (0.145)
Landlock Exporter	-0.148 ** (0.079)	-0.100 (0.095)	-0.173 ** (0.077)	-0.045 (0.095)	-0.071 (0.097)	-0.114 (0.095)	-0.072 (0.096)	-0.064 (0.115)
Common Border	0.301 *** (0.115)	0.470 *** (0.150)	0.439 *** (0.109)	0.566 *** (0.150)	0.632 *** (0.153)	0.539 *** (0.154)	0.664 *** (0.148)	0.557 *** (0.153)
Common Language	0.244 *** (0.106)	-0.041 (0.140)	0.186 * (0.102)	-0.105 (0.144)	-0.121 (0.141)	0.057 (0.131)	-0.048 (0.135)	-0.203 (0.158)
TTRI	-0.227 *** (0.035)	-0.240 *** (0.042)	-0.219 *** (0.036)	-0.216 *** (0.044)	-0.231 *** (0.044)	-0.238 ** (0.110)	-0.134 (0.088)	-0.204 *** (0.044)
Non Tariff Barriers		-0.181 *** (0.054)	-0.108 ** (0.041)	-0.148 *** (0.046)	-0.147 *** (0.045)	-0.101 * (0.061)	-0.102 * (0.054)	-0.229 *** (0.057)
LPI importer			0.537 *** (0.107)		0.100 (0.143)		0.097 (0.131)	
LPI exporter			0.513 *** (0.107)		0.421 *** (0.133)		0.377 ** (0.131)	
DB Import Costs				-0.481 *** (0.093)	-0.436 *** (0.101)		-0.449 *** (0.107)	
DB Export Costs				-0.474 *** (0.116)	-0.330 *** (0.111)		-0.339 *** (0.109)	
Trade Facilitation Importer								0.257 *** (0.068)
Trade Facilitation Exporter Relative Preferential Margin						3.548 *** (0.695)	3.403 *** (0.677)	0.231 ** (0.091)
Pseudo R-squared	0.858	0.859	0.863	0.873	0.871	0.871	0.882	0.862
Observations	10720	10720	10720	10720	10720	10720	10720	4826

<sup>9</sup> The effect of NTMs is captured at the margin, i.e., given the effect of the existing tariff structure.

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Significance levels of 1%, 5% and 10% are indicated by \*\*\*, \*\* and \* respectively. Standard errors are in parentheses. To capture the effect of preferences, in the last two columns the TTRI is computed as the MFN tariff-based TTRI rather than the preferential tariff-based TTRI.

Other trade costs are important. Coefficient estimates for the LPI suggest that a one point reduction in the LPI score would increase trade volumes by about 50 percent, both in terms of exports and imports. Similar results are found for internal trade costs as captured by the Doing Business indicators. The elasticity of imports to the cost of importing is about 0.48, and that of exports to the cost of exporting is about 0.47. That is, a 10 percent reduction in the cost associated with importing (exporting) would increase imports (exports) by about 4.8 percent (4.7 percent). When including both the LPI and the Doing Business indicators in the estimation, all coefficients remain significant except for the LPI for the importers. This suggests that the indices do not completely overlap – each captures different factors affecting the cost of trading.

The effect of tariff preferences on the volume of trade is taken into account by adding the relative preferential margin discussed above. The regression suggests preferences have a statistically significant positive impact on bilateral trade flows. Results suggest that preferences are important: a 1 percentage point advantage over competitors provides an increase in exports of about 3.5 percent. However, as observed above, relative preferences are generally well below 1 percentage point. This preference impact result continues to hold if the LPI and DB variables are also included. Note that inclusion of the relative preference margin results in coefficient estimates for the TTRI and OTRI that are either less significant or no longer significant, although the signs of both continue to be negative. Thus, preferences do appear to have the intended effect of offsetting the effects of MFN tariffs, although, as expected, they do less to help exporters deal with NTMs and do nothing to reduce the impacts of domestic trade transactions costs.

A final specification is estimated using the trade facilitation index. This index captures issues related to the quality of the transport infrastructure, customs, and contract enforcement. Data for this index are collected for a smaller number of countries, thus reducing the number of observations substantially. Although the difference in sample size

implies the results cannot be properly compared, the picture that emerges is similar to that obtained from using the LPI and the Doing Business indicators: the quality of the prevailing regulatory environment matters for trade performance.<sup>10</sup>

To assess the relative impacts of internal trade costs and the trade-impeding effect of border trade policies, Table 7 reports the predicted effect on trade if low-income countries were to converge to a set of policies that would generate the observed average levels of the various indicators in middle-income countries (as reported in Table 5). These results are compared with the average effect of an increase of 1 percentage point in relative preferential access to global markets (not just the OECD) and with a reduction in the TTRI and OTRI to 5 and 10 percent, respectively.

**Table 7: Effects of convergence by low income countries to middle income average**

<b>Indicator/policy area</b>	<b>Increase in Imports</b>	<b>Increase in Exports</b>
LPI Score	15.2%	14.6%
Doing Business, cost of trading	7.4%	4.1%
Trade Facilitation Index	14.0%	12.6%
TTRI for low income countries reduced to 5%	5.7%	
OTRI for low income countries reduced to 10%	8.4%	
Relative Preference Margin increased by 1 percentage point	n.a.	3.5%

The predicted increases in trade volumes of low-income countries of this convergence experiment are substantial. The largest increases in trade are associated with actions to improve the logistics/trade facilitation scores (as measured by the LPI and the trade facilitation index). Improving performance on the Doing Business measure of internal trade costs has an impact that is similar to what could be obtained by further traditional trade policy reform – reducing the TTRI or bringing down the restrictiveness of NTMs.

In general terms, these results indicate that administrative and regulatory policies are at least as important as trade policies in impeding trade. This supports the recent focus of many developing countries on taking action to facilitate trade. A key question for

<sup>10</sup> This indicator is collinear with the Doing Business cost of trading and the LPI index: inclusion of all three variables results in the coefficient estimates losing their statistical significance.

policymakers is of course how performance can be increased on the measures used above. This requires country-specific analysis.

## **5. Concluding Remarks**

The focus of policy debates and international cooperation is more and more on regulatory policies. In this paper we have investigated the impact of a subset of such policies that directly affect trade costs, including traditional trade policies. The latter continue to be important in developing countries as well as for some sectors in high-income countries (agriculture in particular). This raises the question of which set of policies is more important as a trade impediment. The analysis in this paper suggests that the impact of reducing the costs associated with policies that increase transactions costs at and behind the border will have a greater payoff than further reductions in tariffs and NTMs, or seeking additional trade preferences. Our results also indicate that focusing attention on the policies that underpin the logistics and trade facilitation indices will have a bigger impact than actions to reduce the costs of the procedures that are captured by the Doing Business “cost of trading” variable. While suggestive, further work is needed to “unpack” these findings.

The analysis also makes clear that there are still large gains from trade to be had from traditional trade liberalization – which is the focus of the ongoing Doha Round of WTO negotiations. Progress in the Round has unfortunately been slow. Bringing the Doha Round to a successful conclusion is important as it would imply improvements in market access to all export markets. Trade facilitation does not require multilateral (or bilateral) negotiations – the costs that are incurred by traders in developing countries can and should be reduced through unilateral actions. The analysis in this paper strongly supports the argument made by Ikenson (2008) that there is great scope to enhance growth opportunities “while Doha sleeps.”

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