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Technical Measures to Trade in Central America

Incidence, Price Effects, and Consumer Welfare

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Abstract

Despite the widespread tariff reductions sparked by the Dominican Republic-Central America Free Trade Agreement, borders in the region remain thick, with many hurdles standing in the way of regional trade. Although anecdotal evidence suggests that nontariff measures raise trade costs and inhibit trade in the region, little is known about the magnitude of these economic effects. This paper uses a newly collected data set to quantify the incidence of sanitary and phytosanitary measures and technical barriers to trade in the region and benchmarks it with other parts of the world. The results indicate that the Central American region has the lowest prevalence of technical nontariff measures in the world. However, there is significant heterogeneity of trade-related regulations in Central America; for instance, 48 percent of Salvadoran imports are subject to at least one nontariff measure, compared with just 16 percent of Honduran imports. The paper estimates the impact of these technical measures on border prices and finds that the price impact of sanitary and phytosanitary measures is equivalent to an ad-valorem tariff of 11.6 percent. This price-rising effect is further investigated by looking in detail at the impact of sanitary and phytosanitary measures on the prices of beef, chicken meat, bread, and dairy products in Guatemala. The impact is estimated to be equivalent to an ad-valorem tariff of 68.4 percent, 51.4 percent, 22.0 percent, and 5.0 percent, respectively. The paper shows that efforts to streamline key sanitary and phytosanitary measures affecting these products by, for example, reducing the cost and time required to obtain sanitary registries, would likely reduce the Guatemalan urban extreme poverty rate from 5.07 percent to 4.91 percent.

This paper is a product of the International Trade Unit, Poverty Reduction and Economic Management Network. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at jreyes2@worldbank.org.

Technical Measures to Trade in Central America: Incidence, Price Effects, and Consumer Welfare*

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1. Introduction

Broadly defined, Non-Tariff Measures (henceforth NTMs) are policy measures, other than ordinary customs tariffs, that may have an economic effect on international trade in goods by changing quantities traded, prices or both (UNCTAD, 2010). The fall in tariffs in recent decades has been accompanied by an increase in the importance of NTMs in the international trade agenda. NTMs allow countries to address legitimate non-trade objectives such as the protection of human, animal, and plant health. The World Trade Organization (WTO) recognizes that countries are entitled to use NTMs in this manner. However, there are concerns that the multilateral reduction of traditional trade barriers has tempted countries to replace tariffs with NTMs and to use them to protect domestic interests (Fischer and Serra, 2000, Aisbett and Pearson, 2012).

The potential benefits of NTMs are evident, but it is important for policy makers to be cognizant of the costs associated with them. Unlike traditional trade policy instruments, such as tariffs, where the associated price increases are well understood, the costs associated with NTMs are more difficult to immediately quantify. Kono (2006), for instance, finds that democracy induces politicians to reduce tariffs but to increase the use of less transparent NTMs, and hypothesizes that this allows them to protect the domestic market but still to appeal to voters who prefer liberal trade policies. Although the outcome is the same, the price increases are less transparent to both policy makers and the public when NTMs are employed. Even when used legitimately and without protectionist intent, NTMs can have a major economic impact, potentially affecting regional integration, impacting domestic prices, diverting managerial attention, and penalizing small exporters. Countries imposing them may end up hurting their own poor (as NTMs may increase the price of key staples) and hampering the competitiveness of their own private sector (as NTMs may affect the price of imported inputs). The development an accurate metric of the costs of NTMs is thus important as it will inform policy makers of the minimum social benefit which is required to justify the presence of an NTM.

This paper has a particular focus on Central America. Despite the widespread tariff reductions sparked by the Dominican Republic-Central America Free Trade Agreement (DR-CAFTA), Central American borders remain thick, with many hurdles standing in the way of regional trade (see Gordillo et al., 2010). Anecdotal evidence suggests that NTMs raise trade costs and inhibit trade in the region (see, for example, Cato et al (2005) for an analysis of the impact of Sanitary and Phytosanitary (SPS) measures on the shrimp industry in Nicaragua). However, there is a dearth of empirical papers quantifying the economic effects of these regulations, and, traditionally, very limited data availability. Seemingly simple questions such as 'what policy measures are imposed by a country?' or 'what types of measures are faced by particular products?' can often not be answered due to a lack of appropriate data.

In order to fill this gap, and in response to the increased interest of both policy makers and researchers in the region, the World Bank, in collaboration with the United Nations Conference on Trade and Development (UNCTAD), initiated a new effort to collect NTM data in Central America. During the second half of 2012, NTM data was collected in Nicaragua, Guatemala, El Salvador, Honduras, and Costa Rica. This endeavor complemented a multiagency effort to gather NTM data worldwide (see Cadot and Malouche, 2012). To date, this program has resulted in the collection of NTM data in 48 countries. At the time of writing, data on 33 countries was available on WITS[1] (the World Bank's portal for trade data) with the remaining data still under verification by UNCTAD's statistical division. This study is the first attempt to use this new database to provide information about the trade incidence of NTMs across countries in the Central American region. We specifically focus on the role of technical NTMs, namely Sanitary and Phytosanitary (SPS) measures and Technical Barriers to Trade (TBT).

This assessment makes three key contributions to the literature on NTMs. Firstly, using this new and comprehensive dataset, we provide a descriptive analysis of the incidence of SPS and TBT measures in five Central American countries and benchmark Central America against other regions in the world. Secondly, we use econometric techniques to estimate the effect of NTMs on consumer prices, and determine how this effect varies across regions and type of NTMs. Thirdly, we explore the poverty impact of streamlining NTMs in Guatemala, one of the poorest countries in the region.

Results indicate that the Central American region has the lowest prevalence of technical NTMs in the world. However, there is significant heterogeneity in the coverage of NTMs across countries. For instance, 16.2% of all imports to Honduras are covered by at least one NTM, compared to 48.2% of goods entering El Salvador. This variation is reflected in the implementation of TBTs; only 7.9% of imports to Honduras are subject to a TBT, compared to 42.3% of imports to El Salvador. By contrast, countries are quite consistent in their application of SPS measures with this NTM imposed on between 16.1% and 21.6% of trade in the region. Our analysis also indicates that SPS measures inhibit intra-regional integration. In particular, registration requirements for SPS reasons (the so-called sanitary registries) are identified as a possible obstacle to regional integration. When compared with other countries for which data are available, four of the five Central American countries are identified as heavy users of sanitary registries.

We find that SPS measures have a significant impact on domestic prices in Central America. Across all products in the five countries, SPS measures have an average ad valorem equivalent of 11.6%. We investigate this price-raising effect in more detail for four key products in Guatemala: beef, bread and pastry, chicken meat, and dairy products. According to our estimation, the average import prices of these products rise by an amount equivalent to an ad-valorem tariff of 68.4%, 51.4%, 22.0%, and 5.0%, respectively.

Finally, we estimate the impact of streamlining SPS measures in Guatemala, and find that rationalizing the use and processes related to SPS measures affecting beef, bread and pastries, chicken meat, and dairy products would reduce domestic prices. This would have the effect of making the basic consumption basket more affordable, thereby benefitting the poorest segment of the population. Our computations suggest that streamlining the most significant SPS measures affecting these products could reduce the urban poverty rate from 5.07% to 4.91%.

We identify selected issues for policy dialogue at the regional level aimed at streamlining the NTM agenda. The manner in which countries' sanitary registries work is a hindrance to deeper regional integration. A key issue is that while there is mutual recognition of registries across countries, all exporters must produce paperwork for each individual country they wish to enter. A solution that could make great strides in this area is the formation of a regional, electronic database that centralizes

[1] http://wits.worldbank.org/wits/

documentation about the credentials that each firm submits to meet the sanitary registration requirements. This would lessen the time and cost burden on exporters, who currently have to gather all the documentation each time they apply for a mutual recognition certificate. More general issues for policy dialogue include considering setting up a regional secretariat to improve national and regional competitiveness by identifying and streamlining NTMs that prevent further regional integration. This committee should include the main regional agencies that regulate trade as well as representatives from the business chambers and other key stakeholders. It is also important to disseminate information on the current laws and regulations on import and export procedures to the wider public, particularly the business community. In this regard, grouping and regularly updating information in a regional portal would alleviate informational asymmetries which increase the cost of doing business in the region.

This paper is divided into six sections. This first section is a general introduction. The second provides an overview of the current literature on NTMs, details their classification and reports estimated frequency and coverage ratios. The third section assesses the price-raising effect of NTMs. The fourth section presents a preliminary analysis of the impact on poverty rates of streamlining key NTMs in Guatemala. Compiling all the information presented in the previous sections, part five highlights suggested topics for policy dialogue in the region aimed at facilitating international trade and regional integration. The final section presents some concluding remarks.

2. NTM Data and Stylized Facts

a. Conceptual Issues

In 2006, the Secretary-General of UNCTAD established the Group of Eminent Persons on Non-Tariff Barriers (GNTB). Their objective was to discuss the definition, classification, collection and quantification of NTMs. The GNTB established a Multi-Agency Support Team (MAST) which comprised representatives from several international organizations, including the Food and Agriculture Organization of the United Nations (FAO), the International Monetary Fund (IMF), the International Trade Centre UNCTAD/WTO (ITC), the Organization for Economic Co-operation and Development (OECD), the United Nations Industrial Development Organization (UNIDO), the World Bank and the World Trade Organization (WTO). Following a series of meetings and consultations, MAST proposed the following definition of NTMs:

"Non-tariff measures (NTMs) are policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both." (UNCTAD, 2010)

NTMs are a very diverse set of regulations in terms of type, effect and incidence (Gourdon and Nicita, 2012). Governments have a large degree of autonomy regarding the form and objectives of NTMs, and there is a high level of variation in how they are implemented. In addition, the desired level of NTMs varies across countries depending on perceived levels of risk, public demand and governmental priorities. With the reduction of traditional trade barriers, NTMs have become the new frontier of trade policy. This section briefly reviews the key empirical literature attempting to measure and quantify their effect on international trade.

A range of papers find that the global significance of NTMs is large, with Henson et al (2000) asserting that *"SPS measures are currently one of the foremost issues affecting exports of agricultural and food products from developing countries"*. Andriamananjara et al (2004) report that the global welfare gains of the removal of certain NTMs would be in the order of US$90-92 billion, while Walkenhorst and Yasui (2009) find that a reduction in transaction costs of 1 percent of the value of world trade would yield aggregate welfare gains of US$40 billion.

Estimates of tariff equivalents of NTMs tend to be quite high; Bradford (2003) focuses on final good trade and finds that the tariff equivalent of Japan's NTMs is 57%. The tariff equivalent for European countries' NTMs is slightly lower, ranging from 48% to 55%, and much lower for the United States at just 12%. Calvin and Krissoff (1998) use a price gap approach and show that the tariff equivalent of NTMs on US apples exported to Japan is 27.2%. This estimate significantly exceeds the average tariff rate of 19.3%. Chemingui and Dessus (2008) find that NTMs increase the domestic price of imported goods by an average of 17% across all product categories in Syria. By contrast, the average tariff is just 8%. Kee et al (2009) find that NTMs add, on average, an additional 87% to the level of trade restrictiveness imposed by tariffs, and note that for 34 countries (of a sample of 78) the contribution of NTMs to the overall level of restrictiveness is higher than the contribution of tariffs.

Henson et al (2000) report the results of a survey which asked respondents from low and middle income countries to indicate the significance of factors impeding their ability to export agricultural and food goods to the EU. They find that NTMs, specifically "SPS requirements", "other technical requirements" (for example labeling regulations or compositional standards) and "transport and other direct export costs", emerged as the top three issues, ahead of tariffs. Cadot and Gourdon (2012) find that SPS measures raise the price of African foodstuffs by 14%, with peaks for certain products, such as rice and other cereals, some types of meat, and edible oils. Combining this information with Kenyan household survey data, they find that NTMs act as a regressive tax, a result arising from the fact that foodstuffs make up a large share of poor households' budgets and the major impact of NTMs, especially SPS measures, on these goods.

However, NTMs cannot be simply dismissed as trade barriers. Results from gravity type models including Disdier et al (2008), Fontagné et al (2005), Portugal-Perez el al (2010), and Reyes (2011) indicate that while NTMs are generally found to be impediments to trade, they can also be trade promoting. This is because certain NTMs, such as labeling and content requirements, can provide consumers with information thereby lowering transaction costs, facilitating comparison and reducing uncertainty. Thus, NTMs can eliminate a market failure by reducing the cost of determining the quality of a product, thereby helping to prevent a 'lemon' problem (Akerlof, 1970). This point is also made by Crivelli and Gröschl (2012), Disidier et al (2008), and Ganslandt and Markusen (2001). Henson et al (2000) report that, to the extent that higher SPS standards increase costs of production, high SPS requirements offer low and middle income countries a source of competitive advantage over developed country suppliers. Chemnitz and Künkel (2006) study the heterogeneous effect of SPS measures across different countries noting that standards can *"act like a catalyst and like a barrier at the same time"*, and Fontagné et al (2005) find that *"for sensitive products, enforcing a measure at the border may guarantee the existence of trade flows that would otherwise not be recorded at all"*.

However, research indicates that NTMs can have a particularly negative effect on small and developing countries. Reyes (2012) highlights the interplay between standards harmonization and market structure. Using firm-level data, the author finds that the international harmonization of European standards in the electronic sector increases intra-EU competition to the benefit of exporters from the US but to the disadvantage of exporters from the developing world, who lose market share. Ganslandt and Markusen's 2001 general equilibrium model finds that incompatible standards are especially harmful for a small country, which can never win a "standards' war", where two countries impose cost-increasing standards on imports. In the small country, both producers and consumers may lose. Finally, Disdier et al (2008) find that developing and least developed countries' exports to the OECD are significantly reduced by SPS or TBT measures. By contrast, these regulations do not have any effect on exports from other OECD states.

b. Quantifying NTMs: The MAST Nomenclature

The NTM nomenclature, developed by the Multi-Agency Support Team (MAST), comprises a tree/branch structure. Measures with similar objectives are categorized into 16 "branches" (chapters) denoted by alphabetical letters A to P. Chapters A to O specify the requirements the importing country imposes on imports, while Chapter P details those regulations they place on their exports. Each of these 16 "branches" is further disaggregated into "sub-branches" (1-digit), "twigs" (2-digits) and "leafs" (3 digits) allowing for a finer classification of NTMs. The structure of the NTM nomenclature at the highest degree of aggregation is in Table 1.

Table 1. Non-Tariff Measures Classification

Imports	**Technical Measures**	A. Sanitary and Phytosanitary Measures (SPS)
		B. Technical Barriers to Trade (TBT)
		C. Pre-Shipment Inspection and other Formalities (PSI)
	Non technical Measures	D. Contingent Trade-Protective Measures
		E. Non-Automatic Licensing, Quotas and other quantitative controls (QC)
		F. Price Controls (PC)
		G. Financial Measures
		H. Measures affecting Competition
		I. Trade-Related Investment Measures
		J. Distribution Restrictions
		K. Restrictions on Post-Sales Services
		L. Subsidies (Excluding Export Subsidies under P7)
		M. Government Procurement Restrictions
		N. Intellectual Property
		O. Rules of Origin
	Exports	P. Export-Related Measures

Source: UNCTAD 2012

Data on NTMs is traditionally quite fragmented and incomplete. The World Trade Report 2012 finds that "*existing data sources are compromised by large gaps in country coverage, intermittent data collection and a lack of shared terminology*". This applies even to data collected by the WTO; the WTO framework itself is incomplete despite containing more than 200 different legal notification requirements. Specifically, notification requirements do not cover three of the 16 categories of international classification measures (finance measures, distribution restrictions and restrictions on post-sales services). The exclusion of these is not surprising; the notification system is not designed to create a comprehensive database. For example, the SPS and TBT notification requirement is intended so that early drafts of regulations can be viewed by partner countries at the stage when amendments are still possible. Countries are therefore not required to report regulations that predate the introduction of the SPS or TBT Agreements, or new regulations in their final form (WTO, 2012). In addition, because notifications are voluntary with no sanction mechanism, governments may simply choose not to comply with notification requirements, either due to logistical difficulties (Bacchetta et al, 2012) or concern that notification will expose their NTMs to scrutiny or objections. Finally, the quality of notifications varies widely. In many cases, even when NTMs are reported, precise information on certain dimensions of the measures, such as product coverage or the time period during which the measure will remain in place is not provided.

Alterative inventories of NTMs have been obtained through concerns or complaints registered by traders, with sources including direct surveys and WTO Trade Policy Reviews. However, these databases are not comprehensive and tend to be biased as countries vary widely in terms of the administrative procedures required to file complaints against third parties (Beghin and Bureau, 2001).

In a response to this, an effort to collect comprehensive NTM data is currently being undertaken jointly by the World Bank, UNCTAD and the African Development Bank. Since 2009, local consultants have been tasked with drawing up NTM inventories in collaboration with ministries and agencies in 48 countries. One of the challenges related to data collection is that most countries do not have a national repository of NTM data. This is because laws and regulations affecting trade are often developed by different government agencies and regulatory bodies (for instance, in Lao, 14 organizations oversee the 27,975 NTMs, and in Tunisia, there are 10 authorities responsible for the 3,361 regulations). In practice, the data has to be carefully scrutinized for possible duplications, omissions, or any other problems in order to minimize inaccuracies. Once the gathered data are verified and formatted into a common, consistent nomenclature by UNCTAD and also verified by the relevant government, it is uploaded onto WITS, the World Bank's portal for trade data, where it is publicly available. Variables in the WITS database include reporter name, NTM code, HS code, the year in which the measure was implemented, legal sources, enforcing agencies, and a list of affected partner countries.

c. Data Availability

At the time of writing, NTM data has been collected for 48 countries, with 33 of the data files publically available on the WITS website. The remaining data files are in the process of verification by UNCTAD. Table 2 shows the availability of data across each of the six World Bank regions, along with the year in which the data was collected. The table separates out the five Central American countries that are the subject of our analysis. However, they are officially classified under the Latin America and Caribbean region by the World Bank.

Table 2. NTM Data Availability (by World Regions)

Sub-Saharan Africa	East Asia and Pacific	Europe and Central Asia	Rest of Latin America and Caribbean	Central America	Middle East and North Africa	South Asia	High Income Countries
Burkina Faso*	Cambodia	Kazakhstan*	Argentina*	Costa Rica*	Egypt*	Afghanistan*	EU*
(2010)	(2011)	(2012)	(2008)	(2012)	(2011)	(2012)	(2010)
Kenya	China*	Russia	Bolivia*	El Salvador	Lebanon*	Bangladesh	Japan*
(2011)	(2012)	(2009)	(2008)	(2012)	(2011)	(2011)	(2009)
Madagascar*	Indonesia	Turkey	Brazil*	Guatemala*	Morocco*	India*	
(2011)	(2011)	(2010)	(2008)	(2012)	(2011)	(2012)	
Malawi	Lao PDR*		Chile*	Honduras	Syrian Arab Republic	Nepal*	
(2011)	(2011)		(2008)	(2012)	(2011)	(2012)	
Mauritius*	Philippines		Colombia *	Nicaragua	Tunisia*	Pakistan*	
(2011)	(2008)		(2008)	(2012)	(2011)	(2012)	
Namibia*			Ecuador*			Sri Lanka*	
(2011)			(2008)			(2012)	
Rwanda			Mexico*				
(2011)			(2008)				
Senegal*			Paraguay *				

(2011)			(2008)				
South Africa			Peru*				
(2011)			(2008)				
Tanzania*			Uruguay*				
(2011)			(2008)				
Uganda			Venezuela, RB*				
(2011)			(2008)				

Note: This table shows the countries used in this study. The year in which NTM data was collected is in parentheses. An asterisk indicates those countries for which the NTM data are publically available in WITS as of June 2013.
Source: Authors' computation

For the purposes of our analysis, a standardized methodology was developed in order to harmonize each country's NTM data file. Firstly, we only used in the analysis those NTMs that applied to each of a country's trading partners. In those cases where the database did not specify the group of countries to which an NTM applied, it was assumed that it applied to all trading partners.

The second step in the harmonization was to standardize the product codes to the six digit level. In some cases only a two digit chapter heading was provided in the database. In these cases, it was assumed that the NTM applied to all products at the six digit level under that chapter. When a NTM was stated as affecting a product at an eight or ten digit level, the product code was trimmed to six digits to allow a consistent cross-country comparison exercise. In all cases, it was assumed that the NTM affected all goods under the six digit classification. Thirdly, we noted that four different NTM nomenclatures were used in the collection of the NTM data; each of the databases was converted to the 2012 version using a concordance across nomenclatures.

Finally, the data was checked to ensure no duplications at the country-product-NTM code level, and we dropped from the analysis SPS and TBT measures that were applied to all products as these were assumed to be data entry mistakes. For each six digit code, two indicators were developed; a dummy indicating that at least one NTM applied to that good, and a count variable showing the total number of NTMs applying to that product. The same indictors are also created at the NTM chapter level; a dummy indicating the application of at least one regulation from a particular NTM chapter to a product, the second indicator showing the actual number of NTMs from each chapter applying to each good. In this analysis we investigate only SPS and TBT measures.

d. The Incidence of NTMs in Central America

In this section, two simple inventory indicators are used to measure the prevalence of NTMs: the frequency ratio (percentage of product lines exposed to NTMs) and the coverage ratio (share of total imports exposed to NTMs).

The frequency ratio accounts only for the presence or absence of an NTM, and indicates the percentage of imported products to which one or more NTMs are applied. In more formal terms, the frequency ratio of NTMs imposed by country j (F_j) is calculated as:

$$F_j = \left[\frac{\sum D_i M_i}{\sum M_i}\right].100 \qquad \textbf{[1]}$$

where D_i is a dummy variable indicating the presence of one or more NTMs and M_i (also a dummy variable) indicates whether there are imports of good i. Because products have all equal weights, this measure tends to over-emphasize products with very low import value.

A measure of the importance of NTMs in terms of overall import value is given by the coverage ratio. This indicator measures the percentage of imports to country j subject to at least one NTM. In formal terms the coverage ratio (C_j) is given by:

$$C_j = \left[\frac{\sum D_i V_i}{\sum V_i}\right].100 \qquad \textbf{[2]}$$

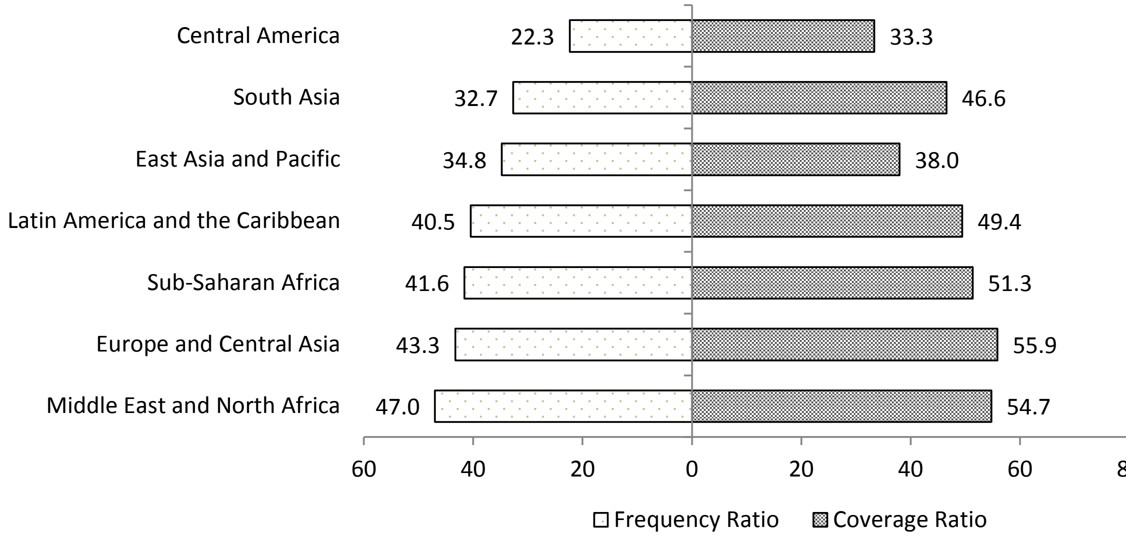
where, D_i is defined as before, and V_i is the value of imports of product i.[2] Unlike the previous indicator, the coverage ratio does not overemphasize products with a low import value, but because products affected by trade restricting measures are imported in lower quantities and therefore get a lower weight in the calculation, it tends to under-estimate overall restrictiveness (endogeneity bias).

Neither the frequency ratio nor the coverage ratio make any distinction between NTMs with relatively little impact on trade and those with major, even prohibitive, trade effects. This is a significant issue as restrictiveness varies widely across type of NTM; Beghin and Bureau (2001) note that there is not even a clear correlation between the number of NTMs in place and their trade effect. Also, it should be noted that frequency and coverage ratios do not give any indication of the level of enforcement of regulations. Because neither of these standard measures is perfect, we present both. Despite their shortcomings, they provide useful information about what is most often observed in a country, what is likely to be important, and thus what may warrant deeper analysis.

This paper focuses on SPS (chapter A) and TBT (chapter B) measures, both of which are technical NTMs. Central America is the region where these measures are least prevalent (Figure 1). On average, approximately 22.3% of active tariff lines in the region are affected by a least one NTM, and one third of imports are subject to an NTM. While the Middle East and North Africa has the highest frequency ratio, Europe and Central Asia has the highest coverage ratio indicating differences in the relative composition of their import baskets – Europe and Central Asia's imports must be weighed more towards regulated goods.

Figure 1: Technical NTMs: Frequency and Coverage ratios, by World Regions (Simple Averages, Percentages)

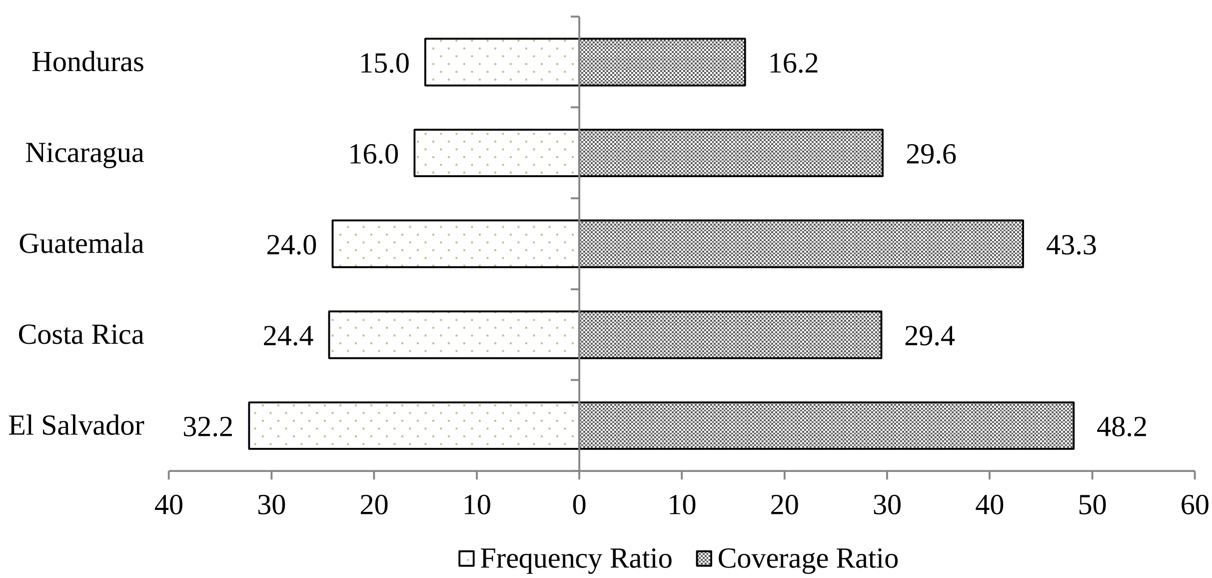
[2] We use the average total import value by product (6-digit HS codes) in the period 2008-2010.



Note: This figure presents the within regions simple average of frequency and coverage ratios. Only SPS and TBT measures are considered. The countries considered for this analysis are listed in Table 2.
Source: Authors' computation

Central American countries differ greatly in their use of NTMs which indicates that there is not a common approach to trade regulation in the region (Figure 2). The more developed countries appear to utilize NTMs more intensely than their less developed neighbors. El Salvador applies NTMs to the highest proportion of import lines (32.2%), which is more than double the proportion of imported goods subject to an NTM in Honduras (15.0%). This heterogeneity may be an indication of differences in governmental priorities and approaches towards trade regulation, composition of import baskets, or the influence of import-competing sectors lobbying for protection.

Figure 2: Central America: Frequency and Coverage ratios, by Country



Note: This figure presents the frequency and coverage ratios for all Central American countries. Only SPS and TBT measures are considered.
Source: Authors' computation.

Table 3 displays the coverage and frequency ratios for SPS regulations and TBT regulations separately. SPS regulations affect between 13.6% and 17.4% of products and cover not more than 22% of import value in the region. There is wider variation in the use of TBT, with only 5% of product lines imported to Honduras covered by a TBT regulation compared to 28.2% of goods imported to El Salvador. For each of the countries, the coverage ratio for TBT regulations is significantly larger than the frequency ratio (2.9 times bigger in the case of Nicaragua). This suggests that these countries import large volumes of products from sectors that use TBTs more extensively.

Table 3. Frequency and Coverage Ratios by Type of NTM

NTM Chapter	Costa Rica		El Salvador		Guatemala		Honduras		Nicaragua	
	FR	CR	FR	CR	FR	CR	FR	CR	FR	CR
A. Sanitary and Phytosanitary Measures (SPS)	17.4	16.2	15.7	21.6	16.2	19.4	14.5	16.1	13.6	16.6
B. Technical Barriers to Trade (TBT)	14.4	25.9	28.2	42.3	21.0	40.4	5.0	7.9	8.7	25.0

Note: This table shows the frequency and coverage ratios by type of NTM in each country in the Central American region. These indicators are computed for all active product lines (6-digit HS codes).
Source: Authors' computation

Analyzing in more detail the type of NTMs in effect in each country provides more information about the nature of trade legislation in the Central American region. Table 4 reports coverage ratios for SPS and TBT measures across economic sectors in each of the five countries under analysis. Each cell represents the import value affected by at least one type of NTM as a share of total sectoral import value. This analysis reveals that SPS measures are primarily concentrated in animal, vegetable, and foodstuff sectors, while TBTs are especially prevalent in trade in animals and chemical goods, but are also used intensively in the vegetable and foodstuffs sectors. These two results are comparable with international practices.

Table 4. Pervasiveness of NTMs within Economic Sectors.
(Coverage Ratios, Percentages)

Sector \ Type		A: SPS					B: TBT				
		CRI	SLV	GTM	HND	NIC	CRI	SLV	GTM	HND	NIC
01-05	Animal	78.8	100.0	100.0	100.0	90.5	58.8	97.5	95.4	57.5	46.8
06-15	Vegetable	68.8	98.4	99.8	85.9	99.8	45.0	32.1	78.8	24.2	91.1
16-24	Foodstuffs	83.3	87.5	98.7	78.5	77.7	35.5	85.9	81.8	21.5	34.6
25-26	Minerals	93.3	11.8	9.1	2.9	2.8	51.1	52.7	12.5	--	82.2
27	Oil Minerals	44.3	16.8	--	2.9	0.0	44.3	97.7	95.2	--	4.6
28-38	Chemicals	36.4	9.0	40.8	19.5	13.8	81.4	98.5	74.0	4.5	63.7
39-40	Plastic / Rubber	0.2	0.8	--	--	--	1.6	44.1	1.4	--	--
41-43	Hides, Skins	44.1	42.1	41.2	--	--	--	28.5	--	--	--
44-49	Wood	--	3.8	1.6	--	--	3.8	0.0	--	--	--
50-63	Textiles, Clothing	0.3	5.1	4.0	--	--	0.1	--	--	--	--
64-67	Footwear	--	0.5	0.0	--	--	--	2.4	--	--	--
68-71	Stone / Glass	--	--	--	4.0	2.1	0.3	--	--	--	2.1
72-83	Metals	--	--	--	0.0	0.0	0.0	0.3	0.3	--	0.0
84-85	Mach/Elec	1.0	--	--	--	--	9.2	0.0	2.9	--	--

Note: This table reports coverage ratios for SPS and TBT measures across economic sectors in each country in the region. Each cell represents the import value affected by at least one NTM as a share of total sectoral import value. Each country is labeled by its 3-digit ISO code.
Source: Authors' computation

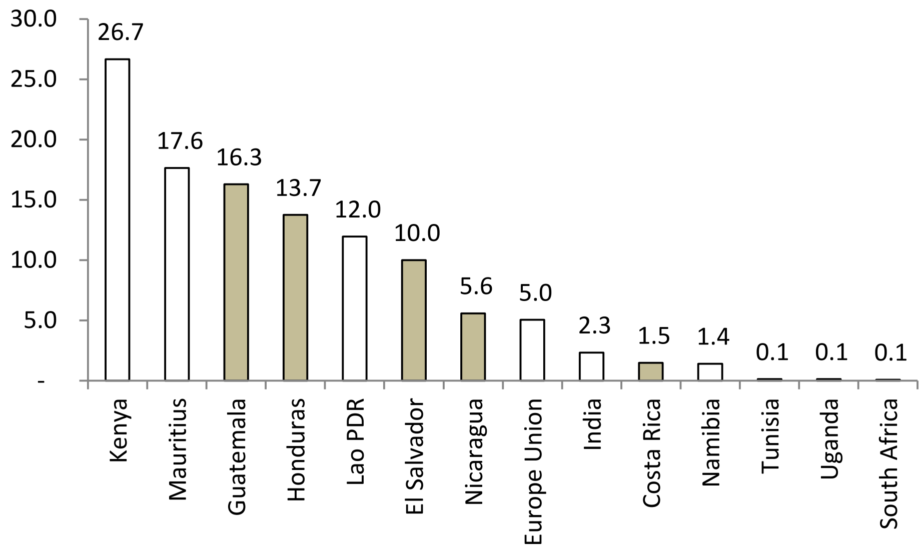
Table 5 shows the most important NTMs by their coverage ratio in each country, and shows that registration requirements are particularly common NTMs in Central America – these are highlighted in grey. These requirements are applied not only on importer firms (codes B150 and A150) but also on selected imported products (codes B810 and A810). As agricultural products are important for regional trade, we compare the use of registration requirements for SPS reasons (code A150) – the so called sanitary registries – in Central America to other countries for which data are available (Figure 3). It appears that each of the Central American countries, with the exception of Costa Rica, is a frequent user of this type of regulation.

Table 5. Most Prevalent NTMs in Central America
(Coverage Ratios)

Rank	Costa Rica NTM	CR	El Salvador NTM	CR	Guatemala NTM	CR	Honduras NTM	CR	Nicaragua NTM	CR
1	B150 Registration requirement for importers for TBT reasons	21.5	B310 Labelling requirements	39.5	B140 Authorization requirement for TBT reasons	32.1	A150 Registration requirements for importers	13.7	A640 Storage and transport conditions	14.3
2	B140 Authorization requirement for TBT reasons	14.4	B810 Product registration requirement	33.0	B150 Registration requirement for importers for TBT reasons	27.3	A140 Special Authorization requirement for SPS reasons	8.7	B310 Labelling requirements	12.5
3	B110 Prohibition for TBT reasons	12.7	B830 Certification requirement	31.0	B420 TBT regulations on transport and storage	25.7	B310 Labelling requirements	6.8	B330 Packaging requirements	11.3
4	A140 Special Authorization requirement for SPS reasons	11.8	A640 Storage and transport conditions	21.5	B310 Labelling requirements	17.3	A820 Testing requirement	6.7	B100 Prohibitions/restrictions of imports for objectives …	10.1
5	B810 Product registration requirement	9.5	A820 Testing requirement	21.3	A150 Registration requirements for importers	16.3	A830 Certification requirement	6.4	A140 Special Authorization requirement for SPS reasons	6.4
6	B190 Prohibitions/restrictions of imports	9.3	A810 Product registration requirement	21.3	A810 Product registration requirement	16.3	B200 Tolerance limits for residues and restricted use of substances	4.5	B700 Product quality or performance requirement	5.7
7	A840 Inspection requirement	8.9	A310 Labelling requirements	15.6	A140 Special Authorization requirement for SPS reasons	14.1	B320 Marking requirements	4.5	A310 Labelling requirements	5.7
8	B840 Inspection requirement	8.9	A830 Certification requirement	15.6	A830 Certification requirement	13.9	B330 Packaging requirements	4.5	A150 Registration requirements for importers	5.6
9	B310 Labelling requirements	7.9	A140 Special Authorization requirement for SPS reasons	15.3	B700 Product quality or performance requirement	11.2	B490 Production or Post-Production requirements n.e.s.	4.5	A190 Prohibitions/restrictions of importsfor SPS reasons n.e.s.	4.3
10	A810 Product registration requirement	5.0	A410 Microbiological criteria of the final product	13.3	A310 Labelling requirements	9.5	B600 Product identity requirement	4.5	A850 Traceability requirements	4.2

Note: This table shows coverage ratios for the most important NTMs in each country in the region. Registration requirements for both SPS and TBT reasons are highlighted in grey.
Source: Authors' computation

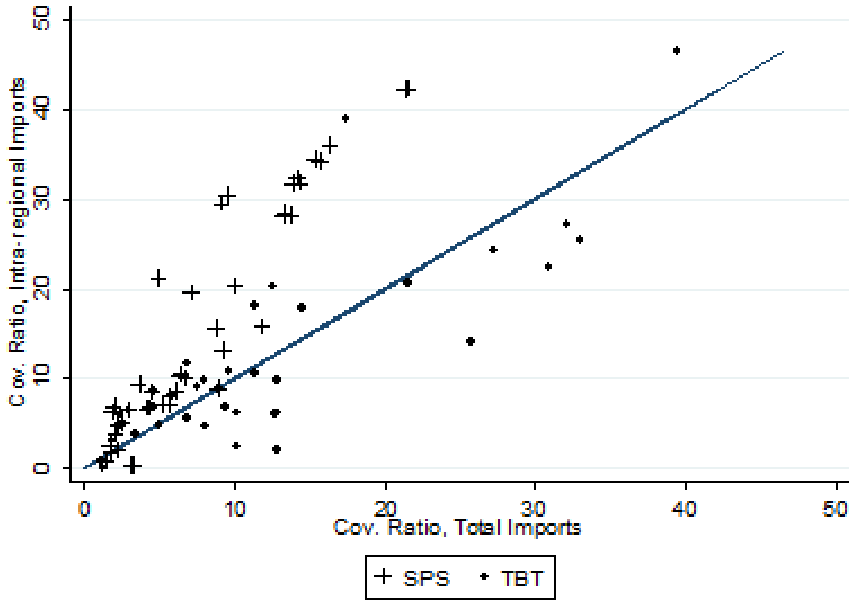
Figure 3: Registration Requirements for Importers due to SPS Reasons (A150) (Coverage Ratios, Percentages)



Note: This figure shows the coverage ratio of registration requirements of importers due to SPS reasons across all countries for which data are available.
Source: Authors' computation

SPS measures disproportionally affect intra-regional trade in Central America. Figure 4 compares total coverage ratios in the region, computed using total imports (X-axis), versus regional coverage ratios, computed using regional imports (Y-axis), for SPS and TBT measures. Each dot represents a NTM code, at the highest level of disaggregation. An NTM located above the 45 degree line indicates that it affects more imports from regional trading partners than imports from all countries in the world. This analysis shows that while TBT measures are relatively balanced across trading partners, SPS measures have a profound impact on intra-regional trade.

Figure 4: Incidence of NTMs in Intra-regional Trade (Coverage Ratios)



Note: This scatter plot compares total coverage ratios, computed using total imports (X-axis), versus regional coverage ratios, computed using regional imports (Y-axis), for SPS and TBT measures. Each dot represents a NTM code, at the highest level of disaggregation. Data are plotted for Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.
Source: Authors' computation

3. Price Rising Effects

a. Price Data: The Trade Unit Value Database

Trade unit values from the French Research Center in International Economics (CEPII) are used to approximate trade prices.[3] These data provide reliable and comparable unit values across countries. Following Cadot and Gourdon (2012), we use Cost of Insurance and Freight (CIF) trade unit values (reported by the importer country) to estimate any potential price-raising effects of NTMs. The CIF price was deemed most appropriate for the analysis as it includes the Freight on Board (FOB) price of the product along with the cost of compliance with SPS and TBT regulations, and any other expenses from pre-shipment inspection, licensing, or any other sort of NTMs.

b. Methodology

The estimation below can be thought of as a simple treatment-effect approach where prices are "treated" by NTMs. We assume that prices are determined by Equation 3. Here, i indexes countries, k indexes products, p_k^* is the world price of product k, p_{ik} is its price in country i, t_{ik} the tariff imposed by country i on product k, and λ_i a cost-of-living adjustment factor for country i depending on its level of income and a number of other characteristics such as landlocked status, remoteness, the quality of the infrastructure, and the regulatory environment. δ_{ijk} is a dummy variable that equals one if country i imposes an NTM of type j on product k, and zero otherwise. Let a_j be the cost of complying with NTM of type j. We assume that this cost is the same across countries and products. Assuming that tariffs and NTM compliance costs are fully passed through to domestic prices, the basic price determination equation is:

$$\boldsymbol{p_{ik} = p_k^*(1+\lambda_i)(1+t_{ik})\prod_j\left(1+a_j\delta_{ijk}\right)} \qquad [3]$$

Logging Equation 3 yields:

$$lnp_{ik} = lnp_k^* + ln(1+\lambda_i) + ln(1+t_{ik}) + \sum_j ln\left(1+a_j\delta_{ijk}\right) \qquad \textbf{[4]}$$

Due to our assumption of perfect tariff pass-through, we can redefine our dependent variable as:

$$ln\tilde{p}_{ik} = lnp_{ik} - ln(1+t_{ik}) \qquad \textbf{[5]}$$

Also note that:

$$\ln\left(1+a_j\delta_{ijk}\right) = \begin{cases} \ln\left(1+a_j\right) & if\ \delta_{ijk}=1 \\ 0 & if\delta_{ijk}=0 \end{cases} \qquad \textbf{[6]}$$

so $\ln\left(1+a_j\delta_{ijk}\right) = \delta_{ijk}\ln\left(1+a_j\right)$.

[3] This database provides a world-level dataset reporting reliable unit values at a high level of disaggregation. One shortcoming is important to note: despite the treatment of missing unit values in the database, there is still a relatively large share of missing data. Berthou and Emlinger (2011) estimate that the database covered around 80% of world total trade values in 2008.

Let $\gamma_k = \ln p_k^*$ and $\gamma_i = \ln(1 + \lambda_i)$. Using this result, and letting u_{ik} be the error term, the basic estimation equation is:

$$ln\tilde{p}_{ik} = \gamma_k + \gamma_i + \sum_j \beta_j \delta_{ijk} + u_{ik} \quad \textbf{[7]}$$

where γ_k and γ_i are product and country fixed effects, respectively. Note that the algebraic interpretation of the estimated coefficient $\widehat{\beta_j}$ is:

$$\widehat{\beta_j} = \ln(1 + \widehat{a_j})$$

or

$$\widehat{a_j} = e^{\widehat{\beta_j}} - 1 \quad \textbf{[8]}$$

where $\widehat{a_j}$ is the estimated ad-valorem equivalent (AVE) of NTM type j.

Note that since we do not observe the compliance costs of NTMs (we only know if an NTM exists and the number of such measures), the pass-through parameter for NTMs cannot be identified. Thus, the estimated AVE for NTMs, $\widehat{a_j}$, is the fraction of the compliance cost that is 'passed through', e.g. if $\widehat{a_j} = 0.2$, an NTM imposed on product k translates, on average, into a 20% rise in its domestic price across products and countries in the sample.

A second series of regressions are also run, using counts rather than dummy variables to capture the presence of NTMs.

c. Results

NTMs are positively and significantly related to domestic prices across our sample of countries. Table 6 shows the baseline regressions results. The first and third specifications use a dummy variable to indicate the presence of an NTM, while the second and fourth specifications use the count of NTMs applied at the product level. Standard gravity type controls are used. Bilateral data on distance between two countries, common language, contiguity and common colonizer since 1945 are sourced from CEPII, and GDP figures come from the World Bank's World Development Indicators database. Three variables on endowments are used, physical capital stock per worker, arable land per worker and education per worker. These figures are sourced from Shirotori et al (2010). After controlling for systematic cross-country cost-of-living differences, and partner and product specific unobservables, we find that the presence of at least one NTM increases domestic prices by 10.6% (exp(0.101)-1) on average across all 33 countries for which data are available. If we interpret the coefficient with the number of NTMs as the increase in domestic prices of adding one additional NTM (regardless of type), then an additional NTM increases domestic prices by an average of 2.2% (exp(0.022)-1).

Table 6. Price Rising Effect of NTMs Across all Countries
(CIF Unit Values)

Specification Variables	NTM dummy [1]	Log Number of NTMs [2]	NTM dummy [3]	Log Number of NTMs [4]
NTM	**0.101***** **(0.008)**	**0.022***** **(0.001)**		
SPS			**0.194***** **(0.011)**	**0.023***** **(0.002)**
TBT			**-0.015*** **(0.009)**	**0.019***** **(0.003)**
Log (GDP)	-0.082*** (0.003)	-0.087*** (0.003)	-0.083*** (0.003)	-0.087*** (0.003)
Log (Distance)	0.155*** (0.004)	0.161*** (0.004)	0.158*** (0.004)	0.161*** (0.004)
Log (H/L)	0.713*** (0.013)	0.704*** (0.013)	0.694*** (0.013)	0.705*** (0.013)
Log (T/L)	-0.160*** (0.004)	-0.151*** (0.004)	-0.156*** (0.004)	-0.151*** (0.004)
Log (K/L)	0.367*** (0.005)	0.375*** (0.005)	0.369*** (0.005)	0.375*** (0.005)
Contiguity	-0.071*** (0.007)	-0.065*** (0.007)	-0.068*** (0.007)	-0.065*** (0.007)
Common Official Language	0.120*** (0.008)	0.115*** (0.008)	0.119*** (0.008)	0.114*** (0.008)
Common Ethnical Language	-0.081*** (0.008)	-0.071*** (0.008)	-0.072*** (0.008)	-0.071*** (0.008)
Common Colonizer	0.007 (0.010)	0.006 (0.010)	0.006 (0.010)	0.007 (0.009)
Constant	3.088*** (0.099)	3.123*** (0.100)	3.104*** (0.100)	3.127*** (0.099)
Exporter FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
Observations	1,922,527	1,922,527	1,922,527	1,922,527
R-squared	0.587	0.588	0.589	0.589

Note: Robust standard errors adjusted for clustering at the product (6-digit HS codes) level are in parentheses. All regressions include exporter and product fixed effects. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.
Source: Authors' computation

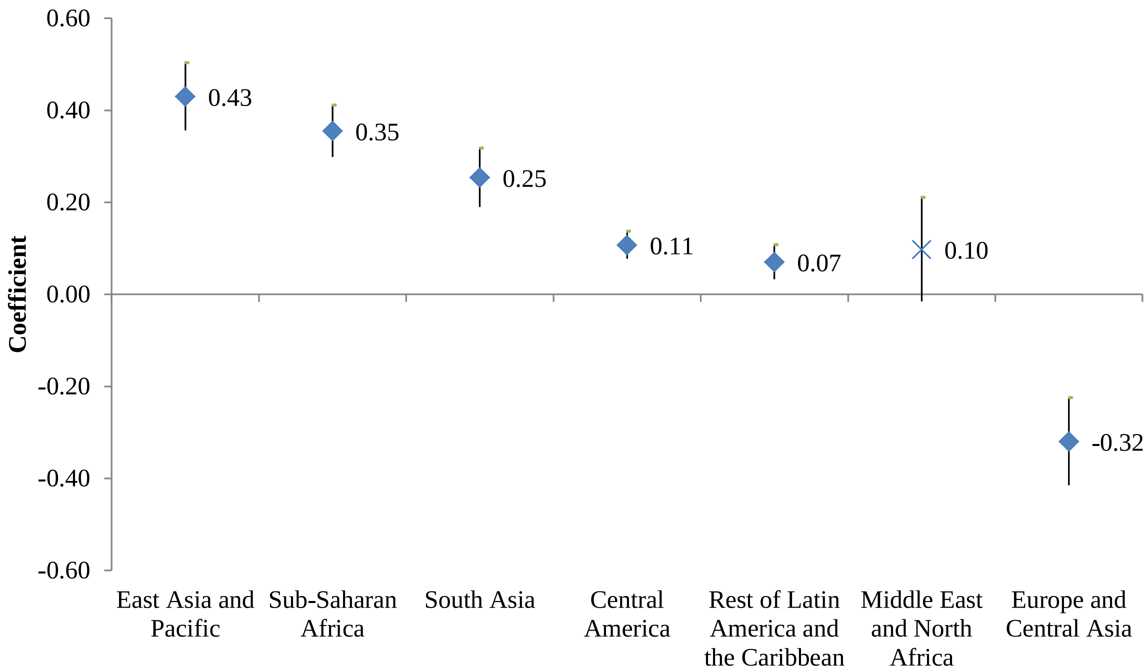
Our results also indicate that SPS measures are positively and significantly related to an increase in border prices. The price increase arising from SPS measures is equivalent to an ad-valorem tariff of 21.4% across all countries and products in the dataset (column 3). By contrast, TBT measures are negatively related to border price with an estimated AVE of -1.5%. The coefficient for TBT is significant only at the 10% level. A negative AVE indicates a net trade-facilitating effect, which may be the result of positive externalities arising from the TBT outweighing its compliance costs (see Beghin et al, 2013). The signs and significance of the control variables are generally as expected.

In order to explore the impact of SPS and TBT measures on border prices across geographic regions, we use specification 3 and interact the SPS and TBT dummies variables with a dummy for each world region.

Results are presented in Appendix A and graphically depicted in Figure 5 and Figure 6 for SPS and TBT measures respectively.

We find that SPS regulations in Central America are positively and significantly related to an increase in border prices, and have a price effect equivalent to a tariff of 12%. This AVE, however, is small compared to that experienced in the Asian and the Sub-Saharan African regions. Figure 5 also shows that the price increase experienced by the Central American countries is close to what is observed for the rest of the Latin America and the Caribbean region.

Figure 5: Price-Rising Effect of SPS Measures, by World Bank Region

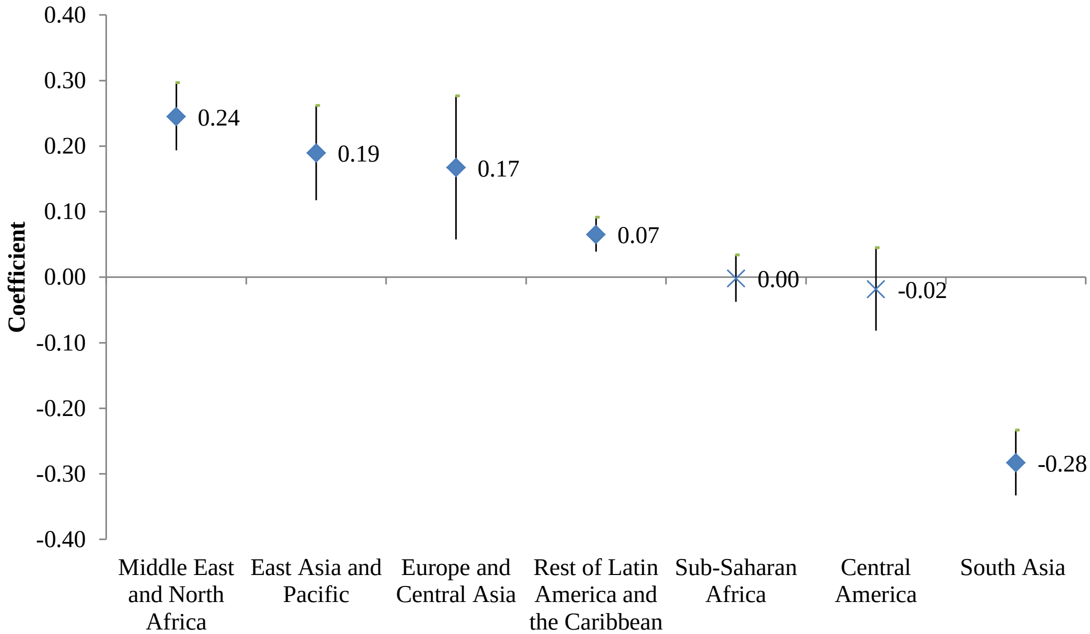


Note: This figure shows the 95% confidence intervals of the price raising impact of SPS regulations by region. The underlying coefficients are computed as the sum of the free-standing coefficient and the respective interaction term. The level of significance is computed by a Wald test applied to this computation. The point estimate is denoted by an X when the coefficient is not statistically different to zero.

Source: Authors' computation.

TBTs, on the other hand, do not have a significant effect on prices in the Central American region (see Figure 6). This is in contrast to the positive estimated impact computed for the rest of the Latin America and Caribbean region. We also find that TBTs have no impact on border prices in Sub-Saharan Africa whereas the South Asian region experiences a negative price effect that is equivalent to a subsidy of 32%.

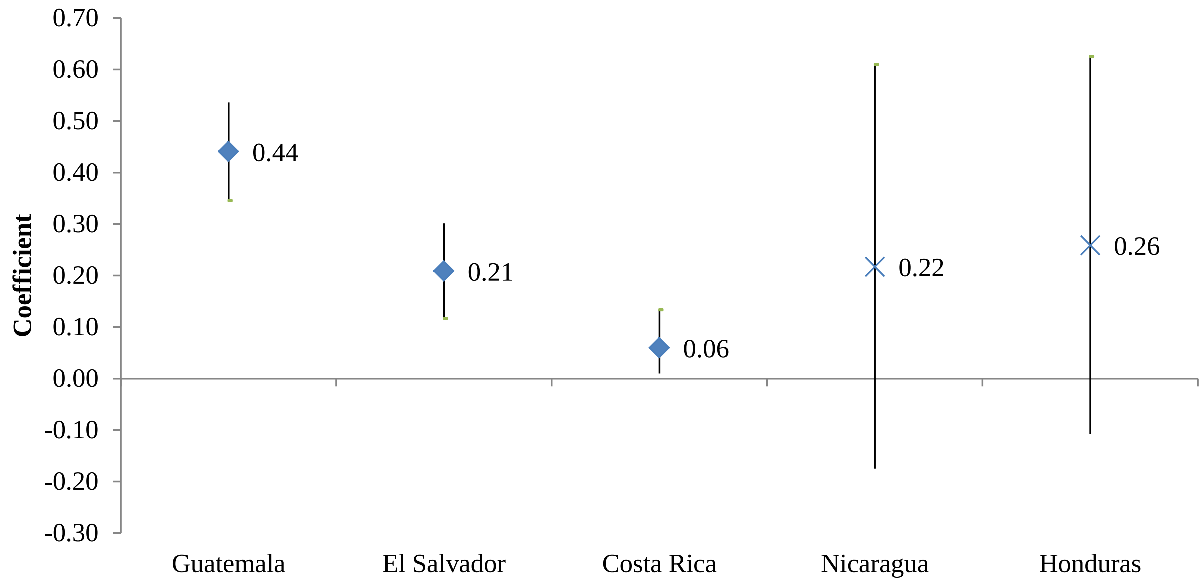
Figure 6: Price-Rising Effect of TBTs, by World Bank Regions



Note: This figure shows the 95% confidence intervals of the price raising impact of TBT regulations by regions. The underlying coefficients are computed as the sum of the free-standing coefficient and the respective interaction term. The level of significance is computed by a Wald test applied to this computation. The point estimate is denoted by an X when the coefficient is not statistically different to zero.
Source: Authors' calculations

In order to decompose the impact of SPS measures on each country in the Central American region, we interact country specific dummies with SPS dummies in specification 3. Results are presented in Appendix B and graphically depicted in Figure 7. The impact of SPS measures on prices varies widely between the five countries in Central America. SPS measures are found to have no impact on prices in Honduras and Nicaragua and have the largest price effect in Guatemala with an AVE of 55%. The AVEs in El Salvador and Costa Rica are 23% and 6% respectively.

Figure 7: Central America: Price-Rising Effect of SPS Measures, by Country



Note: This figure shows the 95% confidence intervals of the price raising impact of SPS regulations by Central American country. The underlying coefficients are computed as the sum of the free-standing coefficient and the respective interaction term. The level of significance is computed by a Wald test applied to this computation. The point estimate is denoted by an X when the coefficient is not statistically different to zero.
Source: Authors' calculations

4. SPS Measures, Household Expenditure, and Consumer Welfare in Guatemala

This section concentrates on the impact of SPS measures on domestic prices and, ultimately, on urban poverty in Guatemala. We focus our analysis on those products for which SPS measures in general, and registration requirements in particular, are especially challenging for traders in the region. These products are bread and pastries, beef, chicken meat, and dairy products.[4] Using the empirical framework developed above, this section estimates the price-raising effects of SPS measures for these products and then presents scenarios of their partial and total removal. Specifically, we offer a preliminary analysis of the direct impact of a reduction in domestic prices due to the streamlining of SPS measures on urban poverty levels.

The principle behind our calculation of changes in poverty due to a reduction or elimination of NTMs is as follows. For urban households, price-raising NTMs increase the cost of goods purchased, thereby acting as a tax, which should be balanced by the reduction of some externality. Without experimental evidence on the willingness to pay for the reduction of this negative externality, we can only estimate the tax side (the cost, but not the benefit). This value constitutes a lower bound on the social benefit (for example a reduction in mortality or disease risks brought about by the measure) which would be required to justify the presence of the NTM.

[4] Consultation with the private sector in the region was undertaken in 2012. The cost of complying with SPS regulations for these four products was identified as one of the main barriers to regional integration.

a. Price-Raising Effect of SPS Measures on Selected Products

We estimate the price-raising effect of SPS measures by employing the empirical framework explained in Section 3. Specifically, we use interaction terms in our cross-country regression to estimate how different the effects of Guatemalan SPS measures, applied to our selected set of products, are from the average effect across countries and products. We then use Equation 8 to compute ad-valorem equivalents. Table 7 shows the results along with the list of the different NTMs (at the highest level of disaggregation) that importers need to comply with in order to import these products into the Guatemalan market.

Table 7. SPS Measures Influencing Trade in Selected Products in Guatemala

	Beef	Bread and Pastry
	Sanitary and Phytosanitary Measures	**Sanitary and Phytosanitary Measures**
	A140 Special Authorization requirement for SPS reasons	A140 Special Authorization requirement for SPS reasons
	A150 Registration requirements for importers	A150 Registration requirements for importers
	A310 Labelling requirements	A310 Labelling requirements
	A330 Packaging requirements	A330 Packaging requirements
	A420 Hygienic practices during production	A810 Product registration requirements
	A640 Storage and transport conditions	A830 Certification requirement
	A810 Product registration requirements	
	A820 Testing requirement	
	A830 Certification requirement	
	A840 Inspection requirement	
AVE	**68.4%**	**51.4%**

	Chicken Meat	Dairy Products
	Sanitary and Phytosanitary Measures	**Sanitary and Phytosanitary Measures**
	A140 Special Authorization requirement for SPS reasons	A140 Special Authorization requirement for SPS reasons
	A150 Registration requirements for importers	A150 Registration requirements for importers
	A310 Labelling requirements	A310 Labelling requirements
	A330 Packaging requirements	A330 Packaging requirements
	A420 Hygienic practices during production	A420 Hygienic practices during production
	A640 Storage and transport conditions	A640 Storage and transport conditions
	A810 Product registration requirements	A810 Product registration requirements
	A820 Testing requirement	A820 Testing requirement
	A830 Certification requirement	A830 Certification requirement
	A840 Inspection requirement	A840 Inspection requirement
AVE	**22.0%**	**5.0%**

Note: This table lists the SPS measures which apply to the selected products. SPS ad-valorem equivalents are statistically significant at least at the 10% level. The HS codes associated with each product are as follows. Beef: 0201, 0202, 0206, 1502. Bread and Pastry: 1905. Chicken meat: 0207. Dairy products: 0401, 0402, 0403, 0404, 0405.

Source: Authors' computation

The results confirm that registration requirements for SPS reasons (the so-called sanitary registries) are a measure affecting trade in Guatemala. As shown in Figure 3, there are only a few other countries that apply these types of measures as broadly as Guatemala. Other regulations, such as labeling and packaging requirements are also imposed on these goods. The impact of SPS measures varies greatly across these four products. According to our estimation, the average increase in the Guatemalan domestic price of beef due to SPS measures is equivalent to an ad-valorem tariff of 68.4%. This seems consistent with the perception of the Guatemalan beef market as quite closed to regional exporters, especially trade from Nicaragua. The AVE equivalents for the SPS measures facing bread and pastry, chicken meat and dairy products are 51.4%, 22.0% and 5.0% respectively.

b. Household Expenditure on Selected Products

We now explore the implications of our results for the cost of living across the income distribution in Guatemala. To do this, we combine our estimated AVEs with household expenditure data from the 2011 Guatemalan Household Survey (HHS) and calculate the budget share of these products by quintiles of the income distribution. Results are presented in Table 8. As expected, given the essential nature of these items, the percentage of total income spent on them decreases with household income. Therefore, any policy aimed at streamlining NTMs would mainly benefit the poorest sector of the population in Guatemala.

Table 8. Guatemala: Households' Budget Shares of Selected Products (%) (By Income Quintiles).

Products	Q1	Q2	Q3	Q4	Q5
Beef	1.18	0.90	0.71	0.57	0.35
Bread and Pastries	1.04	0.96	0.85	0.69	0.38
Chicken Meat	1.30	1.03	0.83	0.70	0.46
Dairy Products	0.59	0.50	0.41	0.36	0.24
Total	4.11	3.39	2.80	2.31	1.43

Note: This table shows households' budget shares of the selected products across the quintiles of income distribution. Budget shares are the percentage of total annual income by household spent on the consumption of each good. Each type of product is mapped to a group of goods in the HHS as follows: Beef (*carne de cerdo con y sin hueso and carne de res sin y con hueso*), bread and pastries (*pan de rodaja, pan dulce, pan frances*), chicken meat (*carne de pollo o gallina, viceras de pollo o gallina*), and dairy products (*leche liquida, queso fresco o duro*).
Source: Authors' computation using the Guatemala 2011 HHS.

c. Measuring the Impact of Streamlining SPS Measures on Poverty

We now look at the hypothetical cases of the total and partial removal of SPS measures on our set of selected products and analyze the impact of these changes on poverty rates in Guatemala. We follow Porto (2010) in this analysis. Using the 2011 Guatemalan Household Survey, we calculate the head count ratio (HC), defined as the fraction of the population with an income below the poverty line z. That is,

$$HC = \frac{1}{N}\sum_{i} 1\{y^i < z\} \qquad [9]$$

where N is total population, y^i is income, and 1{ } is an indicator function that takes value 1 if the $y^i < z$ within brackets is true. Guatemala uses two poverty lines. The extreme poverty line is the cost of purchasing the poverty consumption basket, which includes food items that satisfy a minimum caloric and energetic intake.[5] This value corresponds to 4,380 *quetzales* per person, per year (around 560 US dollars). The general poverty line includes some expenditure for non-food items and is set to 9,030.93 *quetzales* per person, per year (around 1,150 US dollars).[6]

The poverty analysis requires a comparison of the proportion of individuals in poverty before and after the policy scenarios. Given a poverty line *z,* the head count is given by *F(z),* where *F(z)* is the observed cumulative distribution function of income before the shock. The head count is defined as

$$HC = \int_0^z f(y)dy \qquad [10]$$

where f(.) is the density of per equivalent adult income associated to F(.). Let t* be the policy parameter (partial or total removal of NTMs) that represents the level of protection. Differentiating with respect to t*, we get:

$$\frac{\partial}{\partial t*}HC = f(z)\frac{\partial z}{\partial t*} + \int_0^z \frac{\partial}{\partial t*}f(y)dy \qquad [11]$$

A policy shock that changes the ad-valorem equivalent (t*) has two effects on poverty: a change in the poverty line, as a variation in t* affects consumer prices and, therefore, the cost of purchasing the poverty bundle, and a change in the distribution of income. For the sake of simplicity, this study focuses on the first effect (the direct effect on the poverty line).

The poverty line can also be defined as $z = \sum_g p_g q_g$, where p_g is the price of good g, and q_g is the quantity determined in the construction of the poverty line. Holding quantities constant, the change in the (log) poverty line caused by a change in price of good g is given by:

$$\Delta \ln z = \alpha_g \Delta \ln p_g(\text{t*}) \qquad [12]$$

where α_g is the weight attached to good g and $\Delta \ln p_g$(t*) is the price-raising effect of NTMs. We update the poverty line by summing equation [12] across all products affected by the policy shock.

$$\hat{\Delta} \ln z = \sum_{g \in a} \widehat{\alpha_g} \Delta \ln p_g(t^*) \qquad [13]$$

We estimate the weights, $\widehat{\alpha_g}$, using the average budget share spent on food products by households in the second quintile of the distribution.

[5] These values correspond to 2,246 calories in urban areas and 2,362 in rural areas.
[6] Guatemala does not compute different poverty lines for rural and urban households.

We explore two policy shocks associated with an attempt to streamline SPS measures in Guatemala. The first is the unrealistic case of a total elimination of the costs of complying with SPS measures for the selected products (i.e. AVE=0). The second is the case where efforts to streamline SPS measures reduce the AVE by half. Given that we abstract from the impact on production (the change in income distribution), we only consider the impact on poverty for urban households. The underlying assumption is that the price change brought about by the NTM reduction decreases prices but leaves income distribution unchanged because urban households are employed in economic activities outside the agricultural sector. Finally, since we are not allowing the non-tradable prices to adjust, we center the discussion on the impact of our policy scenarios on extreme poverty rates, although we also report the results for general poverty rates. Table 9 compares the proportion of the population living in poverty now (2011) and after streamlining SPS measures.

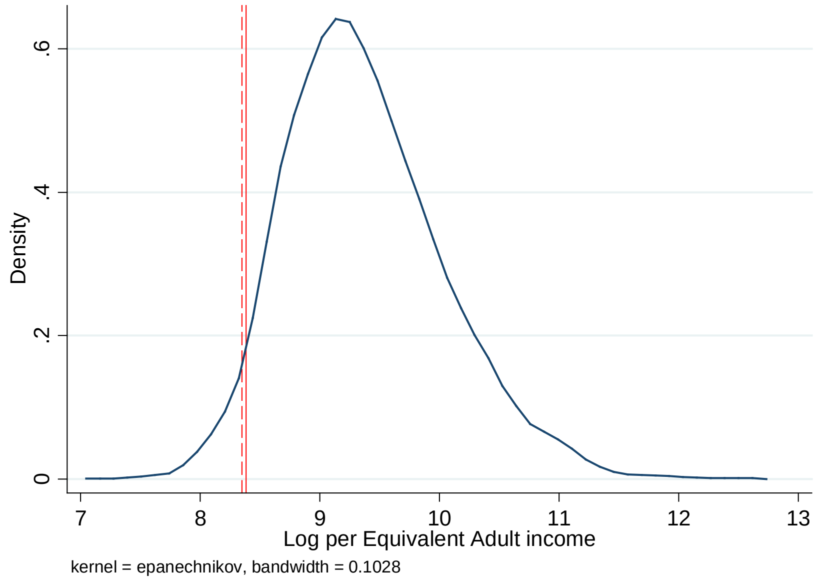
Table 9. Poverty Impact of Streamlining SPS Measures in Guatemala (Urban Poverty Rates).

Poverty Line	Initial Poverty Rate	Ex-Post Poverty Rates	
		Total	Partial
Extreme	5.07	4.59	4.91
Total	34.97	32.66	33.98

Note: This table shows the poverty impact of total and partial elimination of SPS measures applied to beef, bread and pastries, chicken meat, and dairy products in Guatemala.
Source: Authors' computation using the 2011 Guatemalan HHS.

The main finding is that an effort to streamline NTMs in Guatemala would likely reduce poverty. Specifically, working towards rationalizing the processes related to SPS measures affecting beef, bread and pastries, chicken meat, and dairy products would reduce domestic prices and, thus, make the basic consumption basket more affordable. Our computations suggest that streamlining the key SPS measures affecting these products by, for example, reducing the cost and time required to obtain sanitary registries, could reduce the urban poverty rate from 5.07% to 4.91%. This would mean lifting approximately 20 thousand people out of extreme poverty in urban areas in Guatemala. Figure 8 depicts the left shift in the poverty line due to a scenario of total elimination of the cost of complying with SPS measures in our products. The dotted line is the new extreme poverty line under total reduction of price-controls in Guatemala.

Figure 8: Poverty Effect of Streamlining SPS Measures in Guatemala Shift in Urban Poverty Lines



Note: This figure shows the density function of per equivalent adult income and two poverty lines (the vertical lines). The dashed poverty line corresponds to the situation after the hypothetical elimination of SPS measures in Guatemala.
Source: Authors' computation using the 2011 Guatemalan HHS.

5. Suggested Topics for Policy Dialogue

Central America should view the NTM agenda as a crucial issue in enhancing regional integration, increasing private sector competitiveness, and reducing poverty. Sanitary registrations for processed food and beverages are a hindrance to deeper regional integration. To enable goods to enter the market, companies need to obtain a sanitary registry. On average, it takes 70 days to obtain this document (INCAE 2012), and costs an average of US$400 the first time a product enters the market. Even though countries have already approved a regulation for mutual recognition of sanitary registries for food and beverages, the implementation process is stymied by regulatory and technical constraints. The first registry is done in the producer's country, but the company needs to manually re-register the product in the other Central American countries and provide physical documentation. This process is costly, unharmonized, and bureaucratic. It takes 3-8 days to reregister a product by mutual recognition and costs an average of US$250 in each of the remaining countries. These lengthy and costly procedures, as well as the lack of a centralized system for mutual recognition of sanitary registries, increase the cost of doing business in the region. A solution that could make great strides in this arena is the formation of a regional, electronic database that centralizes documentation about the credentials that each firm submits to meet the sanitary registration requirements. This would lessen the time and cost burden on exporters, who currently have to gather all the documentation each time they apply for a sanitary registry.

Other potential problems could be identified through a well-organized consultation process with the private sector. Technical solutions should be sought through careful analysis and public-private dialogue with the aim of reducing the burden of the regulatory environment on the economy. The underlying philosophy of streamlining NTMs is similar to what is known as "regulatory improvement" or "Regulatory Impact Assessment" (RIA).[7] However, whereas RIA is for ex-ante analysis of measures, a competitiveness agenda should include a review of existing measures in response to specific demands from countries struggling with legacies of complicated and penalizing regulations. Dealing with existing measures has the advantage of responding to an immediate need and focusing on measures whose effects are known. It can be thought of as the first stage of a process of regulatory improvement covering not just the stock of existing measures, but also the process of creating new ones.

Central America can address the NTM agenda by setting up a regional secretariat to improve national and regional competitiveness and by convening a forum to consider setting up a public-private steering committee. This should include the main agencies that regulate trade as well as representatives from the business chambers and other key stakeholders such as consumer protection organizations from all member countries. Efforts to anchor NTM reforms in regional integration have led to various forms and levels of implementation of regional secretariats across the world, which mostly depend on the political economy, capacity of national and regional institutions, and the approach adopted.

Despite these challenges, some regions have been more successful than others in effectively addressing and streamlining NTMs. The Association of Southeast Asian Nations (ASEAN) has adopted the most ambitious NTM agenda amongst developing countries. Low-income economies in Southern Africa, also determined to address NTMs regionally, have achieved effective results in terms of transparency. Finally, the EU offers the most comprehensive example of economic integration in NTMs.

[7] See Cadot and Malouche (2012) for a complete overview of these processes.

Another important issue in the region is the need to disseminate information on the current laws and regulations on import and export procedures to the wider public, particularly the business community. In this regard, grouping and regularly updating information in a regional portal would alleviate informational asymmetries that increase the cost of doing business.

6. Concluding Remarks

With the decline in traditional trade barriers initiated by the DR-CAFTA, Non-Tariff Measures (NTMs) are increasingly viewed as a key trade policy issue in Central America. Yet, despite anecdotal evidence that borders remain thick, there is little quantitative understanding of the incidence of NTMs in the region. This paper provides, to the best of our knowledge, the first attempt to look at incidence of technical NTMs (SPS and TBT regulations) and to estimate their impact on border prices in Central America. It also assesses the impact of SPS measures on the border prices of important consumption products in Guatemala and estimates the poverty impact of streamlining key SPS measures affecting them.

We use data collected by the World Bank in Central America in 2012 and carry out three distinct analyses. Firstly, we provide a descriptive analysis of the incidence of technical NTMs in the Central American region. Our results indicate that, of the seven geographic regions of the World Bank, Central America has the lowest prevalence of these regulations, with 33.3% of imports covered by at least one technical NTM. By contrast, over half of all goods imported to Sub-Saharan Africa, Europe and Central Asia and the Middle East and North Africa are governed by at least one technical NTM. However, there is significant variation in the use of NTMs within the Central American region with El Salvador using them most intensively (coverage ratio of 48.2%), but Honduras availing of them quite sparingly (coverage ratio of 16.2%).

We then use econometric techniques to estimate the impact of NTMs on domestic price and find that SPS measures increase prices by an average of 11.6% across the Central American region. However, the ad-valorem equivalent varies widely across the individual countries, ranging from 6% in Costa Rica to 55% in Guatemala, with NTMs having no significant price impact in either Nicaragua or Honduras. Private sector consultation undertaken in 2012 identified four products that are important for regional trade and for which SPS measures in general, and registration requirements in particular, are especially challenging: beef, bread and pastry, chicken meat, and dairy products. Using our empirical framework, we find that the ad-valorem equivalents of SPS measures for these products are 68.4%, 51.4%, 22.0%, and 5.0%, respectively.

Finally, we explore the poverty impact of streamlining NTMs measures in Guatemala by merging the NTM data with Guatemalan household survey data. The main finding is that rationalizing the use and processes related to compliance with SPS measures would reduce domestic prices. This would make the basic consumption basket more affordable benefitting the poorest sector of the population. Our computations suggest that streamlining the main SPS measures affecting these products by, for example, enforcing harmonization and mutual recognition of sanitary registries, could reduce the urban poverty rate from 5.07% to 4.91%.

We suggest three issues for policy dialogue at the regional level aimed at streamlining trade regulation and improving national and regional competitiveness. Our first suggestion is to better disseminate information on the current laws and regulations about import and export procedures to the wider public, particularly the business community. In this regard, grouping and regularly updating information in a regional portal would alleviate informational asymmetries that increase the cost of doing business in Central America. The second suggestion is considering setting up a regional secretariat by assembling a public-private steering committee that oversees and discusses the regional regulatory framework affecting trade. A comprehensive regulatory impact assessment for existing and proposed NTMs may be initiated from this committee. The third suggestion is the establishment of a regional, electronic database that centralizes documentation about the credentials that each firm submits to meet the sanitary registration requirements in each country in the region.

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Appendix A:

Region / Variables	Central America	Rest of Latin America and the Caribbean	Sub-Saharan Africa	East Asia and Pacific	Europe and Central Asia	Middle East and North Africa	South Asia
SPS	0.093***	0.123***	0.258***	0.142***	0.222***	0.181***	0.203***
	(0.013)	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)	(0.012)
X Region Dummy	0.014	-0.053**	0.096***	0.287***	-0.542***	-0.083	0.051
	(0.020)	(0.021)	(0.029)	(0.039)	(0.049)	(0.059)	(0.035)
TBT	0.007	-0.032***	-0.065***	-0.050***	-0.022**	-0.038***	0.029***
	(0.009)	(0.011)	(0.010)	(0.009)	(0.009)	(0.009)	(0.010)
X Region Dummy	-0.026	0.097***	0.064***	0.239***	0.189***	0.283***	-0.312***
	(0.034)	(0.017)	(0.020)	(0.038)	(0.056)	(0.028)	(0.027)
Region Dummy	0.544***	-0.675***	0.754***	-0.385***	0.818***	-0.324***	-0.087***
	(0.020)	(0.011)	(0.015)	(0.016)	(0.031)	(0.013)	(0.014)
Log (GDP)	-0.036***	-0.079***	-0.055***	-0.090***	-0.086***	-0.088***	-0.084***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Log (Distance)	0.144***	0.279***	0.097***	0.146***	0.186***	0.111***	0.154***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Log (H/L)	0.900***	0.958***	0.503***	0.785***	0.530***	0.603***	0.634***
	(0.014)	(0.014)	(0.013)	(0.014)	(0.013)	(0.013)	(0.014)
Log (T/L)	-0.135***	-0.097***	-0.172***	-0.165***	-0.214***	-0.150***	-0.173***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Log (K/L)	0.291***	0.391***	0.480***	0.345***	0.381***	0.389***	0.370***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Contiguity	-0.063***	0.147***	-0.051***	-0.089***	-0.046***	-0.138***	-0.060***
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)
Common Official Language	0.152***	0.028***	-0.038***	0.121***	0.144***	0.117***	0.103***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Common Ethnical Language	-0.099***	0.012	-0.073***	-0.069***	-0.070***	-0.086***	-0.085***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Common Colonizer	0.043***	-0.016*	-0.064***	-0.023**	-0.036***	-0.042***	0.056***
	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)
Constant	2.365***	1.301***	1.656***	3.479***	3.100***	3.679***	3.259***
	(0.096)	(0.095)	(0.098)	(0.102)	(0.101)	(0.100)	(0.099)
Exporter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,922,527	1,922,527	1,922,527	1,922,527	1,922,527	1,922,527	1,922,527
R-squared	0.591	0.600	0.598	0.589	0.590	0.589	0.589

Appendix B:

Variables \ Region	Costa Rica	El Salvador	Guatemala	Nicaragua	Honduras
SPS	0.183***	0.198***	0.183***	0.128***	0.176***
	(0.00978)	(0.00977)	(0.00962)	(0.0102)	(0.0101)
X Country Dummy	-0.124***	0.041***	0.257***	0.090	0.083
	(0.0382)	(0.0486)	(0.0491)	(0.200)	(0.187)
Country Dummy	-0.420***	0.456***	1.172***	0.507**	0.0608
	(0.0163)	(0.0161)	(0.0197)	(0.199)	(0.186)
Log (GDP)	-0.0949***	-0.0775***	-0.0633***	-0.0738***	-0.0818***
	(0.00308)	(0.00311)	(0.00302)	(0.00314)	(0.00314)
Log (Distance)	0.159***	0.160***	0.129***	0.156***	0.158***
	(0.00352)	(0.00354)	(0.00352)	(0.00352)	(0.00353)
Log (H/L)	0.702***	0.681***	1.042***	0.738***	0.698***
	(0.0131)	(0.0132)	(0.0152)	(0.0131)	(0.0130)
Log (T/L)	-0.175***	-0.152***	-0.151***	-0.165***	-0.156***
	(0.00442)	(0.00421)	(0.00419)	(0.00428)	(0.00422)
Log (K/L)	0.384***	0.369***	0.292***	0.356***	0.368***
	(0.00503)	(0.00499)	(0.00531)	(0.00499)	(0.00502)
Contiguity	-0.0738***	-0.0609***	-0.119***	-0.0574***	-0.0679***
	(0.00666)	(0.00668)	(0.00682)	(0.00668)	(0.00666)
Common Official Language	0.119***	0.126***	0.130***	0.131***	0.121***
	(0.00799)	(0.00804)	(0.00805)	(0.00797)	(0.00799)
Common Ethnical Language	-0.0726***	-0.0772***	-0.0771***	-0.0823***	-0.0744***
	(0.00778)	(0.00781)	(0.00780)	(0.00778)	(0.00777)
Common Colonizer	0.00137	0.0125	0.0204**	0.0155	0.00704
	(0.00954)	(0.00953)	(0.00955)	(0.00952)	(0.00955)
Constant	3.240***	2.960***	2.916***	2.923***	3.076***
	(0.0987)	(0.0994)	(0.0987)	(0.0998)	(0.0993)
Exporter FE	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes
Observations	1,922,527	1,922,527	1,922,527	1,922,527	1,922,527
R-squared	0.589	0.589	0.592	0.589	0.588