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Harmonization and mutual recognition:
What are the effects on trade?

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Gianluca Orefice[a] Roberta Piermartini[b] Nadia Rocha[c]

Abstract

This paper analyses the effect of harmonization and mutual recognition of standards on trade flows. Although harmonization and mutual recognition are commonly believed to reduce trade costs towards freer trade, their impact on trade is more complex, and little is known about their actual effects. In order to assess which approach has the greatest impact on trade, this paper looks at the evidence stemming from regional trade agreements. Not all regional trade agreements cover TBT area and among those that do, some favour harmonization, others favour mutual recognition. Using a gravity model, we estimate the effects on trade of harmonization and mutual recognition on the patterns of trade. Results show that standards harmonization and mutual recognition enhance trade. Moreover, mutual recognition has a higher positive effect on trade than harmonization, and this is due to mutual recognition of conformity assessment. These results are robust to endogeneity.

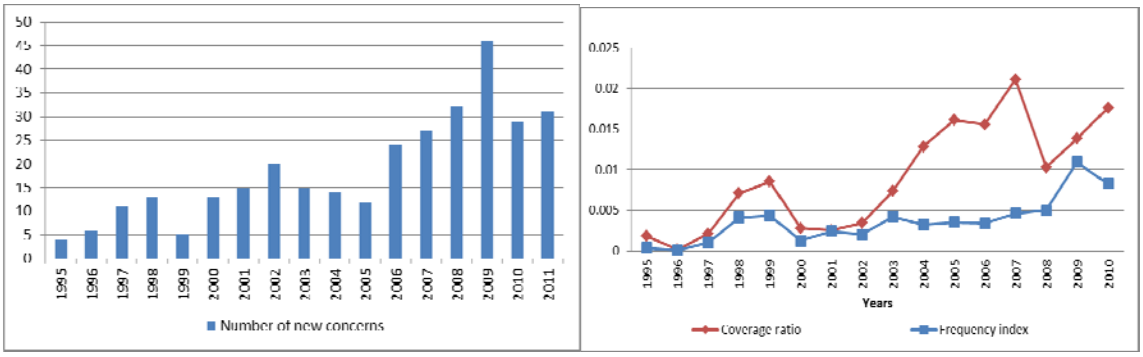
Keywords: technical regulations, standards, regionalism, deep integration
JEL codes: F13, F15, F14

[a] Gianluca Orefice: CEPII, Paris, email: gianluca.orefice@cepii.fr. [b] Roberta Piermartini: Economic Research Division, WTO, Geneva, email: roberta.piermartini@wto.org. [c] Nadia Rocha: Economic Research Division, WTO, Geneva, email: nadia.rocha@wto.org.

I. INTRODUCTION

At a time when traditional barriers to trade are declining, there is concern about the potentially adverse consequences on trade of a proliferation of standards.[1] These may relate to the specification of a product or the procedures to assess compliance with such characteristics. There is a clear upward trend in the number of standard SPS/TBT measures notified to the WTO as well as the number of specific trade concerns (STCs) raised in the devoted WTO committees (WTR, 2012). SPS and TBT measures subject to STCs affect an increasing number of product lines (frequency) and an increasing amount of trade (coverage ratio) (see Figure 1).

Figure 1: TBT-related specific trade concerns raised by year



Source: World Trade Report 2012

Although standards do not discriminate openly against foreign producers -because the same technical requirements apply both to domestically produced and imported products, they may be used to influence trade. For example, a government may be tempted to impose more stringent domestic technical regulations if domestic firms in an import-competing industry find it relatively easier to comply than foreign firms. Existing empirical evidence of policy substitution between tariffs and non-tariff measures supports this argument. For example, focusing on Turkey, Limao and Tovar (2011) show a higher probability of using non-tariff measures in products affected by commitments through the WTO and the PTA with the EU. The problem with an increasing proliferation of technical standards is that they are less transparent than tariffs (see WTR, 2012). Therefore, they may have even more distortive effects on trade than tariffs.

[1] In economic literature the term standard is commonly used to refer to both mandatory and voluntary requirements, as well as requirements relative to product characteristics or conformity assessment procedures. Hereafter, we follow this approach

The increase in standards may be the effect of a greater attention to consumers' needs and environments concerns. Indeed, standards can help markets to work more efficiently. Safety standards, for example, by providing consumers information about the characteristics of a product increase consumers' confidence about foreign products, thus solving problems of asymmetric information.

Independently of the motivation behind the proliferation of standards (protectionist of efficiency-driven), standards may -although they need not to[2]- reduce trade. National standards may impose disproportionate costs on foreign producers. They may generate fixed costs of having to interpret the regulation of the export destination market and bring the product into conformity, and might also raise marginal cost if the standard results in a lower scale of production. In addition, national standards may reduce the scope for international arbitration. In the automotive industry, for example, country-specific emission standards can prevent consumers from importing cheaper cars produced abroad.

Similarly, testing, inspection and certifying compliance to a certain standard entails costs. This cost is in part necessary because it serves to assure compliance with the required standard. Yet, it can result in an unnecessary obstacle to international trade if foreign providers possess the competence to give the required level of assurance in a cost-effective manner but this is not recognized by the importing country. Exporters are often faced with having to test or certify their products in each of the countries to which they are exporting. When conformity assessment requirements differ significantly across countries and procedures are not transparent, companies may need to spend a significant amount of resources to obtain the necessary information, and redesign products to meet different countries conformity assessments standards and requirements.

There are two ways in which potentially negative effects of standards on trade may be reduced: harmonization or mutual recognition. Harmonization of standards between two countries implies a common definition of both the policy objective and the technical requirements to achieve it. Mutual recognition, instead, refers to the reciprocal acceptance of the measures applied in both countries. Suppose that two countries A and B adopt different standards to achieve the same level of car safety. Suppose as well that there is a fixed costs associated with the adoption of each type of standard. Without an agreement, a firm that wants to sell in both market needs to pay two fixed costs (the one associated with the standard in country A and that associated with the standard in B). However, if

[2] National standards may actually facilitate trade compared to a situation when standards do not exist. Standards may increase consumers' confidence about the quality for a foreign product, thus fostering arbitrage between markets and demand for foreign goods. They may also provide foreign exporters with the information about preferences and product characteristics in the foreign market, thus reducing the costs to acquire such information before exporting.

country A and B chose one common standard (harmonization) or recognize as equivalent each other standard (mutual recognition), the firm will be able to sell in both markets paying only one fixed cost of entry in the market. The firm will also be able to better exploit economies of scale, thus producing at a lower marginal cost. On the consumer side, harmonized standards or mutual recognition should both be steps toward increased confidence for the foreign product. Therefore, trade between the two countries will increase.

A general finding of the literature is that harmonization increases trade. For example, using the count of bilaterally shared standards reported in the standards-related data from the Perinorm database, Moenius (2004) finds that shared standards have a positive and significant effect on bilateral trade. Clougherty and Grajek (2008) find that ISO 9000 diffusion in developing nations appears to enhance exports to developed nations. The authors do not, however, find any significant effect of the diffusion of ISO standards in developed countries on either exports or imports. Focusing on intra-EU trade, Vancauteren and Weiserbs (2005) find that countries that have a larger share of trade in sectors covered by the harmonization directive of the EU than the average of EU countries, export more. More recently, using an index of heterogeneity in regulation on veterinary drugs and pesticides across countries, Gervais et al. (2011) estimate a negative effect of differences in standards on trade in pig meat and beef.

Harmonization is also found to have a positive effect on the diversification of export markets (the so-called, extensive margin of trade), that is, on the number of exported varieties and export destinations. Focusing on the exports of textiles, clothing, and footwear, Shepherd (2007) finds that harmonization is associated with higher export variety, mainly for low income countries' exports to the EU. Focusing on the electronics sector, Reyes (2011) examines the response of U.S. manufacturing firms to the harmonization of European product standards with international norms. The author uses the share of non-harmonized standards in an industry[3] as a measure of trade costs due to heterogeneous standards. Reyes' study finds that increasing harmonization increases US exports to the EU. In particular, this increase is due to more US firms entering the EU market–the extensive margin of trade.

Does trade increase more under harmonization or mutual recognition? Theoretical literature does not provide a one-way answer to the question of whether harmonization or mutual recognition is more trade-enhancing. In general, harmonization is expected to boost trade more than mutual recognition for several reasons. One reason is that it reduces home-bias (i.e. the general preference for domestically produced goods). When countries adopt common standards, goods are more homogeneous and better substitutes (World Trade Organization (WTO), 2005). Another reason is that

[3] Defined as the number of CENELEC standards that are not identical to an existing IEC standard over the total number of standards in each SIC4 industry.

common standards increase compatibility between complementary goods in production or consumption, thus reducing market segmentation and smoothing the functioning of the markets. In specific sectors such as telecommunication, characterized by network externalities, where the value of the network for each consumer increases with the size of the network itself, common standards ensure the required degree of coordination to guarantee universal access and therefore they are essential to trade. Similarly, consumers' ability to use a standardized CD-player with a wide range of CDs will contribute to increase their value and tradability. In sectors, where production chains are important, common standards enhance firms' ability to interchange components, thus reducing inventory costs and increase flexibility. Finally, common standards lower the information costs faced by consumers and increase their confidence about the quality of imported products (Dissanayaka et al., 2001). This also applies for business-to-business relationships, where harmonization enhances communication effectiveness (M. Grajek, 2004).

However, harmonization imposes a cost in terms of reduced variety. Insofar as the demand for foreign product is driven by love for variety, a reduced degree of product differentiation would hamper trade. Another potential advantage of mutual recognition is that it allows any firm to pick a standard (the one that implies the lower level of compliance costs) and sell its product to its trading partner without the need to match a harmonised standard. Harmonization to a certain standard may instead imply high compliance costs for certain firms, thus effectively raising a barrier. Under mutual recognition a producer can still benefit from economies of scale, and trade driven by love for variety need not to be affected, but it is unclear to what extent mutual recognition improves consumers' confidence in foreign goods.

As far as conformity assessment procedures are concerned, their harmonization will reduce the costs for the exporters of having to find out what the procedure is and adapt once and for all the product to the testing requirement. But, mutual recognition of conformity assessment is essential to reduce the costs of multiple testing in each of the destination markets. Even if countries rely on internationally harmonized product standards or accept as equivalent another country's product standard, importing countries may not rely on an exporting country's conformity assessment results. Therefore, exporters incur the costs of redundant testing and certification for each of the destination markets. This can substantially increase the costs of exporting, including because exporters face the risk that goods are rejected by the importing country after shipment and the costs of lengthy procedures. For some time-sensitive products, such as textile and clothing and high-technology product with a short life cycle, the time delays associated with product testing and certification in the importing country can severely impact on profitability and the ability to penetrate the market.

In sum, whether harmonization or mutual recognition is more trade-enhancing is an empirical issue. This is likely to depend on the sector and on whether harmonization and mutual recognition refer to standards of goods or conformity assessment procedures.

Existing literature on the effects of harmonization and mutual recognition of standards and conformity assessment has, so far, not compared their relative effects on trade. Chen and Mattoo (2008) look at the impact of regional initiatives of harmonization of product regulation and mutual recognition of conformity assessment procedure on trade between countries within and outside the region. They find that product standard harmonization and MRAs increase trade between countries within the region, but they do not necessarily increase trade with countries outside the region, especially exports from developing countries. However, their study focuses on the impact of harmonization among EU countries (measured by the number of harmonized directives at the 3 digit SITC product level) without distinguishing whether harmonization refers to product standards or conformity assessment. Furthermore, they assess the impact only of MRAs of conformity assessment, but they do not assess the impact of mutual recognition of product standards.

In order to fill this gap, this paper uses information from a recently built database on the favoured approach for TBT-integration in regional trade agreements. Not all regional trade agreements include TBT provisions and among those that do, some favour harmonization, others favour mutual recognition. The advantage of using this database is that it covers a large sample of countries and regional trade agreements (i.e. 80 RTAs covering 120 countries).

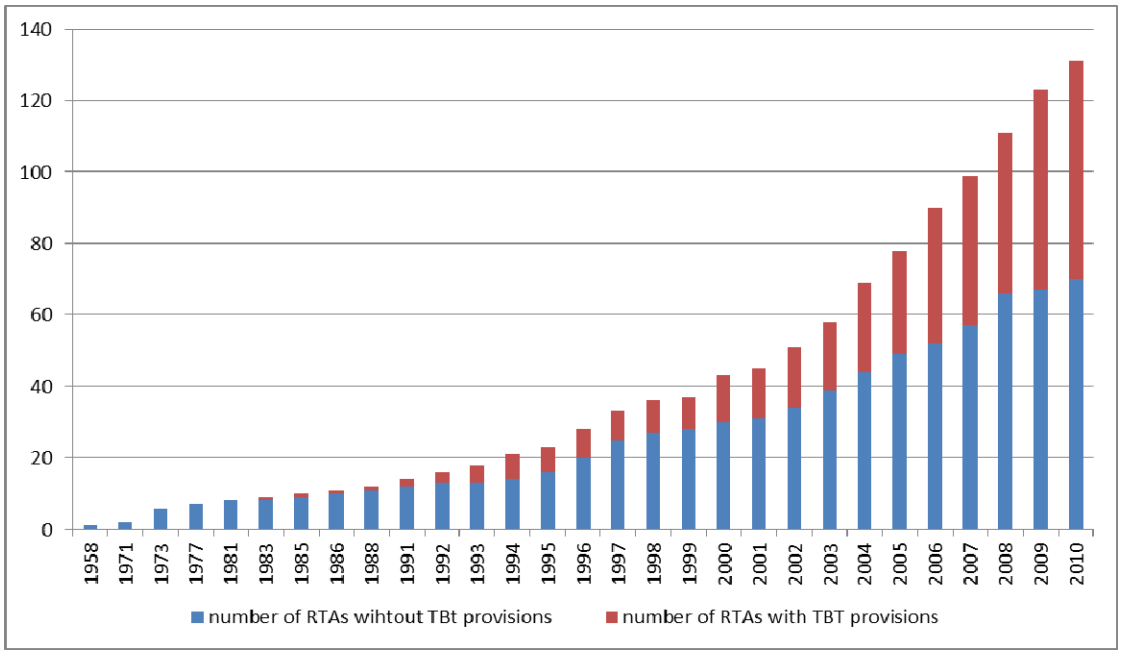
We expect that the effect of harmonization and mutual recognition differs across sectors. The effects of TBT-integration (whether through harmonization or mutual recognition) should be stronger in industries that rely heavily on regulation than in less regulated ones. To identify the degree of TBT sensitivity of different sectors, we use data on specific trade concerns raised at the WTO Committee on TBT. Relying on these variations, we estimate a gravity model over the period 1995-2008 in which the key explanatory variables are bilateral indexes of harmonization and mutual recognition interacted with TBT sensitivity measures. That is, we use a difference-in-difference model to explain the patterns of trade and estimate the effects on trade of harmonization and mutual recognition. The advantage of using this approach is that it reduces concerns related to the endogeneity of regional trade agreements.

Results show that harmonization and mutual recognition increase trade. Mutual recognition of conformity assessment drives the impact of mutual recognition on trade.

II. DESCRIPTIVE STATISTICS

The number of RTAs that include TBT provisions has been increasing over time. Approximately 50 per cent of regional agreements in force include TBT-provisions in 2011, compared with a figure of 30 per cent in 2000 and 10 in 1985 (Figure 2). This supports the view that the perceived importance of standard-related measures as an obstacle to trade has increased over time, thus providing an incentive for countries entering into negotiations for the formation of an RTA to include TBT-provisions.

Figure 2: Evolution over time of RTAs with and without TBT provisions



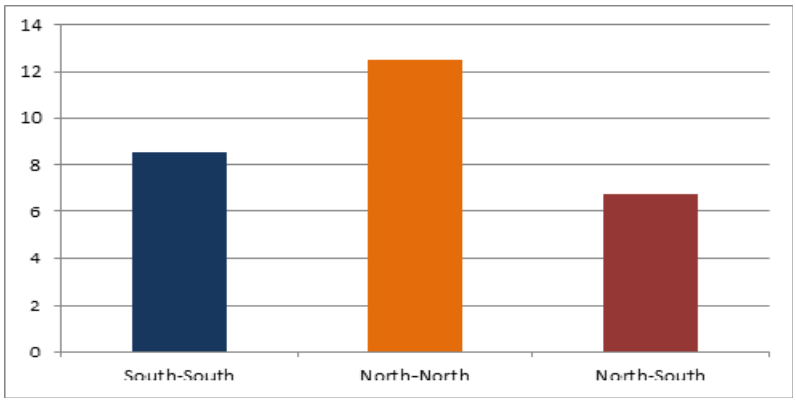
The depth of TBT commitments in regional agreements varies significantly across agreements. Relying on the mapping of TBT commitments in RTA developed by Piermartini and Budetta (2009), we rank agreements according to the number of provisions that go beyond WTO commitments (i.e. WTO plus commitments). We use this variable as the index of the depth of TBT commitments in RTAs (so called *TBT total index* in the regressions).

The mapping of TBT provisions in RTA distinguishes 38 possible characteristics according to which commitments in RTAs can go beyond WTO. In particular, Piermartini and Budetta (2009)'s template distinguishes five types of provisions: (i) that refer to WTO rules, (ii) that define the type of integration approach (harmonisation or mutual recognition) chosen for standards, technical regulations and conformity assessment procedures, (iii) that improve transparency, (iv) that establish

institutions or mechanisms to administer the agreement and solve disputes; and (v) that foresee cooperation among regional partners on standard-related issues beyond trade related targets and technical assistance. For each type of provision the template identify specific characteristics that further WTO commitment. For example, concerning a provision related to mutual recognition of conformity assessment, the template include information as to whether the importing country needs to provide reasons for not accepting a standard as equivalent, whether mutual recognition is in force[4], whether countries commit to negotiate a MRAs within a certain time period, whether RTAs member countries participate in international accreditation bodies (Appendix 1 reports the template used for mapping TBT provisions in RTAs).

Out of a maximum value of 28 (that corresponds to the EU), on average the number of TBT provisions that go beyond WTO commitments (i.e. WTO plus commitments) is 12 in agreements among developed countries (North-North agreements), while it is only 6 in North-South.

Figure 3: Average level of TBT integration in RTAs by level of development



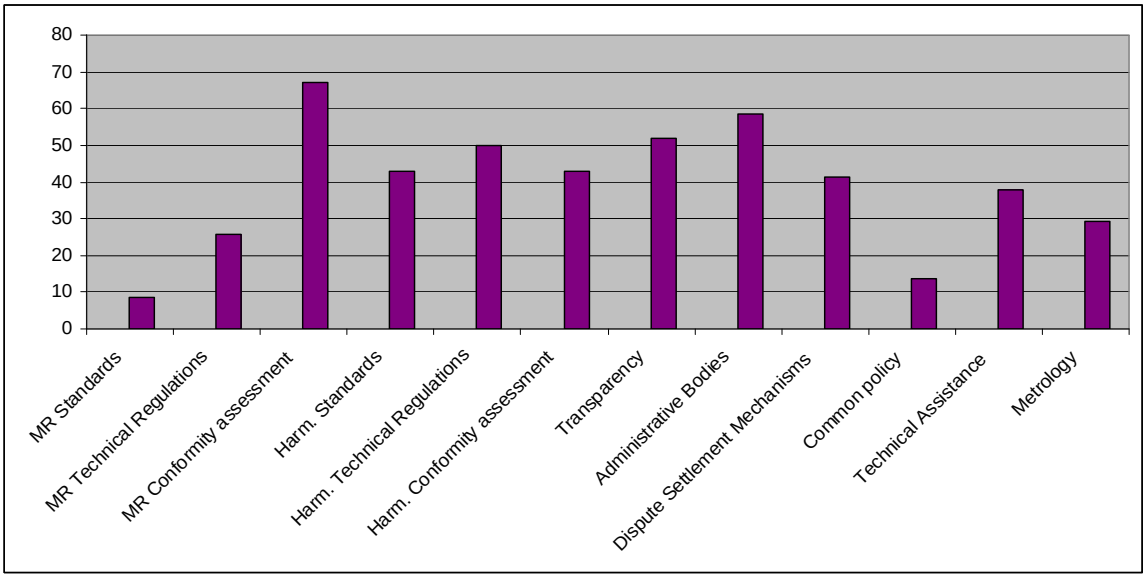
Note: The "North" is consist of the EU, EFTA countries, Australia, New Zealand, the United States, Canada and Japan. Agreements with no TBT provisions are included.
Source: World Trade Report 2011.

This paper focuses on harmonization and mutual recognition as alternative ways to fosters TBT integration. Figure 4 clearly shows a clear prevalence of mutual recognition of conformity assessment procedures and harmonization of standards and technical regulations as preferred approach to TBT integration in RTAs. They occur in over 50 per cent of the mapped PTAs. In the regressions we use either dummies that indicate whether the RTA agreement contains at least one harmonization or mutual recognition related provision (called *harmonization_dummy*, mutual *recognition_dummy*, respectively) or indexes of harmonization or mutual recognition (called *harmonization_index* and

[4] This includes information on the existence of MRAs.

mutual *recognition_index*, respectively) that count the number of characteristics of harmonization-related provisions or of mutual recognition-related agreement that go beyond the relative WTO commitments. The subscript standards or conformity assessment indicate whether the provision relates to standard and technical regulation or to conformity assessment procedures.

Figure 4: Most common provisions in PTAs



Note: Percentages are relative to the number of mapped PTAs with TBT section (i.e. 58)
Source: World Trade Report 2011

Other common provisions in RTAs relate to transparency requirements and TBT-related institutions. We expect the inclusion of these provisions to have a positive effect on trade. Transparency reduces the exporters' costs of having to monitor the destination country's policy changes in order to meet their requirements. Strengthening the institutional setting provides an indication of the degree of the enforcement of regional commitments.[5] In the regressions we control for the existence of these provisions when we use country-pair time varying fixed effects (see section below).

[5] It is worth noting that Piermartini and Budetta's database primarily relies on the legal texts of the agreements. Therefore, it does not allow an assessment of the actual extent of implementation of the provisions.

III. EMPIRICAL METODOLOGY

To investigate the impact of TBT integration on trade, an augmented gravity is estimated as a first step, over a set of 154 countries, 68 manufacturing industries[6] and for the time interval 1995-2008:

$$Ln\,\text{Imports}_{ijkt} = \alpha + \varphi_{it} + \varphi_{jt} + \mu_k + \beta_1 \log dist_{ij} + \beta_2 TBT\ depth_{ijt} + \varepsilon_{ijkt} \quad (1)$$

where the subscripts i, j k and t correspond to the importer, the exporter, the hs2 industry and the year respectively. The dependent variable is the log of bilateral imports in the manufacturing sector from country i to country j in industry k at time t ; $dist_{ij}$ is the distance between country i and country j[7]; ϕ_{it} and ϕ_{jt} capture importer and exporter time varying characteristics such as their economic size or their GDP per capita; μ_k are sector fixed effects at HS2 level. $TBT\ depth_{ijt}$ is a count variable that captures the level of depth of TBT commitments included in a PTA between country j and country i . Specifically, this variable takes the value of zero for those pairs of countries that have never implemented a TBT agreement and takes positive values whenever a PTA agreement including TBT provisions is in place. A positive coefficient on this variable would imply that the higher levels of TBT integration are trade enhancing.

As discussed above the indexes of TBT-related regional integration as well as the harmonization and mutual recognition dummies are built from Piermartini and Budetta's database. This database covers 72 RTA (58 of which including TBT agreements). The list of RTAs with and without TBT provisions is obtained from the WTO database built for the WTR 2011.[8] The rest of the data are from standard sources. Trade data are from the UN Comtrade database. Gravity variables such as country-pair distances, language and colony are taken from the Mayer and Zignago dataset.

The main purpose of this paper is however to examine how different integration approaches — harmonization versus mutual recognition— affect trade volumes. In other words, we want to investigate whether harmonization of product standards is more or less trade enhancing than mutual

[6] We exclude agricultural products, because in this sector other forms of non-tariff barriers, such as quotas and SPS measures are more relevant than TBT measures.

[7] Since the EU has a common trade policy, in our dataset the EU is considered as a single country. For the calculation of the variable distance between a certain country and the EU we have used the data from Germany given that it is the major trading country in the EU and it is also relatively central in geographical terms.

[8] The WTO database on the content of PTAs can be found at http://www.wto.org/english/res_e/publications_e/wtr11_dataset_e.htm

recognition of product standards and conformity assessment procedures, and whether integration of product standards (in whatever form) enhance trade more than integration of conformity assessment procedures. In order to do this we estimate the following regression:

$$Ln\,\text{Imports}_{ijkt} = \alpha + \varphi_{it} + \varphi_{jt} + \mu_k + \beta_1 \log dist_{ij} + \beta_2 harmonization_{ijt} + \beta_3 mutual\ recognition_{ijt} + \varepsilon_{ijkt} \quad (2)$$

Note that this regression is run over a sub-sample of agreement for which there is a mapping of TBT rules. $Harmonization_{ijt}$ and $mutual\ recognition_{ijt}$ are the variables of our interest. They capture, respectively, the depth of commitment in terms of harmonization or mutual recognition in an agreement that has been signed between country *j* and country *i* at time *t.* These variables take the value of zero for those pairs of countries that have never implemented a TBT agreement. For those countries that have entered into an agreement during the time period 1995-2008, the variables are equal to zero before the agreement is signed and takes a positive value, captured by the different indices defined in section II, from the year in which the agreement is signed onwards . In order to be able to compare the coefficients among the two variables they are also computed as dichotomous variables.

The previous specification could be subject to omitted-variables bias given that the error term might include the effect of country-specific policy variables, such as an environmental tax, that affect both trade flows and the probability of singing a TBT agreement. The set of fixed effects included in specification (1) deals with such endogeneity.[9] Specifically, country-time fixed effects account for unobserved factors such as multilateral price terms. In addition, sector fixed effects account for unobserved industry factors.

There is a potential reverse causality problem in our regressions. This is because countries that trade more may have higher returns to either recognize a common standard or to grant unrestricted access to products that meet the standards of their trade partner. Part of the reverse causality is attenuated in our regressions since our dependent variable varies at sector level whilst the explanatory variables of our interest are country-pair specific. Nevertheless, if exports are concentrated among few sectors it is possible that those sectors are also characterized by a high level of lobbing activities.

[9] See Baier and Bergstrand (2007)

To control for endogeneity, we estimate a difference-in-difference regression. We expect that the impact of TBT-related integration on trade increases with the degree if sectoral regulatory intensity. Specifically we estimate the following equation:

$$Ln\,\text{Imports}_{ijkt} = \alpha + \varphi_{ijt} + \mu_k + \beta_1 harmonization_{ijt} * TBTsensitivity_k + \beta_2 mutual\ recognition_{ijt} * TBTsensitivity_k + \varepsilon_{ijkt} \quad (3)$$

where TBT-sensitivity is calculated is calculated as the average over time of the total number (across raising and maintaining countries) of STCs raised in a sector.

The set of fixed effects included in the regression controls for the omitted variables bias. In particular, this approach allows us to control for the existence of a PTA including TBT provisions between countries, thus completely disentangling the effect of harmonization and mutual recognition provisions from other elements of the agreement (such as, transparency and enforcement provisions).

IV. RESULTS

The results for the OLS estimation of specification (1) are reported in the first three columns of Table 1. Columns (1) and (2) show the impact of having an agreement on TBT on trade flows. In Column (1) we use a set of 96 regional trade agreements for which information exists as to whether they include including TBT provisions. In Column (2) we limit the analysis to the subsample of 72 agreements for which there is information on the depth of TBT provisions. This is the subsample of reference for the rest of the analysis in this paper. The two regressions are run to test the sensitivity of the results to our subsample. The positive and significant coefficient from column (1) implies that signing an RTA that includes TBT provisions increases trade. A very similar coefficient is found in column (2), implying that the sub-sample of TBT agreements considered in this second regression is representative.

Results on the impact of the overall level of TBT integration are reported in column (3). A positive and significant coefficient confirms the fact that TBT integration has a positive impact on trade. Specifically, having an extra commitment in terms of TBT integration will increase trade by 7 per cent.

The next 4 columns show the impact of harmonization and mutual recognition. Columns (4) and (5) report the results of each variable independently. In column (6) both variables are included in the regression. The results show that harmonization and mutual recognition have a positive and significant impact on trade.

We also compare the impact on trade flows of harmonization relative to mutual recognition provisions using dummy variables that take the value one whenever there is at least one commitment regarding the harmonization (mutual recognition) of either standards or technical regulation and zero otherwise. The results, reported in column (7) of Table 1 show that harmonization in either standards or technical regulation is more trade enhancing than mutual recognition.

In column (8) of Table 1 we include a dummy variable for harmonization and mutual recognition that takes positive values whenever there is a commitment in either standards or conformity assessment procedures. Results show that whilst the impact of mutual recognition on trade flows is positive and significant, the coefficient on harmonization becomes not significant. This implies that for conformity assessment, mutual recognition matters more than harmonization. More specifically, when we split the variable and distinguish between harmonization and mutual recognition of conformity assessment (columns 9 and 10), results show that mutual recognition of conformity assessment is trade enhancing, while the requirement to harmonize conformity assessment procedure appear to reduce trade. Commitments to harmonize and mutually recognize conformity assessment procedures are not mutually exclusive. A large number of RTAs in our sample have commitments that fosters mutual recognition and harmonization of conformity assessment procedures. This requirement reduces the degree at which mutual recognition is granted, which explains the negative sign in the regressions.

In table 2 we control for endogeneity and we perform a difference-in-difference estimation in order to analyse the impact of harmonization and mutual recognition on TBT-sensitive sectors. As expected we find that TBT-integration increases trade more in TBT-sensitive sectors. In addition, our main results that harmonization matters more for standards while mutual recognition matters more for conformity assessment is also confirmed for TBT-sensitive sectors.

V. CONCLUSIONS

There are two ways in which standards and conformity assessment procedures may be integrated across countries: harmonization and mutual recognition. Both approaches, by allowing firms to access the whole market by conforming to only one standard (whether in terms of product characteristics or

conformity assessment procedure), should have a positive impact on trade. The risk however exist (in plurilateral agreements) that, if the harmonised standard is stricter than the initial standard in some countries, the positive effect of the enhanced economies of scale is offset by the higher cost of complying to the new standard, or that, if different standards reflected consumers' preferences for different product, producers cost advantage may be more than compensated by a reduced demand for the product.

There is also no clear cut theoretical prediction as to which approach is more trade enhancing. While mutual recognition allows firms to choose the standard that better suits their technology, thus minimising adaptation costs, it may not equally effective as harmonization in enhancing consumers' confidence on foreign goods. Furthermore, little is known about whether exiting technical barrier to trade arise mainly from non-integrated product standards or conformity assessment procedures.

This paper addresses these issues by analysing the implication for trade of the various regional initiatives to foster TBT-integration. We find that harmonization and mutual recognition have overall a positive effect on trade. However, while the positive effect on trade of harmonization is due to harmonization of product standards, most of the positive effect mutual recognition on trade is due to mutual recognition of conformity assessment procedures.

We also address a potential endogeneity problem of signing preferential TBT agreements by using a difference in difference specification. The estimated effects of harmonization and mutual recognition are robust to this correction for endogeneity.

Further research on this topic should aim to explore the different effects that harmonization and mutual recognition of standards and conformity assessment procedures have on third parties excluded from the preferential regime; to investigate whether harmonization and mutual recognition have a different impact on the likelihood and the volume of trade and whether this effect depends on the sector to which these regulations apply.

Table 1: Harmonization vs. mutual recognition

Dependent variable: log imports	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	OLS (8)	OLS (9)	OLS (10)
TBT depth	1.656***	1.032***								
	[0.025]	[0.030]								
TBT total index			0.070***							
			[0.002]							
Harmonization				0.222***		0.131***				
				[0.008]		[0.009]				
Mutual Recognition					0.540***	0.364***				
					[0.017]	[0.019]				
Harmonization standards							1.068***			0.493***
							[0.035]			[0.100]
Mutual Recognition standards							0.746***			0.415***
							[0.066]			[0.074]
Harmonization all								-0.029		
								[0.079]		
Mutual Recognition all								1.207***		
								[0.074]		
Harmonization conformity assessment									-0.366***	-0.504***
									[0.060]	[0.072]
Mutual Recognition conformity assessment									1.400***	0.980***
									[0.048]	[0.082]
Observations	802,936	703,504	703,504	703,504	703,504	703,504	703,504	703,504	703,504	703,504
R-squared	0.439	0.432	0.432	0.431	0.431	0.432	0.432	0.432	0.432	0.432

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All regressions include country-time fixed effects, HS2 FE and distance.

Table 2: The impact of harmonization and mutual recognition in TBT-sensitive sectors

Dependent variable: log imports	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TBT* TBT sensitivity	0.024***								
	[0.002]								
TBT depth*TBT sensitivity		0.002***							
		[0.000]							
Harmonization*TBT sensitivity			0.005***		0.002***				
			[0.000]		[0.001]				
Mutual Recognition*TBT sensitivity				0.015***	0.012***				
				[0.001]	[0.001]				
Harmonization standards*TBT sensitivity						0.020***			-0.016***
						[0.002]			[0.006]
Mutual Recognition standards*TBT sensitivity						0.025***			0.011***
						[0.004]			[0.004]
Harmonization all*TBT sensitivity							-0.015***		
							[0.005]		
Mutual Recognition all*TBT sensitivity							0.038***		
							[0.005]		
Harmonization conf. ass.*TBT sensitivity								0.007**	0.010***
								[0.003]	[0.003]
Mutual Recognition conf. ass.*TBT sensitivity								0.021***	0.032***
								[0.002]	[0.005]
Observations	725,021	725,021	725,021	725,021	725,021	725,021	725,021	725,021	725,021
R-squared	0.673	0.673	0.673	0.673	0.673	0.673	0.673	0.673	0.673

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All regressions include country-pair-time fixed effects and HS2 FE.

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Appendix

Table 1: The Structure of the Template for mapping regional rules on standards, technical regulations and conformity assessment procedures

I. REFERENCE TO WTO-TBT AGREEMENT
- *definitions* - *rules* - *specific provisions (notifications, consultations, dispute settlement mechanism)*
II. INTEGRATION APPROACH:
(A) Standards, (B) Technical Regulations, (C) Conformity Assessment **(i) (Mutual) recognition** - *Is the burden of explaining reasons for non-equivalence on the importing country?* - *Is mutual recognition in force?* - *Is there a time schedule for the achievement of mutual recognition?* - *Do parties participate to international/regional accreditation agencies?* **(ii) Harmonisation** - *Are there specified existing standards/rules to which countries shall harmonise?* - *Is the use/creation of regional standards/rules promoted ?* - *Is the use of international standards/rules promoted?*
III. TRANSPARENCY REQUIREMENTS
(i) Notification - *Is the time period allowed for comments specified?* - *Is the time period allowed for comments longer than 60 days?* **(ii) Contact points/consultations for the exchange of information**
IV. INSTITUTION
(i) Administrative Bodies - *Is a regional body established?* **(ii) Dispute Settlement Mechanisms** - *Is there a regional dispute settlement body ?* - *Are there regional consultations foreseen to solve disputes?* - *Is there a mechanism to issue recommendations?* - *Are recommendations mandatory?* - *Is the recourse to the dispute settlement disallowed?*
V. FURTHER CO-OPERATION AMONG MEMBERS
(i) Common policy/standardization programme (beyond trade-related objectives) **(ii) Technical Assistance** **(iii) Metrology**

Source: Piermartini and Budetta, 2009