North-South Standards Harmonization and International Trade

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Abstract

Recent years have seen a surge in regional trade agreements (RTAs) and the development of non-tariff measures (NTMs). As a consequence, a growing number of RTAs include provisions on NTMs. This paper focuses on provisions on technical regulations and conformity assessment procedures. We investigate whether the technical requirements contained in North-South Agreements affect international trade. More particularly, using a gravity equation, we assess to what extent North-South harmonization of technical barriers creates or reinforces a hub-and-spoke trade structure potentially detrimental to the integration of Southern countries in world economy.

Keywords: Regional trade agreement, technical provisions, harmonization, hub-and-spoke trade structure
JEL Codes: F13, F15

1. Introduction

Two statements concerning the changing patterns of trade integration lead to reconsider the impact of specific provisions included in Regional Trade Agreements (RTAs). First, tariffs on goods have been extensively bound and reduced to an average below 5%, while technical, sanitary and regulatory measures at the border have spread. Second, it is often advocated that progress is more easily achieved on a regional or bilateral level when it comes to trade liberalization: the multilateral scene has become too heterogeneous to converge easily on mutually beneficial ambitious agendas of liberalization. Hence, the surge in regional agreements would simply reflect the need for a more flexible tool of negotiations than the traditional multilateral rounds. These two evolutions reinforce each other. This is partly because the agenda of negotiation has shifted from tariffs to more complex issues that the multilateral arena finds it increasingly difficult to progress; regional agreements accordingly offer a more versatile negotiating environment. That is, beyond tariffs, regionalism opens up an ambitious agenda of negotiation including a wide array of border measures. By the same token, the trade impact of RTAs is no longer restricted to the traditional trade creation and trade diversion effects.

However, as highlighted by Bourgeois et al. (2007), little attention has been given in the literature to the effect of standards liberalization in the context of RTAs. The existing literature (see, among others, Moenius, 2004; Czubala et al., 2009) focuses on the trade effects of standards – often distinguishing between country-specific and internationally-harmonized standards – but does not examine whether these effects are influenced by the presence of RTAs.

A first issue relating to the inclusion of standards provisions in RTAs concerns integration among high-income countries. The question is whether mutual recognition - or

harmonization - of standards is leading to different outcomes. Chen and Mattoo (2008) show that both mutual recognition (with or without rules of origin) and harmonization of standards increase significantly the probability and the volume of intra-regional trade between developed countries. However, the effect is larger for mutual recognition agreements, especially those without rules of origin, than for harmonization agreements. Ultimately, this means that outside developing economies suffer from such harmonization (Amurgo-Pacheco, 2006).

A second set of issues arises with North-South agreements. Here the tension between liberalizing trade and introducing new distortions is even greater. As we can expect that regulations and standards of different kinds are more stringent in high-income countries, what is at stake in such RTAs is a convergence of standards to the more stringent ones, and the adoption by developing economies of standards imposed on rich markets. There has been an abundant literature on the standards divide (Wilson and Abiola, 2003) pointing to the potential detrimental effects of high-income countries' standards on exports from developing economies (Otsuki, 2001). But the question of the effect of such adoption when Southern countries manage to match Northern standards remains open. This is the question addressed here.

Notwithstanding this standard divide, compliance of Southern producers with Northern standards can raise the quality of exported products and thus can rise outside demand for their exports. But this is typically at a cost, even though the assistance programs sometimes embodied in agreements can cover part of it. The adoption of Northern standards will lead to higher quality and higher costs. This move can price these exports out of Southern markets. Ultimately, Southern exports will redirect their shipments to the North, detrimental to South-South trade, what can be considered as a trade-diversion effect of a new kind.

How large are these effects is an empirical question that depends, *inter alia*, on how specific and stringent the standards are. For instance, adopting a standard imposed by the European Union (EU) does not necessarily guarantee that the product can enter more easily on the US market. On the other hand, these effects are likely to be more limited when harmonization takes place on the basis of international standards.

The main objective of our paper is accordingly to assess whether liberalization of TBTs in North-South RTAs creates or strengthens a hub-and-spoke structure potentially damaging for the trade integration of Southern countries. Trade may expand with the North as the result of the deep integration associated with provisions on standards included in the RTA. However, this may well be at a cost: reduced South-South trade.

We use a standard theoretically founded gravity framework to investigate systematically how provisions on standards included in North-South RTAs impact international trade. Two results emerge from our exercise. First, contrary to expectations, standards harmonization in North-South RTAs cancels the positive trade impact linked to the signature of a RTA between Northern and Southern partners, and the effect is larger if harmonization takes place on the basis of *regional* rather than international standards. Second, we show that the existence of North-South RTAs hurts *South-South* trade at the extensive margin. Taken together, both results suggest that standard harmonization provisions included in North-South RTAs miss their target and tend to marginalize Southern countries from the world economy.

The rest of the paper is structured as follows. Section 2 surveys the literature in order to highlight our contribution. Section 3 presents our econometric specification and data. Results are discussed in section 3. We conclude in section 4.

2. Literature review

A first strand of the literature examines standards provisions in several RTAs and investigates whether they go beyond the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT). These papers do not quantify the trade impact of this regional liberalization. Covering 28 RTAs where the European Union (EU) or the United States (US) is a partner, Horn et al. (2009) show that all except two US agreements include TBT provisions. Furthermore, for 5 EU and 11 US agreements, these provisions are legally enforceable, meaning that the agreement specifies clear legal obligations, which are thus more likely to be implemented.

Piermartini and Budetta (2009) survey 58 RTAs with TBT provisions. They scrutinize whether these provisions refer to the WTO TBT agreement and whether regional liberalization of TBTs through harmonization or mutual recognition is pursued. They also examine transparency requirements, institutional and administrative frameworks, and co-operation between members on TBTs. Their study provides rich information. For instance, harmonization appears to be often used for standards and technical regulations, whereas mutual recognition is favored for TBTs of conformity assessment procedures. Moreover, RTAs signed by the US promote mutual recognition of conformity assessment procedures, whereas RTAs signed by the EU also often promote further harmonization of technical regulations. In view of this last observation, Piermartini and Budetta (2009) wonder whether regional harmonization may not lock countries into RTAs, hampering multilateral trade liberalization. However, they do not test this hypothesis. Lesser (2007) extends Piermartini and Budetta (2009)'s mapping to 82 RTAs, with a special focus on Chile, Singapore and Morocco.

A second strand of the literature seeks to quantify the trade effects of agreements on standards. Note that the presence of such arrangement does even not necessarily flank a RTA. This is the case for pharmaceutical products, whereby the EU and the US have signed a Mutual Recognition Agreement (MRA). The objective of such agreement is a mutual recognition not only of technical standards but also of conformity assessment procedures. Using a Tobit model over 1990-2004, Amurgo-Pacheco (2006) shows that the MRA has harmed third-country exports irrespective of their level of development.

Baller (2007) studies the trade impact on both member and non-member countries of TBTs liberalization through mutual recognition or harmonization agreements. Her analysis includes North-North, North-South and South-South agreements and uses a two-stage gravity estimation. The results suggest that mutual recognition agreements significantly increase the probability and the volume of trade for member countries. Interestingly, third-party developed countries benefit from harmonization in other regions, whereas third-party developing countries do not. However, Baller's study includes only two sectors (telecommunications equipment and medical devices) and one may wonder whether her results generalize to other sectors.

Chen and Mattoo (2008) examine regional standards liberalization through harmonization and mutual recognition agreements. In the latter case, they control whether the agreement contains rules of origin or not. Their sample covers 42 countries (28 OECD and 14 non-OECD countries) at the SITC 3-digit level of manufacturing industries from 1986 to 2001. Chen and Mattoo (2008) find that harmonization fosters trade between member countries but decreases trade with the rest of the world. A similar conclusion is reached for mutual recognition agreements with rules of origin, while mutual recognition agreements without rules of origin increase trade both within member countries and between member and

non-member countries. However, only standards liberalization between *developed* countries is analyzed.

Last, Baldwin (2000) examines different routes towards standard liberalization and concludes that mutual recognition among developed countries could well lead to a two-tier international trade system with developing countries in the second tier.

The bottom line of this literature review is that harmonization of standards has an impact on trade, and that it can be detrimental to third countries, in particular developing ones. However, our opening question, i.e. whether provisions on standards harmonization included in North-South trade agreement are detrimental or not to the integration of Southern countries in world economy, remains an open issue.

3. Econometric specification and data

3.1 Econometric specification

In this section we tackle the impact of TBT provisions in North-South RTAs on Southern countries' trade. What we aim at identifying is the deviation from "normal" bilateral trade patterns of countries having signed such agreements. This question has two separate components. First what is the impact on North-South trade, meaning the impact on trade with the signatory Northern country? Second what is the impact on trade with other Southern countries?

The gravity equation provides an appropriate framework for such analysis. As is well-known, it can be seen as a reduced form of the theoretical trade flow prediction based on the combination of the importer's budget allocation and a market-clearing condition for the exporter. Our theoretical foundation for trade patterns is the standard monopolistic competition-CES demand-Iceberg trade costs model first introduced by Krugman (1980) and

used by many since then.[1] Producers operating under increasing returns in each country produce differentiated varieties that they ship, at a cost, to consumers in all countries. Following Redding and Venables (2004), the total value x_{ijt} of exports from country i to country j in year t can be written as follows:

$$x_{ijt} = n_{it} p_{it}^{1-\sigma} (T_{ijt})^{1-\sigma} Y_{jt} P_{jt}^{\sigma-1} \qquad (1)$$

with n_{it} and p_{it} the number of varieties and prices in country i in year t, Y_{jt}, and P_{jt} being the expenditure and price index of country j in year t. T_{ijt} represents the iceberg transport costs in year t.

The simplest way to estimate (1) is to use ordinary least squares (OLS). However, this approach excludes zero-value observations from the estimation. One way to deal with zero flows consists in using a two-stage estimation procedure. The decision to export is estimated in the first stage, while the second stage focuses on the value of exports. The Heckman model is often used in the trade literature. However, in the presence of fixed effects in the first-stage, the Heckman model leads to the incidental parameter problem. To avoid such a problem we use a modified two-stage estimation procedure (Chen and Mattoo, 2008). This procedure uses a linear probability model in the first stage. One potential drawback of this approach is that predicted probabilities may be outside the unit interval. However, as highlighted by Wooldridge (2002, chapter 15, pp.456-457), if the set of explanatory variables contains dummies for mutually exclusive and exhaustive categories (which is the case in our specification, cf. infra), the linear probability model is completely general and fitted probabilities outside the unit interval are not a problem. Lastly, the presence on the export

[1] Alternative theoretical foundations of the gravity equations include very different assumptions: perfect competition with technology differences as in Eaton and Kortum (2002), monopolistic competition with different functional forms as in Melitz and Ottaviano (2008), or heterogeneous firms operating in a Dixit–Stiglitz environment as in Chaney (2008). All of those however yield a strictly equivalent estimable specification for our purpose.

market at time t-3 is used as the selection variable in our specification (Chen and Mattoo, 2008).

While $n_{it}p_{it}^{1-\sigma}$ and $Y_{jt}P_{jt}^{\sigma-1}$ are not totally disconnected from the two GDPs of *i* and *j* respectively, they are crude approximations at best, raising issues on the validity of simple gravity specifications and results. A specification more consistent with theory involves the use of fixed effects for each importer and exporter (Feenstra, 2004; Baldwin and Taglioni, 2006). The fixed effects incorporate size effects as in gravity, but also the other origin and destination determinants seen above, the price and the number of varieties of the exporting country, and the demand size and price index (often referred to as a remoteness term) of the importing country. Our specification includes country and year fixed effects. We keep time-varying GDPs in the estimation, which allows us to identify the effect of changes in income. In all regressions, the correlation of errors across years for a same country-pair is taken into account by appropriate clustering at the country-pair level.

3.2 Data

Trade data come from the BACI database developed by the CEPII.[2] Our dependent variable is the *total* bilateral imports of country *j* from country *i*. Note that in BACI flows are reconciled and that such value is equal to exports from *i* to *j*. In BACI, values are FOB. We cover the period from 1990 to 2006 (except for some newly independent countries in Central Asia or Africa). Countries' GDPs are extracted from the World Development database. Transport costs are measured using the bilateral distance between both partners. These distances are extracted from the CEPII database.[3] In addition, we include a dummy variable "Common

[2] http://www.cepii.fr/anglaisgraph/bdd/baci.htm. This database uses original procedures to harmonize the United Nations COMTRADE data (evaluation of the quality of country declarations to average mirror flows, evaluation of cost, insurance and freight rates to reconcile import and export declarations).
[3] http://www.cepii.fr/anglaisgraph/bdd/distances.htm. These distances are calculated as the sum of the distances between the biggest cities of both countries, weighted by the share of the population living in each city.

border" that equals one if both countries share a border. Bilateral trade can also be fostered by countries' cultural proximity. We therefore control for this proximity by introducing two dummies, respectively equal to one if a language is spoken by at least nine percent of the population in both countries or if both partners have had a common colonial history. In the latter case, we distinguish between the existence of a colonial relationship (North-South trade) and the existence of a common colonizer (South-South trade). Data come from the above-mentioned CEPII database.

Our focus in this paper is on the trade effect of standards harmonization included in North-South RTAs on Southern countries' trade. This leads us to consider both North-South and South-South trade. Accordingly, we split our sample of relations between all *i* and all *j* into two sub-samples corresponding respectively to North-South and South-South trade relations.[4] North-North relations are dropped. The list of Northern and Southern countries is given in Appendix 1.

The last step is to specify the variables used to quantify the effect on North-South and South-South trade of incorporating provisions on standards harmonization in a North-South RTA. The full list of North-South RTAs considered in our exercise is provided in Appendix 2. We cover 43 RTAs. We use the template provided by Piermartini and Budetta (2009) and simply update it by adding some recent North-South RTAs they did not review. For each RTA, we focus on provisions on technical regulations and on conformity assessment procedures. According to the WTO definition, compliance with a technical regulation is mandatory and conformity assessment procedures are used to demonstrate that products conform to requirements in technical regulations. Importantly, we must disentangle the impact of the North-South RTA as such from the inclusion of provisions on technical regulations and on conformity assessment procedures in it. That is, we have a "treatment" that

[4] In addition, a Chow test suggests that estimated coefficients on both sub-samples differ significantly and confirms this divide.

can take on different intensities and forms: just RTA, RTA with standards harmonization, RTA with harmonization on regional or international standards (see figure 1).

Figure 1 about here

We accordingly introduce a full set of dummies defined as follows:

For North-South trade relations:

Basic treatment:

- We define a "North-South RTA" dummy taking the value of 1 when *i* and *j* are members of a common regional North-South agreement (0 otherwise).

Treatment intensity/form:

- We first control whether the common North-South RTA includes a TBT provision involving standards harmonization. Two dummies are defined: one for the harmonization of technical regulations and one for the harmonization of conformity assessment procedures;
- We then investigate whether, in addition to the harmonization, the common North-South RTA promotes the use of some (regional and/or international) standards. Three dummies are built: a first dummy takes the value 1 if the RTA promotes the use of some standards (0 otherwise). We then distinguish whether the RTA promotes the use of regional standards only (2^{nd} dummy) or the use of international (alone or in addition to regional ones) standards (3^{rd} dummy).

The different treatments (presence of a RTA, harmonization of standards, and promotion of specific standards) are included separately in the estimations. Indeed, the harmonization of standards is conditional to the presence of a RTA and the promotion of specific standards is conditional to the presence of a RTA and to the harmonization of standards. Therefore, our treatment variables are highly correlated.

For South-South trade relations:

Basic treatment: We control whether either the importing and/or the exporting countries have signed a RTA with a country in the North. This control allows us to test for trade diversion.

Treatment intensity/form:

- We control whether the RTA signed by the Southern partner (the importing or/and exporting country in the South-South trade relation) with the North involves standards harmonization. We distinguish whether the RTA involves the harmonization of technical regulations or conformity assessment procedures.

As for North-South estimations, the different treatments are included separately in the estimations.

Lastly, for South-South trade, we also control for the existence of a South-South RTA between trading partners by including a "South-South RTA" dummy set to 1 if *i* and *j* are members of a common regional South-South agreement (0 otherwise).

Before turning to the estimation results, we briefly report some statistics showing the expansion of North-South RTAs over the period 1990-2006. Table 1 provides the number of North-South RTAs and the share of Northern imports from the South covered by these RTAs in 1990, 1999 and 2006. The number of RTAs expanded from 4 in 1990 to 43 in 2006. The share of Northern imports from the South covered by a RTA reached 19.5% in 2006. Furthermore, an increasing number of RTAs include TBT provisions involving the harmonization of technical regulations (21 North-South RTAs in 2006) or conformity assessment procedures (17 North-South RTAs in 2006). A few numbers of RTAs promote the use of regional standards only (6 for the harmonization of technical regulations and 7 for the harmonization of conformity assessment procedures in 2006) and the trade coverage of these RTAs is about 4%. Lastly, one may note that the trade coverage of RTAs promoting the use

of international standards (alone or in addition to regional standards) is decreasing between 1999 and 2006.

Table 1 about here

4. Results

We now present the results. As emphasized above, we expect different impacts of standards harmonization within North-South RTAs on South-North trade and South-South trade. Accordingly, we will first focus on North-South trade and then discuss the results for South-South trade.

4.1 North-South trade

Tables 2 and 3 present an overview of the results for North-South trade. They focus on the imports of the North from the South. Fixed effects for each importing country, exporting country and year are included in the estimations.

The first column of Table 2 simply examines the mean impact of an RTA between a Northern and a Southern country on their bilateral trade. The two partners can pursue deeper integration through the harmonization of their technical regulations, but this is not addressed in the first column, as generally in the literature. The trade impact of such deeper integration is analyzed in column (2) whereby the presence of harmonization of standards is controlled for. Column (3) distinguishes whether, in addition to harmonization, the RTA promotes the use of specific standards. In column (4), we investigate the type of promoted standards (regional vs. international standards). Table 3 replicates columns (2)-(4) of table 2 for conformity assessment procedures.

The overall fit of regressions is consistent with what is found in the literature. The variation over time of exporting and importing countries GDP (remind that we have country

fixed effects controlling for any time invariant country characteristic) has a positive and significant effect on the value traded (2nd stage of the estimation, $p<0.01$), while its influence on the decision to export is less significant (1st stage of the estimation, $p<0.10$). Regarding traditional covariates, distance negatively influences bilateral imports, but common border has no significant trade effect. If we focus on cultural proximity variables, we see that the probability of trade and the value of imports are higher if both countries share a language. The existence of a past colonial relationship has a significant influence on the second stage of the estimation ($p<0.01$). Before we discuss the results on the RTA variables, we should mention that estimated coefficients on GDPs and traditional gravity variables are stable across all specifications.

Regarding RTA variables, column (1) suggests that the existence of a RTA between the Northern importing country and the Southern exporting country increases the value of their bilateral exchanges (intensive margin of margin), while the probability that they trade together (extensive margin of trade) is not affected. A RTA raises trade by a factor of 1.63 (exp[0.49]), everything else held constant.

Column (2) highlights the trade effect of the harmonization of technical regulations between the two partners. The harmonization of technical regulations seems to *cancel* the positive trade effect linked to the signature of the North-South RTA. The estimated coefficient on the variable 'N-S RTA with harmonization of technical regulations' is indeed negative and significant in the first stage of the estimation ($p<0.01$), while it becomes non significant in the second stage. Therefore, a deeper integration through standards harmonization reduces the expected trade benefit of the RTA and we can make a clear distinction between North-South agreements that do not include harmonization and promote North-South trade, and North- South agreements that miss the target of increasing this trade due to the presence of harmonization. As shown in Table 1 this result is not anecdotic: while

only one North-South agreement out of a two was comprising harmonization of technical regulations in 2006, the trade coverage of these agreements was 80% of total North-South trade covered by RTAS.

The RTA may define the standards to which partners shall harmonize. Column (3) shows that a RTA including provisions involving the harmonization and the promotion of standards has no specific impact on trade (results are similar to column (2)). Column (4) suggests that harmonization to regional standards is more trade-impeding than harmonization to international standards. In the first stage estimation, a negative and significant coefficient is obtained in the case of harmonization to regional standards. These results show that the detrimental effect on North-South trade of harmonization contained in North-South RTAs is falling on harmonization of regional standards only. When harmonization authorizes the use of international standards, the negative impact on trade vanishes.

Table 3 deals with conformity assessment procedures instead of technical regulations. Results are very similar to the ones reported in table 2. As for technical regulations, harmonization of conformity assessment procedures reduces the positive trade effect linked to the RTA. Furthermore, this negative effect of harmonization falls again mainly on harmonization to regional standards. Notice that harmonization of standards and of conformity assessment procedures are not two disjointed events (more precisely, the harmonization of technical regulations in N-S RTAs is usually conditional to the harmonization of technical regulations). Out of the 21 agreements comprising harmonization of standards 16 also comprise the harmonization of conformity assessment procedures.

These results suggest that the cost linked to standards harmonization, i.e. the adoption by developing exporters of standards imposed on developed markets is too high for some of these exporters, which are therefore excluded from the market. According to our results, the worst situation for a Southern country in terms of commerce with the North is the signature of

a North-South RTA involving the harmonization of technical regulations or conformity assessment procedures and promoting the use of regional standards only. In such case, the positive effects of trade preferences granted by developed countries on account of the development policy are more than cancelled out.

Tables 2 and 3 about here

4.2 South-South trade

This section analyzes the influence of standards harmonization in North-South RTAs on bilateral trade between Southern countries. Results are reported in Table 4. As previously, importing country, exporting country and year fixed effects are included in all regressions.

We first estimate the determinants of bilateral flows between Southern countries without controlling for the potential existence of RTAs between Southern countries and Northern partners (column (1)). We then investigate the trade impact of North-South RTAs and standards harmonization on South-South trade (columns (2)-(4)). Columns (2) tests for potential diversion effects by investigating the impact on South-South trade of the signature by either the importing and/or the exporting Southern countries of a RTA with the North. Column (3) (respectively (4)) examines the additional trade impact linked to the harmonization of technical regulations (respectively of conformity assessment procedures).

In all estimations, the increase in GDPs of both countries over time generates an increase in the probability of trade (extensive margin) and in the traded value (intensive margin). Distance has a negative and significant impact on trade flows, while common language and past common colonizer increase trade (p<0.01). Furthermore, the dummy variable controlling for the existence of a South-South RTA is positive and significant in both stages of the estimation (p<0.01). Lastly, we may note that the magnitude of coefficients on GDPs and gravity variables estimated for South-South trade are somewhat different from the

ones previously estimated for North-South trade. This upholds the sample divide in two parts (North-South and South-South trade).

Columns (2) highlights that the signature by the importing and/or exporting Southern countries of a RTA with the North tends to reduce the probability of trade with other Southern partners ($p<0.01$ for the exporting and for the importing countries). This result is suggesting the presence of trade diversion effects at the extensive margin of trade. But whether such effect is of the traditional kind or conditional to the presence of harmonization is not controlled at that stage. In terms of traded value (intensive margin of trade), the second-stage estimation interestingly shows that the signature by the exporting country of a RTA with the North increases its bilateral exports to other Southern countries, while no significant effect is observed for the importing country.

Column (3) introduces controls for the harmonization of technical regulations in the North-South agreement signed. Interestingly, results differ between the exporting and importing country. As such, the signature by the exporting country of a RTA involving the harmonization of its standards with the North has a significantly higher negative impact on its probability of exchanges with other Southern countries than previously observed in column (2) (0.04^{a} vs. -0.02^{a}). This result highlights the presence of a new type of trade diversion effect in addition to the traditional one. One explanation is as follows. The harmonization of standards has a cost and increases the price of the products. Such products become too expansive to be exported to other some Southern countries. Results for the importing country are different. The signature of a RTA with the North reduces its probability of imports from other Southern countries (pure trade diversion effect induced by a better access to the Northern market), but the harmonization of technical regulations has no significant impact. Another explanation is that such cost requires an initial investment that may not be easily financed in developing countries due to low level of financial development. For both the

exporting and the importing countries, the harmonization of technical regulations has no effect per se on the intensive margin of trade (the estimated coefficients in the 2nd stage of the estimation are not significantly different from the ones of column (2)).

Finally, the last column deals with the North-South harmonization of conformity assessment procedures. Sign and significance are similar to the ones observed in column (3).

Table 4 about here

5. Conclusion

The purpose of this paper is to study the impact of North-South standards harmonization on the trade integration of Southern countries in the world economy. We distinguish the impact on North-South trade versus South-South trade. Our results suggest that North-South deep integration comprising harmonization of standards may be harmful for South-South trade. Furthermore, our findings also confirm Piermartini and Budetta (2009)'s intuition, i.e. harmonization on a regional basis may lock countries into some RTAs and reinforces the hub-and-spoke trade structure. South-South trade is negatively impacted by harmonization, as South-North trade if harmonization is on regional standards only. These results call for further research, especially at the sector level. One may also explore whether some differences in terms of trade impact are observable between developing and least developed countries.

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Appendix 1: List of Countries Included in the Sample

Northern countries:

Australia
Austria
Belgium-Luxembourg
Canada
Denmark
Finland
France
Germany
Greece
Iceland
Ireland
Italy
Japan
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States

Southern countries:

Afghanistan
Albania
Algeria
Angola
Antigua and Barbuda
Argentina
Armenia
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belize
Benin
Bermuda
Bhutan
Bolivia
Brazil
Brunei Darussalam
Burkina Faso
Burundi
Cambodia
Cameroon
Cape Verde
Central African Republic
Chad
Chile
China
Colombia
Comoros
Congo
Costa Rica
Côte d'Ivoire
Dem. Rep. of the Congo
Djibouti
Dominica
Dominican Republic
East Timor
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Ethiopia
Fiji
Gabon
Gambia
Georgia
Ghana
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong
India
Indonesia
Iran
Iraq
Israel
Jamaica
Jordan
Kazakhstan
Kenya
Kiribati
Korea, Republic of
Kuwait
Kyrgyzstan
Lao People's Dem. Rep.
Lebanon
Liberia
Libyan Arab Jamahiriya
Madagascar
Malawi
Malaysia
Maldives
Mali
Mauritania
Mauritius
Mexico
Moldova, Rep. of
Mongolia
Morocco
Mozambique
Nepal
Nicaragua
Niger
Nigeria
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Qatar
Russian Federation
Rwanda
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
Sao Tome & Principe
Saudi Arabia
Senegal
Seychelles
Sierra Leone
Singapore
Solomon Islands
Somalia
South Africa
Sri Lanka
Sudan
Suriname
Syrian Arab Republic
Tajikistan
Tanzania, United Rep. of
Thailand
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Emirates
Uruguay
Uzbekistan
Vanuatu
Venezuela
Viet Nam
Yemen
Zambia
Zimbabwe

Appendix 2: List of North-South RTAs Included in the Study

Australia – Papua New Guinea (PATCRA)
Canada – Chile
Canada – Costa Rica
Canada – Israel
Dominican Republic – Central America – United States Free Trade Agreement (CAFTA-DR)
EC – Albania
EC – Algeria
EC – Chile
EC – Egypt
EC – Israel
EC – Jordan
EC – Lebanon
EC – Mexico
EC – Morocco
EC – South Africa
EC – Syria
EC – Tunisia
EC – Turkey
EFTA – Chile
EFTA – Israel
EFTA – Jordan
EFTA – Korea, Republic of
EFTA – Mexico
EFTA – Morocco
EFTA – Singapore
EFTA – Tunisia
EFTA – Turkey
Japan – Malaysia
Japan – Mexico
Japan – Singapore
New Zealand – Singapore
North American Free Trade Agreement (NAFTA)
Singapore – Australia
South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA)
Thailand – Australia
Thailand – New Zealand
Trans-Pacific Strategic Economic Partnership
US – Bahrain
US – Chile
US – Israel
US – Jordan
US – Morocco
US – Singapore

Table 1: North-South RTAs and Trade[#] Coverage

	1990		1999		2006	
	Nb	Trade coverage (%)	Nb	Trade coverage (%)	Nb	Trade coverage (%)
RTAs	4	0.4	12	15.8	43	19.5
Of which RTAs with standards harmonization						
Harmonization of technical regulations	0	0	5	14.2	21	15.7
Promotion of the use of regional standards only	0	0	2	2.1	6	3.8
Promotion of the use of international standards (alone or in addition to regional ones)	0	0	2	12.1	12	11.8
Harmonization of conformity assessment procedures	0	0	4	14.1	16	14.7
Promotion of the use of regional standards only	0	0	2	2.1	7	4.0
Promotion of the use of international standards (alone or in addition to regional ones)	0	0	1	12.1	6	10.1

[#]: Northern imports from the South

Table 2: North-South Trade (Technical regulations)

Model	(1)		(2)		(3)		(4)	
	Decision to trade	Trade value	Decision to trade	Trade value	Decision to trade	Trade value	Decision to trade	Trade value
Ln GDP exporting country	0.01[c]	0.59[a]	0.01[c]	0.59[a]	0.01[c]	0.59[a]	0.01[c]	0.59[a]
	(0.008)	(0.06)	(0.008)	(0.06)	(0.008)	(0.06)	(0.008)	(0.06)
Ln GDP importing country	-0.02[c]	0.38[a]	-0.02[c]	0.39[a]	-0.02[c]	0.39[a]	-0.02[c]	0.39[a]
	(0.01)	(0.12)	(0.01)	(0.12)	(0.01)	(0.12)	(0.01)	(0.12)
Ln distance	-0.06[a]	-1.64[a]	-0.06[a]	-1.70[a]	-0.06[a]	-1.70[a]	-0.06[a]	-1.70[a]
	(0.007)	(0.09)	(0.007)	(0.09)	(0.007)	(0.09)	(0.007)	(0.09)
Common border	-0.04	0.30	-0.03	0.29	-0.03	0.29	-0.03	0.28
	(0.03)	(0.70)	(0.03)	(0.68)	(0.03)	(0.68)	(0.03)	(0.68)
Common language	0.04[a]	0.22[b]	0.04[a]	0.23[b]	0.04[a]	0.23[b]	0.04[a]	0.23[b]
	(0.008)	(0.11)	(0.008)	(0.11)	(0.008)	(0.11)	(0.008)	(0.11)
Colonial links	0.007	1.04[a]	0.007	1.04[a]	0.007	1.04[a]	0.007	1.04[a]
	(0.01)	(0.16)	(0.01)	(0.16)	(0.01)	(0.16)	(0.01)	(0.16)
North-South RTA	-0.006	0.49[a]						
	(0.01)	(0.13)						
N-S RTA with harmon. of technical regulations			-0.05[a]	0.03				
			(0.01)	(0.09)				
N-S RTA with harmon. of technical regul. and promotion of specific stds.					-0.05[a]	0.04		
					(0.01)	(0.09)		
N-S RTA with harmon. of technical regul. & promot. of regional stds only							-0.08[a]	-0.07
							(0.01)	(0.14)
N-S RTA with harmon. of technical regul. & promot. of international stds. (alone/ in addition to regional ones)							-0.01	0.16
							(0.02)	(0.11)
Presence at the export market at *t*-3	0.24[a]		0.24[a]		0.24[a]		0.24[a]	
	(0.008)		(0.008)		(0.008)		(0.008)	
Constant	1.52[a]	-2.21	1.51[a]	-1.83	1.51[a]	-1.82	1.52[a]	-1.82
	(0.39)	(3.54)	(0.39)	(3.56)	(0.39)	(3.56)	(0.39)	(3.55)
Mills		-4.62[a]		-4.62[a]		-4.62[a]		-4.62[a]
Observations	40,854	36,160	40,854	36,160	40,854	36,160	40,854	36,160
R^2	0.378	0.760	0.378	0.760	0.378	0.760	0.378	0.760

Note: Fixed effects for each importing country, exporting country, year not reported. Robust standard errors (importing country-exporting country clustered) in parentheses. [a], [b], [c] denote significance at the level of 1, 5, and 10%, respectively.

Table 3: North-South Trade (Conformity assessment procedures)

Model	(1)		(2)		(3)	
	Decision to trade	Trade value	Decision to trade	Trade value	Decision to trade	Trade value
Ln GDP exporting country	0.01[c]	0.59[a]	0.01[c]	0.59[a]	0.01[c]	0.59[a]
	(0.008)	(0.06)	(0.008)	(0.06)	(0.008)	(0.06)
Ln GDP importing country	-0.02[c]	0.39[a]	-0.02[c]	0.39[a]	-0.02[c]	0.39[a]
	(0.01)	(0.12)	(0.01)	(0.12)	(0.01)	(0.12)
Ln distance	-0.06[a]	-1.70[a]	-0.06[a]	-1.70[a]	-0.06[a]	-1.70[a]
	(0.007)	(0.09)	(0.007)	(0.09)	(0.007)	(0.09)
Common border	-0.02	0.29	-0.02	0.29	-0.03	0.28
	(0.03)	(0.68)	(0.03)	(0.68)	(0.03)	(0.68)
Common language	0.04[a]	0.23[b]	0.04[a]	0.23[b]	0.04[a]	0.23[b]
	(0.008)	(0.11)	(0.008)	(0.11)	(0.008)	(0.11)
Colonial links	0.007	1.04[a]	0.007	1.04[a]	0.007	1.04[a]
	(0.01)	(0.16)	(0.01)	(0.16)	(0.01)	(0.16)
North-South RTA						
N-S RTA with harmon. of conform. assessment proced.	-0.07[a]	0.04				
	(0.009)	(0.09)				
N-S RTA with harmon. of conform. assessm. proced. regul. and promotion of specific stds.			-0.07[a]	0.02		
			(0.01)	(0.11)		
N-S RTA with harmon. of conform. assessm. proced. & promot. of regional stds only					-0.08[a]	-0.06
					(0.01)	(0.14)
N-S RTA with harmon. of conform. assessm. proced. & promot. of international stds. (alone or in addition to regional ones)					-0.04[b]	0.17
					(0.02)	(0.13)
Presence at the export market at *t*-3	0.24[a]		0.24[a]		0.24[a]	
	(0.008)		(0.008)		(0.008)	
Constant	1.51[a]	-1.83	1.51[a]	-1.83	1.52[a]	-1.82
	(0.39)	(3.56)	(0.39)	(3.56)	(0.39)	(3.56)
Mills		-4.62[a]		-4.62[a]		-4.62[a]
Observations	40,854	36,160	40,854	36,160	40,854	36,160
R^2	0.378	0.760	0.378	0.760	0.378	0.760

Note: Fixed effects for each importing country, exporting country, year not reported. Robust standard errors (importing country-exporting country clustered) in parentheses. [a], [b], [c] denote significance at the level of 1, 5, and 10%, respectively.

Table 4: South-South Trade

Model	(1)		(2)		(3)		(4)	
	Decision to trade	Trade value	Decision to trade	Trade value	Decision to trade	Trade value	Decision to trade	Trade value
Ln GDP exporting country	0.02[a]	0.21[a]	0.02[a]	0.22[a]	0.02[a]	0.21[a]	0.02[a]	0.21[a]
	(0.004)	(0.04)	(0.004)	(0.04)	(0.004)	(0.04)	(0.005)	(0.04)
Ln GDP importing country	0.03[a]	0.66[a]	0.03[a]	0.65[a]	0.03[a]	0.66[a]	0.03[a]	0.66[a]
	(0.004)	(0.04)	(0.004)	(0.04)	(0.004)	(0.04)	(0.004)	(0.04)
Ln distance	-0.11[a]	-1.36[a]	-0.11[a]	-1.36[a]	-0.11[a]	-1.36[a]	-0.11[a]	-1.36[a]
	(0.003)	(0.03)	(0.003)	(0.03)	(0.003)	(0.03)	(0.003)	(0.03)
Common border	-0.05[a]	0.89[a]	-0.05[a]	0.89[a]	-0.05[a]	0.89[a]	-0.05[a]	0.89[a]
	(0.02)	(0.12)	(0.02)	(0.12)	(0.02)	(0.12)	(0.02)	(0.12)
Common language	0.05[a]	0.58[a]	0.05[a]	0.58[a]	0.05[a]	0.58[a]	0.05[a]	0.58[a]
	(0.005)	(0.05)	(0.005)	(0.05)	(0.005)	(0.05)	(0.005)	(0.05)
Common colonizer	0.05[a]	0.50[a]	0.05[a]	0.50[a]	0.05[a]	0.50[a]	0.05[a]	0.50[a]
	(0.005)	(0.06)	(0.005)	(0.07)	(0.005)	(0.07)	(0.005)	(0.07)
S-S RTA	0.04[a]	0.78[a]	0.04[a]	0.78[a]	0.04[a]	0.78[a]	0.04[a]	0.78[a]
	(0.005)	(0.05)	(0.005)	(0.05)	(0.005)	(0.05)	(0.005)	(0.05)
N-S RTA for the exporting country			-0.02[a]	0.20[a]				
			(0.005)	(0.04)				
N-S RTA for the importing country			-0.04[a]	0.008				
			(0.005)	(0.04)				
N-S RTA with harmon. of tech. regul. for the exporting country					-0.04[a]	0.24[a]		
					(0.005)	(0.04)		
N-S RTA with harmon. of tech. regul. for the importing country					-0.03[a]	0.01		
					(0.006)	(0.05)		
N-S RTA with harm. of conf. assessm. proced. for the exporting country							-0.04[a]	0.24[a]
							(0.006)	(0.04)
N-S RTA with harm. of conf. assessm. proced. for the importing country							-0.04[a]	0.02
							(0.007)	(0.05)
Presence at the export market at *t*-3	0.30[a]		0.30[a]		0.30[a]		0.30[a]	
	(0.004)		(0.004)		(0.004)		(0.004)	
Constant	-0.16	-3.67[a]	-0.12	-3.68[a]	-0.15	-3.69[a]	-0.15	-3.69[a]
	(0.14)	(0.18)	(0.14)	(0.18)	(0.14)	(0.18)	(0.14)	(0.18)
Mills		-3.60[a]		-3.83[a]		-3.69[a]		-3.68[a]
Observations	244,932	111,928	244,932	111,928	244,932	111,928	244,932	111,928
R^2	0.524	0.656	0.525	0.656	0.525	0.656	0.525	0.656

Note: Fixed effects for each importing country, exporting country, year not reported. Robust standard errors (importing country-exporting country clustered) in parentheses. [a], [b], [c] denote significance at the level of 1, 5, and 10%, respectively.

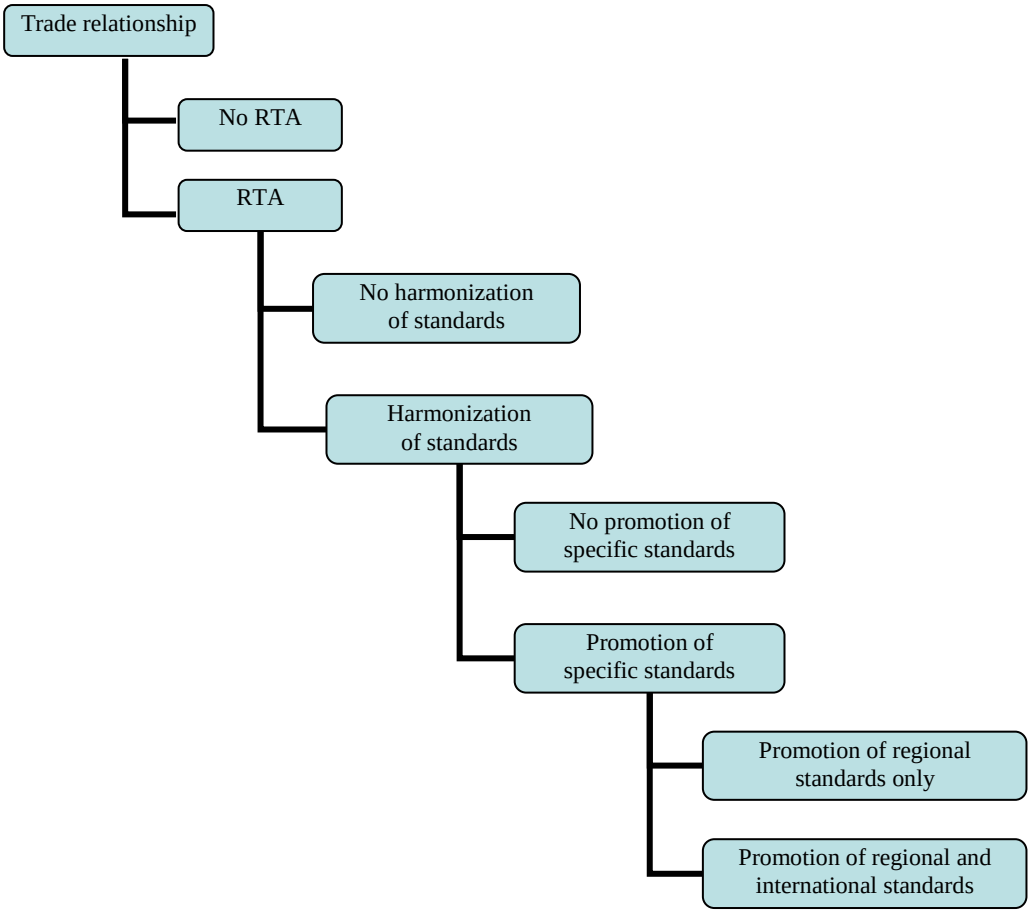

Figure 1: The Different Steps of Integration