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Anne-Célia Disdier, Lionel Fontagné
and Olivier Cadot

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Anne-Célia Disdier, Paris School of Economics-INRA
Lionel Fontagné, Paris School of Economics, European University Institute, and CEPII
Olivier Cadot, Université de Lausanne, FERDI, CEPREMAP and CEPR

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ABSTRACT

North-South Standards Harmonization and International Trade*

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 investigates the effect of standards-harmonization clauses contained in many North-South Agreements on international trade. Using a gravity equation, we find that (i) North-South harmonization of technical regulations reinforces a hub-and-spoke trade structure potentially detrimental to the development of South-South trade and (ii) harmonization on regional standards hurts Southern exports to the North. Thus, standards-harmonization provisions included in many recent North-South RTAs miss their target and contribute to marginalize Southern countries in the world economy.

Anne-Célia Disdier
Paris School of Economics-INRA
48 bd Jourdan
75014 Paris
FRANCE

Lionel Fontagné
Université Paris 1 Panthéon-Sorbonne
106-112 bd de l'Hôpital
75647 Paris Cedex 13
FRANCE

Email:
Anne-Celia.Disdier@ens.fr

Email:
Lionel.Fontagne@univ-paris1.fr

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Olivier Cadot
HEC Lausanne
Université de Lausanne
BFSH1
CH-1015 Lausanne
SWITZERLAND

Email: Olivier.Cadot@unil.ch

1. Introduction

Two statements concerning the changing patterns of trade integration lead to reconsider the impact of specific provisions included in Free Trade Agreements (FTAs) or 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 et al., 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, harmonization on the basis of *regional* standards in North-South RTAs impacts negatively the exports of developing countries to the North. Second, we show that the existence of North-South RTAs hurts *South-South* trade. 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 describes the TBT provisions included in N-S RTAs. Section 4 presents our econometric specification and data. Results are discussed in section 5. We conclude in section 6.

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. TBT provisions in North-South RTAs

To what extent do harmonization clauses in North-South RTAs constrain the regulatory flexibility of Southern countries? There is no single answer to that question, as TBT and SPS harmonization clauses in RTAs vary widely in their intent and wording. Broadly speaking, there is a continuum of degrees of stringency, ranging from agreements where the Northern partner—typically the EU—clearly expects the Southern one to align its domestic regulations, to others with rather loose cooperation clauses.

In cases where FTAs are part of broad-ranging partnerships, they can include strong suggestions that the Southern country should seek to harmonize all of its domestic product regulations on that partner's own regulations and build the necessary institutions. For instance, Article 51 of the European Community (EC)-Morocco FTA states that:

"[t]he Parties shall cooperate in developing: (a) the use of Community rules in standardisation, metrology, quality control and conformity assessment; (b) the updating of Moroccan laboratories, leading eventually to the conclusion of mutual recognition agreements for conformity assessment; (c) the bodies responsible for

intellectual, industrial and commercial property and for standardisation and quality in Morocco.

Article 51 of the EC-Tunisia FTA is identical. Article 40 of the EC-Palestinian Authority FTA contains a harmonization clause worded in similar language: "The objective of cooperation will be to narrow the gap in standards and certification. In practical terms cooperation will take the form of the promotion of the use of Community technical regulations and European standards and conformity assessment procedures." Likewise, Article 68 of the EC-Jordan agreement states that "[c]ooperation in this field will be aimed in particular at: (a) increasing the application of Community rules in the field of standardization, metrology, quality standards, and recognition of conformity". In such cases, it seems to be the intention of EU negotiators to encourage partners to adopt EC regulations even for products aimed at the domestic or other, non-EU export markets.

EU trade agreements with countries with which it has less ambitious cooperation agendas contain less stringent clauses on TBTs, although sometimes one can detect a whiff of the same intention. For instance, Article 18 of the EC-Chile agreement states that "[c]ooperation between the Parties will seek to promote efforts in (a) regulatory cooperation; (b) compatibility of technical regulations on the basis of international *and European standards"* [italics added].

Neither the EC-Mexico nor the EC-Egypt agreements contain any suggestion of that type. Instead, harmonization is expected to take place on the basis of international standards. For instance, Article 19 of the EC-Mexico merely states that the Parties "shall work towards: […] (c) promoting the use of international standards, technical regulations and conformity assessment procedures on the basis of international agreements; (d) facilitating the adoption of their respective standards, technical regulations and conformity assessment procedures on the basis of international requirements." Similar clauses can be found in other North-South

agreements. For instance, Article 705 of the Australia-Thailand FTA states that "[t]he Parties shall, where appropriate, endeavor to work towards harmonization of their respective technical regulations, taking into account relevant international standards, recommendations and guidelines, in accordance with their international rights and obligations." However, there is a nuance in the scope of harmonization. In the latter case (Australia-Thailand), Chapter 7, to which Article 705 belongs, applies to "all goods traded between the parties", implying that goods not traded bilaterally could potentially remain uncovered; whereas no such scope limitation can be found in the EC-Mexico clause on harmonization. Therefore, if one accepts the idea that, even when the letter of the agreement does not prescribe convergence on the Northern standard, de facto this is what is likely to happen, the EC-Mexico harmonization clause can be taken as more encompassing than the Australia-Thailand one which leaves regulations that are irrelevant to *bilateral* trade outside of the agreement's scope. Similar scope limitations can be found e.g. in Article 7.2 of the US-CAFTA (Dominican Republic – Central America) agreement and in Article 7.1 of the US-Bahrain agreement.

Whether or not Southern alignment on Northern regulations is explicitly called for in the text of the agreement, we will assume in the rest of this paper that the ability of Southern producers to freely choose their technical specifications is always constrained, one way or another, by the existence of a TBT harmonization clause in a North-South FTA. When the harmonization of domestic regulations is not explicitly called for, the argument is essentially one about production lines—that once the Southern-based producer has been forced to adapt its production processes to Northern regulations for products bound for that market, it is likely to adopt the same processes for all of its production in order to avoid unnecessary complications. When those processes are costlier on account of stringent Northern regulations, one can expect the Southern country's trade flows to be affected with all partners. This is what we test.

4. Econometric specification and data

4.1 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.

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[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.

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 the Poisson estimator suggested by Santos Silva and Tenreyro (2006). This specification deals adequately with the zero-value observations, since the dependent variable is measured in levels. Furthermore, it provides estimates that are comparable to elasticity estimates from the standard linear-in-logs specification and corrects for the heteroskedasticity in the error terms.

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 and year (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 also control for the potential endogeneity of RTAs by using country-pair fixed effects (Baier and Bergstrand, 2007; Anderson and Yotov, 2011). 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.

4.2 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). To avoid the potential bias associated with fixed effects estimations on data pooled over consecutive years (Anderson and Yotov, 2011), we use only the years 1991, 1994, 1997, 2000, 2003 and 2006.

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 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

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[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.

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. According to the WTO definition, compliance with a technical regulation is mandatory. Importantly, we must disentangle the impact of the North-South RTA as such from the inclusion of provisions on technical regulations in it. That is, we have a "treatment" that 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:

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 harmonization of technical regulations.
- We then investigate whether, in addition to the harmonization, the common North-South RTA promotes the use of some regional and/or international standards. Two

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

dummies are built: a first dummy takes the value 1 if the RTA promotes the use of regional standards (0 otherwise); the second dummy is set to one if the RTA promotes the use of international standards (0 otherwise).

The different treatments (presence of a RTA, harmonization of standards, and promotion of specific standards) are included consecutively 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.

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.

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

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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). A few numbers of RTAs promote the use of regional standards only (6 in 2006) and the trade coverage of these RTAs is about 3.8%. 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

5. 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.

5.1 North-South trade

Table 2 presents an overview of the results for North-South trade. It focuses on the imports of the North from the South.

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 main issue here is the necessary control for unobserved relative prices when it comes to explaining bilateral trade. Baldwin and Taglioni (2006) refer to this as the "the gold medal of classic gravity model mistakes", namely the fact that the bilateral trade costs used as regressors in the estimated equation are correlated with the omitted variable since trade costs enter into these unobserved prices. To

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control for this issue, column (1) includes exporting country, importing country and year fixed effects. Baldwin and Taglioni (2006) show, however, that in the case of panel data, time-invariant country fixed effects are not sufficient to remove all the related bias: the cross-section bias will be removed but not the time-series bias. To remove the latter, column (2) interacts our country fixed effects with year dummies. Column (2) also controls for the endogeneity of RTAs by including country-pair fixed effects (Baier and Bergstrand, 2007).

The two partners can pursue deeper integration through the harmonization of their technical regulations, but this is not addressed in the first and second columns, as generally in the literature. The trade impact of such deeper integration is analyzed in column (3) whereby the presence of harmonization of standards is controlled for. Column (4) distinguishes whether, in addition to harmonization, the RTA promotes the use of specific standards (regional vs. international standards).

The overall fit of regressions is consistent with what is found in the literature. Regarding traditional covariates (column 1), distance negatively influences bilateral imports, while common border has a positive trade effect. If we focus on cultural proximity variables, we see that imports are higher if both countries share a language. The existence of a past colonial relationship has no significant influence.

Regarding RTA variables, column (1) suggests that the existence of a RTA between the Northern importing country and the Southern exporting country increases their bilateral exchanges. A RTA raises trade by a factor of 1.36 (exp[0.31]), everything else held constant. Column (2) shows that the positive trade effect of RTAs is in fact largely due to an endogeneity bias. Once this bias is controlled for (by the inclusion of country-pair fixed effects), the estimated coefficient on RTAs becomes not significant. This result suggests that North-South RTAs are signed between countries that already traded a lot together.

Column (3) highlights the trade effect of the harmonization of technical regulations between the two partners. Once we control for standards harmonization, the effects of trade preferences granted by developed countries to Southern partners through the RTA become negative. However, the estimated coefficient is significant only at the 10 percent level. The effect of standards harmonization is positive ($p<0.10$). Therefore, a deeper integration through standards harmonization seems to increase the expected trade benefit of the RTA.

The RTA may define the standards to which partners shall harmonize. Column (4) suggests that harmonization to regional standards is trade-impeding, while harmonization to international standards is trade-enhancing. 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.

These results suggest that the cost linked to standards harmonization on a *regional* basis, i.e. the adoption by developing exporters of standards imposed on some 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 and promoting the use of regional standards. In such case, the positive effects of trade preferences granted by developed countries on account of the development policy are more than cancelled out.

Table 2 about here

5.2 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 3. 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 2-5). Columns (2) and (4) test 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. Columns (3) and (5) examine the additional trade impact linked to the harmonization of technical regulations.

In all estimations, distance has a negative and significant impact on trade flows, while common border, common language and past common colonizer increase trade ($p<0.01$ for contiguity and common language and $p<0.1$ for colonial links). Furthermore, the dummy variable controlling for the existence of a South-South RTA is not significant. This result is not very surprising since many South-South RTAs are not really effective in promoting trade between members. Lastly, we may note that the magnitude of coefficients on 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 trade flows 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. But whether such effect is of the traditional kind or conditional to the presence of standards harmonization is not controlled at that stage.

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 negative and significant impact on its exchanges with other Southern countries, while the significant effect observed in the previous column on the variable 'North-South RTA for the exporting country' disappears. This result highlights the presence of a new type of trade diversion effect. 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 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.

Columns (4) and (5) investigate the impact on South-South trade of the signature by either one (exporting country vs. importing country) or both Southern partners of a RTA with the North. In cases where only one country has signed, previous conclusions remain observed. Interestingly, in cases where both Southern countries have signed RTAs with the North, results suggest the presence of traditional trade diversion effects only. The standards harmonization has no significant trade impact.

Table 3 about here

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6. 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. 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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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 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

[#]: Northern imports from the South

Table 2: North-South Trade

Dependent variable	Bilateral imports of the Northern country from the Southern partner			
Specification	Poisson maximum likelihood			
Years	1991006 (every 3 years)			
Model	(1)	(2)	(3)	(4)
Ln distance	-0.59^a (0.10)			
Common border	1.40^a (0.34)			
Common language	0.41^a (0.13)			
Past colonial links	0.11 (0.19)			
North-South RTA	0.31^b (0.13)	-0.05 (0.07)	-0.17^c (0.09)	-0.15^c (0.09)
N-S RTA with standards harmonization			0.20^c (0.12)	
N-S RTA with standards harmonization and promotion of regional standards				-0.26^b (0.11)
N-S RTA with standards harmonization and promotion of international standards				0.32^a (0.11)
Observations	18,304	18,045	18,045	18,045
R²	0.881	0.995	0.995	0.996
FE exporting country	Yes			
FE importing country	Yes			
FE year	Yes			
FE exporting country X year		Yes	Yes	Yes
FE importing country X year		Yes	Yes	Yes
FE dyad		Yes	Yes	Yes

Note: Constant and fixed effects 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: South-South Trade

Dependent variable	Bilateral imports between Southern countries				
Specification	Poisson maximum likelihood				
Years	1991-2006 (every 3 years)				
Model	(1)	(2)	(3)	(4)	(5)
Ln distance	-0.78[a]	-0.78[a]	-0.78[a]	-0.78[a]	-0.78[a]
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Common border	0.67[a]	0.66[a]	0.66[a]	0.68[a]	0.68[a]
	(0.14)	(0.14)	(0.14)	(0.15)	(0.15)
Common language	0.42[a]	0.42[a]	0.42[a]	0.41[a]	0.41[a]
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Past common colonizer	0.26[c]	0.25[c]	0.25[c]	0.26[c]	0.26[c]
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
South-South RTA	0.08	0.08	0.08	0.07	0.07
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
N-S RTA for the exporting country		-0.29[a]	-0.12		
		(0.07)	(0.08)		
N-S RTA for the importing country		-0.22[a]	-0.26[a]		
		(0.07)	(0.10)		
N-S RTA for the exporting country only				-0.24[a]	-0.09
				(0.07)	(0.09)
N-S RTA for the importing country only				-0.17[b]	-0.24[b]
				(0.07)	(0.11)
N-S RTA for both countries				-0.59[a]	-0.42[a]
				(0.13)	(0.14)
N-S RTA x standards harmonization with the North for the exporting country			-0.18[b]		
			(0.08)		
N-S RTA x standards harmonization with the North for the importing country			0.05		
			(0.10)		
N-S RTA x standards harmonization with the North for the exporting country only					-0.15[c]
					(0.09)
N-S RTA x standards harmonization with the North for the importing country only					0.07
					(0.10)
N-S RTA x standards harmonization with the North for both countries					-0.18
					(0.16)
Observations	114,702	114,702	114,702	114,702	114,702
R²	0.877	0.877	0.877	0.878	0.878
FE exporting country	Yes	Yes	Yes	Yes	Yes
FE importing country	Yes	Yes	Yes	Yes	Yes
FE year	Yes	Yes	Yes	Yes	Yes

Note: Constant and fixed effects 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.
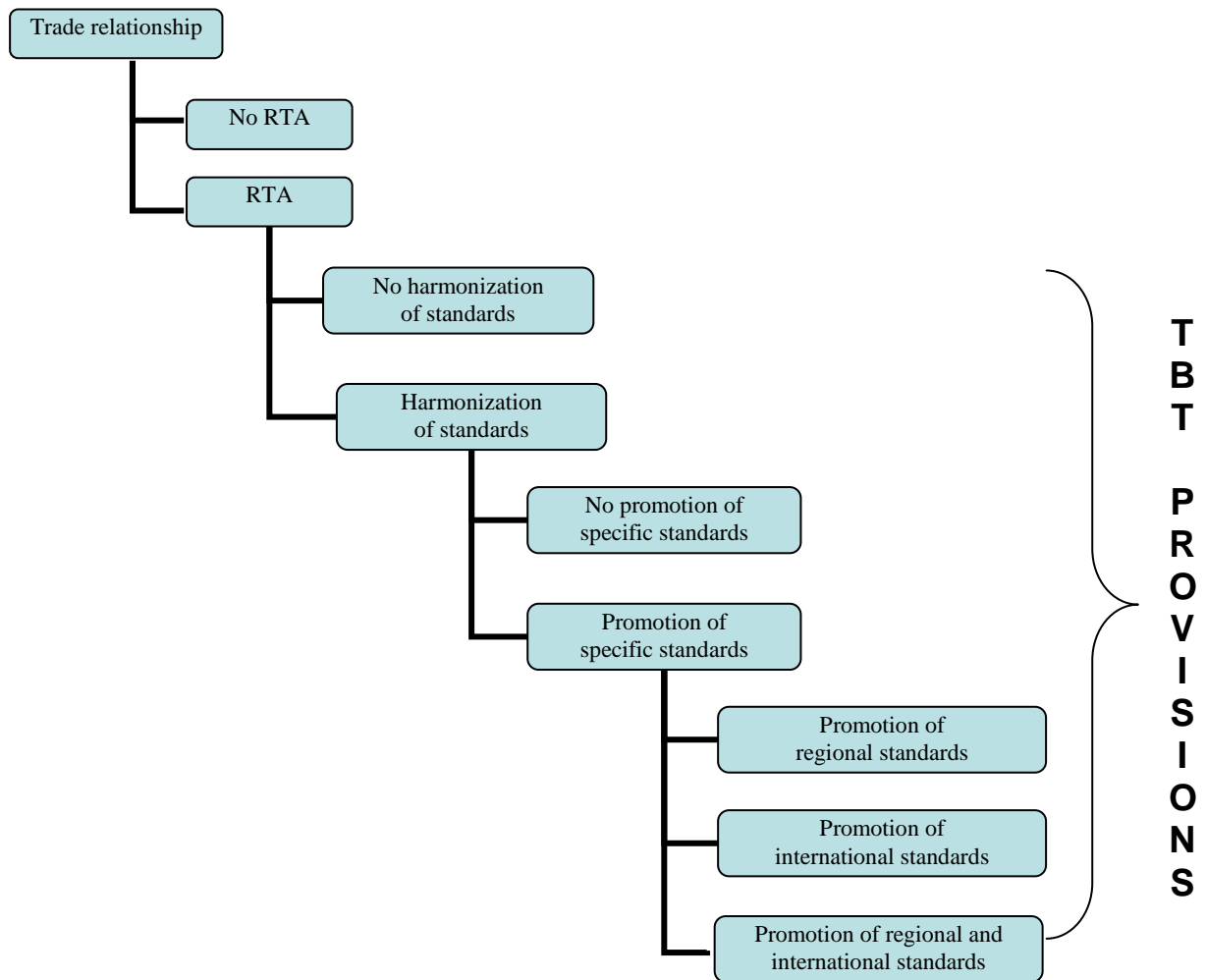
Figure 1: The Different Steps of Integration

Appendix 1: List of Countries Included in the Sample

Northern countries:

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

Southern countries:

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