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North-South Standards Harmonization and International Trade

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For sustainable and inclusive world development

North-South Standards Harmonization and International Trade

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Abstract

Recent years have seen a surge in economic integration agreements (EIAs) and the development of non-tariff measures (NTMs). As a consequence, a growing number of EIAs include provisions on NTMs. This paper focuses on provisions on technical regulations. 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: Economic integration agreement, technical provisions, harmonization, hub-and-spoke trade structure

JEL Codes: F13, F15, O19

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1. Introduction

Two emerging features of the changing patterns of trade integration suggest that the impact of specific provisions included in Economic Integration Agreements (EIAs) should be reconsidered from a broader perspective than traditional trade diversion and creation. 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 argued that progress is more easily achieved within EIAs when it comes to deep trade liberalization, the multilateral scene having become too heterogeneous to converge easily on ambitious and mutually beneficial liberalization agendas. These two trends reinforce each other: It is partly because the agenda of trade negotiations has shifted from tariffs to more complex issues that progress has become increasingly difficult in the multilateral arena; EIAs offer a more versatile negotiating environment.

Seen this way, EIAs have become vehicles to open up ambitious negotiation agendas covering a wide range of border and behind-the-border measures, and whose trade impact can no longer be viewed through the traditional lens of trade creation and trade diversion. Non-tariff measures and their harmonization, including (inter alia) product standards and sanitary and phytosanitary (SPS) measures, feature prominently in those agendas, albeit with varying degrees of success in terms of real achievements.

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 EIAs. The existing literature (see, among others, Czubala et al., 2009; Moenius, 2004, Henry de Frahan and Vancauteran, 2006) focuses on the trade effects of standards – often distinguishing between country-specific and internationally-harmonized standards – but does not examine whether these effects interact with the presence of EIAs.

A first issue relating to the inclusion of standards provisions in EIAs concerns integration among high-income countries; namely, whether the mutual recognition of standards leads to different outcomes than their harmonization. Chen and Mattoo (2008) show that both standards harmonization and their mutual recognition (with or without rules of origin) raise significantly the probability and 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.

A second set of issues arises with North-South agreements. Here the tension between liberalizing trade and introducing new distortions is even greater. As technical regulations are typically more stringent in high-income countries, either *de jure* or *de facto* (through stricter enforcement), what is at stake in such EIAs is a convergence of standards to the more stringent Northern ones and their adoption by developing countries. There is 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 how the adoption of Northern standards by Southern countries—when they manage to match them—affects trade patterns remains an open question. It is this question we address here.

Notwithstanding the standard divide, compliance of the Southern partner with Northern standards in an EIA can confer indirect benefits by raising the quality of exported products and encouraging improved management and production processes (see Maertens and Swinnen, 2009, for an example in Senegalese agriculture). But this typically will come at a cost—even if that cost is sometimes reduced by technical-assistance programs such as the European Pesticides Initiative Program—and the higher cost and changed market positioning may price those exports out of other Southern markets. The Southern partner will then

redirect its exports to the Northern partner, a trade deflection that may hurt actual or potential South-South trade.

How large is this trade deflection is an empirical question that depends, *inter alia*, on how specific and stringent the standards are. When the Northern partner's standard is idiosyncratic (national or regional), the Southern partner's adaptation to that particular standard may make it costlier to produce also for other markets with different standards, or at least may not help on those markets. For instance, adopting a standard imposed by the European Union (EU) does not necessarily facilitate clearance of the product in the United States (US). This effect may be mitigated when harmonization takes place on the basis of international standards. Although there is no theoretical argument establishing a cost hierarchy to standards, and regional standards are not necessarily costlier to implement than international ones, a number of papers (see e.g. Otsuki et al., 2001; Wilson and Otsuki, 2004) have shown empirically that international standards are less trade-inhibiting than domestic or regional ones, having a smaller negative trade impact and even, in some cases, a positive one.¹

The main objective of our paper is accordingly to assess whether the liberalization of technical barriers to trade (TBTs) in North-South EIAs contributes to reinforce hub-and-spoke trade patterns centered around large Northern blocs, potentially damaging for South-South trade integration. Put differently, the hypothesis is that, as a result of the deep integration associated with standards provisions included in the EIA, the Southern partners' trade expands with the North, but at the expense of their trade with non-bloc Southern partners.

Unlike classical trade diversion, the trade deflection we study in this paper has theoretically ambiguous welfare implications for two main reasons. First, to the extent that the

¹ However, there are counterexamples where even international standards impose adaptation costs that stifle trade; for instance, Jensen and Keyser (2012) show how the adoption by the East African Community of dairy standards based on the international *Codex Alimentarius* led to requirements so tight that regional trade in dairy products was largely stifled.

Southern partner's producers adapt their entire production processes to Northern standards, negative externalities on health or the environment may be reduced, with positive welfare effects. Such concerns are important for agricultural and food products, and we replicate our exercise for manufactured products in order to downplay this concern. Second, even abstracting from externality arguments, it is difficult to ascertain, without making additional assumptions, why the adoption of a Northern standard (say, a certain plug design) inducing trade deflection toward that market would necessarily be welfare-reducing for the Southern partner. Against this background, we will limit our analysis to trade patterns and refrain from drawing welfare implications.

We use a standard theoretically founded gravity framework to investigate systematically how provisions on standards included in North-South EIAs impact international trade. This equation is estimated for trade in goods as a whole and for manufactured products only. The identification of classical trade-diversion effects in a gravity equation relies on changes in bilateral *import* patterns for trade bloc's members (see e.g. Carrère, 2006). In contrast, our identification of deflection effects relies on changes in bilateral *export* flows between two Southern countries when one of them belongs to a North-South trade bloc. Our conjecture therefore relies on a cost-raising effect rather than a tariff-preference effect.

Empirical results provide strong support to our conjecture. The existence of North-South EIAs hurts South-South trade, and does so even more in the presence of standards harmonization. Moreover, contrary to expectations, harmonization on the basis of *regional* standards in North-South EIAs impacts negatively the exports of developing countries to the North. Taken together, both results suggest that standard harmonization provisions included in North-South EIAs hardly reinforces the export potential of Southern countries.

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 North-South EIAs. Section 4 presents our econometric specification and data. Results are discussed in section 5. We conclude in section 6.

2. Literature review

In an early contribution, Baldwin (2000) examined different routes towards standard liberalization and argued that mutual recognition among developed countries could well lead to a two-tier international trade system with developing countries in the second tier. Since then, the literature, mostly empirical, has developed along two strands.

A first strand examines standards provisions in several EIAs and investigates whether they go beyond the World Trade Organization (WTO) Agreement on TBT. These papers do not quantify the trade impact of this regional liberalization. Covering 28 EIAs where the EU or the 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 EIAs with TBT provisions. They carefully analyze the legal text of these EIAs and scrutinize whether the TBT 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 conformity assessment procedures. Moreover, EIAs signed by the US promote mutual recognition of conformity

assessment procedures, whereas EIAs signed by the EU also often promote further harmonization of technical regulations. In view of this last observation, Piermartini and Budetta (2009) raise the issue of whether regional harmonization may not lock countries into EIAs, hampering multilateral trade liberalization, although they do not test their conjecture. Lesser (2007) extends Piermartini and Budetta (2009)'s mapping to 82 EIAs, with a special focus on Chile, Singapore and Morocco.

A second strand of the literature seeks to quantify the trade effects of agreements covering standards and uncovers potentially damaging effects for developing countries, in accordance with Baldwin's intuition. Chen and Mattoo (2008) examine regional standards liberalization through harmonization and mutual recognition agreements between industrial countries, controlling for the presence of rules of origin in the latter case. On the basis of a sample covering disaggregated manufacturing trade flows between 42 countries (28 OECD and 14 non-OECD countries) over 1986-2000, they find that harmonization fosters trade between member countries but reduces it with the rest of the world. Mutual recognition with rules of origin has a qualitatively similar effect, while mutual recognition without rules of origin raises trade both within and outside the bloc.

Baller (2007) studies the trade impact on both member and non-member countries of TBT liberalization through mutual-recognition and harmonization agreements. Her analysis includes North-North, North-South and South-South agreements and uses a two-stage gravity estimation for two sectors: Telecom equipment and medical devices. She finds that mutual-recognition agreements significantly raise the probability and volume of trade for member countries. Interestingly, third-party *developed* countries outside the bloc also benefit from harmonization, whereas third-party *developing* countries do not.

Reyes (2011, 2012) provides a possible explanation for Baller's result. Using detailed firm-level data, he shows that the harmonization of the EU's electronics standards on

international ones in the 1990s induced entry by new US exporters, making the market more competitive and encouraging trade (in this case, with a Northern non-member). However, this change in market structure was accompanied by a retrenchment by Southern exporters on the EU markets, thus hurting trade with Southern non-members. It is difficult to ascertain the mechanism that induced this substitution, but one conjecture is that the EU market became tougher, inducing the exit of weaker Southern players.

Note that the presence of standards arrangement does not necessarily flank EIAs. For instance, the EU and US have agreed to mutual recognition of pharmaceutical products without this being part of an FTA. The agreement's objective is 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 mutual recognition agreement harmed third-country exports, irrespective of their level of development.

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' exports, 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 the world economy, remains an open issue.

3. TBT provisions in North-South EIAs

To what extent do harmonization clauses in North-South EIAs constrain the regulatory flexibility of Southern countries? There is no single answer to that question, as TBT harmonization clauses in EIAs vary widely in their intent and wording. Broadly speaking, there is a continuum of degrees of stringency, ranging from agreements where the Northern partner clearly expects the Southern one to align its domestic regulations, to others with rather loose cooperation clauses. This diversity suggests that Northern countries do not have "RTA

models” that they tend to negotiate with all their Southern partners. Even EU negotiators, notwithstanding their clear view of what deep integration means, adjust their requests to local conditions.

In cases where EIAs 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 EIA 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 EIA is identical. Article 40 of the EC-Palestinian Authority EIA 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.” 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 EIA 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 EIA. 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 EIAs 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.² Producers operating under increasing returns in each country

² 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

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:

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

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. Helpman et al. (2008) also develop a two-stage estimation procedure which accounts for both the extensive (decision to export from i to j) and the intensive (volume of exports conditional on exporting) margins of trade. While this approach offers a better understanding of the determinants of trade flows, it provides biased estimates in the presence of heteroskedasticity in trade data (Santos Silva and Tenreyro, 2009). The RESET test (Ramsey, 1969) performed on our data suggests the presence of heteroskedasticity in our sample. Therefore to avoid biased estimation results, we use the Poisson estimator suggested by Santos Silva and Tenreyro (2006). The Poisson estimator provides estimates that are comparable to elasticity estimates from the standard linear-in-logs specification and corrects for heteroskedasticity in the error term. The performance of the Poisson estimator has been challenged in the literature on the ground that

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.

Santos Silva and Tenreyro's 2006 paper was not considering the case where the dependent variable has a substantial proportion of zero values. However, Santos Silva and Tenreyro (2011) show that even in the presence of many zeroes, the Poisson estimator is well behaved. In addition, our data are aggregated, which reduces the proportion of zeroes in our sample.

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 (Baldwin and Taglioni, 2006; Feenstra, 2004). 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 EIAs by using country-pair fixed effects (Anderson and Yotov, 2011; Baier and Bergstrand, 2007). Another source of bias could be the potential dependence between some EIAs. However, as shown in section 3, there is a great diversity in the TBT harmonization clauses included in EIAs, suggesting that Northern countries (the EU, the US, etc.) do not negotiate the same provisions on standards harmonization with all their Southern partners. Therefore, this potential bias is not likely to be at play in our analysis. Lastly, 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.³ Our dependent variable is the *total* bilateral imports of country j from country i in year t (x_{ijt}). Note that in BACI flows are reconciled and that such value is equal to exports from i to j in t . 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 (d_{ij}). These distances are extracted from the CEPII database.⁴ In addition, we include a dummy variable for contiguity ($cbord_{ij}$) 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 ($clang_{ij}$) or if both partners have had a colonial relationship ($colony_{ij}$). 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 EIAs 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.⁵ North-North relations are dropped. The list of Northern and Southern countries is given in Appendix A.

³ <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).

⁴ <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 (Mayer and Zignago, 2011).

⁵ In addition, a Chow test suggests that estimated coefficients on both sub-samples differ significantly and confirms this divide.

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 EIA. The full list of North-South EIAs considered in our exercise is provided in Appendix B. We cover 43 EIAs. We use the template provided by Piermartini and Budetta (2009) and update it by adding some recent North-South EIAs they did not review. For each EIA, we focus on provisions on technical regulations. According to the WTO definition, compliance with a technical regulation is mandatory. To build their template, Piermartini and Budetta (2009) focus on the legal text of the Agreements⁶ and scrutinize the wording. Expressions inviting parties to ‘bridge the gap’, ‘reduce divergence’ or ‘make compatible’ their standards and technical regulations indicate that the policy adopted is harmonization. Importantly, we must disentangle the impact of the North-South EIA 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 EIA, EIA with standards harmonization, EIA 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 EIA” 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 EIA includes a TBT provision involving harmonization of technical regulations.

⁶ The database on EIAs maintained by Baier and Bergstrand (<http://www.nd.edu/~jbergstr/>) also provides detailed and useful information on EIAs and links to the legal text of the Agreements.

- We then investigate whether, in addition to the harmonization, the common North-South EIA promotes the use of some regional and/or international standards. Two dummies are built: a first dummy takes the value 1 if the EIA promotes the use of regional standards (0 otherwise); the second dummy is set to one if the EIA promotes the use of international standards (0 otherwise).

The different treatments (presence of an EIA, 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 an EIA and the promotion of specific standards is conditional to the presence of an EIA 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 an EIA with a country in the North. This control allows us to test for trade diversion.

Treatment intensity/form:

- We control whether the EIA 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 EIA between trading partners by including a “South-South EIA” dummy set to 1 if i and j are members of a common regional South-South agreement (0 otherwise).

Our estimated equation is therefore as follows:

$$x_{ijt} = \exp(\mu_i fe_i + \mu_j fe_j + \mu_t fe_t + \mu_{ji} fe_{ij} + \delta_1 \ln d_{ij} + \delta_2 cbord_{ij} + \delta_3 clang_{ij} + \delta_4 colony_{ij} + \delta_5 \mathbf{EIAs}_{ijt}) \eta_{ijt} \quad (2)$$

where x_{ijt} is the dollar value of country j 's imports from country i in year t , fe_i and fe_j are the importer and exporter fixed effects, fe_t the time fixed effects, and fe_{ij} the country-pair fixed effects. d_{ij} is the bilateral distance, $cbord_{ij}$, $clang_{ij}$ and $colony_{ij}$ are dummies to control for common border, common language and past colonial links. \mathbf{EIAs}_{ijt} is the vector of dummies accounting for the presence of EIAs and for the provisions on standards harmonization included in these EIAs. The vector δ_5 represents the estimated coefficients on these variables. Our estimations pick up the “average treatment” effects (and not the general equilibrium effects). $\eta_{ijt} \equiv \exp(u_{ijt})$, with u_{ijt} the error term.

Before turning to the estimation results, we briefly report some statistics showing the expansion of North-South EIAs over the period 1990-2006. Table 1 provides the number of North-South EIAs and the share of Northern imports from the South covered by these EIAs in 1990, 1999 and 2006. The number of EIAs expanded from 4 in 1990 to 43 in 2006. The share of Northern imports from the South covered by an EIA reached 19.5% in 2006. Furthermore, an increasing number of EIAs include TBT provisions involving the harmonization of technical regulations (21 North-South EIAs in 2006). A few numbers of EIAs promote the use of regional standards only (6 in 2006) and the trade coverage of these EIAs is about 3.8%. Lastly, one may note that the trade coverage of EIAs 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 EIAs 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 EIA 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 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 EIAs 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 EIA 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 EIA variables, column (1) suggests that the existence of an EIA between the Northern importing country and the Southern exporting country increases their bilateral exchanges. An EIA raises trade by a factor of 1.36 ($\exp[0.31]$), everything else held constant. Column (2) shows that the positive trade effect of EIAs 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 EIAs becomes not significant. This result suggests that North-South EIAs 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 EIA become negative. While the estimated coefficient is significant only at the 10 percent level and should therefore be taken with caution, a simple explanation arises. There is a redistribution of market shares between countries having engaged in standard harmonization and other exporters from the South, still preferred but having missed such move. 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 EIA.

The EIA 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 EIAs is falling on harmonization of regional standards only. When harmonization authorizes the use of international standards, the negative impact on trade vanishes. Interestingly, the combined effect of the North-South EIA and the harmonization on international standards is positive, equal to 0.17 and significant at the 5 percent level.

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 EIA involving the harmonization of technical regulations and promoting the use of regional standards. Assuming a unit price elasticity of import demand, the ad valorem equivalent (AVE) is 29.7%.⁷ That is, the inhibiting trade effect of a North-South EIA promoting the use of regional standards is equivalent to a tariff at a whopping 29.7%. In such case, the positive effects of trade preferences granted by developed countries on account of the development policy are more than cancelled out.

Lastly, columns (5) and (6) provide results of two robustness checks. We first restrict our sample to trade in manufactured products (column 5). Our focus in this paper is on the provisions on TBTs in EIAs. TBTs are with sanitary and phytosanitary measures the two main types of non-tariff measures. If sanitary and phytosanitary measures mainly affect agricultural products, TBTs are usually applied on manufactured goods. We therefore check whether our results are robust to the exclusion of agricultural trade flows from our sample. Results in

⁷ The ad valorem equivalent is $\exp(-\beta/\varepsilon)-1$, where β is the estimated coefficient and ε the price elasticity of import demand (in algebraic form, ie negative). The average price elasticity of imports, over all goods and countries, is estimated by Kee et al. (2008) at -3.12 at HS6 and -1.1 at ISIC3. As we are dealing with aggregate flows here, the lower value estimated by Kee et al. at the more aggregate level (ISIC3) where substitution possibilities are reduced, is more plausible.

columns (4) and (5) are very similar, suggesting that the exclusion of agricultural products from our sample, which are less affected by TBTs, does not change our results.

Our second robustness check deals with the lagged terms-of-trade effects of EIA and TBT harmonization. As shown by Baier and Bergstrand (2007), almost every trade agreement has a phase-in period and their trade effects could therefore not be totally captured in the concurrent year only. We therefore allow for gradual phasing-in of EIA and standard harmonization by including one lag for these variables in the estimation. Results are presented in column (6). We report the total trade effect by summing the value of the coefficients on the dummy for the concurrent year and on the lag. Standard errors are computed with the Delta method. This last estimation confirms our previous conclusions. Harmonization to regional standards is trade-impeding, while harmonization to international standards enhances trade.

Table 2 about here

5.2 South-South trade

This section analyzes the influence of standards harmonization in North-South EIAs 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 EIAs between Southern countries and Northern partners (column 1). We then investigate the trade impact of North-South EIAs 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 an EIA with the North.

Columns (3) and (5) examine the additional trade impact linked to the harmonization of technical regulations.

Traditional trade-diversion effects may arise from the simple elimination of intra-bloc tariffs, especially if the Southern partner has high MFN tariffs. They will be reinforced in rare cases where the North-South agreement is a customs union (CU) causing the Southern country to raise its external tariff. The only example of a North-South CU in our database is Turkey with the EU. With the exception of agricultural products, the low level of EU tariffs however guarantees that this effect has hardly played a role. As for the effect of agricultural products, our results are robust when limited to trade in manufactured products. Traditional trade-diversion effects would be picked up in our specification by dummy variables marking bilateral flows where the *importer* belongs to a NS EIA (“NS EIA for the importing country”, or “NS EIA for the importing country only”).

By contrast, the trade-deflection effects we are exploring here would be picked up by dummy variables marking bilateral flows where the *exporter* belongs to a NS EIA with harmonization of standards, since it is the exporter who would suffer from additional production costs as a result of the harmonization. These dummies, which are included in specifications (3), (5) and (6), are labeled “NS EIA with standards harmonization with the North for the exporting country” (or for the exporting country only).

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 EIA is not significant. This result is not very surprising since many South-South EIAs have not proved very effective in promoting trade between members (see e.g. Yang and Gupta, 2005, for Africa or Baldwin, 2008, for Asia). 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 an EIA 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. This estimation is our preferred one. Interestingly, results differ between the exporting and importing country. As such, the signature by the *exporting country* of an EIA 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 EIA for the exporting country’ disappears. This result highlights the presence of the type of trade deflection we have been discussing in this paper. One explanation is as follows. The harmonization of standards has a cost and increases the price of the products. Such products become too expensive to be exported to some other Southern countries. The AVE is 19.7% under the assumption of a unit price elasticity. That is, a Southern country signing an EIA with a Northern partner involving the harmonization of technical regulations imposes a negative trade-deflection effect on its Southern partners equal to a 19.7% tariff, a very large effect.

Results for the *importing country* are different. The signature of an EIA 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.

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 an EIA with the North. In cases where only one country has signed, previous conclusions remain observed. Interestingly, in cases where both Southern countries have signed EIAs with the North, results suggest the presence of traditional trade diversion effects only. The standards harmonization has no significant trade impact.

The two last columns of table 3 report robustness checks' results. These tests replicate the estimation of column (3), which is our preferred specification. Column (6) indicates that our results are not affected by the exclusion of agricultural products, which are less subject to TBTs than manufactured products, from our sample.

Lastly, the inclusion of a lag in the estimation (column 7) tends to reinforce our previous conclusions. The estimated coefficient on the variable capturing the harmonization on Northern standards in the exporting country is now stronger (-0.35 vs. -0.18) and significant at the one percent level. Therefore, standard harmonization in the exporting country has statistically significant lagged effects, which reinforce the trade diversion between Southern countries and the hub-and-spoke trade structure previously highlighted.

Our results suggest that the trade deflection observed here may be at least partly a quality upgrading effect. As Southern exporters adopt Northern standards, they move up the quality ladder and redirect their exports towards markets with richer consumers. However, our results rule out such interpretation for the adoption of regional standards. In the case of international standards, the question remains open. However, the aggregated data used here does not allow us to further investigate this issue, as unit values (a proxy for quality) must be computed at the very detailed level of the product classification.

Table 3 about here

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 EIAs 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 EIAs and Trade^a Coverage

	1990		1999		2006	
	Nb	Trade coverage (%)	Nb	Trade coverage (%)	Nb	Trade coverage (%)
EIAs	4	0.4	12	15.8	43	19.5
Of which EIAs 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

^a: Northern imports from the South

Table 2: North-South Trade

Specification Dependent variable Trade flows	Poisson maximum likelihood					
	Bilateral imports of the Northern country			from the Southern partner		
	All products			Manufactured Products	All products	
Years	1991-2006 (every 3 years)				1994-2006 (every 3 years) [#]	
Model	(1)	(2)	(3)	(4)	(5)	(6)
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 EIA	0.31 ^b (0.13)	-0.05 (0.07)	-0.17 ^c (0.09)	-0.15 ^c (0.09)	-0.16 ^c (0.09)	-0.22 ^a (0.08)
N-S EIA with standards harmonization			0.20 ^c (0.12)			
N-S EIA with standards harmonization and promotion of regional standards				-0.26 ^b (0.11)	-0.34 ^a (0.12)	-0.23 ^b (0.12)
N-S EIA with standards harmonization and promotion of international standards				0.32 ^a (0.11)	0.34 ^a (0.12)	0.39 ^a (0.13)
Observations	18,304	18,045	18,045	18,045	18,045	15,266
R ²	0.881	0.995	0.995	0.996	0.996	0.996
FE exporting country	Yes					
FE importing country	Yes					
FE year	Yes					
FE exporting country × year		Yes	Yes	Yes	Yes	Yes
FE importing country × year		Yes	Yes	Yes	Yes	Yes
FE dyad		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.

[#]: The last column reports the total effect of EIA and harmonization by summing the values of the coefficients on the dummy for the concurrent year and on the lagged dummy. Standard errors are computed with the Delta method.

Table 3: South-South Trade

Specification Dependent variable Trade flows	Poisson maximum likelihood						
	Bilateral imports between Southern countries All products					Manufactured products	All products
Years	1991-2006 (every 3 years)						1994-2006 (every 3 years) [#]
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ln distance	-0.78 ^a (0.07)	-0.78 ^a (0.07)	-0.78 ^a (0.07)	-0.78 ^a (0.07)	-0.78 ^a (0.07)	-0.78 ^a (0.07)	-0.79 ^a (0.07)
Common border	0.67 ^a (0.14)	0.66 ^a (0.14)	0.66 ^a (0.14)	0.68 ^a (0.15)	0.68 ^a (0.15)	0.73 ^a (0.15)	0.67 ^a (0.14)
Common language	0.42 ^a (0.12)	0.42 ^a (0.12)	0.42 ^a (0.12)	0.41 ^a (0.12)	0.41 ^a (0.12)	0.43 ^a (0.12)	0.42 ^a (0.12)
Past common colonizer	0.26 ^c (0.14)	0.25 ^c (0.14)	0.25 ^c (0.14)	0.26 ^c (0.14)	0.26 ^c (0.14)	0.25 ^c (0.15)	0.25 ^c (0.14)
South-South EIA	0.08 (0.14)	0.08 (0.14)	0.08 (0.14)	0.07 (0.14)	0.07 (0.14)	0.03 (0.15)	0.07 (0.15)
N-S EIA for the exporting country		-0.29 ^a (0.07)	-0.12 (0.08)			-0.11 (0.09)	0.04 (0.09)
N-S EIA for the importing country		-0.22 ^a (0.07)	-0.26 ^a (0.10)			-0.26 ^b (0.10)	-0.26 ^a (0.10)
N-S EIA for the exporting country only				-0.24 ^a (0.07)	-0.09 (0.09)		
N-S EIA for the importing country only				-0.17 ^b (0.07)	-0.24 ^b (0.11)		
N-S EIA for both countries				-0.59 ^a (0.13)	-0.42 ^a (0.14)		
N-S EIA × standards harmonization with the North for the exporting country			-0.18 ^b (0.08)			-0.20 ^b (0.09)	-0.35 ^a (0.09)
N-S EIA × standards harmonization with the North for the importing country			0.05 (0.10)			0.03 (0.10)	0.05 (0.10)
N-S EIA × standards harmonization with the North for the exporter only					-0.15 ^c (0.09)		
N-S EIA × standards harmonization with the North for the importer only					0.07 (0.10)		
N-S EIA × standards harmonization with the North for both countries					-0.18 (0.16)		
Observations	114,702	114,702	114,702	114,702	114,702	114,702	98,700
R ²	0.877	0.877	0.877	0.878	0.878	0.880	0.885
FE exporting country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE importing country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE year	Yes	Yes	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.

[#]: The last column reports the total effect of EIA and harmonization by summing the values of the coefficients on the dummy for the concurrent year and on the lagged dummy. Standard errors are computed with the Delta method.

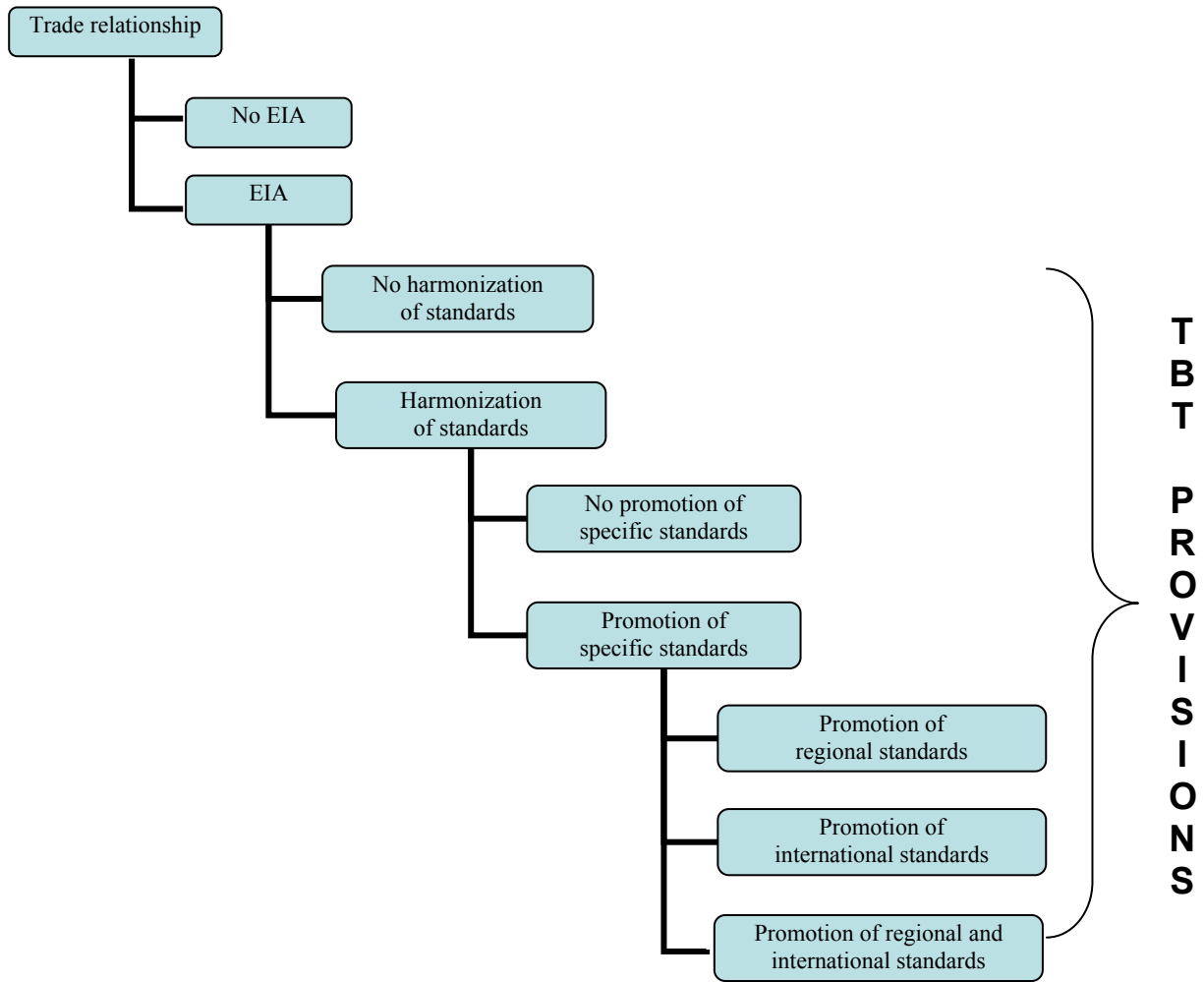


Figure 1: The Different Steps of Integration

Appendix A: 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 B: List of North-South EIAs Included in the Study

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