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Rules of Origin: A World Map and Trade Effects *

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Rules of Origin: World Map and Trade Effects

Introduction

Preferential trading agreements (PTAs) have proliferated spectacularly around the world over the past decade.¹ The wave of PTA formation has carried with it a colorful mosaic of trade disciplines—such as provisions on market access for goods and services, standards, safeguards, government procurement, and investment—to govern economic relations between the PTA partners. These rules are hardly inconsequential given that more than a third of global commerce takes place within PTAs.² Moreover, reverberating to firms' export, outsourcing, and investment decisions around the world, PTA disciplines arbitrate both actual and potential trade and investment flows within PTAs—and between PTAs and the rest of the world (ROW).

Yet, the richness of the PTA universe notwithstanding, there are astonishingly few rigorous efforts to disaggregate PTA agreements in order to analyze the operation and effects of the various rules they carry.³ This, in turn, implies that (1) very little is known about the compatibility of PTA agreements with one another or with the multilateral WTO Agreements; (2) the political economy sources of the divergent contractual formats of PTAs remain unexplored; and (3) analysts have yet to disentangle the respective economic effects of the different PTA disciplines from each other, let alone from the effects of variables beyond PTAs. The lack of understanding of the various component parts of the rapidly burgeoning PTA universe severely undercuts the credibility and usefulness of the arguments of both those who view PTAs as discriminatory instruments hostage to protectionist interests that work to obstruct global trade liberalization, and those who regard PTAs as containing a liberalizing logic conducive to multilateral opening.

The purpose of this paper is to break new ground in dissecting and capturing the effects of PTAs. We focus on rules of origin (RoO), a crucial yet poorly understood market access discipline included in virtually every PTA. The economic justification for RoO is to curb trade deflection—to avoid products from non-PTA members from being transshipped through a low-tariff PTA partner to a high-tariff one.⁴ Basically all PTAs contain rules for establishing the origin of goods. RoO are also a central issue in many on-going PTA negotiations, such as the 34-country talks to establish the Free Trade Area of the Americas (FTAA), and the European Union-Southern Common Market (Mercosur) negotiations to connect the world's two largest customs unions. In addition, RoO are gaining growing policy attention at the multilateral level: in preparation for the Doha Trade Round, the WTO's Committee on Regional Trade Agreements⁵ has for the first time raised preferential RoO to a systemic issue in the negotiation agenda.

¹ PTAs include free trade agreements, customs unions, common markets, and single markets. Some 250 PTAs had been notified to the World Trade Organization (WTO) by the end of 2002; of these, 130 were notified after January 1995 (WTO 2003). The number of PTAs is expected to soar to nearly 300 by the end of 2005.

² When unilateral preferential schemes such as the Generalized System of Preferences

(GSP) are accounted for, no less than 60 percent of world trade is estimated to be conducted on a preferential basis. Importantly, the unilateral preferential programs carry many of the same disciplines as PTAs.

³ The few mappings of PTA disciplines include WTO (1998, 2002ab) and IADB (2002). The few existing rigorous, scholarly studies on the determinants of PTA provisions (beyond the contributions on rules of origin discussed below) tend to center on a single PTA and examine inter-sectoral variation in its market access provisions. See Milner (1997); Kowalczyk and Davis (1998); Olarreaga and Soloaga (1998); and Estevadeordal (2000). For the effects of PTAs' market access provisions, see Estevadeordal and Robertson (2003) and Ghosh and Yamarik (2003).

Since a failure to meet the RoO disqualifies an exporter from the PTA-conferred preferential treatment, RoO can and must be seen as a central market access instrument reigning over preferential trade. Notably, the relevance of RoO as gatekeepers of commerce can accentuate over time: RoO remain in place even after preferential tariffs have been phased out. However, despite RoO's function of refereeing preferential market access, centrality in PTA negotiations, and increasing relevance on the multilateral agenda, the global RoO panorama remains largely unexplored.⁶ Moreover, although analysts' interest in RoO has surged over the past few years,⁷ and even though RoO are widely considered a trade policy instrument that can work to offset the benefits of tariff liberalization, there are as yet only a handful of rigorous theoretical and empirical efforts to understand the economic effects of RoO.⁸

⁴ RoO are an inherent feature of free trade agreements (FTAs) where the member states' external tariffs diverge and/or where the members wish to retain their individual tariff policies vis-à-vis the ROW. RoO are also widely used in customs unions (CUs), either as a transitory tool in the process of moving toward a common external tariff (CET), or as a more permanent means of covering product categories where reaching agreement on a CET is difficult, for instance due to large tariff differentials between the member countries. The Asia-Pacific Cooperation (APEC) forum is a prominent exception, with its members employing their respective domestic RoO. APEC is based on a principle of open regionalism—extending tariff preferences on an MFN basis—which renders the need for preferential RoO obsolete.

⁵ Meanwhile, the WTO Committee on Rules of Origin is making strides towards finalizing the process of harmonizing non-preferential RoO at the global level.

⁶ The exceptions are WTO (2002), Estevadeordal and Suominen (2003), Estevadeordal and Suominen (2004a), and Suominen (2004a).

⁷ See Krueger (1993); Krishna and Krueger (1995); Jensen-Moran (1996); Garay and Estevadeordal (1996); Stephenson (1996); Scollay (1996); Ju and Krishna (1998); Appiah (1999); Falvey and Reed (2000); Estevadeordal (2000); Duttagupta (2000); Duttagupta and Panagariya (2001); Lloyd (1996, 2001ab); Rodriguez (2001); Augier and Gasiorek (2002); Brenton and Manchin (2002); Cadot et al. (2002); Flatters (2002); Garay and Cornejo (2002); Hirsch (2002); Krishna (2002); Estevadeordal and Miller (2002); Estevadeordal and Suominen (2003, 2004abc); Suominen (2004abc); and contributions in Cadot et al. (2004).

See Estevadeordal and Suominen (2004b) and Suominen (2004a). Estevadeordal, López-Córdova and Suominen (2004) strive to open new ground in capturing RoO's investment effects.

It is the task of this paper to foster the understanding of the universe of RoO regimes and the global trade effects of RoO. In particular, we strive to (1) provide an overview of the types of RoO used around the world; (2) present a comparative analysis of the preferential RoO regimes in some of the main PTAs in Europe, the Americas, Asia-Pacific, Africa, and the Middle East; (3) measure the degree of restrictiveness and selectivity of product-specific RoO employed in the various RoO regimes; (4) put forth a facilitation index to capture the extent of flexibility instilled in RoO regimes by various regime-wide RoO; and (5) empirically assess the effects of RoO on aggregate trade flows as well as trade on intermediate goods in five major economic sectors—chemicals, machinery, textile, television and radio transmitters, and vehicles—through a modified gravity model. Our sample covers 155 countries and nearly a hundred PTAs around the world for 1981-2001.

Change of headingChange of item and/or sub-headingNo change of classification specified

This paper yields five main findings. First, the most recent wave of PTA formation that started swelling in the 1990s forged in regimes with unprecedentedly restrictive and complex product-specific RoO—while compensating these features with relatively lenient regime-wide RoO. Second, assessing the trade effects of RoO, we find that regimes with restrictive RoO and with high degrees of sectoral selectivity in RoO discourage aggregate trade flows. Third, regime-wide RoO that allow for flexibility in the application of product-specific RoO, such as cumulation and drawback, facilitate trade flows. As such, various regime-wide RoO provisions can counteract restrictive product-specific RoO's negative effects on trade. Fourth, at the sectoral level, both restrictive RoO and selectivity in RoO in final goods encourage trade in intermediate goods, and can thus entail trade diversion in inputs. Fifth, exporters and producers learn over time to comply with stringent product-specific RoO, and to take greater advantage of permissive regime-wide provisions: “RoO learning” gradually reduces “RoO interference”.

The first section of this paper discusses the types of RoO employed around the world. The second section presents a comparative study of the prevalence of the different types of RoO in the main integration schemes in the world. Section three puts forth a methodology for measuring the relative restrictiveness of the various product-specific RoO within and across RoO regimes. The fourth section presents our empirical models and discusses the results. Section five puts forth policy proposals to counteract the negative effects of RoO. Section six concludes.

Types of Rules of Origin in FTAs

There are two types of rules of origin, non-preferential and preferential RoO. Non-preferential RoO are used to distinguish foreign from domestic products in establishing anti-dumping and countervailing duties, safeguard measures, origin marking requirements, and/or discriminatory quantitative restrictions or tariff quotas, as well as in the context of government procurement. Preferential RoO, meanwhile, define the conditions under which the importing country will regard a product as originating in an exporting country that

receives preferential treatment from the importing country. PTAs, in effect, employ RoO to determine whether a good qualifies for preferential treatment when exported from one member state to another.

Both non-preferential and preferential RoO regimes have two dimensions: sectoral, product-specific RoO, and general, regime-wide RoO. We discuss each in turn.

A. Product-Specific RoO

The Kyoto Convention recognizes two basic criteria to determine origin: wholly obtained or produced, and substantial transformation.⁹ The wholly obtained or produced-category applies only to one PTA member, and asks whether the commodities and related products have been entirely grown, harvested, or extracted from the soil in the territory of that member, or manufactured there from any of these products. The rule of origin is met through not using any second-country components or materials. Most countries apply this strict and precise definition.

The substantial transformation-criterion is more complex, involving four main components that can be used as stand-alone or in combinations with each other. The precision with which these components define RoO in PTAs today contrasts sharply with the vagueness of the substantial transformation-criterion as used by the United States since 1908 until the inception of the Canada-US Free Trade Agreement (CUSFTA) in 1989 and, subsequently,¹⁰ the North American Free Trade Agreement (NAFTA) in 1994 (Reyna 1995: 7).

The first component of the substantial transformation criterion is a change in tariff classification (CTC) between the manufactured good and the inputs from extra-PTA parties used in the productive process. The CTC may require the product to alter its chapter (2 digits under the Harmonized System), heading (4 digits), subheading (6 digits) or item (8-10 digits) in the exporting PTA member.

The second criterion is an exception attached to a particular CTC (ECTC). ECTC generally prohibits the use of non-originating materials from a certain subheading, heading, or chapter.

The third criterion is value content (VC), which requires the product to acquire a certain minimum local value in the exporting country. The value content can be expressed in three main ways: as the minimum percentage of value that must have been added in the exporting country (domestic or regional value content, RVC); as the difference between the value of the final good and the costs of the imported inputs (import content, MC); or as the value of parts (VP), whereby originating status is granted to products meeting a minimum percentage of originating parts out of the total.

The Revised Kyoto Convention is an international instrument adopted by the World Customs Organization (WCO) to standardize and harmonize customs policies and procedures around the world. The WCO adopted the original Convention in 1974. The revised version was adopted in June 1999.

The old criterion basically required the emergence of a “new and different article” from the manufacturing process applied to the original article. It was, however, much-criticized

for allowing—and indeed requiring—subjective and case-by-case determinations of origin (Reyna 1995: 7).

The fourth RoO component is technical requirement (TECH), which requires the product to undergo certain manufacturing operations in the originating country. TECH essentially prescribes or prohibits the use certain input(s) and/or the realization of certain process(es) in the production of the good.¹¹ It is a particularly prominent feature in RoO governing textile products.

B. Regime-Wide RoO

Besides product-specific RoO, RoO regimes vary by the types of general RoO they employ—including in the degree of *de minimis*, the roll-up principle, and the type of cumulation.

First, most PTAs contain a *de minimis* rule, which allows for a specified maximum percentage of non-originating materials to be used without affecting origin. The *de minimis* rule inserts leniency in the CTC and TECH criteria by making it easier for products with non-originating inputs to qualify.

Second, the roll-up or absorption principle allows materials that have acquired origin by meeting specific processing requirements to be considered originating when used as input in a subsequent transformation. That is, when roll-up is allowed, non-originating materials are not taken into account in the calculation of the value added of the subsequent transformation.

Third, cumulation allows producers of one PTA member to use materials from another PTA member (or other members) without losing the preferential status of the final product. There are three types of cumulation. Bilateral cumulation operates between the two PTA partners and permits them to use products that originate in the other PTA partner as if they were their own when seeking to qualify for the PTA-conferred preferential treatment in that partner. Basically all RoO regimes apply bilateral cumulation. Under diagonal cumulation, countries tied by the same set of preferential origin rules can use products that originate in any part of the common RoO zone as if they originated in the exporting country. Full cumulation extends diagonal cumulation. It provides that countries tied by the same RoO regime can use goods produced in any part of the common RoO zone even if these were not originating products: any and all processing done in the zone is calculated as if it had taken place in the final country of manufacture. As such, diagonal and full cumulation can¹² notably expand the geographical and product coverage of a RoO regime.

¹¹ TECH can be highly discretionary given that lack of classification tools to objectively guarantee sufficient transformation in the production of the good.

Whereas *de minimis*, roll-up, and cumulation allow for leniency in the application of RoO, there are three provisions that may have the opposite effect, namely increase the stringency of RoO.¹³

First, most PTAs contain a separate list indicating the operations that are in all circumstances considered insufficient to confer origin, such as preservation during transport and storage, as well as simple operations of cleaning, sorting, painting, packaging, assembling, and marking and labeling.

Second, many PTAs prohibit duty drawback—preclude the refunding of tariffs on non-originating inputs that are subsequently included in a final product that is exported to a PTA partner. Many developing countries employ drawback in order to attract investment and to encourage exports; however, drawback in the context of a PTA is viewed as providing a cost advantage to the PTA-based producers who gear their final goods to export over producers selling their final goods in the domestic market.¹⁴ The end of duty drawback entails an increase in the cost of non-originating components for PTA-based final goods producers. As such, the end of drawback in the presence of cumulation may encourage intra-PTA producers to shift to suppliers in the cumulation area (WTO 2002).

Third, a complex method of certifying the origin of goods can impose high administrative costs on exporters. The main certification methods are self-certification by exporters, certification by the exporting country government or an industry umbrella group to which the government has delegated the task of issuing the certificate, and a combination of the “private” self-certification and the “public” governmental certification. The more numerous the bureaucratic hurdles and the higher the costs for an exporter to obtain an origin certificate, the lower the incentives to seek PTA-conferred preferential treatment.

¹²

In bilateral cumulation, the use of the partner country components is favored; in diagonal cumulation, all the beneficiary trading partners of the cumulation area are favored. Full cumulation is more liberal than diagonal cumulation by allowing a greater use of third-country materials. However, it is rarely allowed in RoO regimes.

¹³

To be sure, non-members to a cumulation area may view the cumulation system as introducing another layer of discrimination by virtue of its providing incentives to the member countries to outsource from within the cumulation zone at the expense of extra-zone suppliers.

¹⁴

Cadot, de Melo and Olarreaga (2001) show that duty drawback may have a protectionist bias due to reducing the interest of producers to lobby against protection of intermediate products.

Rules of Origin around the World

This section turns to examining the great variety of combinations of product-specific and regime-wide RoO used in selected PTAs in Europe, the Americas, Asia-Pacific, Africa, and the Middle East, as well as in PTAs between these regions. We subsequently discuss the structure of non-preferential RoO. The latter part of this section presents an analytical, comparative assessment of (1) the relative restrictiveness of the product-specific RoO governing different economic sectors in the different RoO regimes; and (2) the degree of flexibility instilled in the various RoO regimes by the regime-wide RoO.

A. Comparing the Structure of RoO Regimes in Five Regions

i. Europe: Expansion of the PANEURO System

The RoO regimes employed today across the EU's FTAs are highly uniform vis-à-vis each other. This owes largely to the European Commission's recent drive to harmonize the EU's existing and future preferential RoO regimes in order to facilitate the operations of EU exporters dealing on multiple trade fronts, and to pave the way for particularly the EU's East European FTA partners to draw greater benefits from the EU-provided preferential treatment via diagonal cumulation—that was previously precluded by the lack of compatibility among the EU's RoO regimes. The harmonization efforts pertained to product-specific and regime-wide RoO alike. They extended to EU's RoO protocols with the European Free Trade Association (EFTA) countries that dated from 1972 and 1973, as well as across the EU's FTAs forged in the early 1990s in the context of the Europe Agreements with Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Romania.¹⁵ The work culminated in 1997 in the launch of the Pan-European (PANEURO) system, which established identical RoO protocols and product-specific RoO across the EU's existing FTAs, thereby providing for diagonal cumulation among the participating countries. The Commission's regulation 46 of January 1999 reiterates the harmonized protocols, outlining the so-call single list RoO. Overall, the PANEURO RoO are highly complex, combining CTC mainly at the heading level with exceptions, VC, and TECH, and varying markedly across products.

Since 1997, the PANEURO model has become incorporated in the EU's newer FTAs, including the Euro-Mediterranean Association Agreements, the Stabilization and Association Agreements with Croatia and the Former Yugoslav Republic of Macedonia, the EU-Slovenia FTA, as well as the extra-regional FTAs with South Africa, Mexico, and Chile. Also the RoO of the EU's generalized system of preferences (GSP) and the 2000 Cotonou Agreement with the African Caribbean, and Pacific (ACP) developing countries approximate the single list, PANEURO model. EFTA's recently concluded FTAs with Mexico and Singapore follow the PANEURO model, as well; however, the EFTA-Singapore RoO provide in many sectors—such as plastics, rubber, textiles, iron and steel products, and some machinery products—an alternative, 50 percent RoO that either does not exist for a given product in the PANEURO model, or is in the PANEURO system set at lower and thus more demanding levels.

¹⁵

See Driessen and Graafsma (1999) for review.

Overall, however, the harmonized RoO do not represent a dramatic break with those of the pre-1997 era. For example, the RoO in nearly 75 percent of the products (in terms of tariff subheadings) in PANEURO and the original EU-Poland RoO protocol published in 1993 are identical. Both the new and the old versions combine CTC with VC and/or TECH. Indeed, EU RoO feature remarkable continuity: the RoO of the European Community-Cyprus FTA formed in 1973 are strikingly similar to those used today. One notable difference between the older and the newer protocols is that the latter allow for an optional way of meeting the RoO for about 25 percent of the products, whereas the former specify mostly only one way of meeting the RoO. The second alternative RoO, much like the first RoO, combine different RoO criteria; however, the most frequently used alternative RoO is a stand-alone import content criterion.

ii. The Americas: Four RoO Families

There is much more variation across RoO regimes in the Americas. Nevertheless, distinct RoO families can be identified (Garay and Cornejo 2002). One extreme is populated by the traditional trade agreements such as the Latin American Integration Agreement (LAIA), which uses a general rule applicable across the board for all tariff items (a change in tariff classification at the heading level or, alternatively, a regional value added of at least 50 percent of the FOB export value of the final good). The LAIA model is the point of reference for RoO used in the Andean Community (CAN) and Caribbean Community (CARICOM). At the other extreme lie the so-called new generation PTAs such as NAFTA, which is used as a reference point for the US-Chile, Mexico-Costa Rica, Mexico-Chile, Mexico-Bolivia, Mexico-Nicaragua, Mexico-Northern Triangle (El Salvador, Guatemala, and Honduras), Chile-Canada, and Mexico-Colombia-Venezuela (or G-3) FTAs. The RoO regimes in these agreements may require a change of chapter, heading, subheading or item, depending on the product in question. In addition, many products combine the change of tariff classification with an exception, regional value content, or technical requirement. The NAFTA model, particularly the version employed in the US-Chile FTA, is also widely viewed as the likeliest blueprint for the RoO of the Free Trade Area of the Americas (FTAA).

Mercosur RoO, as well as RoO in the Mercosur-Bolivia and Mercosur-Chile FTAs fall between the LAIA-NAFTA extremes. They are mainly based on change of heading and different combinations of regional value content and technical requirements. The Central American Common Market's (CACM) RoO regime can be seen as located between those of Mercosur and NAFTA: it uses chiefly change in tariff classification only, but in more precise and diverse ways than Mercosur due to requiring the change to take place at either the chapter, heading, or subheading level, depending on the product in question. In some products, CACM introduces exceptions; a handful of products are also governed by regional value content or technical requirements.

Notably, unlike the EU's extra-European FTAs that follow the PANEURO system, US bilateral FTAs with extra-Hemispheric partners—Jordan and Israel—diverge markedly from the NAFTA model, operating on VC alone. However, the RoO of the US-Singapore FTA are again more complex, resembling the NAFTA RoO. Similarly, the RoO of the recently forged Chile-South Korea FTA also feature a high degree of sectoral selectivity à

la NAFTA, and, indeed, resemble the US-Chile FTA RoO. Nonetheless, the RoO of the Chile-Korea regime are overall less complex than either NAFTA or US-Chile RoO, and also more reliant on the change in heading criterion than NAFTA, which has an important change in chapter-component, and US-Chile FTA, which features an important change in subheading-component.

iii. Africa, Asia, Middle East: Toward Sectoral Selectivity?

The relative complexity of RoO in Europe and the Americas stands in contrast to the generality of RoO in many Asian, African, and Middle Eastern PTAs. Some of the main integration schemes in these regions—the ASEAN Free Trade Area (AFTA), Australia-New Zealand Closer Economic Relations Trade Agreement (ANZCERTA), Singapore-Australia Free Trade Agreement (SAFTA), and South Pacific Regional Trade and Economic Cooperation (SPARTECA) in the Asia-Pacific; the Economic Community of West African States (ECOWAS), Common Market for Eastern and Southern Africa (COMESA), and Namibia-Zimbabwe FTA in Africa; and the Gulf Cooperation Council (GCC) in the Middle East—are based on an across-the-board VC rule that, when defined as RVC, ranges from 25 percent (in Namibia-Zimbabwe FTA) to 50 percent (ANZCERTA). Some of the agreements allow, or, indeed, require, RoO to be calculated on the basis of import content. Most of these regimes also specify an alternative RoO based on the CTC criterion; most often the alternative involves a change in heading or, in the case of ECOWAS that has a relatively low RVC requirement of 30 percent, change in subheading.

However, the more recent RoO regimes in both Africa and Asia-Pacific carry RoO of high degrees of sectoral selectivity. The Southern African Development Community (SADC) RoO approximate the PANEURO model both in the *types* of sectoral RoO and in sectoral selectivity. Moreover, there have been some initiatives to renegotiate COMESA RoO; such attempts may well eventually lead to regimes of greater complexity. On the Asian front, the RoO of the Japan-Singapore Economic Partnership Agreement (JSEPA) are also complex, as evinced by the more than 200-page RoO protocol. However, much like in the Chile-Korea FTA, nearly half of JSEPA RoO are based on a simple change in heading-criterion, which makes the regime much less complex when contrasted with the PANEURO and NAFTA models. Furthermore, for many products JSEPA introduces an alternative, usually PANEURO-type, free-standing VC rule, which instills generality and flexibility to the agreement.

The inter-continental RoO regimes of the US-Singapore and Chile-Korea FTAs have delivered additional complexity to the Asia-Pacific RoO theater. RoO in these agreements tend to follow the NAFTA model yet be notably less complex overall, featuring a strong change of heading component. The future Mexico-Singapore, Canada-Singapore, Mexico-Korea, Mexico-Japan, and US-Australia FTAs, among others, will likely compound this trend. Meanwhile, further European overtures to the Asian front will likely bring the PANEURO model to accompany the NAFTA model in the region. The EFTA-Singapore FTA attests to that; however, importantly and much like in JSEPA, the standard PANEURO package in the FTA is accompanied by the flexible, alternative import content RoO. Further intra-regional FTAs in the Asia-Pacific—such as between Japan and Korea, Japan and the Philippines, Korea and Singapore, and between ASEAN on the one hand, and China, Japan, and/or Korea, on the other—will allow to gauge whether a genuinely Asian RoO model is emerging. Judging by JSEPA, such a model would likely carry notable sectoral selectivity, yet be simpler and more general than either the EU or the NAFTA RoO regime. The future FTA between India and Singapore could bring further novel features to the Asian RoO panorama.

B. Non-Preferential RoO

Non-preferential RoO are used for purposes distinct from those of preferential rules. Even if a country did not use preferential RoO, it would still apply some type of non-preferential RoO. Unlike preferential RoO that have thus far escaped multilateral regulation, non-preferential RoO have been under a process of harmonization since 1995 as mandated by the Uruguay Round's Agreement on Rules of Origin (ARO). The harmonization work, propelled precisely by growing concerns about the divergent national RoO's effects on unfettered trade flows, has been carried out under the auspices of the Committee on Rules of Origin (CRO) of the World Trade Organization (WTO) and the Technical Committee on Rules of Origin (TCRO) of the Brussels-based World Customs Organization. The latter has been responsible for the technical part of the work, including discussions on the RoO options for each product.

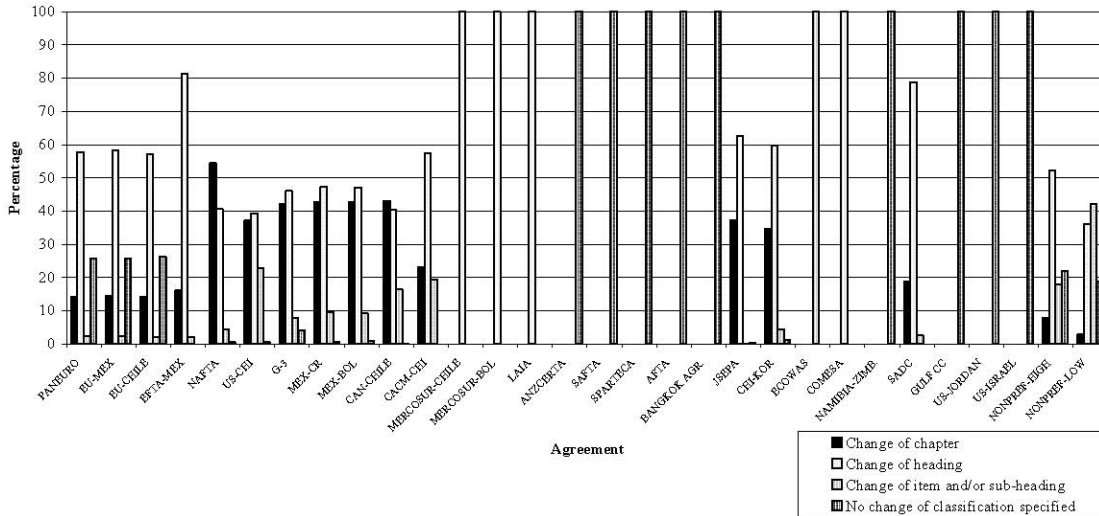
The harmonization drive was initially scheduled for completion by July 1998. However, the deadline has been extended several times since then. The Technical Committee's work was concluded in 1999, with about 500 pending issues that could not be solved at the technical level being sent to the CRO in Geneva. As of June 2003, the process at the WTO had yet to reach a solution to some 93 issues; these affect an estimated fifth of the tariff subheadings of the entire tariff universe. In their current structure, the non-preferential RoO approximate the PANEURO and NAFTA models in sectoral specificity, yet are less demanding than either of the two main RoO regimes. However, since several issues are still contested at the WTO, the final degree of complexity and restrictiveness of the non-preferential RoO remains to be gauged. What is clear is that the definition of the non-preferential RoO is driven by similar political economy considerations as the crafting of preferential RoO; indeed, the harmonization work can be considered in part endogenous to the RoO regimes that already exist in the manifold PTAs around the world.

C. Depicting Product-Specific RoO around the World

Figure 1 focuses on the first RoO component, the CTC criterion, in the RoO regimes of 28 PTAs around the world. These are three of EU's PTAs (PANEURO—where the RoO are basically fully identical to those of the EU-South Africa FTA—and the EU-Mexico and EU-Chile FTAs); EFTA-Mexico FTA where RoO approximate the EU-Mexico RoO model; six FTAs drawing on the NAFTA RoO model that is gaining prominence in the Western Hemisphere (NAFTA, US-Chile, Group of Three, and Mexico-Costa Rica, Mexico-Bolivia, and Canada-Chile FTAs); CACM-Chile FTA; Mercosur-Chile and Mercosur-Bolivia FTAs; LAIA; seven PTAs in Asia-Pacific (ANZCERTA, SAFTA, SPARTECA, AFTA, Bangkok Agreement, JSEPA, and Chile-Korea FTA); four PTAs in Africa (ECOWAS, COMESA, Namibia-Zimbabwe FTA, and SADC); the Gulf Cooperation Council in the Middle East; and US extra-hemispheric FTAs with Jordan and Israel. The two final sets of bars depict two potential outcomes of the harmonization process of the non-preferential RoO (as set to their “lowest” and “highest” levels of stringency, which will be discussed in the next section).¹⁶ The calculations are conducted on the basis of RoO coded at the 6-digit level of disaggregation.

The figure is based on the first RoO only when two or more possible RoO are provided for a tariff subheading.

Figure 1 - Distribution of CTC Criteria by Agreement



Source: Authors' calculations on the basis of PTA texts.

The change of heading-criterion dominates EU RoO, whereas the RoO built upon the NAFTA RoO regime are based on change of heading and change of chapter criteria at relatively even quantities. The US-Chile FTA stands somewhat apart from the NAFTA format for requiring only change in subheading for a substantial number of tariff lines. The Chile-CACM FTA diverges from the NAFTA model due to its marked change in heading-component, as do the Japan-Singapore and Chile-Korea FTAs. The other Asian PTAs considered here stand out for their generality—for using an across-the-board value content requirement exclusively. Except for the SADC, African RoO regimes are also marked by general, across-the-board CTC RoO, as are LAIA and Mercosur's FTAs with Chile and Bolivia that employ the change of heading-criteria across the RoO universe. In contrast to the PANEURO and NAFTA models, non-preferential RoO feature also a prominent change of subheading-component.

Another notable difference between the various PTAs is that some, such as ANZCERTA, employ the VC criterion across sectors, completely foregoing the use of the CTC-criterion. The EU does this in about a quarter of its RoO; the bulk (more than 80 percent) of these RoO are based on the wholly-obtained criterion used particularly in agricultural products, or on the import content-rule that imposes a ceiling of 40-50 percent to non-originating components of the ex-works price of the final product. The stand-alone import content RoO are used particularly frequently for optics, transportation equipment, and machinery and electrical equipment. Another idiosyncrasy of the EU RoO, yet one that escapes the figure here, is the use of the so-called "soft RoO" in more than a quarter of the 6-digit universe of RoO requiring a change of heading and about a sixth of the RoO requiring a change of chapter. Soft RoO allows the use of inputs from the same heading (or chapter) up to a

certain share of the price of the final product even when the RoO requires a change of heading (or change of chapter). The share is generally between five and 20 percent.

Table 1 centers on the tariff subheadings governed by VC (including combinations of VC with CTC, and VC when employed as an alternative to a CTC criterion) in various RoO regimes, and, in particular, on the level of the VC criterion. The most usual level of VC is 40-50 percent, whether defined as MC or RVC. However, the permitted value of non-originating inputs of the price of the final product is as low as 15-30 percent for some products in the PANEURO and SADC regimes. The table also displays the various bases for calculation of the VC. Differences in the method of calculation can have crucial implications to the exporters' capacity to meet the RoO. The PE model that is separated here for analytical purposes essentially involves the same product-specific RoO as PANEURO, while diverging somewhat from the PANEURO in the regime-wide RoO. It applies to some 15 FTAs, particularly to those forged by the EU and East European countries with Israel (WTO 2002).

Table 1 – VC Criteria by Agreement

PTA	Value Content Criterion (percent)		Basis for Calculation
	MC	RVC	
PANEURO (50) ⁱⁱ	50-30		Ex-works price ⁱ
PE (15)	50-30		Ex-works price
EU-South Africa	50-30		Ex-works price
EU-Mexico	50-30		Ex-works price
EU-Chile	50-30		Ex-works price
EFTA-Mexico	50-30		Ex-works price
NAFTA		50-60	50 net cost; 60 transaction value ⁱⁱⁱ
US-Chile		35-45	35 build-up; 45 build-down ^{iv}
Canada-Chile		50-60	50 net cost; 60 transaction value
G-3		50-55 ^v	Transaction value
Mexico-Costa Rica		41.66-50	41.66 net cost; 50 transaction value
Mexico-Bolivia		41.66-50	41.66 net cost; 50 transaction value
Mexico-Chile		40-50	40 net cost; 50 transaction value
CACM		N/A	Transaction value
CACM-Chile		30	Transaction value
Mercosur	40	60	Fob export value ^{vi}
Mercosur-Chile	40		Fob export value ^{vii}
Mercosur-Bolivia	40		Fob export value
Andean Community	50 ^{viii}		Fob export value
Caricom-Dom. Rep.		N/A	Transaction value
LAIA	50		Fob export value ^{ix}
ANZCERTA		50	Factory cost
SAFTA		30-50	Factory cost

SPARTECA		50	Factory cost
AFTA		40	Value of content
Bangkok Agreement		40	Ex-works ^x
Japan-Singapore	40	60	Export value ^{xi}
US-Singapore		30-65	30-35 build-up; 45-65 build-down
Chile-Korea		30-45	30 build-up; 45 build-down
COMESA	60	35	60 value of materials; 35 ex-factory cost ^{xii}
ECOWAS		30	Factory cost
Namibia-Zimbabwe		25	N/A
SADC	70-35		Ex-works price
Gulf Coop. Council		40 ^{xiii}	Ex-works price
US-Jordan		35	Value of materials/processes ^{xiv}
US-Israel		35	Value of materials/processes
MEX-ISRAEL		35-45	35 net cost; 45 transaction value
NON-PREF.	60-40		Ex-works price

Source: Authors' classification on the basis of PTA texts.

Capturing the full scale of variation in the RoO regimes requires a look at the various combinations of RoO components. Table 2 displays the RoO combinations in selected FTAs around the world. It considers the entire 6-digit tariff universe in each RoO regime, and shows the percentage shares of all possible RoO types and combinations thereof in each respective regime. Particularly notable is the high degree of selectivity of PANEURO, NAFTA, and non-preferential RoO.

i Ex-works price means the price paid for the product ex works to the manufacturer in the Member States in whose undertaking the last working or processing is carried out, provided the price includes the value of all the materials (the customs value at the time of importation of the non-originating materials used, or the first ascertainable price paid for the materials in the member state concerned) used, minus any internal taxes which are, or may be, repaid when the product obtained is exported.

ii The PE model that is separated here for analytical purposes carries the same product-specific RoO as the PANEURO model. However, its regime-wide RoO diverge somewhat from those of the PANEURO model. It applies to some 15 FTAs, particularly to those forged by the EU and East European countries with Israel (WTO 2002).

iii The transaction method is:

$$RVC = (TV - VNM/TV) \times 100,$$

where

RVC is the regional value content, expressed as a percentage;

TV is the transaction value of the good adjusted to a FOB basis; and

VNM is the value of non-originating materials used by the producer in the production of the good.

The net cost method is

$$RVC = [(NC - VNM)/NC] \times 100,$$

where

RVC is the regional value content, expressed as a percentage;

NC is the net cost of the good; and

VNM is the value of non-originating materials used by the producer in the production of the good.

iv The build-down method is

$$RVC = [(AV - VNM)/AV] \times 100;$$

the build-up method is:

$$RVC = (VOM/AV) \times 100,$$

where RVC is the regional value content, expressed as a percentage;

AV is the adjusted value;

VNM is the value of non-originating materials used by the producer in the production of the good; and

VOM is the value of originating materials used by the producer in the production of the good.

v The initial VC for chs. 28-40 is 40 percent for the first three years, 45 percent during the fourth and fifth years, and 50 percent starting in year six. For chs. 72-85 and 90, VC is 50 percent for the first five years, and 55 percent starting year six.

vi The MERCOSUR RoO is 60 percent RVC, and, additionally, change in tariff heading (Garay and Cornejo 2002). When it cannot be determined that a change in heading has taken place, the CIF value of the non-originating components cannot exceed 40 percent of the FOB value of the final good. Special RoO apply to selected sensitive sectors, including chemical, some information technology, and certain metal products.

vii The requirement is that the CIF value of the non-originating materials does not exceed 40 percent of the of the FOB export value of the final good.

viii A 50 percent MC rule applies to Colombia, Peru and Venezuela; products from Bolivia and Ecuador are governed by a 60 percent MC rule.

ix The value added test and is based on the formula: Qualifying Expenditure (Q/E) / Factory Cost (F/C), where

Q/E = Qualifying expenditure on materials + qualifying labor and overheads (includes inner containers); and

F/C = Total expenditure on materials + qualifying labor and overheads (includes inner containers).

The factory or works cost are essentially the sum of costs of materials (excluding customs, excise or other duties), labor, factory overheads, and inner containers.

x The agreement requires the value added ensuing from their production in member states be not less than 40 percent of their final value "at the termination of the production phase". In addition, the share owned by the citizens of the member states of the producing plant cannot be less than 51 percent.

xi The MC criterion is calculated from CIF and FOB as follows:

$$NOM = MCIF/FOB \times 100,$$

where NOM is the value content of non-originating materials, MCIF is the CIF value on non-originating materials, and FOB is the free on board value payable by the buyer to the seller.

xii The origin protocol requires that either the CIF value of non-originating materials does not exceed 60 percent of the total cost of the materials used in the production of the goods; or that the value added (the difference between the ex-factory cost of the finished product and the CIF value of the materials imported from outside the member states and used in the production) resulting from the process of production accounts for at least 35 percent of the ex-factory cost (the value of the total inputs required to produce a given product) of the goods.

xiii Besides the 40 percent RVC rule, the share of member states' citizens of the plant that produced the product must be at least 51 percent.

xiv The RVC is calculated as the sum of (i) the cost or value of the materials produced in the exporting Party, plus (ii) the direct costs of processing operations performed in the exporting party. It cannot be less than 35

D. Regime-Wide RoO

Besides sectoral RoO, the different RoO regimes can be compared by their regime-wide RoO. Table 3 contrasts the various RoO regimes by their general, regime-wide RoO—*de minimis*, roll-up, cumulation, and drawback.

PTA	<i>De minimis</i> (percentage) Bilateral	Roll-Up		Cumulation Diagonal	Drawback Allowed? ^{vi}
PANEURO (50)	10	Yes	Yes	Yes (full in EEA)	No
PE (15)	10	Yes	Yes	Yes Yes with ACP	No ^{xv}
EU-South Africa	15	Yes	Yes	(full with SACU)	Not mentioned
EU-Mexico	10	Yes	Yes	No	No after 2 years
EU-Chile	10	Yes	Yes	No	No after 4 years
EFTA- Mexico	10 (not chs. 50- 63)	Yes	Yes	No	No after 3 years
NAFTA	7 (exceptions in agric. and ind. products; 7% of weight in chs. 50- 63)	Yes except automotive	Yes	No	No after 7 years
US-Chile	10 (excep. in agric. and processed agr. products)	Yes	Yes	No	Not mentioned
G3	7 (7% of weight in chs. 50-63)	Yes	Yes	No	Not mentioned
Mexico- Costa Rica	7 (excep. in chs. 4-15 and headings 0901, 1701, 2105, 2202)	Yes	Yes	No	No after 7 years
Mexico- Chile	8 (excep. in agric. and ind. products; 9% of weight in chs. 50-63)	Yes	Yes	No	Not mentioned
Mexico- Bolivia	7 (not chs. 1-27 unless CS; not chs. 50-63)	Yes	Yes	No	No after 8 years
Canada-Chile	9 (excep. in agric. and ind. products; 9% of weight in chs. 50-63)	Yes	Yes	No	Not mentioned
CACM-Chile	8 (not chs. 1-27 unless CS)	Yes	Yes	No	Not mentioned
CACM	10 until 2000; 7 from 2001 on (7% of weight in chs. 50-63)	N/A	Yes	No	Yes Yes (except automotive imports from Arg. and Braz.)
Mercosur	Not mentioned	Yes except automotive	Yes	No	
Mercosur- Chile	Not mentioned	Yes	Yes	No	Yes
Mercosur- Bolivia	Not mentioned	Yes	Yes	No	No after 5 years
Caricom	Not mentioned	Not mentioned	Yes	No	Possibly ^{xvi}
Caricom-DR	7	Not mentioned	Yes	No	Not mentioned

ANZCERTA	2	Yes	Yes	Yes (full)	Yes
SAFTA	2	Yes	Yes ^{xvii}	No	Not mentioned
SPARTECA	2	Yes	Yes	Yes (full)	Yes
AFTA	Not mentioned	Not mentioned	Yes ^{xviii}	No	Yes ^{xix}
BANGKOK Japan- Singapore	Not mentioned	Yes	Yes	No No (OP allowed)	Possibly ^{xix}
US- Singapore	To be determined 10 (excep. in various agric. products; 7% of weight in chs. 50-63) 8 (not chs. 1-24 unless CS; 8% of weight in chs. 50-63)	Yes	Yes	No (OP and ISI allowed)	Not mentioned
Chile-Korea	2 ^{xx}	Yes	Yes	No	Not mentioned Not after 10 years
COMESA	Not mentioned	Not mentioned	Yes	No	Not mentioned
ECOWAS	10 (not chs. 50-63, 87, 98)	Yes	Yes	No	Not mentioned
SADC	Not mentioned	Not mentioned	Yes	No	Not mentioned
Gulf CC	Not mentioned	Not mentioned	Yes	No	Not mentioned
US-Jordan	Not mentioned	Not mentioned	Yes	No	Not mentioned
US-Israel	Not mentioned	Yes	Yes	No	Yes
Canada- Israel	10 (excep. in agric. and industrial products; 7% of weight in chs. 50- 63)	Yes	Yes	Yes (w/ any 3rd party with which both have an FTA) ^{xxi}	Not mentioned
Mexico- Israel	10 (excep. in agric. and industrial products; 7% of weight in chs. 50- 63)	Yes	Yes	No	Not mentioned

Table 3 – Regime-Wide RoO in Selected PTAs

Source: Authors' classification on the basis of PTA texts.

First, EU RoO regimes feature a higher *de minimis* than NAFTA and many other FTAs in the Americas, while there is no *de minimis* rule in Mercosur's FTAs and various FTAs in Asia and Africa. However, the principle does have exceptions in most regimes: for example, EU's *de minimis* does not apply to textiles and apparel, except for allowing an 8 percent *de minimis* of the total weight of textile materials in mixed textiles products. In the EU-South Africa FTA, *de minimis* is set at 15 percent but excludes fish and crustaceans, tobacco products, as well as certain meat products and alcoholic beverages. NAFTA *de minimis* does not extend to the production of dairy produce; edible products of animal origin; citrus fruit and juice; instant coffee; cocoa products; and some machinery and mechanical appliances, such as air conditioners and refrigerators (Reyna 1995: 115-117). In textiles, the 7 percent *de minimis* refers to the total weight rather than cost of the input component. The Chile-Korea FTA places *de minimis* at 8 percent, but requires the non-originating materials in chapters 1-24 of the Harmonized System to undergo a change in subheading prior to re-exportation. JSEPA *de minimis*, which is still under negotiation, will be defined for each chapter individually.

Second, the roll-up principle is widely used around the world. For example, in NAFTA, a good may acquire originating status if it is produced in a NAFTA country from materials considered as originating (whether such materials are wholly obtained or having satisfied a CTC or RVC criterion) even if no change in tariff classification takes place between the intermediate material and the final product. Similarly, the EU-Mexico FTA stipulates that “if a product which has acquired originating status by fulfilling the conditions...is used in the manufacture of another product, the conditions applicable to the product in which it is incorporated do not apply to it, and no account shall be taken of the non-originating materials which may have been used in its manufacture.”

Third, the EU’s Pan-European system of cumulation applied since 1997 draws a clear distinction between the EU RoO regimes on the one hand, and most RoO regimes elsewhere in the world, on the other. The foremost diagonal cumulation regime in the world, the Pan-European system incorporates 16 partners and covers no fewer than 50

¹⁷ FTAs. These include FTAs between EU and third parties, such as the members of EFTA, the central and eastern European countries, the Baltic states, Slovenia, and Turkey, and also FTAs forged between the EU’s partner countries—such as between Slovenia and Estonia. In concrete terms, the Pan-European system enables producers to use components originating in any of the participating countries without losing the preferential status of the final product. The European Economic Association (EEA) agreement between EU and EFTA permits full cumulation. The EU-South Africa FTA allows both parties to cumulate diagonally with the ACP states. In addition, it incorporates the “single territory” concept, whereby South Africa can calculate working or processing carried out within the Southern Africa Customs Union (SACU) area as if these had been performed in South Africa (but not in the EU). Notably, AFTA and ANZCERTA models provide for full cumulation, while the Canada-Israel FTA permits cumulation with the two countries’ common FTA partners, such as the United States. Singapore’s FTAs incorporate the outward processing (OP) concept tailored to accommodate Singapore’s unique economic features and its access to low-cost processing in the neighboring countries. The US-Singapore FTA also incorporates the integrated sourcing initiative (ISI), which provides further flexibility to outsourcing. OP and ISI will be detailed in Section IV of this paper.

¹⁷

The participants in the PANEURO system of cumulation are the EU, Bulgaria, Czech Republic, Estonia, Hungary, Iceland, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, Slovak Republic, Slovenia, Switzerland, and Turkey.

Fourth, EU’s FTAs and FTAs in the Americas tend explicitly to preclude drawback. Nonetheless, both have allowed for a phase-out periods during which drawback is permitted. For instance, the EU-Mexico FTA permitted drawback for the first two years, while the EU-Chile FTA allows drawback through 2007, the fourth year of the FTA. NAFTA allowed for drawback for the first seven years; however, drawback in the bilateral trade between Canada and the United States under the agreement was valid for only two years. Importantly, NAFTA does provide leniency in the application of the no-drawback rule by putting in place a refund system, whereby the producer will be refunded the lesser of the amount of duties paid on imported goods and the amount of duties paid on the exports of the good (or another product manufactured from that good) upon its introduction to another NAFTA member. AFTA, ANZCERTA, SPARTECA, the US-Israel FTA,

CACM, and Mercosur's FTAs stand out for not prohibiting drawback. However, in Mercosur *per se*, there is a no-drawback rule governing Argentine and Brazilian imports of intermediate automotive products when the final product is exported to a Mercosur partner.

E. Administration of RoO

The various RoO regimes diverge in their administrative requirements, particularly in the method of certification (table 4).

Table 4 – Certification Methods in Selected PTAs

PTA	Certification method
PANEURO	Two-step private and public; limited self-certification
PE	Two-step private and public; limited self-certification
EU-South Africa	Two-step private and public; limited self-certification
EU-Mexico	Two-step private and public; limited self-certification
EU-Chile	Two-step private and public; limited self-certification
NAFTA	Self-certification
G3	Two-step private and public
US-Chile	Self-certification
Mexico-Costa Rica	Self-certification
Mexico-Bolivia	Self-certification (two-step private and public during first 4 years)
Canada-Chile	Self-certification
CACM-Chile	Self-certification
CACM	Self-certification
Mercosur	Public (or delegated to a private entity)
Mercosur-Chile	Public (or delegated to a private entity)
Mercosur-Bolivia	Public (or delegated to a private entity)
Andean	
Community	Public (or delegated to a private entity)
Caricom	Public (or delegated to a private entity)
Caricom-DR	Public (or delegated to a private entity)
LAIA	Two-step private and public
ANZCERTA	Public (or delegated to a private entity)
SAFTA	Public (or delegated to a private entity)
SPARTECA	Not mentioned
AFTA	Public (or delegated to a private entity)
Bangkok	
Agreement	Public (or delegated to a private entity)
Japan-Singapore	Public (or delegated to a private entity)
US-Singapore	Self-certification
Chile-Korea	Self-certification
COMESA	Two-step private and public
ECOWAS	Public (or delegated to a private entity)
SADC	Two-step private and public
US-Jordan	Self-certification

Source: Authors' classification on the basis of PTA texts.

The EU RoO regimes require the use of a movement certificate, EUR.1, that is to be issued in two steps—by the exporting country government once application has been made by exporter or the exporter’s competent agency, such as a sectoral umbrella organization. However, the EU regimes provide for an alternative certification method, the invoice declaration, for “approved exporters” who make frequent shipments and are authorized by the customs authorities of the exporting country to make invoice declarations. Meanwhile, NAFTA and a number of other FTAs in the Americas as well as the Chile-Korea FTA rely on self-certification, which entails that the exporter’s signing the certificate suffices as an affirmation that the items covered by it qualify as originating. Mercosur, Andean Community, Caricom, AFTA, ANZCERTA, SAFTA, the Bangkok Agreement, JSEPA, and ECOWAS require certification by a public body or a private umbrella entity approved as a certifying agency by the government. However, unlike in the two-step model, the exporter is not required to take the first cut at filling out the movement certificate, but, rather, to furnish the certifying agency with a legal declaration of the origin of the product.¹⁸

The self-certification model can be seen as placing a burden of proof on the importing country producers; as such, it arguably minimizes the role of the government in the certifying process, entailing rather low administrative costs to exporters and governments alike. In contrast, the two-step system requires heavier involvement by the exporting country government and increases the steps—and likely also the costs—that an exporter is to bear when seeking certification. To be sure, the invoice declaration system implemented by the EU facilitates exporting among frequent traders.

III. Analytical Coding Methodology for RoO Rules of Origin in FTAs

This section presents a methodology for measuring (1) the relative restrictiveness of the product-specific RoO governing different economic sectors in the different agreements; and (2) the degree of flexibility instilled in the various RoO regimes by the various regime-wide RoO, such as *de minimis* and drawback. We subsequently compare RoO regimes by the values yielded by these two analytical measures.

A. A Comparative Analysis of the Levels of Restrictiveness of Product-Specific RoO

The NAFTA RoO family is based on the change of chapter rules, whereas the change of tariff heading-component figures prominently in the EU and most Asian and African RoO models. As such, these regimes will entail somewhat divergent demands on exporters. However, understanding the implications of membership in the different types of regimes for an exporter operating in a particular industry requires both (1) a measure of the restrictiveness of RoO that allows for a more nuanced sectoral analysis of the requirements imposed by RoO; and (2) an indicator of the overall flexibility instilled in a RoO regime by the various regime-wide RoO. This section presents two such measures: a restrictiveness index, and a facilitation index.

¹⁸

The certificate in NAFTA, G3, and CACM-Chile FTA will be valid for a single shipment or multiple shipments for a period of a year; in ANZCERTA and SAFTA, the certificate will be valid for multiple shipments for two years. In ECOWAS, the certificate is not required for agricultural, livestock products and handmade articles produced without the use of tools directly operated by the manufacturer. In ANZCERTA, SAFTA, and Mercosur-Chile, Mercosur-Bolivia, and CARICOM-DR FTAs, the certificate requires to be

accompanied by a legal declaration by the final producer or exporter of compliance with the RoO. In CAN and CARICOM, declaration by the producer is required. In CARICOM, the declaration can be completed by the exporter if it is not possible for the producer to fill it.

i. Restrictiveness of RoO

The manifold RoO combinations within and across RoO regimes present a challenge for cross-RoO comparisons. This paper seeks to draw such comparisons through an index grounded on the plausible restrictiveness of a given type of RoO. Estevadeordal (2000) constructs a categorical index ranging from 1 (least restrictive) to 7 (most restrictive) on the basis of NAFTA RoO. The index can be conceptualized as an indicator of how demanding a given RoO is for an exporter. The observation rule for the index is based on two assumptions: (1) change at the level of chapter is more restrictive than change at the level of heading, and change at the level of heading more restrictive than change at the level of subheading, and so on; and (2) VC and TECH attached to a given CTC add to the RoO's restrictiveness.¹⁹ The observation rule yields a RoO index as follows:

- $y = 1$ if $y^* \leq CI$
- $y = 2$ if $CI < y^* \leq CS$
- $y = 3$ if $CS < y^* \leq CS$ and VC
- $y = 4$ if CS and $VC < y^* \leq CH$
- $y = 5$ if $CH < y^* \leq CH$ and VC
- $y = 6$ if CH and $VC < y^* \leq CC$
- $y = 7$ if $CC < y^* \leq CC$ and TECH

where y^* is the latent level of restrictiveness of RoO (rather than the observed level of restrictiveness); CI is change of tariff classification at the level of tariff item (8-10 digits), CS is change at the level of subheading (6-digit HS), CH is change at the level of heading (4 digits), and CC is change at the level of chapter (2 digits HS); VC is a value content criterion; and TECH is a technical requirement.

We make three modifications to the observation rule in the case of RoO for which no CTC is specified in order to allow for coding of such RoO in the PANEURO, SADC, and other regimes where not all RoO feature a CTC component. First, RoO based on the import content rule are equated to a change in heading (value 4) if the content requirement allows up to 50 percent of non-originating inputs of the ex-works price of the product. Value 5 is assigned when the share of permitted non-originating inputs is below 50 percent, as well as when the import content criterion is combined with a technical requirement. Second, RoO featuring an exception alone is assigned the value of 1 if exception concerns a heading or a number of headings, and 2 if the exception concerns a chapter or a number of chapters.²⁰ Third, RoO based on the wholly-obtained criterion are assigned value 7.

¹⁹ Given that the degree of restrictiveness is a function of *ex ante* restrictiveness rather than the effective restrictiveness following the implementation of the RoO, the methodology—much like that of Garay and Cornejo (2002)—is particularly useful for endogenizing and comparing RoO regimes. The methodology allows RoO to be analyzed in terms of their characteristics rather than their effects.

Table 5 illustrates the application of the observation rule on the various RoO combinations that exist in the PANEURO and NAFTA regimes. The percentage shares of the combinations are as in table 2.

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In the case of the non-preferential RoO, a RoO that requires change in item or a change in item and an exception and/or TECH is coded as 1. When a change in item plus VC is required, a 2 would be assigned; however, empirically, there are no such cases. In subheadings where an agreement on the RoO has yet to be reached, up to four RoO proposals are taken into account. A RoO value for a product is established by taking the averages of the proposals. In the handful of categories where there are more than four proposals, the four proposals are selected in a way that captures the maximum range of different restrictiveness values.

To be sure, the observation rule is somewhat crude (1) for accounting for the restrictiveness of a stand-alone TECH RoO, which is likely more demanding than a coding of 1-2 allows; and (2) for capturing subtleties of the EU RoO as it does not account for the “soft” CTC criterion used by the EU. However, it does allow for establishing useful cross-regime comparisons.

RoO or RoO COMBINATION		PANEURO	NAFTA	ROO INDEX
NC		0.39	0.54	1
NC+ECTC		2.39		1-2
NC+TECH		1.39		2
NC+ECTC+TECH				2
NC+VC		11.46		4-5
NC+ECTC+VC		1.57		4-5
NC+VC+TECH		0.08		5
NC+WHOLLY CHAPTER	OBTAINED	7.62		7
NC+WHOLLY HEADING	OBTAINED	0.70		7
<i>SUBTOTAL</i>		<i>25.60</i>	<i>0.54</i>	
CI				
CI+ECTC			0.02	1
CI+TECH				
CI+ECTC+TECH				
CI+VC				
CI+ECTC+VC			0.02	2
CI+VC+TECH				
<i>SUBTOTAL</i>		<i>0.00</i>		<i>0.04</i>
CS		0.20	1.29	2
CS+ECTC			2.52	2
CS+TECH		1.90	0.04	2
CS+ECTC+TECH			0.40	2
CS+VC		0.27		3
CS+ECTC+VC			0.10	3
CS+VC+TECH				3
CS+ECTC+VC+TECH				3
<i>SUBTOTAL</i>		<i>2.37</i>	<i>4.35</i>	
CH		32.99	17.09	4
CH+ECTC		4.60	19.18	4
CH+TECH			0.02	4
CH+ECTC+TECH		6.66	0.14	4
CH+VC		13.01	3.54	5
CH+ECTC+VC		0.37	0.58	5
CH+VC+TECH			0.10	5

CH+ECTC+VC+TECH	0.02		5
<i>SUBTOTAL</i>	<i>57.65</i>	<i>40.65</i>	
CC	2.16	30.95	6
CC+ECTC	1.02	17.71	6
CC+TECH	0.04	0.02	6
CC+ECTC+TECH	11.02	5.76	6
CC+VC			7
CC+ECTC+VC			7
CC+VC+TECH			7
CC+ECTC+VC+TECH			7
<i>SUBTOTAL</i>	<i>14.24</i>	<i>54.44</i>	
TOTAL	100	100	

Table 5 - Shares of RoO Combinations in PANEURO and NAFTA and Restrictiveness Values by Combination

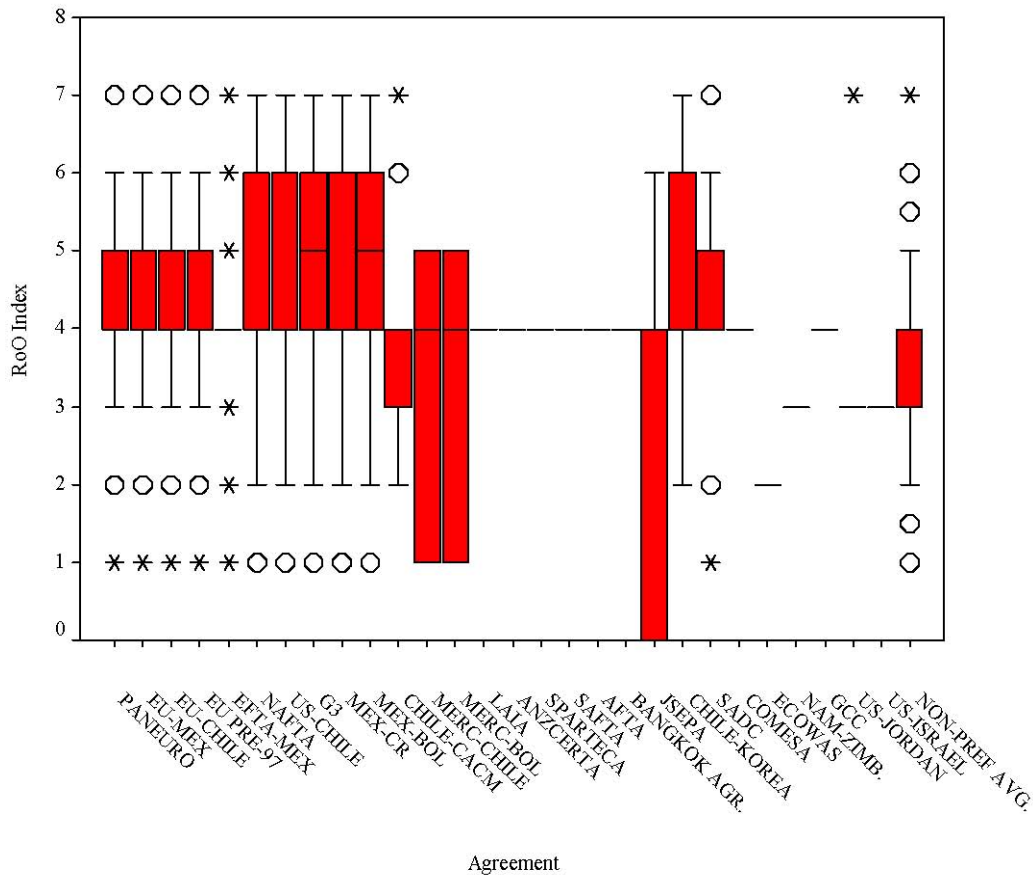
Source: Authors' calculations and classification.

ii. Depicting Restrictiveness of RoO around the World

Figure 2 reports the restrictiveness of RoO as calculated at the 6-digit level of disaggregation in selected FTAs. The EU RoO regimes are again strikingly alike across agreements. Indeed, the similarities are accentuated in comparison to the graphs above, as the differences between the pre- and post-1997 RoO regimes in about a fifth of subheadings are too small to alter the restrictiveness code. For instance, in many products the only difference between the two sets of regimes is that a RoO requiring, say, a change of heading for a given product may also impose an ECTC under one regime while not doing so under another. However, such differences go uncaptured by the index employed here.

The RoO regimes based on the NAFTA model, such as the G-3, are also highly alike. The Mercosur model pertinent to Mercosur-Chile and Mercosur-Bolivia FTAs is more general, yet still exhibits more cross-sectoral variation in the restrictiveness of RoO than the LAIA model marked by the across-the-board change of heading RoO. However, diverging from each other, the NAFTA, Mercosur, and LAIA models evince the distinctive RoO families operating in the Americas. The generality of the LAIA model is replicated by the most Asian and African RoO regimes. However, some newer PTAs—Japan-Singapore FTA, Chile-Korea FTA, and SADC—feature high levels of cross-sectoral variation in RoO. The JSEPA model appears less restrictive than it is, as about half of the tariff subheadings in the agreement do not have RoO because the parties already have zero MFN tariffs in these sectors; for these subheadings, the graph simply assigns the value of zero. The non-preferential RoO also carry marked sectoral selectivity. However, their overall restrictiveness is lower than that of the complex preferential regimes.

Figure 2 - Restrictiveness of RoO in Selected PTAs



Note: Boxplots represent interquartile ranges. The line in the middle of the box represents the median 50th percentile of the data. The box extends from the 25th percentile to the 75th percentile, or through the so-called inter-quartile range (IQR). The whiskers emerging from the boxes extend to the lower and upper adjacent values. The upper adjacent value is defined as the largest data point less than or equal to $x(75) + 1.5 \text{ IQR}$. The lower adjacent value is defined as the smallest data point greater than or equal to $x(25) - 1.5 \text{ IQR}$. Observed points more extreme than the adjacent values are individually plotted (outliers and extreme values are marked using “x” and “o” symbols, respectively).
 Source: Authors’ calculations.

iii. Comparing the Restrictiveness of Sectoral RoO

To what extent does the restrictiveness of RoO vary across economic sectors? Are some sectors more susceptible to the potential negative trade and investment effects of restrictive RoO than others?

We explore these questions by focusing on nine RoO regimes with inter-sectoral variation in RoO—the PANEURO, EFTA-Mexico, NAFTA, US-Chile, Chile-CACM, JSEPA, Chile-Korea, SADC, and non-preferential models. Table 6 reports the restrictiveness values in these regimes as aggregated from 6-digit values by section of the Harmonized System.

Table 6 – Sectoral Restrictiveness of Sectoral RoO in Selected PTAs

HS Section	PAN- EURO	EFTA- MEX	NAFTA	US- Chile	Chile- CACM	JSEPA	Chile- Korea	SADC	Non-Pref. Avg.
1. Live Animals	7.0	5.3	6.0	6.0	5.9	7.0	6.0	7.0	6.2
2. Vegetable Products	6.6	4.0	6.0	6.0	5.6	7.0	6.1	6.6	6.6
3. Fats and Oils	4.7	4.0	6.0	6.0	3.0	7.0	7.0	7.0	4.0
4. Food, Bev. & Tobacco	5.0	4.4	4.7	5.7	3.7	6.8	5.2	5.4	4.6
5. Mineral Products	3.5	3.5	6.0	3.9	5.3	6.6	5.4	4.0	4.8
6. Chemicals	3.9	3.8	5.3	2.6	2.6	3.7	4.0	4.0	2.5
7. Plastics	4.9	4.9	4.8	3.7	3.2	4.0	4.1	4.7	4.0
8. Leather Goods	3.3	3.5	5.6	5.0	3.7	4.0	4.9	3.8	3.4
9. Wood Products	2.9	2.9	4.0	4.1	3.2	4.0	4.1	4.8	3.3
10. Pulp and Paper	4.4	4.6	4.8	4.9	4.1	4.0	4.3	4.3	3.9
11. Textile and App.	6.1	6.1	6.9	5.9	4.5	6.0	5.5	6.1	3.4
12. Footwear	2.8	4.1	4.9	4.8	3.5	4.3	4.7	2.6	3.7
13. Stone and Glass	3.7	3.7	4.9	4.4	4.2	4.0	5.0	3.7	3.5
14. Jewelry	3.7	3.7	5.3	5.2	4.0	4.0	5.4	3.7	3.4
15. Base Metals	4.2	4.2	4.6	4.6	3.8	4.0	4.5	3.9	3.4
16. Mach. & Elec. Eq.	4.8	4.0	3.2	2.9	4.3	6.0	3.8	4.1	3.6
17. Transportation Eq.	4.7	4.2	4.8	4.2	3.4	4.0	4.3	3.8	3.8
18. Optics	5.0	4.4	4.0	4.5	4.0	4.0	4.3	3.9	3.5
19. Arms & Ammun.	4.0	4.0	4.7	5.5	4.0	4.0	4.8	3.1	4.0
20. Works of Art, Misc.	4.1	4.1	5.1	5.3	3.6	4.6	4.7	4.0	3.3
<i>Average</i>	4.5	4.2	5.1	4.8	4.0	4.9	4.9	4.5	3.9

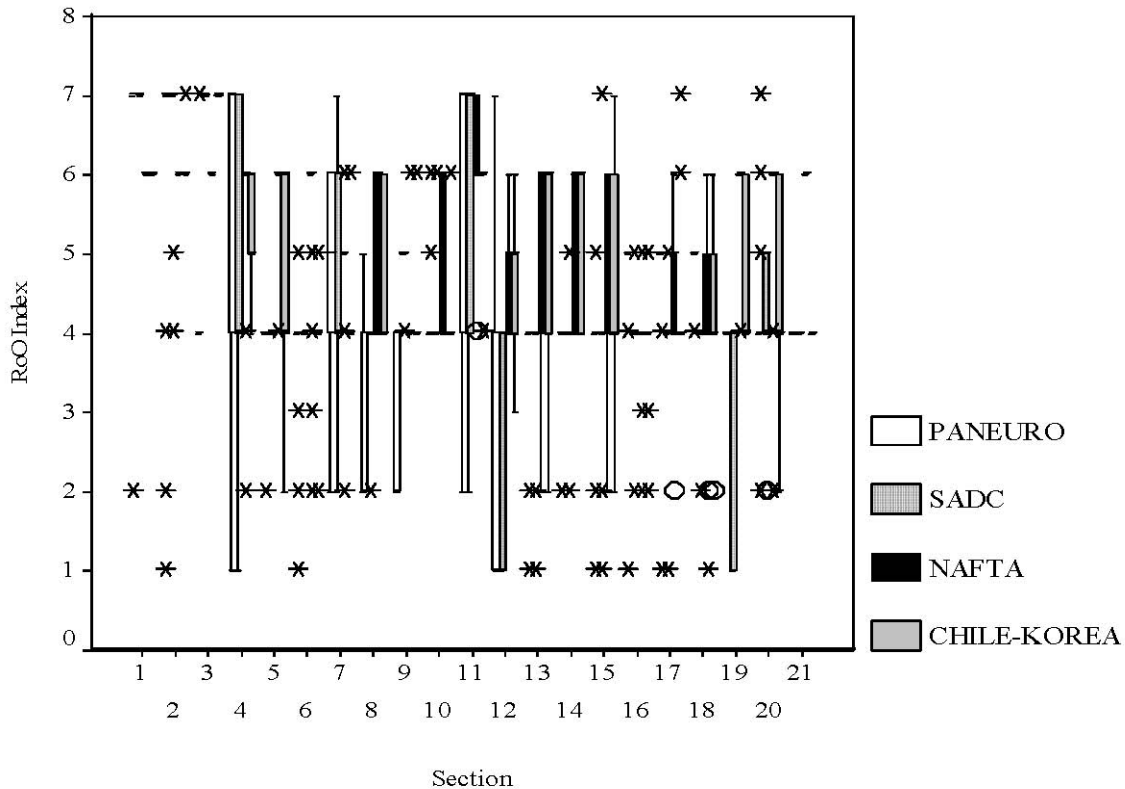
Source: Authors' calculations.

Two issues stand out. First, the average restrictiveness value for the PANEURO RoO falls between 4 and 5, which correspond to the change of heading and change of heading plus regional value content criteria, respectively. As such, the index conveys the same message as the analysis above of the predominance of the change of heading rule in EU's RoO regimes. The average is somewhat higher for NAFTA, reflecting the use of the change in chapter criterion. EFTA-Mexico and Chile-CACM RoO are somewhat more lenient, while the restrictiveness of the SADC RoO is strikingly similar to the PANEURO model. Non-preferential RoO, here set at the average level of restrictiveness of RoO in sectors where various options are being contemplated so that the RoO that will apply has yet to be identified are less restrictive overall given the downward influence of the change of subheading and change of item criteria.

Second, the data reveal important variation in the degree of restrictiveness across economic sectors within regimes, as well as striking similarities across regimes in the levels of sectoral restrictiveness. Agricultural products and textiles and apparel are marked by a particularly high restrictiveness score in each regime, which suggests that the restrictiveness of RoO may be driven by the same political economy variables that arbitrate the level of tariffs particularly in the EU and the United States. Non-preferential RoO exhibit similar patterns across sectors, communicating the operation of political economy dynamics also at the multilateral level. Yet, most sectors in the non-preferential RoO are less restrictive than their preferential counterparts.

The box-and-whisker plots in figure 3 provide a more nuanced look at the sectoral restrictiveness across four major recent RoO regimes—PANEURO, SADC, NAFTA, and the Chile-Korea FTA. The plots reveal some differences in the range of restrictiveness (or the lack of it) within sectors in each agreement. For instance, while PANEURO RoO and SADC RoO tailored to a good extent after the PANEURO model are nearly uniform with sections 13-21, NAFTA and Chile-Korea RoO vary more within these sections—and tend to be more restrictive than the EU RoO. Meanwhile, EU and SADC RoO in foodstuffs (section 4) feature a wide range of restrictiveness values, while NAFTA and Chile-Korea RoO are highly uniform in the sector. Also notable is the somewhat lower extent of intra-sectoral variation in the Chile-Korea FTA than in NAFTA in some sectors, such as pulp and paper (section 10) and transportation equipment (section 17), which evinces the higher level of generality of the trans-Pacific regime.

Figure 3 – Profiles of Sectoral Restrictiveness of RoO in PANEURO, SADC, NAFTA, and Chile-Korea FTA



Note: Observed points more extreme than the adjacent values are individually plotted (outliers and extreme values are marked using “x” and “o” symbols).
 Source: Authors’ calculations.

iv. “Weighted” RoO: RoO’s Coverage of Actual Trade Flows

While examining RoO by their restrictiveness values provides insights into the operation of RoO regimes, it is the volume of trade affected by a given RoO that ultimately impacts economic outcomes. Table 7 strives to capture the relevance of RoO restrictiveness by weighting the sectoral restrictiveness values of NAFTA, PANEURO, Chile-CACM, and SADC RoO with trade—with US imports from NAFTA partners, EU’s total imports, Chilean imports from CACM, and South African imports from SADC partners, respectively, in year 2000. The column next to each FTA specifies the deviation of the weighted RoO from the unweighted RoO, operationalized here as the share of the weighted RoO of the unweighted one. When the share is 1, the RoO in the unweighted and weighted exercises are as restrictive; when the share rises above 1, the weighted RoO are more restrictive. When the share is zero, the country on whose imports the weights are generated has no incoming flows from the partners, as is the case in many sectors in the Chile-CACM FTA.

The table reveals striking similarities between the weighted and unweighted RoO. However, the weighted RoO tend to be less restrictive than the unweighted RoO; this may in and of itself indicate that stringent RoO stifle commerce.

Table 7 – Weighted Restrictiveness of PANEURO, NAFTA, Chile-CACM, and SADC RoO

HS Section	PAN-EURO	as share of unweighted	NAFTA	as share of unweighted	Chile-CACM	as share of unweighted	SADC	as share of unweighted
1. Live Animals	7.0	1.00	6.0	1.00	7.0	1.19	7.0	1.00
2. Vegetable Products	5.5	0.83	5.8	0.96	7.0	1.25	6.3	0.96
3. Fats and Oils	4.2	0.90	6.0	1.00	4.0	1.33	7.0	1.00
4. Food, Bev. & Tobacco	4.9	0.99	5.0	1.06	0.9	0.23	6.4	1.19
5. Mineral Products	2.4	0.68	5.3	0.88	0.0	0.00	4.0	1.00
6. Chemicals	4.1	1.04	4.9	0.93	4.1	1.56	4.0	1.00
7. Plastics	4.8	0.97	4.8	1.00	2.3	0.72	4.3	0.91
8. Leather Goods	3.5	1.06	5.5	0.98	2.0	0.54	4.0	1.05
9. Wood Products	2.5	0.85	4.0	1.00	0.0	0.00	5.0	1.04
10. Pulp and Paper	4.3	0.97	5.6	1.17	4.0	0.98	4.0	0.93
11. Textile and Apparel	6.6	1.09	6.8	0.98	6.9	1.54	4.5	0.74
12. Footwear	2.1	0.74	4.9	1.00	0.0	0.00	1.2	0.46
13. Stone and Glass	3.8	1.03	5.0	1.02	0.0	0.00	2.8	0.76
14. Jewelry	3.6	0.98	5.7	1.08	0.0	0.00	3.9	1.06
15. Base Metals	3.9	0.93	4.8	1.03	4.6	1.22	4.5	1.15
16. Mach. & Elec. Eq.	4.9	1.01	3.8	1.20	4.6	1.07	4.0	0.96
17. Transportation Eq.	4.6	0.98	4.8	0.99	0.0	0.00	3.7	0.97
18. Optics	5.2	1.04	4.1	1.02	5.0	1.25	3.8	0.98
19. Arms and Ammun.	4.0	1.00	4.8	1.02	0.0	0.00	0.0	0.00
20. Works of Art, Misc.	2.9	0.72	5.4	1.05	0.0	0.00	4.9	1.22
<i>Average</i>	4.2	<i>0.94</i>	<i>5.1</i>	<i>1.01</i>	2.6	<i>0.66</i>	4.3	<i>0.95</i>

Source: Authors' calculations.

The RoO index provides an extremely useful means for capturing the restrictiveness of RoO. However, as a caveat, it should be kept in mind that restrictiveness of RoO is in practice highly specific to the product in question, with some nuances escaping the index.

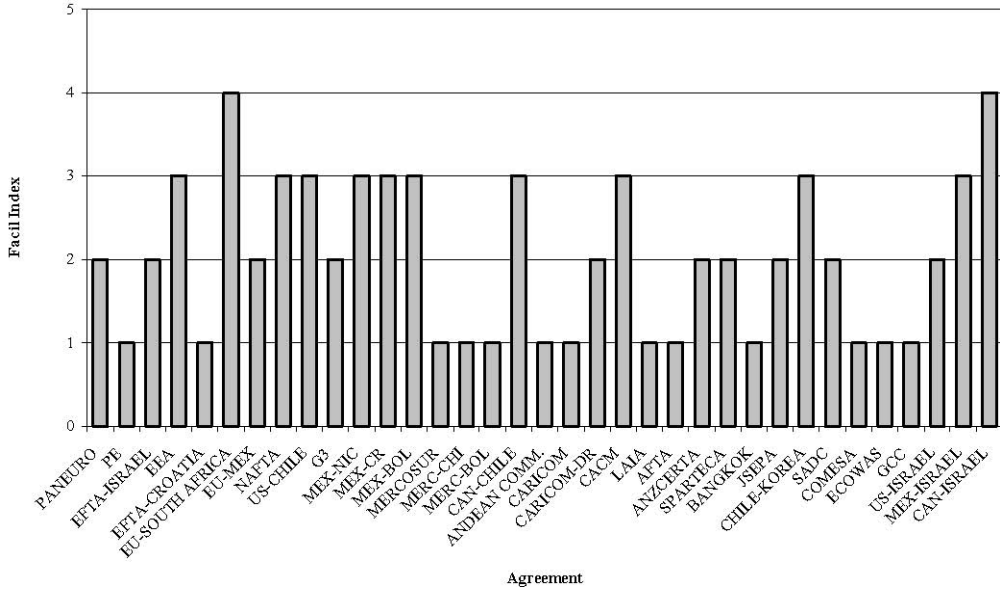
First, that RoO are formulated on the basis of the Harmonized System, which was not designed with a consideration for the determination of origin, can have important implications to some types of products: even if a product undergoes a substantial transformation from the standpoint of production processes and subsequent uses, it may still fail to alter its HS tariff classification, and hence fail to meet the CTC test. The ostensibly simple change of heading criterion can be highly restrictive for some sectors, such as machinery, where the intermediate and final goods are often classified in the same heading. Second, the seemingly simple stand-alone VC RoO can be problematic in the face of frequent fluctuations in exchange rates and changes in production costs, as well as in countries with very low costs of production. The VC rule is also particularly susceptible to subjectivity by the importing country customs. The problems of calculating the production costs particularly of goods produced in multiple countries has led Lloyd (2001) to recommend a value added tariff in lieu of RoO—a tariff whose base is not the price of the imported article but rather the proportion of the value added outside the area.

B. Comparing Regime-Wide RoO: A Facilitation Index

Product-specific RoO in complex PTAs—PTAs not carrying across-the-board RoO—can impose highly divergent requirements to the exporters of different goods. Furthermore, even an across-the-board rule will undoubtedly have more striking implications in some sectors than in others, depending on the product-specific features. However, as discussed above, RoO regimes employ several mechanisms to add flexibility to the application of the product-specific RoO. We strive to capture the combined effect of such mechanisms by developing a regime-wide “facilitation index”. The index is based on five components: *de minimis*, diagonal cumulation, full cumulation, drawback, and self-certification. The maximum index value of 5 results when the permitted level of *de minimis* is 5 percent or higher and when the other four variables are permitted by the RoO regime in question. The minimum value of zero results when *de minimis* is below 5 percent and none of the other regime-wide RoO are included in the PTA. Each component provides one extra “point” to the index.

Figure 4 graphs the “facil index” values for PTAs. The PANEURO and NAFTA models are nearly at *a par*; the difference here is produced by coding NAFTA as allowing drawback, as it did for the first seven years. The EU-South Africa and the Canada-Israel are the most “permissive” regimes, the former thanks to drawback and diagonal and full cumulation, and the latter because of self-certification, drawback and cumulation with the United States. Meanwhile, many regimes with an across-the-board RoO neither provide for *de minimis* nor feature many regime-wide provisions of flexibility; the most usually occurring regime-wide rule in these PTAs is drawback. Indeed, that regimes with the most stringent RoO and the highest degree of sectoral selectivity in RoO feature the highest facilitation values may evince counter-lobbying by producers jeopardized by stringent product-specific RoO. Given that the restrictiveness of product-specific RoO is likely a less salient issue in regimes employing an across-the-board RoO, political economy pressure for alleviating mechanisms could be hypothesized to be reduced at the time when RoO are negotiated.

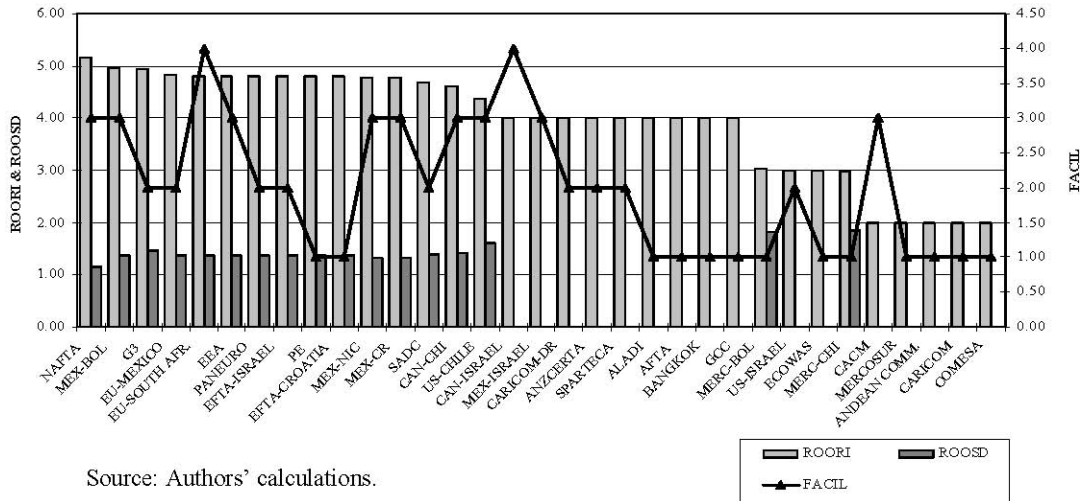
Figure 4 – Facilitation Index for Selected PTAs



Source: Authors' calculations.

Figure 5 illustrates the average restrictiveness of RoO (ROORI), the sectoral selectivity of RoO (ROOSD, operationalized as standard deviation in the product-specific RoO), and the facilitation index scores (Facil) for PTAs. Correlation among the three variables evinces the use of restrictive and selective RoO and relatively flexible facilitation terms in the NAFTA- and PANEURO-type regimes.

Figure 5 – Restrictiveness of RoO, Standard Deviation in RoO, and Facil Index Values in Selected PTAs



Source: Authors' calculations.

Source: Estevadeordal and Suominen (2004a).

Source: Authors' calculations.

Given that these regimes entered into force at different points in time (as specified in appendix VIIa), the aggregate level of restrictiveness, selectivity, and facilitation around the world can be expected to alter over time. Indeed, (1) that a larger number of country pairs will be tied by a common RoO regime over time; and (2) that regimes with most restrictive and selective product-specific RoO and most lenient facilitation terms—such as NAFTA and the bulk of the EU's FTAs—emerged after the early 1990s mean that the “world average” restrictiveness and selectivity of RoO and the level of facilitation should be increasing over time. Figures 6a-c confirm this, displaying the upward trend in the trade-weighted world averages of restrictiveness, selectivity, and facilitation as measured as a dyadic variable for a sample of 155 countries in 1981-2001.

Figures 7a-c reveal the similar upward trend for PTA pairs. The trend is unsurprisingly less striking given that unlike pairs in the full sample, no pair in the PTA sample ever features ROORI value of zero—and that the rise in the overall average measure upon the entry into effect of PTAs with restrictive RoO regimes is moderated by the simultaneous increase in the number of country pairs in the PTA sample (while the number of country pairs remains constant over time in the full sample). Note that the drop in the restrictiveness values in the early 1990s is not as dramatic as the graph may imply but rather a matter of scaling, as the decline is only from a restrictiveness average value of 3.4 to 3.0. The drop in the average owes largely to the entry into effect of ECOWAS, which markedly expanded the existing PTA member universe at the time by incorporating nearly 20 countries, *and* carried loose RoO (coded at here with restrictiveness value of 3.0).²¹ The subsequent upward trend is telling of the proliferation of restrictive RoO regimes in the 1990s. Figures 8a-b present the behavior of RoO restrictiveness and standard deviation values for final goods in the five sectors analyzed in the next section of this paper.

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Note that the graphs for PTA pairs are not weighted by trade. This is because the relative stability over time in the ROORI values over time in the PTA sample takes place against the backdrop of rapidly rising trade

flows among PTA pairs. Weighting by trade among PTA pairs means that the numerator remains relatively consistent while the denominator rises exponentially, with the result being that the ROORI average appears to decline over time among PTA pairs—an outcome that is misleading. Weighting makes better sense for the entire sample given that while the denominator certainly rises, so does the numerator as more and more countries enter into PTAs (so that their RoO values shoot up from zero to the value of the regime of which they form part).

Figure 6a - Trade-Weighted World Average of Restrictiveness of RoO, 1981-2001

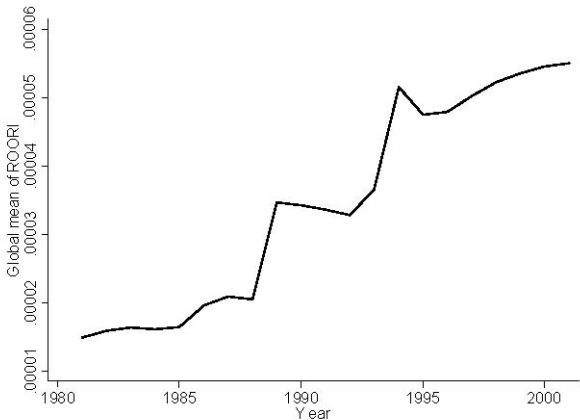


Figure 6b - Trade-Weighted World Average of Sectoral Selectivity of RoO, 1981-2001



Figure 6c - Trade-Weighted World Average of Facilitation in Regime-Wide RoO, 1981-2001

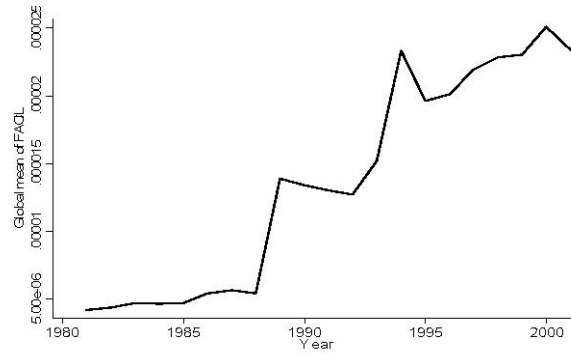


Figure 7a –Average of Restrictiveness of RoO for PTA Pairs, 1981-2001

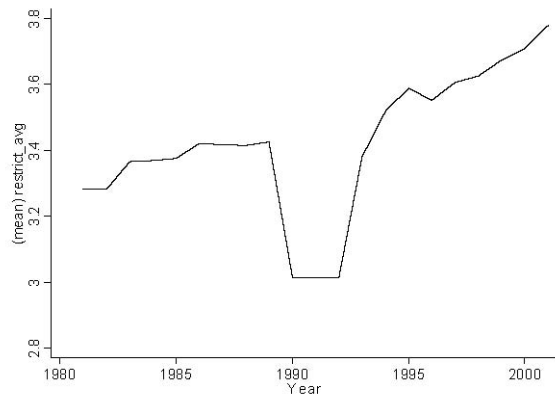


Figure 7b –Average of Sectoral Selectivity of RoO for PTA Pairs, 1981-2001

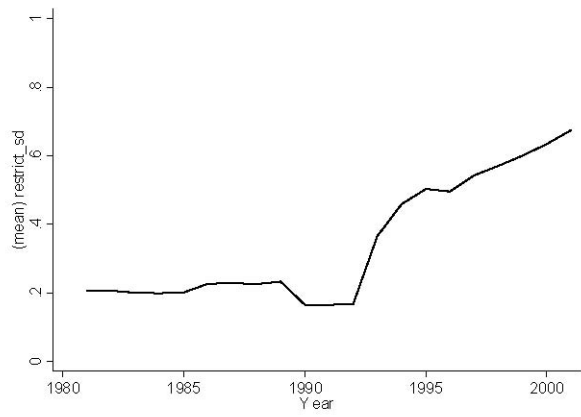
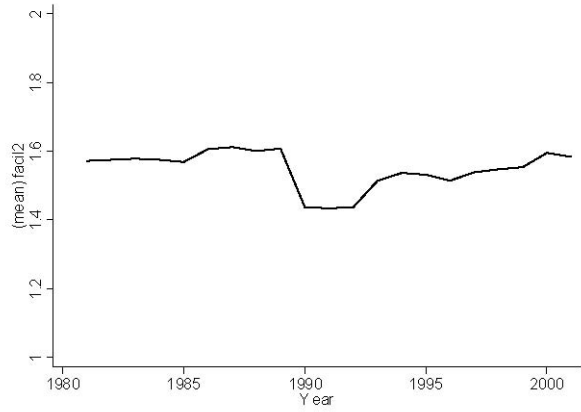


Figure 7c - Average of Facilitation in Regime-Wide RoO for PTA Pairs,



1981-2001

Figure 8a – Average Level of Restrictiveness of RoO by Sector, 1988-2001

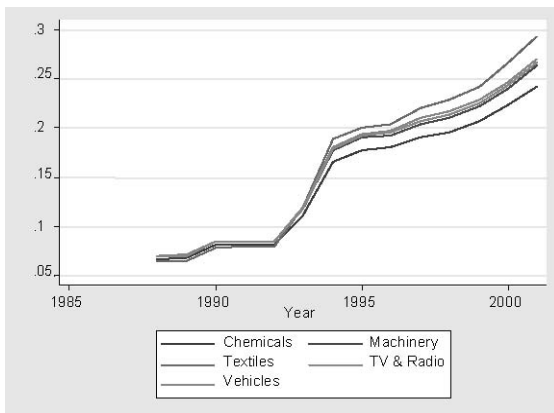
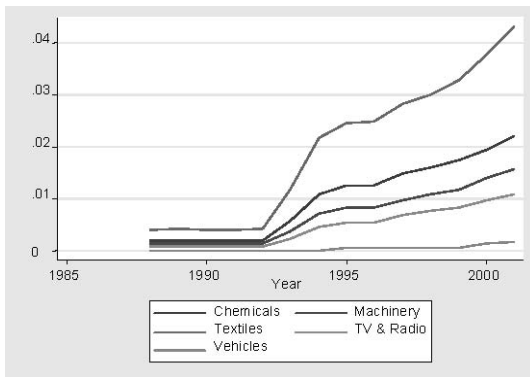


Figure 8b – Average Level of Standard Deviation of RoO by Sector, 1988-2001



Source: Authors' calculations.

IV. Trade Effects of RoO: A Gravity Application

What are the effects of RoO on trade? A RoOless PTA could be expected to result in dramatic changes in trade patterns due to the rise in transshipment through the member with the lowest tariff. The PTA would be highly liberalizing given that the lowest tariff would apply to each import category. However, RoO can decrease particularly intermediate good imports to the PTA area from the ROW by increasing the incentives for intra-PTA outsourcing among producers that strive to qualify for the PTA-conferred preferential treatment. Intra-PTA trade can subsequently be expected to rise. However, note that in the long-run stringent RoO can moderate such an increase in trade flows due to increasing the demand for intra-PTA inputs and thus raising their price, which, in turn, would increase the

costs for the intra-PTA final goods producers, decreasing final goods production and lowering the downstream producers' derived demand for intra-PTA inputs. As such, RoO can gradually work to undercut intra-PTA trade in both inputs and final goods (Ju and Krishna 1998).²²

However, theoretical efforts to capture RoO's trade effects—first and foremost Ju and Krishna (1998) and Duttagupta and Panagariya (2001)—are hard-pressed to derive the ultimate trade effects of RoO. This owes largely to the inherent interaction of the intermediate and final goods markets. Moreover, at least two external shocks can affect trade flows. First, a higher return on inputs in the PTA area can attract investment in intermediate goods industries, which, in turn, can crowd out the market for inputs, reduce their price, and thus allow intra-PTA commerce to flourish. Second, the phasing out of the preferential tariffs by any PTA member can accentuate the lure of shipping from or through the other members to that member under preferential terms. This would subsequently reduce RoO's interference on trade, as exporters would have greater incentives to comply with (or, alternatively, cheat and circumvent) the RoO.

Three theoretical results do seem relatively clear. First, restrictive RoO dampen intra-PTA final goods trade below the levels that would be generated by a RoOless PTA or a PTA with very loose RoO. This is due to (1) the increase in production costs imposed by RoO; and (2) RoO's undermining the possibilities for transshipment. In other words, intra-PTA final goods producers would in a RoOless PTA enjoy a cost advantage to themselves in a PTA with RoO; two like pairs of countries would thus witness less growth in bilateral trade in final goods as a result of a PTA in the presence of stringent RoO than if RoO were loose or absent. Second, at least in the short-run, intra-PTA trade in intermediate goods would likely increase more in the presence of stringent RoO downstream than if RoO were loose or absent. Third, PTA-ROW commerce would likely be higher in the presence of a RoOless PTA or a PTA with very loose RoO than in the face of a PTA with highly restrictive RoO.²³

To be sure, PTA formation *per se* can entail a shift to intra-PTA inputs from lower-cost ROW supplies due to the drop in intra-PTA tariffs along the lines of the Vinerian (1950) trade diversion-trade creation argument. However, this standard notion of trade diversion would in a RoOless world require assuming the absence of trade deflection and/or the existence of relatively similar most favored nation (MFN) tariff regimes among the PTA partners (or a customs union as in Viner), as otherwise transshipment would counteract the trade-diverting impact of the PTA. However, there is a crucial difference between RoO- and PTA-induced trade diversion: RoO can induce a turn to intra-PTA inputs *even when* the price of the lowest cost ROW inputs is lower than that of the intra-PTA ones. This is because intra-PTA downstream producers must use a RoO-defined share of intra-PTA inputs in their final goods when seeking to qualify for preferential treatment regardless of the cost of the inputs. RoO, in other words, entail a minimum cost share that has to arise within the PTA. That RoO accentuate the prospects for trade diversion entails (1) an extension of protection to uncompetitive intra-PTA input producers; and (2) “exporting protection” to the input suppliers in one PTA partner to the borders of another (Krueger 1993; Krueger and Krishna 1995).

See Ju and Krishna (1998) for some disclaimers to this notion that pertain to the interaction of intermediate and final goods markets.

The purpose of this section is to provide clarity to the trade effects of RoO. We seek to accomplish this by employing a modified gravity model to assess the trade effects of (1) product-specific RoO of different degrees of restrictiveness and selectivity; and (2) the

flexibility instilled in RoO regimes by different types of regime-wide RoO provisions. That is, we put the RoO and Facil indices to work. We examine two types of trade flows: aggregate imports, and imports in intermediate goods in the chemical, machinery, textile, television and radio transmitter, and vehicle sectors. The sample covers 155 countries and nearly a hundred PTAs for years 1981-2001 for aggregate trade, and 1988-2001 for trade in intermediates.²⁴ The following parts of this section discuss the gravity application for RoO and its potential contributions, and present the empirical specifications and results.

A. *RoO and The Gravity Model*

The gravity model has been used widely to predict bilateral trade flows between countries. In its barest form, it posits that controlling for size, trade between two regions increases as bilateral trade barriers relative to the average barrier to trade that the regions have with all their partners falls. Initially specified by Tinbergen (1962), Pöyhönen (1963), and Linneman (1966), the model proved empirically robust yet became discredited for lacking theoretical underpinnings. More recent scholars, such as Anderson (1979), Bergstrand (1985, 1989, 1990), Helpman and Krugman (1985), and Deardorff (1997, 1998) have developed theoretical foundations for the gravity equation. Indeed, Heckscher-Ohlin, Ricardo-Viner, and the increasing returns to scale (IRS) models of trade have all been found to generate predictions consistent with the gravity model.²⁵

This study strives to present a novel way of capturing the effect of RoO on trade by employing a modified gravity model that accounts for the structure of RoO governing preferential economic relations between countries. The first novel features of our approach are that in contrast to the prior single-FTA empirical studies largely focused either on NAFTA or the PANEURO system, this study pioneers in (1) incorporating virtually all RoO regimes around the world; and (2) examining the trade effects of RoO over time. However, we also strive to make three more general contributions to applying the gravity model.

First, this study adds to the very small pool of gravity applications, first and foremost by Estevadeordal and Robertson (2003) and Ghosh and Yamarik (2003), that, rather than seeking to capture the impact of preferential relationships with a simple PTA dummy, consider the trade effects of different degrees and types of economic integration. The application here is the first attempt (1) to explicitly incorporate the restrictiveness and selectivity of product-specific RoO as independent variables in the gravity equation; and (2) to also operationalize five regime-wide provisions—*de minimis*, drawback, certification method, and diagonal and full cumulation—as well as the Facil index created on their basis.²⁶

²⁴ For the list of countries, see appendix VI. For the list of PTAs, see appendix VII.

²⁵ The approaches have usually kept with the constant elasticity of substitution (CES) preference structure.

Second, this study contributes to the thus far small number of gravity applications²⁷ conducted at the sectoral level. The vast majority of gravity models in general—as well as gravity models focused on PTAs, in particular—continue geared to explaining aggregate flows of trade, rather than allowing income elasticities and distance to vary by product. Meanwhile, the existing sectoral approaches are somewhat limited given that they simply regress sectoral flows on the same variables as aggregate trade flows, rather than generating²⁸ sector-specific independent variables. One of the most prominent strands of the disaggregated studies, and one we draw on, is focused on estimating a proxy for standards—essentially, technical barriers to trade (TBTs)—and hence does put forth a sectoral independent variable (Moenius 1999, 2000; Wilson and Otsuki 2001; Maskus, Wilson, Otsuki 2000). Indeed, our study paves the way for exploring the combined impact of TBTs and RoO on trade.

Third, the approach here adds nuance to the growing volume of studies—including gravity models—that explore outsourcing and trade in intermediate goods, in particular. Fancello and Pinna (2002) explore Italian and German intermediate imports in footwear and computers and parts. Hummels, Ishii and Yi (1999) generate a vertical specialization-variable and use input-output tables from the OECD countries and selected emerging markets. However, except for Augier et al.'s (2003) examination of cumulation, no study focused on outsourcing has as yet incorporated rules of origin, which, after all, are one of the most, if not the most, crucial determinants of trade in intermediates.

²⁶

Augier, Gasiorek, and Lai-Tong (2003) present evidence of the impact of cumulation on trade.

²⁷

Bergstrand (1989) derives a gravity equation for a multi-industry world that allows for intra-industry trade. Vittas and Mauro (1997) estimate the gravity model on data for trade between OECD countries for five sensitive products and at the aggregate trade. Brenton and Di Mauro (1998) focus on CEEC exports of sensitive products to the EU market in a panel of 45 to 47 source countries using 1995 data. Schumacher and Trubswetter (2000) explore aggregate and sectoral CEEC exports to the EU. Bertolini and Montanari (2002) also examine CEEC-EU trade at the aggregate level and in agriculture, food and beverages, and manufacturing. Leejour, Mooji and Nahuis (2001) employ the gravity model for estimating the effects of eastward enlargement of Europe. Carrillo and Li (2002) examine Andean Community's trade through the gravity model, disaggregating goods into agricultural, mineral, labor, and capital intensive categories. Dihel and Walkenhorst (2002) study trade between Germany on the one hand, and the EU and non-EU countries, on the other, via the gravity model in eight sectors.

²⁸

The large standard error in these studies have led analysts to argue that disaggregate flows might be best explored through specifications other than the gravity model. See Brenton and Di Mauro (1998: 301).

B. Testing the Impact of RoO: Aggregate Trade

This part presents the empirical specification for exploring the impact of RoO on aggregate trade flows between countries. The dependent variable is imports by partner for 155 countries (listed in appendix VI) for 1981-2001. The import data (imports CIF) is drawn

form the International Monetary Fund’s Direction of Trade Statistics, and deflated with US consumer price index. The GDP and GDP per capita variables are expressed in constant 1995 dollars and based on the World Bank’s World Development Indicators. The bilateral distance-variable is based on the calculations by Centre d’Etudes Prospectives et d’Informations Internationales (CEPII). The other dyadic variables are to a large extent constructed by the author. The RoO-regime variables are also constructed by the author on the basis of the RoO protocols of the various PTAs considered in this study.²⁹ The coding method for the gravity dataset is detailed in appendix I; appendix III contains the descriptive statistics.

i. Empirical Specification for Panel Regression

We estimate the following basic gravity equation using OLS:

$$[1] \ln(V_{ij}) = b_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln(GDPPC_i) + b_4 \ln(GDPPC_j) + b_5 \ln(DIST_{ij}) + b_6 (BORDER_{ij}) + b_7 (COMLANG_{ij}) + b_8 (COL_{ij}) + b_9 (COMCOL_{ij}) + b_{10} (PTA_{ij}) + b_{11} \ln(ROORI_{ij}) + b_{12} (FACIL_{ij}) + \varepsilon$$

where

V_{ij} is the value of imports of country i from country j ;

GDP_i is the exporter’s GDP;

GDP_j is the importer’s GDP;

$GDPPC_i$ is the exporter’s GDP per capita ratio;

$GDPPC_j$ is the importer’s GDP per capita ratio;

$DIST_{ij}$ is the distance between the capitals of the two countries and serves as a proxy for

transportation costs;³⁰

²⁹ Rather than employing the trade-weighted ROORI, we use the ROORI variable based on the observation rule in order to avoid endogeneity problems.

³⁰ Another useful control variable would be a “distance from major economic centers”-variable; according to Soloaga and Winters (2001), after controlling for distance between i and j , the farther country i is from all its trading partners, the greater its imports will be from country j —i.e. Australia and New Zealand will likely trade with each other more due to being far apart from any other trading partners than two other countries separated by the same distance (such as Poland and Spain) due to the latter having many trading partners nearby. We for now lack such distance data for all of the 155 countries in the sample.

$BORDER_{ij}$ is a dummy that takes value 1 if countries i and j share a land border and 0 otherwise;

$COMLANG_{ij}$ is a dummy for cultural affinities, that takes value 1 when the two countries speak the same language and 0 otherwise;

COL_{ij} is a dummy that takes value 1 when one country has been colonized by the other and 0 otherwise;

COMCOL_{ij} is a dummy that takes value 1 when the two countries have been colonized by the same colonial power and 0 otherwise;

PTA_{ij} is a dummy that takes value 1 when two countries belong to the same PTA and 0 otherwise;

ROORI_{ij} is the average of the restrictiveness of RoO-values (as measured at the 6-digit level of disaggregation) of a PTA regulating trade between the two countries, and can take values anywhere between 1 and 7;

FACIL_{ij} is the facilitation index of a PTA regulating trade between the two countries, and can take values anywhere between 1 and 5; and

ε is a normally-distributed error term.

All regressions include year, importer, and exporter dummies in order to control for any effects peculiar to a certain time or country beyond the variables included in the model. The importer and exporter dummies also serve as a proxy for the multilateral resistance term applied by Anderson and van Wincoop (2001), where trade between *i* and *j* depends on both barriers between the two countries, and between either of them and the rest of the world.³¹

The effect of GDP and GDPPC variables should be positive on trade, whereas DIST can be expected to have a negative sign. The impact of a common border and cultural affinities should be positive. PTA is expected to have a positive impact on trade flows. Meanwhile, the first key independent variable, ROORI, is expected to stifle aggregate trade between PTA partners. In contrast, FACIL should—through its components of *de minimis*, diagonal and full cumulation, and drawback that expand the pool of intermediate goods available to producers, and self-certification which can be hypothesized to reduce exporters' administrative costs of complying with the RoO regime—have a positive impact on trade flows.

Table 8 reports the results for all country pairs in the sample, and for the subset of PTA pairs.

³¹

Indeed, Anderson and van Wincoop (2003) suggest that empirically, the inclusion of country fixed effects captures multilateral resistance and thus corrects misspecification.

Table 8 – Effects of Restrictive RoO and Sectoral Selectivity of RoO on Trade, 1981-2001

Independent Variables	Dependent Variable: Ln(Trade)					Dependent Variable: Ln(Trade)					
	All pairs 1981-2001		PTA Pairs 1981-2001			All Pairs 1981-2001		PTA Pairs 1981-2001		PTA Pairs 1991-2001	
	I	II	III	IV	V	VI	VII	VIII	XI	X	XI
ln(GDP_imp)	0.224 (8.18)**	0.206 (7.55)**	0.207 (7.58)**	0.800 (9.86)**	0.782 (9.68)**	0.207 (7.58)**	0.207 (7.56)**	0.797 (9.80)**	0.789 (9.72)**	0.437 (4.86)**	0.434 (4.84)**
ln(GDP_exp)	0.464 (10.58)**	0.403 (9.20)**	0.406 (9.27)**	0.530 (3.04)**	0.480 (2.76)**	0.405 (9.22)**	0.403 (9.17)**	0.532 (3.04)**	0.512 (2.93)**	-0.216 (0.94)	-0.197 (0.86)
ln(PerCap GDP_imp)	0.378 (13.74)**	0.398 (14.51)**	0.397 (14.46)**	-0.533 (8.82)**	-0.516 (8.57)**	0.393 (14.31)**	0.393 (14.30)**	-0.532 (8.79)**	-0.520 (8.60)**	-0.568 (9.00)**	-0.561 (8.90)**
ln(PerCap GDP_exp)	0.601 (14.40)**	0.659 (15.82)**	0.657 (15.76)**	-0.347 (2.64)*	-0.304 (2.32)*	0.649 (15.54)**	0.650 (15.56)**	-0.35 (2.66)**	-0.327 (2.49)*	0.106 (0.68)	0.102 (0.65)
ln(Distance)	-1.234 (185.94)**	-1.222 (183.73)**	-1.218 (182.75)**	-1.158 (47.45)**	-1.151 (47.29)**	-1.231 (185.22)**	-1.228 (184.45)**	-1.183 (49.01)**	-1.182 (49.09)**	-1.253 (45.61)**	-1.253 (45.70)**
Common Border	0.27 (10.32)**	0.238 (9.12)**	0.244 (9.37)**	0.504 (11.71)**	0.481 (11.19)**	0.241 (9.22)**	0.245 (9.37)**	0.507 (11.78)**	0.489 (11.34)**	0.539 (10.82)**	0.519 (10.40)**
Common Language	0.354 (24.39)**	0.334 (23.07)**	0.337 (23.26)**	-0.031 (0.54)	-0.013 (0.23)	0.334 (22.99)**	0.335 (23.06)**	-0.013 (0.23)	-0.002 (0.04)	0.105 (1.68)	0.117 (1.87)
Colonial Rel.	1.287 (41.74)**	1.295 (42.07)**	1.294 (42.04)**	0.802 (7.99)**	0.765 (7.63)**	1.285 (41.68)**	1.282 (41.60)**	0.846 (8.43)**	0.819 (8.17)**	1.055 (8.19)**	1.014 (7.87)**
Common Colonizer	0.643 (39.11)**	0.618 (37.67)**	0.627 (38.11)**	0.715 (14.79)**	0.720 (14.93)**	0.625 (38.01)**	0.632 (38.38)**	0.685 (14.13)**	0.676 (13.97)**	0.621 (10.55)**	0.613 (10.44)**
PTA	0.550 (28.56)**	2.417 (38.53)**	2.341 (36.90)**			0.879 (36.51)**	0.643 (15.66)**				
ln(Restrictiveness Avg)		-1.482 (31.26)**	-1.676 (31.49)**	-0.637 (6.91)**	-0.715 (7.74)**						
ln(Restrictiveness Sd)						-0.942 (22.71)**	-1.144 (22.74)**	0.095 (1.13)	-0.048 (0.55)	-0.14 (1.49)	-0.252 (2.63)**
Facil			0.189 (8.02)**		0.474 (8.47)**			0.181 (7.10)**	0.376 (6.85)**		0.319 (5.53)**
Constant	2.597 (2.59)**	-1.281 (1.28)	-1.363 (1.36)	-3.806 (1.00)	-3.336 (0.88)	-1.137 (1.13)	-1.067 (1.06)	-4.704 (1.23)	-4.779 (1.25)	19.176 (3.83)*	18.351 (3.67)**
Observations	185497	185491	185491	11920	11920	185497	185497	11926	11926	8857	8857
Adjusted R-squared	0.73	0.73	0.73	0.88	0.88	0.73	0.73	0.88	0.88	0.88	0.88
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer and Exporter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Absolute value of t-statistics in parentheses

* significant at 5 percent level, ** significant at 1 percent level

The results on the traditional gravity variables are as expected. The basic gravity model used in several studies to examine the effects of regional integration shows that PTAs have a positive effect on aggregate trade flows. However and as expected, rules of origin, a key market access provision in virtually all PTAs, has a negative sign and is significant at the 1 percent level. This is the first main finding of this study: restrictive product-specific RoO undermine aggregate trade. Indeed, stringent RoO are key in countering the PTA-inspired boost to trade: the difference in the coefficient for the PTA variable in columns I and II (i.e., 2.417-0.550 = 1.867) approximates the negative coefficient of the RoO variable (-1.482).

Column III incorporates the FACIL variable. As expected, FACIL has a positive and significant effect on trade. This is the second main finding of this paper: the combined effect of regime-wide variables that instill flexibility to the application of product-specific RoO boosts trade.

Columns IV and V show that the results on RoO and FACIL hold also for the sub-sample of PTA pairs. RoO undermine aggregate trade flows among PTA pairs; however and importantly, the opposite effect of permissive facilitation terms compensates for this negative impact of product-specific RoO.³² Indeed, this is an important result because a regression incorporating all pairs may contain an endogeneity problem: countries do not select randomly into PTAs, but may choose to enter PTAs with the partners which with they trade the most—which, in turn, might cause the effect of RoO on trade to appear excessively accentuated. The policy implication is clear: PTA members adopting stringent product-specific RoO are well-advised to adopt lenient regime-wide RoO. (The individual effect of each FACIL component is explored below).

Another important question is whether RoO regimes with marked intra-regime variation across products in the levels of restrictiveness of RoO—regimes with high levels of sectoral selectivity or “peak RoO”—have greater negative effects on trade than regimes with an across-the-board RoO. Work on the structure of tariff regimes shows that regimes populated by tariff peaks can have stronger negative effects on trade and even be more susceptible to corruption than regimes with homogeneous tariffs, *ceteris paribus*.³³ We explore the relevance of RoO peaks by estimating [1] but replacing ROORI with ROOSD:

$$[2] \ln(V_{ij}) = b_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln(GDPPC_i) + b_4 \ln(GDPPC_j) + b_5 \ln(DIST_{ij}) + b_6 (BORDER_{ij}) + b_7 (COMLANG_{ij}) + b_8 (COL_{ij}) + b_9 (COMCOL_{ij}) + b_{10} (PTA_{ij}) + b_{11} \ln(ROOSD_{ij}) + b_{12} \ln(FACIL_{ij}) + \varepsilon$$

where

ROOSD is the standard deviation of ROORI values within a regime.

Note that there are two complementary reasons why ROOSD would have a negative effect on trade. First, ROOSD necessarily captures some of the effects of the ROORI variable due to correlation between the two variables: the most restrictive ROO regimes—those based on the NAFTA and the PANEURO model—also have the highest ROOSD values. Conversely, regimes with an across-the-board rule and hence zero ROOSD are empirically also the less restrictive ones. However and second, regimes with high ROOSD values—regimes with peak ROORI—are those where the high ROOSD is produced by the existence of some ROORI values taking very high levels; it is thus the existence of ROO peaks—³⁴ rather than overall level of ROORI—that is in model [2] expected to reduce trade.

³² To be sure, the facilitation term may pick up and thus proxy for some other trade-enhancing variables of the PTAs, such as sturdy regulations on the use of emergency safeguards.

³³ See, for instance, Gatti (1999).

Columns VI-XI of table 8 present the results. As expected, the ROOSD has a negative effect on trade. The finding allows for concluding that greater sectoral selectivity in RoO regimes undermines trade. FACIL, meanwhile, has a positive and significant effect on trade. This provides further evidence that flexible regime-wide RoO can help boost aggregate trade flows. This is the third major result of this paper: high levels of sectoral selectivity in RoO undermine aggregate trade.

The results are less resounding when ROOSD is examined in the sub-sample of PTA pairs. However, this is due to the construct of the data. Apart from the US-Canada FTA of 1989, all RoO regimes formed prior to 1991 in the sample feature an across-the-board RoO, which implies that the ROOSD values are basically zero until the 1990s. Indeed, column XI shows that ROOSD re-acquires its negative and significant sign³⁵ when the sample is limited to the years of the rise of complex RoO regimes (1991-2001).

The marked positive effect of FACIL on trade begs the question of the individual contributions of the five component parts of FACIL. We estimate the effects of the FACIL components through the following regression:

$$\begin{aligned}
 [3] \ln(V_{ij}) = & b_0 + b_1 \ln(\text{GDP}_i) + b_2 \ln(\text{GDP}_j) + b_3 \ln(\text{GDPPC}_i) + b_4 \ln(\text{GDPPC}_j) + \\
 & b_5 \ln(\text{DIST}_{ij}) + b_6 (\text{BORDER}_{ij}) + b_7 (\text{COMLANG}_{ij}) + b_8 (\text{COL}_{ij}) + \\
 & b_9 (\text{COMCOL}_{ij}) + b_{10} (\text{PTA}_{ij}) + b_{11} \ln(\text{ROORI}_{ij}) + b_{12} \ln(\text{DE MINIMIS}_{ij}) + \\
 & b_{13} \ln(\text{CUMUDIAG}_{ij}) + b_{14} \ln(\text{CUMUFULL}_{ij}) + b_{15} \ln(\text{DRAWBACK}_{ij}) + \\
 & b_{16} \ln(\text{SELFCERT}_{ij}) + \varepsilon
 \end{aligned}$$

where

DE MINIMIS_{ij} is takes the percentage value of *de minimis* provided by the PTA (i.e., between 0 and 15 percent);

CUMUDIAG_{ij} is a dummy variable that takes value 1 when the PTA binding the two countries allows diagonal cumulation;

CUMUFULL_{ij} is a dummy variable that takes value 1 when the PTA binding the two countries allows full cumulation;

³⁴

In other words, a three-product PTA with ROORI values of 4, 4, and 4 (i.e., ROORI average of 4 and ROOSD of 0) should be less detrimental to trade than PTA with ROORI values of 2, 3, and 7 (i.e., ROORI average of 4 but ROOSD value of 2.64).

³⁵

Robustness checks below show that the results for all pairs rather than PTA pairs only is also more marked when estimating the effect of ROOSD on trade in the 1990s only.

DRAWBACK_{ij} is a dummy variable that takes value 1 when the PTA binding the two countries allows or does not explicitly prohibit the use drawback; and

SELFCERT_{ij} is a dummy variable that takes value 1 when the PTA binding the two countries allows self-certification.

The other variables are as in [1].

Table 9 presents the results for all pairs and PTA pairs. *De minimis*, full cumulation, drawback and self-certification all enter with a positive sign and are significant at the one percent level. Diagonal cumulation is positive that is significant at the 10 percent level; however, this may also be because of the high correlation between *de minimis* and diagonal cumulation. Notable are the highly positive effects of full cumulation (which markedly expands the geographical scope of intermediate goods) and self-certification (which cuts the steps for an exporter to certify the origin of a shipment) on aggregate trade flows. The results for the sample of PTA pairs are similar, although correlation between three variables—*de minimis*, diagonal cumulation, and drawback—likely affects them to an extent.

Table 9– Effects of RoO, *De Minimis*, Cumulation, Drawback and Self-Certification on Aggregate Trade, 1981-2001

Independent Variables	Dependent variable: Ln(Trade)	
	All Pairs 81-01	PTA Pairs 81-01
	I	II
ln(GDP_imp)	0.199 (7.27)**	0.772 (9.56)**
ln(GDP_exp)	0.381 (8.67)**	0.443 (2.55)*
ln(PerCap GDP_imp)	0.401 (14.62)**	-0.506 (8.41)**
ln(PerCap GDP_exp)	0.672 (16.12)**	-0.275 (2.10)*
ln(Distance)	-1.217 (182.63)**	-1.151 (46.87)**
Common Border	0.238 (9.11)**	0.471 (10.97)**
Common Language	0.329 (22.66)**	-0.007 (0.13)
Colonial Rel.	1.299 (41.77)**	0.722 (7.20)**
Common Colonizer	0.631 (38.35)**	0.734 (14.93)**
PTA	1.394 (11.61)**	
ln(Restrictiveness Avg)	-1.309 (20.22)**	-0.744 (7.91)**
<i>De Minimis</i>	0.037 (5.52)**	0.067 (4.64)**
Diagonal Cumulation	0.127 (1.58)	-0.329 (2.65)**
Full Cumulation	0.215 (4.11)**	0.735 (8.41)**
Drawback	0.838 (10.03)**	0.031 (0.29)
Self-Certification	0.868 (10.04)**	0.858 (5.59)**
Constant	-0.617 (0.61)	-1.729 (0.45)
Observations	185491	11920
Adjusted R-squared	0.73	0.88
Year FE	Yes	Yes
Importer and Exporter FE	Yes	Yes

Absolute value of t-statistics in parentheses

* = significant at 5 percent level; ** = significant at 1 percent level

ii. Learning to Play by the Rules: Effects of RoO Over Time

How do the trade effects of RoO vary over time? There are two plausible answers. First, given that the restrictiveness and selectivity of RoO around the world has increased over time, RoO could be expected to obstruct trade flows increasingly each year. However and second, the effects of RoO may also decrease over time given that exporters learn to comply with the product-specific RoO and to take advantage of the facilitation terms, and/or alter their production strategies to meet the RoO. This “RoO learning” implies that the growing stringency of RoO around the world does not necessarily translate into a growing “RoO interference” over time.

We examine these possibilities by running [1] as a panel for 1981-2001 but interacting RoO and Facil, respectively, with a year dummy. (The exercise is extended with cross-section estimates for each year; these are reported in appendix V.) This allows for examining whether the response of trade to rules of origin is significantly different in any given year from the reference year of 1981, when few PTAs, much less PTAs with demanding or complex RoO, were in place. The procedure also allows for contrasting the year-by-year effects to each other. The model is as follows:

$$\begin{aligned} [4] \ln(V_{ij}) = & b_0 + b_1 \ln(\text{GDP}_i) + b_2 \ln(\text{GDP}_j) + b_3 \ln(\text{GDPPC}_i) + b_4 \ln(\text{GDPPC}_j) + \\ & b_5 \ln(\text{DIST}_{ij}) + b_6 (\text{BORDER}_{ij}) + b_7 (\text{COMLANG}_{ij}) + b_8 (\text{COL}_{ij}) + \\ & b_9 (\text{COMCOL}_{ij}) + b_{10} (\text{PTA}_{ij}) + b_{11} \ln(\text{ROORI}_{ij}) + b_{12} \ln(\text{FACIL}_{ij}) + \\ & b_{13} \ln(\text{ROORI} * \text{YEAR}_{ij}) + \varepsilon \end{aligned}$$

where

$\text{ROORI} * \text{YEAR}_{ij}$ is an interaction term for ROORI and a given year in the set (1982-2001).

Table 9 presents the results for all pairs and the sub-sample of PTA pairs.

Table 9 – Interactive Effect of Time and RoO on Trade, 1981-2001

Independent Variables	All Countries ln(Trade)		PTA Members ln(Trade)	
	<i>coef.</i>	<i>t-stat</i>	<i>coef.</i>	<i>t-stat</i>
ln(GDP_imp)	0.208	(7.61)**	0.778	(9.59)**
ln(GDP_exp)	0.422	(9.60)**	0.704	(3.96)**
ln(PerCap GDP_imp)	0.396	(14.42)**	-0.530	(8.75)**
ln(PerCap GDP_exp)	0.646	(15.49)**	-0.455	(3.42)**
ln(Distance)	-1.223	(180.44)**	-1.151	(47.36)**
Common Border	0.251	(9.59)**	0.477	(11.11)**
Common Language	0.341	(23.51)**	-0.014	(0.26)
Colonial Rel.	1.288	(41.82)**	0.754	(7.55)**
Common Colonizer	0.629	(38.27)**	0.729	(15.15)**
PTA	2.338	(36.56)**		
Restrict_Avg	-1.482	(17.46)**	-1.115	(5.53)**
Facil	0.199	(8.43)**	0.456	(8.15)**
Restrict*1982	-0.150	(4.24)**	-0.023	(0.26)
Restrict*1983	-0.182	(5.23)**	-0.028	(0.32)
Restrict*1984	-0.181	(5.21)**	0.081	(0.91)
Restrict*1985	-0.162	(4.69)**	0.141	(1.61)
Restrict*1986	-0.144	(4.28)**	0.233	(2.73)**
Restrict*1987	-0.120	(3.60)**	0.218	(2.62)**
Restrict*1988	-0.103	(3.10)**	0.203	(2.45)*
Restrict*1989	-0.078	(2.33)*	0.161	(1.96)*
Restrict*1990	-0.060	(1.82)	0.121	(1.55)
Restrict*1991	-0.069	(2.10)*	0.174	(2.23)*
Restrict*1992	-0.039	(1.19)	0.098	(1.27)
Restrict*1993	-0.063	(2.09)*	-0.013	(0.18)
Restrict*1994	-0.094	(3.48)**	0.031	(0.44)
Restrict*1995	-0.083	(3.14)**	0.086	(1.24)
Restrict*1996	-0.084	(3.17)**	0.130	(1.87)
Restrict*1997	-0.082	(3.15)**	0.115	(1.67)
Restrict*1998	-0.065	(2.51)*	0.185	(2.69)**
Restrict*1999	-0.053	(2.07)*	0.230	(3.34)**
Restrict*2000	-0.033	(1.27)	0.232	(3.32)**
Restrict*2001	-0.009	(0.36)	0.240	(3.55)**
Constant	-1.034	(1.05)	-7.129	(1.88)
Observations	185491		11920	
Adj R-squared	0.73		0.88	
Year FE	Yes		Yes	
Importer and Exporter FE	Yes		Yes	

Absolute value of t-statistics in parentheses

* = significant at 5 percent level; ** = significant at 1 percent level

All C

The ROORI*YEAR variable is, *ceteris paribus*, significantly different from the reference category of 1981 for most years in the regression containing the entire sample. The negative trend from the 1981 level accentuates in the early 1980s around the formation of such integration schemes as LAIA, ANZCERTA, and SPARTECA, and then again upon the wave of regionalism in the Americas, Europe, and South-East Asia. However, the evolution of the coefficients over time reveals a downward trend in the negative pressure of RoO on trade, which, in turn, suggests that “RoO learning” gradually reduces “RoO interference”—i.e., that exporters have learned to comply with RoO and potentially also altered their production strategies to better meet the RoO, so that the interference level gradually converges back to that of 1981.³⁶ To be sure, whether such retailing of production strategies follows an economic logic or, rather, leads to allocational inefficiencies is clearly debatable.

Interestingly, however, the response of trade to RoO among PTA pairs is significantly different from that in 1981 only in eight years. This may again suggest some endogeneity issues, but can also simply indicate that exporters and producers in the PTA partners are equally and even better equipped to deal with RoO (or evade RoO at lower costs) than in 1981; have *ex ante* altered their outsourcing strategies to comply with RoO; and, indeed, in a strategy that is not as readily available to extra-PTA producers, have themselves lobbied for RoO tailored to accommodate their existing production and outsourcing patterns—and even to obstruct extra-PTA producers from entering the PTA market.³⁷

Importantly, however, there are three further factors potentially contributing to the decline in RoO interference in the sample with all pairs. First, the ROORI variable may simply capture some of the effects of the onset of the tariff phase-outs in the newer PTAs—which is not necessarily fully captured by the PTA dummy that remains constant since the first year of any PTA.

Second and more interestingly, the lowering of preferential tariffs has also increased exporters’ incentives to qualify for preferences and hence learn to comply with RoO. Indeed, that the RoO interference declines (1) in the early 1990s when the truly liberalizing PTAs emerged to replace the older schemes, many of which, such as LAIA, had patchy records at tariff lowering; and (2) in the mid-1990s upon the kick-in of the preferences of the major PTAs, such as NAFTA and the EEA, suggests that the attraction of preferences gradually overwhelms the burdens of RoO.

Third and contrary to the second point, the multilateral lowering of tariffs and non-tariff barriers resulting particularly from the conclusion of the Uruguay Round in 1994 may have reduced the relevance of RoO: exporters may simply have started circumventing RoO altogether by paying the (declining) MFN tariff to enter a PTA member’s market. This would happen particularly in product categories—admittedly rare—where the preferential tariffs are high and preferential liberalization is very slow, yet multilateral liberalization is speedy and substantial. We explored this “circumvention hypothesis” by including in model [4] a dummy for WTO members, which took the value of 1 starting in year 1995 for all pairs where both the importer and the exporter signed the 1994 Marrakech Agreement.

As expected, the dummy, despite its crudeness given the vast variation in the WTO signatories' tariff lowering commitments, entered with a positive and highly significant sign. However, this does not necessarily still mean that exporters circumvented RoO, but merely that the lowered barriers to trade have propelled trade flows along. The overall year-by-year behavior of ROORI remains unaltered and significant even when the WTO dummy is included.

³⁶

A similar trend occurs in the cross-sectional regressions.

³⁷

For empirical work on the endogeneity of RoO to political pressures, see Estevadeordal (2000) and Suominen (2004abc).

If exporters learn to comply with product-specific RoO over time, might they also draw greater advantage from the facilitation terms in RoO regimes? The following equation modifies [4] to explore this question:

$$\begin{aligned}
 [5] \ln(V_{ij}) = & b_0 + b_1 \ln(\text{GDP}_i) + b_2 \ln(\text{GDP}_j) + b_3 \ln(\text{GDPPC}_i) + b_4 \ln(\text{GDPPC}_j) + \\
 & b_5 \ln(\text{DIST}_{ij}) + b_6 (\text{BORDER}_{ij}) + b_7 (\text{COMLANG}_{ij}) + b_8 (\text{COL}_{ij}) + \\
 & b_9 (\text{COMCOL}_{ij}) + b_{10} (\text{PTA}_{ij}) + b_{11} \ln(\text{ROORI}_{ij}) + b_{12} \ln(\text{FACIL}_{ij}) \\
 & b_{13} \ln(\text{FACIL} * \text{YEAR}_{ij}) + \varepsilon
 \end{aligned}$$

where

$\text{FACIL} * \text{YEAR}_{ij}$ is an interaction term for FACIL and a given year in the set (1982-2001).

The results in table 10 show that the response of trade to FACIL becomes in the 1990s significantly different from the response in 1981.³⁸ This is not surprising given that the regimes of the 1990s—those with the most restrictive product-specific RoO—also contain the relatively most flexible facilitation terms. Again, however, the response is not significantly different from the 1981 levels among PTA pairs. This may mean that intra-PTA exporters have throughout the sample period been able to use facilitation terms to their advantage and/or, again, tailored these terms *ex ante* to meet their preferences. However, it may also indicate that the relevance of facilitation terms *per se* has over time been less to intra- than extra-PTA exporters, which may be caused by the likely endogeneity of the product-specific RoO to the intra-PTA exporters' preferences. If product-specific RoO have over time posed few hurdles to compliance to begin with in comparison to the reference year of 1981, the facilitation terms will not be of much greater use in any time since 1981 than in 1981, either. Nonetheless, facilitation terms do play a statistically significant role in intra-PTA trade flows in 1987-88 and in 1995-96; the impact during these years is just not too different from that in 1981.

That FACIL per se becomes insignificant may be due to some colinearity between FACIL and the FACIL*YEAR variables.

Table 10 – Interactive Effect of Time and Facilitation Terms on Trade, 1981-2001

Independent Variables	All Countries ln(Trade)		PTA Members ln(Trade)	
	<i>coef.</i>	<i>t-stat</i>	<i>coef.</i>	<i>t-stat</i>
ln(GDP_imp)	0.210	(7.68) ^{***}	0.757	(9.26) ^{***}
ln(GDP_exp)	0.425	(9.68) ^{***}	0.385	(2.16) [*]
ln(PerCap GDP_imp)	0.396	(14.43) ^{***}	-0.521	(8.63) ^{***}
ln(PerCap GDP_exp)	0.646	(15.48) ^{***}	-0.261	(1.96) [*]
ln(Distance)	-1.219	(182.83) ^{***}	-1.149	(47.15) ^{***}
Common Border	0.246	(9.41) ^{***}	0.484	(11.25) ^{***}
Common Language	0.339	(23.41) ^{***}	-0.014	(0.01)
Colonial Rel.	1.292	(41.99) ^{***}	0.770	(7.68) ^{***}
Common Colonizer	0.628	(38.19) ^{***}	0.716	(14.86) ^{***}
PTA	2.367	(37.12) ^{***}		
Restrict_Avg	-1.729	(31.92) ^{***}	-0.686	(7.40) ^{***}
Facil	0.058	(0.06)	0.397	(4.19) ^{***}
Facil*1982	0.029	(0.03)	0.017	(0.02)
Facil*1983	0.018	(0.02)	0.208	(1.99) [*]
Facil*1984	0.014	(0.01)	0.256	(2.45) [*]
Facil*1985	0.036	(0.04)	0.239	(2.31) [*]
Facil*1986	0.045	(0.05)	0.227	(2.21) [*]
Facil*1987	0.085	(0.08)	0.221	(2.19) [*]
Facil*1988	0.099	(0.10)	0.152	(0.15)
Facil*1989	0.150	(2.08) [*]	0.159	(0.16)
Facil*1990	0.155	(2.17) [*]	0.061	(0.06)
Facil*1991	0.140	(1.96) [*]	0.094	(0.09)
Facil*1992	0.199	(2.81) ^{***}	0.059	(0.06)
Facil*1993	0.176	(2.56) [*]	0.000	(0.00)
Facil*1994	0.122	(1.92) [*]	0.010	(0.01)
Facil*1995	0.138	(2.17) [*]	0.025	(0.02)
Facil*1996	0.139	(2.20) [*]	0.051	(0.05)
Facil*1997	0.137	(2.20) [*]	0.007	(0.01)
Facil*1998	0.173	(2.77) ^{***}	0.091	(0.09)
Facil*1999	0.192	(3.10) ^{***}	0.134	(0.13)
Facil*2000	0.235	(3.81) ^{***}	0.067	(0.07)
Facil*2001	0.289	(4.80) ^{***}	0.040	(0.04)
Constant	-1.165	(1.19)	-0.939	(0.25)
Observations	185491		11920	
Adj R-squared	0.73		0.88	
Year FE	Yes		Yes	
Importer and Exporter FE	Yes		Yes	

Absolute value of t-statistics in parentheses

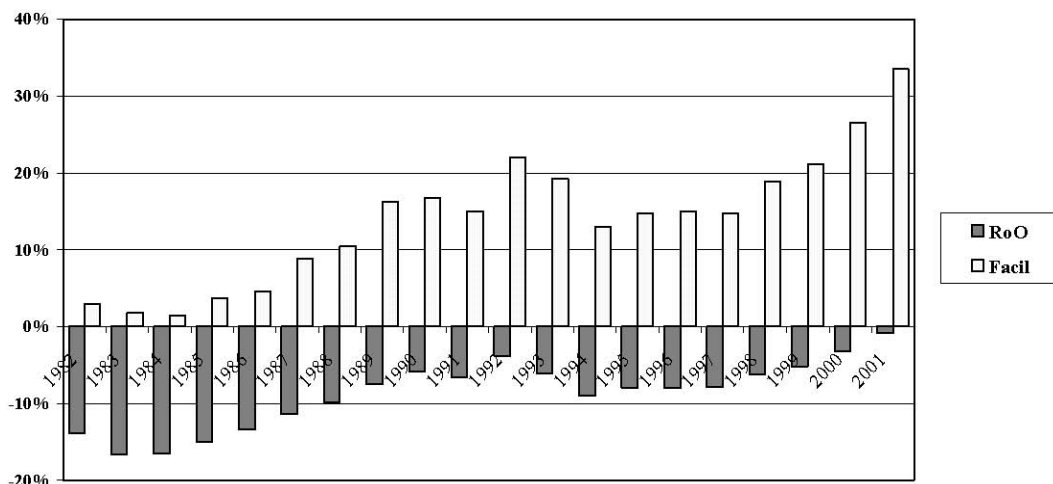
* = significant at 5 percent level; *** = significant at 1 percent level

Figure 9 summarizes the effects of ROORI and FACIL on trade over time for the entire sample.³⁹ Notable in both tables is a jump in the effect of RoO in the 1993-95 period, which captures the entry into force of many important PTAs in 1992-95. However, the jump in “RoO interference” is compensated by the simultaneous entry into effect of the relatively permissive facilitation terms of the PANEURO and NAFTA models; the overall effects thus remain largely unaltered. Interestingly, however, the positive trend in FACIL appears to lag behind the negative effect of RoO by some three years: while the negative ROORI peak takes place around 1993-94, the positive effect of FACIL actually drops before gaining steam in 1998. These results further suggest that exporters learn to circumvent restrictive RoO by altering production strategies and taking advantage of FACIL only a few years into the demanding RoO regimes. In other words, the decline in the negative effect of ROORI and growth in the positive effect of FACIL coincide some three years into a PTA. Training of especially extra-PTA export groups about the requirements of RoO as well as the opportunities provided by the facilitation terms well before the onset of a PTA negotiated would likely reduce such a time lag—a task which is, however, complicated by the fact that RoO tend to be among the last items that are agreed upon in PTA negotiations. To be sure, fast and deep preferential tariff phase-out schedule built in a PTA would likely also reduce the lag by providing exporters an incentive to qualify for PTA-provided preferences. Meanwhile, prompt MFN tariff liberalization by the PTA partners would⁴⁰ obliterate the relevance of RoO to both intra- and extra-PTA exporters alike.

³⁹ These are calculated as $\exp(\text{coef. ROORI} \times \text{YEAR}) - 1$ and $\exp(\text{coef. FACIL} \times \text{YEAR}) - 1$, respectively.

⁴⁰ We further explored the immediate net effect of the 1993-95 wave of PTAs (and restrictive RoO) by focusing on the years 1990-92 on the one hand, and the 1993-95 period, on the other. More specifically, we compared the average of coefficients of the ROORI*YEAR variable in 1990-92 to the average of coefficients of the variable in 1993-95 for the whole sample (per the first column 1 in table 4). The comparisons are calculated as $\exp(\text{avg. coef } 90-92 - \text{avg. coef } 93-95) - 1$. We subsequently performed the same exercise comparing the 1990-92 period to the post-PTA wave period of 1998-2001. We also calculated the inter-annual differences for Facil, but with the three-year period that the positive effects of Facil appear to lag behind the negative effects of RoO. As such, the contrast was between the period 1993-95 when the new Facil terms went into effect yet had scant beneficial effects and 1998-2000, the period when exporters plausibly had learned to use the facilitation terms to their benefit. We subsequently performed the same exercise comparing the 1993-95 period to 2001. The results indicate that the hike in the negative impact of the restrictiveness of RoO on trade between the 1990-92 to the 1993-95 period was some 2.4 percent; the effects dissipated fully by the 1998-2000 period as shown in figure 9. Meanwhile, in contrast to a low in 1993-95, Facil increases its positive effects in 1998-2001 by 5.3 percent, and in 2001 by 14.2 percent.

Figure 9 - Effect of RoO and Facil on Aggregate Trade, 1981-2001



C. RoO and Intermediate Imports: A Sectoral Approach

Source: Authors' calculations.

Rules of origin are first and foremost geared to affecting the input composition of goods. As such, they can be expected to have particularly important effects on trade in intermediate goods. This part assesses such effects by estimating the impact of the restrictiveness of product-specific RoO in final goods on trade in intermediate goods in five major manufacturing sectors—chemicals, machinery, textiles, television and radio transmitters, and vehicles. Sectors are here defined as Divisions of the ISIC Rev. 3 classification system (Division 24 for chemicals, 29 for machinery, 17 for textiles, 32 for television and radio transmitters, and 34 for vehicles). The dependent variable in each sector is the total imports of a bundle of Harmonized System 6-digit level intermediate products used intensively in the production of the HS 6-digit level final goods falling in the ISIC Division (here, “sector”) in question. The correspondence between ISIC and HS is obtained from the United Nations. We use Divisions rather than higher levels of disaggregation, such as Groups of the ISIC system, since a given country may not have any comparative advantages when product categories are highly disaggregated and sectors

narrowly defined.⁴¹ The details on the construction of the dataset are discussed in appendix II.

i. Empirical Specification

We explore the impact of RoO in final goods on imports in intermediates by estimating the following equation using OLS:

⁴¹ Dihel and Walkenhorst (2002) note that the problem dissipates once sectors are defined broadly enough, as potential for intra-industry trade expands.

$$\begin{aligned}
 [6] \ln(\text{INPUT}_{ijs}) = & b_0 + b_1 \ln(\text{GDP}_i) + b_2 \ln(\text{GDP}_j) + b_3 \ln(\text{GDPPC}_i) + b_4 \ln(\text{GDPPC}_j) \\
 & + b_5 \ln(\text{DIST}_{ij}) + b_6 (\text{BORDER}_{ij}) + b_7 (\text{COMLANG}_{ij}) + b_8 (\text{COL}_{ij}) + \\
 & b_9 (\text{COMCOL}_{ij}) + b_{10} \ln(\text{ROORIFINAL}_{ijs}) + b_{11} \ln(\text{FACIL}_{ij}) + \varepsilon
 \end{aligned}$$

where

INPUT_{ijs} is the value of intermediate imports of country i from country j in sector s ; and

ROORIFINAL_{ijs} is the average of the restrictiveness of RoO-values (as measured at the 6-digit level of disaggregation) in final goods in sector s .

The other variables are defined as in [1].

The expectation is now that the key independent variable, ROORIFINAL_{ijs} , will be *positively* related to trade flows: stringent RoO in final goods should encourage trade in intermediates in the PTA area at the expense of outsourcing by the PTA partners from the ROW. FACIL should, as above, be positively related to trade flows between the partners.

Importantly here, the model does not include the PTA variable. This is because while a PTA should and does reduce barriers to trade between partners *on average* in the tariff universe as a whole and does so immediately in the first year of the PTA, its liberalizing impact on trade in the five narrowly defined bundles of intermediate goods examined here is questionable for two reasons. One, the PTA dummy *per se* is a very crude measure of regional integration agreements, each of which incorporates great many disciplines, and enormous variation across product categories in the discipline of market access. Second, the PTA dummy may be completely inapplicable to any given narrow subset of the tariff lines included in the PTA, such as the small bundles of intermediate goods analyzed here—which make up only between 0.2 percent (textiles) and 3.6 percent (vehicles) of the total of about 5,000 6-digit tariff lines in the negotiated tariff universe. It is hardly self-evident that tariffs in that particular bundle are being dropped either immediately or completely in any given PTA much less across all PTAs included in this study—or cut down even after repeated rounds of tariff phase-outs. In other words, PTA-inspired trade liberalization may be subject to significant time lags in certain intermediate goods and/or sensitive sectors; the onset of a PTA *per se, ceteris paribus*, may thus entail a markedly lower or no boost to trade between the partners in the narrow bundles of intermediates than it does at the

aggregate level. Indeed, the regressions We conducted with models that contained (1) both ROORIFINAL and PTA, and (2) ROOFINAL, PTA, and FACIL, the coefficient for PTA behaves inconsistently across regressions, and most often acquires a negative sign. The variable may simply capture the effects of the existing barriers remaining to trade in the small bundles of intermediate goods.

In contrast to the PTA variable, ROORIFINAL and FACIL can be expected to have important explanatory power for trade flows of intermediates for two reasons. First, each intermediate good in each of the five bundles is used very intensively in the production of the final goods in the examined Division. As such, unlike the PTA variable that is insensitive to intra-sectoral variations in market access, ROORIFINAL is a highly targeted variable arbitrating the flow of trade in the selected bundle of intermediate goods, in particular, and takes effect immediately at the onset of the PTA. Second, FACIL, unlike PTA, applies by and large similarly across products in the entire tariff universe and is, like ROORIFINAL, applied immediately upon the launch of the PTA. Note that since the PTA indicator has poor predictive value in the kind of enterprise we are carrying out—estimation of the determinants of trade of a narrow bundle of intermediate goods—circumscribing the sample by the PTA variable to examine flows among PTA pairs only is also theoretically unsound.

Table 11 summarizes the regression results by the variables of interest.⁴² The key independent variables, ROORIFINAL and FACIL are, as expected, positively related to trade in intermediate goods. This is the fourth major result of this paper: the restrictiveness of RoO in final goods encourages trade in intermediate products. This finding serves as evidence to the long-suspected impact of RoO on input trade—an impact that could divert trade in intermediates from ROW to the PTA area.

⁴²

The dependent variable is here expanded to the log of trade+1. This is because the use of positive flows only curbs each sample somewhere between 19,000 observations (textiles) and 65,000 observations (vehicles); because of the limited sample, a large set of the ROOFINAL values used to estimate the impact of RoO in final goods on the behavior of the flows in the intermediate goods falls outside the pairs with positive trade flows (from 46 percent of all ROOFINAL values in vehicles to 77 percent in textiles). In other words, the explanatory value of the RoO variable is greatly curbed by limiting the estimation to the pairs with positive values only; the “true” impact of RoO on trade can be discerned only by including in the sample also pairs with zero trade flows, which maximizes the use of the explanatory variable of ROOFINAL. In sharp contrast, the loss of ROORI values at the aggregate level by estimating the regressions with the log of trade is below ten percent.

Table 11 – Effects of RoO in Final Goods and Facilitation Terms on Trade in

Intermediates, 1988-2001

Chemicals		
RoO Restrictiveness	0.984	0.339
	(64.96) ^{***}	(9.45) ^{***}
Facilitation Index		0.474
		(19.81) ^{***}
Observations	237708	237708
Adjusted R-squared	0.43	0.43
Machinery		
RoO Restrictiveness	0.928	0.496
	(67.56) ^{***}	(14.73) ^{***}
Facilitation Index		0.333
		(14.06) ^{***}
Observations	237715	237715
Adjusted R-squared	0.45	0.45
Television and Radio Transmitters		
RoO Restrictiveness	1.002	0.583
	(63.85) ^{***}	(15.25) ^{***}
Facilitation Index		0.326
		(12.01) ^{***}
Observations	237708	237708
Adjusted R-squared	0.47	0.47
Textiles		
RoO Restrictiveness	0.407	0.347
	(54.47) ^{***}	(18.31) ^{***}
Facilitation Index		0.050
		(3.42) ^{***}
Observations	237708	237708
Adjusted R-squared	0.30	0.30
Vehicles		
RoO Restrictiveness	1.000	0.603
	(59.63) ^{***}	(14.66) ^{***}
Facilitation Index		0.311
		(10.55) ^{***}
Observations	237708	237708
Adjusted R-squared	0.50	0.50

Absolute value of t-statistics in parentheses

* = significant at 5 percent level; *** = significant at 1 percent level

All regressions with year and exporter and importer fixed effects

Note that inclusion of the FACIL variable reduces the coefficient of the ROORIFINAL variable by precisely the amount of the coefficient of FACIL; as such, it appears to be the combined effect of ROORIFINAL and FACIL that serves to boost trade in intermediates.⁴³ This result stands in clear contrast to the regressions at the aggregate level, where ROORI and FACIL pulled in different directions. Indeed, even in regressions conducted at the aggregate level that did not contain the PTA variable, ROORI entered with a negative and significant sign and FACIL with a positive and significant sign. This further warrants concluding that the restrictiveness of RoO plays an inherently different role at the sectoral than at the aggregate level in arbitrating trade flows. (The graphs resulting from the year*ROORIFINAL interactions are included in appendix IV.) The effect of FACIL appears less important in textiles. This may be caused by the fact that many RoO regimes define *de minimis*, one of the key components of FACIL, for textiles in terms of weight rather than in terms of value: basing *de minimis* on the weight principle may reduce the usefulness of *de minimis*.

⁴³

Thus, omitting either would lead to attributing too much weight to each individual variable.

The next set of estimations explore the impact of the complexity or sectoral selectivity of RoO in final goods on imports in intermediates by replacing ROORIFINAL by ROOSDFINAL through the following equation:

$$\begin{aligned}
 [7] \ln(\text{INPUT}_{ij}) = & b_0 + b_1 \ln(\text{GDP}_i) + b_2 \ln(\text{GDP}_j) + b_3 \ln(\text{GDPPC}_i) + b_4 \ln(\text{GDPPC}_j) \\
 & + b_5 \ln(\text{DIST}_{ij}) + b_6 (\text{BORDER}_{ij}) + b_7 (\text{COMLANG}_{ij}) + b_8 (\text{COL}_{ij}) + \\
 & b_9 (\text{COMCOL}_{ij}) + b_{10} \ln(\text{ROOSDFINAL}_{ij}) + b_{11} \ln(\text{FACIL}_{ij}) + \varepsilon
 \end{aligned}$$

The expectation is as above: regimes with high levels of sectoral selectivity in the restrictiveness of RoO in final goods should have a positive impact on trade in intermediates. However, whereas ROOSD at the aggregate level may have captured some

of the effects of ROORI given the high level of correlation between the two variables, this is not the case in intermediate goods. For example, while ROORIFINAL is very high (at 5-7 in the ROO index scale) in textiles at the HS 6-digit level in most PTAs, ROOSDFINAL—the variation in the ROORI levels across final goods *within a Division* rather than across all goods within a PTA—is very low, as the ROORI values vary little across products in the five examined Divisions in most RoO regimes analyzed here. Thus, the sectoral regressions should reflect particularly well the genuine effects of RoO peaks.

The results are reported in table 11. They are consistent across the models: the sectoral selectivity of RoO in final goods is positively and significantly related to trade in intermediate goods. FACIL, meanwhile, continues to boost trade. The only exception is again its inefficacy in textiles. As above, it is the combined effect of FACIL and ROOSDFINAL that encourage trade between the PTA partners. This is the fifth key result of this paper: RoO peaks in final goods encourage trade in intermediate products.

Table 11 – Effects of Sectoral Selectivity of RoO in Final Goods and Facilitation Terms on Trade in Intermediates, 1988-2001

Chemicals		
RoO Selectivity	4.321	3.695
	(81.61) ^{***}	(47.06) ^{***}
Facilitation Index		0.162
		(10.85) ^{***}
Observations	237721	237721
Adjusted R-squared	0.43	0.43
Machinery		
RoO Selectivity	5.519	4.605
	(82.05) ^{***}	(48.35) ^{***}
Facilitation Index		0.185
		(13.53) ^{***}
Observations	237721	237721
Adjusted R-squared	0.45	0.45
Television and Radio Transmitters		
RoO Selectivity	7.137	5.225
	(71.27) ^{***}	(40.05) ^{***}
Facilitation Index		0.330
		(22.82) ^{***}
Observations	237721	237721
Adjusted R-squared	0.47	0.47
Textiles		
RoO Selectivity	1.279	1.264
	(67.66) ^{***}	(43.90) ^{***}
Facilitation Index		0.006
		(0.66)
Observations	237721	237721
Adjusted R-squared	0.30	0.30
Vehicles		
RoO Selectivity	4.985	2.847
	(20.71) ^{***}	(11.76) ^{***}
Facilitation Index		0.682
		(56.12) ^{***}
Observations	237721	237721
Adjusted R-squared	0.50	0.50

Absolute value of t-statistics in parentheses

* = significant at 5 percent level; *** = significant at 1 percent level

All regressions with year and exporter and importer fixed effects

D. Results in Sum

In sum, we have reached four main results: (1) both the restrictiveness and selectivity of rules of origin have an adverse effect on aggregate trade flows; (2) regime-wide RoO—and particularly the combined effects of such RoO—that are designed to add leniency to the application of product-specific RoO boost trade; (3) restrictive and selective rules of origin in final goods markedly increase trade in intermediates; and (4) exporters learn to apply RoO over time, which is reflected in (a) the decreasing relevance of RoO, as evident in the analysis of aggregate trade flows, in creating disincentives for exporters to qualify for PTA-provided preferential treatment; and (b) the growing importance of RoO in diverting trade in intermediates to flow between the parties applying RoO.

E. Robustness Checks

Table 12 reports robustness checks of the estimations, including for trade weighted by total trade; limiting the sample to pairs with dependent variable three and two standard deviations from the mean; limiting the sample to pairs with above \$500,000 in trade; excluding PANEURO pairs in order to verify that the PANEURO system alone does not drive the results; and including country pair fixed effects and country pair random effects. All regressions include year fixed effects, and, except for those containing country pair fixed and random effects, importer and exporter fixed effects.

The results remain robust. The country pair dummies do seem to sap the explanatory power of the ROORI variable; however, in the regression for the years of the heyday of PTAs and the greatest number of positive ROORI and ROOSD values in the dataset, 1990-2001, ROORI again enters with a negative and significant sign, while FACIL acquires a positive and significant sign. It should also be kept in mind that it is not necessarily clear that country pair fixed effects accomplish the task of capturing all the variables that are constant for a given country pair. Table 13 extends the robustness checks to the PTA pairs; again, the results remain robust.⁴⁴

44

Note that running country pair fixed effects and country pair random effects without year dummies enhances the robustness of all variables; indeed, ROO in such specifications acquire significant values.

xv Drawback is not mentioned in Hungary-Israel, Poland-Israel, Slovenia-Croatia, Slovenia-FYROM FTAs. Drawback allowed for the first two years in EU-Palestinian Authority, two and one half years in EFTA-Palestinian Authority, three years in EFTA-FYROM, one year in Bulgaria-FYROM, three months in Turkey-FYROM, and two years in Israel-Slovenia.

xvi The Revised Treaty of Chaguaramas Establishing the Caribbean Community, including the CARCIOM Single Market and Economy stipulates that any member state needs to justify the need to apply an export drawback Council for Trade and Economic Development (COTED). COTED is mandated to review the use of drawback by members on an annual basis.

xvii When products from the South Pacific Islands that are exported to New Zealand are cumulated with Australian inputs, a minimum of 25 percent of “qualifying expenditure” from South Pacific Islands is required.

xviii Requires the expenditure on goods produced and labor performed *within the territory of the exporting member state* in the manufacture of the goods to not less than 50 percent of the ex-factory or ex-works cost of the goods in their finished state.

xix The agreement stipulates that “With respect to drawbacks within one year from the date of entry into force of this Agreement, the Standing Committee shall consider whether drawbacks on goods imported from third countries should be permitted in relation to products used in the manufacture of finished products for which concessions have been exchanged by the Participating States.”

xx Mentioned in the section on trade remedies. One of the criteria for imposing a countervailing duty is that the targeted subsidy is not less than the 2 percent *de minimis*.

xxi The FTA stipulates that “Where each Party has entered separately into a free trade agreement under Article XXIV of the GATT 1994 with the same non-Party before this Agreement enters into force, a good, which, if imported into the territory of one of the Parties under such free trade agreement with that non-Party, would qualify for tariff preferences under that agreement, shall be considered to be an originating good under this Chapter when imported into the territory of the other Party and used as a material in the production of another good in the territory of that other Party.”

Table 12 – Robustness Checks, Aggregate Trade 1981-2001

Independent Variable	WTO Regime & Trade Liberalization		Trade Liberalization		WTO Regime & Trade Liberalization		WTO Regime & Trade Liberalization		WTO Regime & Trade Liberalization		Trade Liberalization	
	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001
PTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WTO Regime	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trade Liberalization	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses
 * significant at 10 percent level, ** significant at 5 percent level
 All regressions with year dummies
 Sample period 1981-2001, observations 10,000

Table 13 – Robustness Checks for PTA Pairs, Aggregate Trade 1981-2001

Independent Variable	WTO Regime & Trade Liberalization		Trade Liberalization		WTO Regime & Trade Liberalization		WTO Regime & Trade Liberalization		WTO Regime & Trade Liberalization		Trade Liberalization	
	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	1981-2001	
PTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WTO Regime	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trade Liberalization	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses
 * significant at 10 percent level, ** significant at 5 percent level
 All regressions with year dummies
 Sample period 1981-2001, observations 10,000

B. All HS 6-digit
finalgoods falling in A

Given the possible instability in the regressions with country fixed effects, we run another specification that is less affected by measurement errors yet allows for controlling for country pair fixed effects. This is done by calculating the difference in all time-variant variables between 2001 and 1981, and 2001 and 1991, respectively, and running [1] with these calculated differentials.⁴⁵ Table 14 presents the results for the key variables of interest. They show that the increase in RoO values over time stifles commerce, while the rise in the PTA value (from 0 to 1) helps boost trade. Changes in Facil over time, meanwhile, have a less appreciable effect on trade—which may simply evince some of the same results as in table 10. The results provide further indication of the robustness of the key variables.

Table 14 – Effects of Changes in PTA, RoO, and Facil on Changes in Trade over One and Two Decades

Dependent variable: $\text{Ln}[(\text{Trade}_{2001} - \text{Trade}_{1991}) + 1]$		
	I	II
PTA01-PTA91	1.523 (3.24)**	1.098 (2.09)*
Restrict_Avg01-Restrict_Avg91	-0.873 (3.12)**	-0.995 (3.46)**
Facil01-Facil91		0.393 (1.81)

Dependent variable: $\text{Ln}[(\text{Trade}_{2001} - \text{Trade}_{1981}) + 1]$		
	I	II
PTA01-PTA81	2.015 (4.79)**	1.591 (3.34)**
Restrict_Avg01-Restrict_Avg81	-0.629 (2.39)*	-0.752 (2.78)**
Facil01-Facil81		0.412 (1.90)

Absolute value of t-statistics in parentheses

* = significant at 5 percent level; ** = significant at 1 percent level

All regressions with exporter and importer dummies

Table 15 extends the robustness checks to the sectoral regressions. There is less leeway for conducting robustness checks at the sectoral level given that curbing the number of observations on the dependent variable causes too many RoO values to drop out of the regression. However, robustness checks with trade weighted by total trade and country pair fixed and random effects show that the sectoral effects remain significant and with the correct signs. Chemicals is the only exception; including FACIL in regressions with country pair fixed and random effects saps

explanatory power from the ROORI variable—which nonetheless is positive and significant when FACIL is not considered.

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Note that RoO values can also decline during this time. For instance, Chile-Mercosur RoO regime formed in 1997 has a ROORI average of slightly above 3, while LAIA, the prior forum for preferential trade between Chile and Mercosur, has a ROORI of 4. Similarly, the joining of Austria, Finland, and Sweden to the EU in 1995 effectively dropped their bilateral ROORI values with all EU partners from the nearly 5 to 1.

Table 15 – Robustness Checks, Sectoral Trade 1988-2001

		Dependent Variable: ln(Trade + 1)									
WLS (weight: ln total imports)		Chemicals		Machinery		Textiles		TV & Radio Transm.		Vehicles	
		I	II	I	II	I	II	I	II	I	II
ln(Restrictiveness Avg)		0.999	0.376	0.941	0.531	0.412	0.364	1.015	0.62	1.011	0.633
		(65.11)**	(10.33)**	(67.77)**	(15.59)**	(54.51)**	(18.95)**	(64.03)**	(16.03)**	(59.71)**	(15.23)**
Facil			0.455		0.315		0.041		0.307		0.295
			(18.84)**		(13.17)**		(2.75)**		(11.21)**		(9.94)**
ln(Restrictiveness Sd)		4.296	3.642	5.528	4.602	2.197	1.381	7.117	5.173	5.143	3.014
		(80.74)**	(46.03)**	(81.57)**	(47.77)**	(50.97)**	(25.98)**	(70.70)**	(39.38)**	(21.06)**	(12.27)**
Facil			0.168		0.187		0.188		0.336		0.684
			(11.16)**		(13.53)**		(26.11)**		(22.99)**		(55.92)**
Country Pair Fixed Effects											
		Chemicals		Machinery		Textiles		TV & Radio Transm.		Vehicles	
		I	II	I	II	I	II	I	II	I	II
ln(Restrictiveness Avg)		1.113	-0.162	1.019	0.199	0.440	0.417	1.219	0.320	1.114	0.237
		(51.87)**	(2.49)*	(53.43)**	(3.32)**	(43.42)**	(12.39)**	(56.09)**	(4.76)**	(46.94)**	(3.21)**
Facil			0.957		0.656		0.02		0.729		0.719
			(20.81)**		(14.42)**		(0.71)		(14.15)**		(12.55)**
ln(Restrictiveness Sd)		4.352	3.844	1.114	4.055	1.742	0.833	6.784	4.027	4.087	1.487
		(65.17)**	(33.84)**	(46.94)**	(31.72)**	(35.77)**	(13.61)**	(57.45)**	(25.50)**	(14.73)**	(5.28)**
Facil			0.142		0.254		0.265		0.584		0.872
			(5.53)**		(11.32)**		(24.46)**		(26.26)**		(46.47)**
Country Pair Random Effects											
		Chemicals		Machinery		Textiles		TV & Radio Transm.		Vehicles	
		I	II	I	II	I	II	I	II	I	II
ln(Restrictiveness Avg)		1.136	-0.051	1.045	0.243	0.443	0.388	1.222	0.356	1.149	0.311
		(56.50)**	(0.89)	(58.02)**	(4.51)**	(46.39)**	(12.95)**	(59.34)**	(5.84)**	(51.50)**	(4.72)**
Facil			0.891		0.639		0.049		0.699		0.683
			(22.03)**		(15.83)**		(1.95)		(15.14)**		(13.50)**
ln(Restrictiveness Sd)		4.480	3.780	5.401	4.178	1.845	0.920	7.011	4.207	4.274	1.602
		(70.08)**	(35.81)**	(67.95)**	(34.41)**	(38.98)**	(15.53)**	(61.00)**	(27.49)**	(15.70)**	(5.81)**
Facil			0.194		0.274		0.26		0.576		0.888
			(8.33)**		(13.33)**		(25.90)**		(27.67)**		(50.95)**
Absolute value of t-statistics in parentheses											
* = significant at 5 percent level; ** = significant at 1 percent level											
All regressions with year dummies											
WLS regressions with importer and exporter dummies											

F. Methodological Issues

The coding methodology for the variables and different RoO regimes is detailed in appendix I. There are three further methodological issues that warrant mentioning—and if resolved, would add greater nuance to the estimations.

First, all the models assume homogeneous trade policy institutions beyond RoO regimes. One, for PTA members, the speed and extent of preferential tariff liberalization is assumed not to vary across agreements. Two, the model also assumes that all countries' MFN tariffs are alike. These assumptions are made because identifying the annual applied preferential and MFN tariffs for each country (much less for each country in each sector) is difficult. The latter assumption is justified in part by the fact that the WTO member countries' MFN tariffs are increasingly harmonized as well as lowered by the multilateral trade rounds.

Second, RoO are used also in the generalized system of preferences (GSP) schemes of the EU and the United States, affecting bilateral preferential commerce between these entities on the one hand, a dozens of developing countries, on the other. This paper, however, has operationalized only RoO that apply in reciprocal liberalization schemes. This is in good extent due to the fact that the sectoral coverage of the GSP-provided preferences often varies by partner country, so that a given set of RoO applicable to one GSP beneficiary may not be applicable to another. Moreover, the product coverage and preferences provided by the GSP schemes often vary over time for any given beneficiary. These issues make coding the GSP RoO very time-consuming. However, in recent studies, Brenton (2004) and Inama (2004) show that GSP RoO do play an important role in arbitrating the odds for developing countries to qualify for GSP treatment.

Third, diagonal cumulation can have widely different implications on bilateral trade depending on the space where cumulation is allowed. For instance, cumulation with the United States that is permitted in the Canada-Israel FTA might have widely divergent effects should cumulation be permitted with a smaller country, such as Jordan. Meanwhile, cumulation in the PANEURO zone that incorporates more than a dozen parties will likely have different implications to any given member than if the zone incorporated only three parties. The effects of the size of the cumulation area are, however, beyond this paper and could be explored in future work.

V. Policy Recommendations: Counteracting Restrictive RoO and the Splintering of the Global RoO Panorama

While RoO are not necessarily bad for sound economic decisions, restrictive RoO can be. Furthermore, the existing differences in the product-specific and regime-wide RoO *across* the different RoO regimes can even in a simplified bi- or tripolar RoO world make a difference in economic decisions and limit exporters' opportunities for diversifying markets.

How can the potential frictions created by stringent RoO and cross-regime differences in RoO be reduced? How can entrepreneurs import inputs from the cheapest sources, firms exploit cross-border economies of scale at lowest costs, and multinational companies make sweeping investment decisions based on economic efficiency rather than distortionary policies? What are the best ways to counter the development of trade- and investment diverting hubs in favor of globally free flow of goods, services, and investment?

Abolishing RoO altogether would certainly be the best and simplest means to counteract the impact of RoO. Another way to relegate RoO to irrelevance is by bringing MFN tariffs to zero globally. However, since these options are hardly politically palatable in the near future, a third possibility would be to harmonize preferential RoO at the global level. This would ensure that at least the required production methods in a given sector would remain similar across export markets. Measures to accompany the harmonization work could involve (1) the incorporation of the various mechanisms of flexibility to RoO regimes during the transition to a global RoO regime;⁴⁶ and (2) the establishment of a multilateral mechanism to monitor the member states' implementation of preferential and non-preferential RoO in order to help pre-empt politicization of, and/or lack of transparency in, the application of RoO, first and foremost in the importing country customs.

What are the prospects for harmonization of preferential RoO? To be sure, harmonization would not be a simple endeavor given the differences in the types of RoO around the world. Even slight differences can be difficult to overcome due to political resistance by sectors benefiting from *status quo*. Meanwhile, it is not clear that a strong global exporter lobby would materialize to voice demands for harmonization. Perhaps most importantly, both the EU and the US would likely in principle be reluctant to adopt each other's RoO. Both parties would likely also be concerned of the counterpart's striving for a RoO regime that would allow it to transship via the parties' common PTA partners, such as Mexico, to the other party's market.

However, adopting a globally uniform preferential RoO regime is not necessarily all that daunting. There are four sources of optimism.

First, the WTO members have already been able to sit down and compromise on harmonized non-preferential RoO, which not only evinces a reservoir of political will to tackle RoO, but also provides an immediately available blueprint for harmonizing preferential RoO. And not only are non-preferential RoO negotiated and readily available as a model, but they make a good model: overall, they are less restrictive and complex than either the NAFTA- or PANEURO-type RoO. Some non-preferential RoO might, to be sure, require tightening if translated into preferential RoO in order for products to remain sufficiently differentiated, and thus to keep PTAs what they are constructed to be, geographical areas of selective liberalization where deeper trade preferences are conferred to the partner countries than to the ROW. Moreover, loosening RoO markedly in some sectors could risk a political backlash against PTAs by sensitive sectors. The handful of such potentially necessary sectoral exceptions notwithstanding, the ready availability of globally harmonized and relatively loose RoO should be fully exploited for advancing to the harmonization of preferential RoO.

The second reason why harmonization of preferential RoO might not be farfetched is that preferential RoO would likely prove easier to negotiate than non-preferential RoO. Non-preferential RoO involve tracking the production process all the way to the country in which the good originates, while preferential RoO simply require a determination that the final exporter country is also the country of origin: the good either originates in the PTA area or it does not, with the "true" and very initial origin being immaterial. As such, non-preferential RoO talks likely engage a greater number of interested parties to contest a given rule than would be the case

in preferential RoO. Moreover, unlike non-preferential RoO that are employed in the application of numerous other trade policy instruments, preferential RoO have few purposes beyond refereeing the market access of goods to the PTA space. As such, their negotiation would unlikely involve as much consideration of the other WTO agreements as the harmonization of non-preferential RoO does.

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See Suominen (2004a) and Estevadeordal and Suominen (2004c) for details.

Third, the growing attention at the WTO on PTAs in general and preferential RoO, in particular, should propel constructive proposals as to the types of RoO that are most conducive to the march toward unfettered global flow of commerce. For the first time in its history, the WTO Committee on Regional Trade Agreements (CRTA) has decided to consider RoO a “systemic” issue, as opposed to both individual PTA-issues such as prior considerations of the PANEURO system, and issues that—whether systemic or individual—are not being prioritized by the CRTA. The concomitant growing interest by policy analysts and academia in RoO will add to the understanding of the operation and effects of the different types of RoO and RoO regimes.

Fourth, advances in Trade-Related Investment Measures (TRIMS) can help advance the harmonization of RoO, if RoO are viewed, as they rightfully can and should be, as policy instruments affecting investment decisions (Thorstensen 2002). Like TRIMS, RoO can be employed strategically as an incentive to attract investment and encourage exports—and exports with high local value. A sturdier multilateral regulatory framework on investment policies could help curb the strategic, trade- and investment-distorting uses of RoO.

In sum, harmonization of preferential RoO—and harmonization toward a flexible regime model—provides at present the most attainable means to counteract RoO’s negative effects on global trade and investment. The negotiators of the Doha Trade Round should decisively tackle RoO as a distortionary trade and investment policy instrument, and do so in four concrete ways.

First, they should provide a forceful push for completing the task of harmonizing non-preferential RoO. Completing the harmonization process is all the more compelling in the face of the growth of global commerce and the increasing fragmentation of global production, both of which would thrive under clear and uniform set of rules.

Second, the Doha negotiators should launch a process of *de jure* harmonization of preferential rules of origin. The relatively high levels of restrictiveness of the main RoO regimes and the differences between regimes pose unnecessary policy hurdles to rational economic decisions, limiting the opportunities for exporters to operate on multiple trade fronts simultaneously, and hampering consumers’ access to the best goods at the lowest prices.

Third, the Doha Round should forge in a multilateral mechanism to monitor and enforce the transparent application of both preferential and non-preferential RoO. And fourth, RoO should be incorporated in the TRIMs negotiations.

To be sure, preferential RoO matter only as long as there are MFN tariffs. Thus, the ultimate key to counteracting preferential RoO’s negative effects lies in the success of multilateral liberalization. Should multilateral trade rounds result in deep MFN tariff lowerings and the

proliferation of PTAs engender a dynamic of competitive liberalization worldwide, the importance of preferential RoO as gatekeepers of commerce would automatically dissolve.

Conclusion

This paper has provided a novel descriptive and analytical mapping of the global rules of origin panorama, and opened new avenues to capturing the trade effects of RoO. We have (1) reviewed the types of RoO used around the world; (2) drawn comparisons between the structure of RoO across a host of PTAs; (3) presented methodologies for constructing generalizable measurements for (a) the degree of restrictiveness and selectivity of product-specific RoO, and (b) the level of flexibility provided by the various regime-wide RoO; and (4) explored the behavior of RoO over time. The empirical exercises carried out here provide preliminary evidence that restrictive rules of origin stifle trade and hence constrain the liberalizing potential of PTAs. However, we have also found that various regime-wide provisions, such as drawback and cumulation, can encourage trade, and thus reduce the negative effects of stringent product-specific RoO. At the sectoral level, our findings indicate that restrictive RoO in final goods encourage trade in intra-PTA inputs. As such, restrictive RoO in final goods may result in trade diversion in intermediate goods.

Importantly, we also encounter a reduction in the negative effects of RoO over time; this can be attributed to exporters' learning to comply with the product-specific RoO, and to take full advantage of permissive regime-wide RoO, and/or adjusting their production strategies to meet the RoO. Whether such RoO-driven adjustments are welfare-enhancing in the long run is questionable, but beyond the scope of this paper. Also beyond this paper, yet a highly important and a particularly fruitful focus for future research, are the effects of RoO on investment.

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APPENDIX I. Coding Methodology for RoO in Gravity Dataset

This appendix details the coding methodology for various country pairs in the gravity dataset.

PTA Indicators

PTA dummy is set at 1 when a country pair belongs to the same FTA or CU. In the panel, PTA dummies and PTA-related provisions for a given year acquire positive values if the country pair is in or enters into a PTA no later than the first day of the year in question. Thus, a PTA that was launched on 1 January 2001 qualifies as a PTA for 2001, whereas a PTA that is launched, say, in February (or 2 January for that) of 2001 would not qualify as a PTA until the year 2002. The same rule applies to dates of countries' accessions to existing PTAs (such as Spain and Portugal to EC or Haiti to CARICOM).

Product-Specific RoO

The product-specific RoO include restrictiveness of RoO of a given regime, and standard deviation in restrictiveness of RoO-values in the regime.

The average ROORI variable is the average of the 6-digit restrictiveness values in the different RoO regimes. The ROORI coding is based on the first RoO defined in the RoO protocol if two or more RoO alternatives are allowed for a given product. Although the RoO of the bulk of the PTAs have been coded, agreements for which restrictiveness values have yet to be calculated (such as Georgia-Kazakhstan) are coded as having a ROORI average of 4. For the years preceding Turkey's entry into a CU with the EU in 1996 (i.e., 1981-1995), its ROORI with the EU is also set at 4. Canada-US FTA RoO that apply in 1989-1993 are coded as 5, slightly below NAFTA ROORI of 5.15.

The ROORI variable is set at 2 when the country pair is party to the same customs union, but when the customs union is an aspiring one and hence "imperfect", i.e. where RoO continues governing trade between members in the portion of the tariff universe for which a CET has not been reached. This "imperfect CU"-rule applies to Mercosur, Andean Community, CACM, CARICOM, and Mercosur. Except for Mercosur that was launched in November 1991, each of the four imperfect CUs are in the panel data treated similarly across years. As such, the coding does not take into account the "relaunch" of these agreements in the early-1990s or the attendant alterations in RoO that the relaunch may have entailed.

For the sectoral regressions, ROORIFINAL is the average restrictiveness value of the 6-digit level of final goods falling in the ISIC Rev. 3 Division under analysis.

The ROOSD (ROOSDFINAL) variable is the regime-wide (sector-wide) standard deviation in the 6-digit ROORI (ROORIFINAL) values.

Regime-Wide Variables

Regime-wide variables include *de minimis*, diagonal and full cumulation, drawback rule, self-certification, and the facilitation index.

As in product-specific RoO, except for Mercosur that was launched in November 1991, each of the four imperfect CUs are in the panel data treated similarly across years.

De Minimis

De minimis is coded as the percentage of *de minimis* permitted by the PTA agreement. Between parties not belonging to a PTA or belonging to a perfect customs union, *de minimis* is set at 0.

Diagonal and Full Cumulation

Diagonal and full cumulation are set at 1 between states party to a PTA that allows for either or both of these systems of cumulation, and at 0 for pairs whose common FTA does not allow diagonal and full cumulation, respectively, and between states not party to a common PTA and between states party to a common perfect customs union.

In the panel, for EFTA members that had bilateral FTAs with the EC prior to the 1994 EEA agreement between EU and EFTA (Iceland, Norway, and Switzerland), diagonal cumulation is set at 1 in the bilateral FTAs and full cumulation at 0. When the EEA is launched, all EFTA members of the time (Austria, Finland, Iceland, Norway, Sweden, and Switzerland) are coded to have diagonal and full cumulation in their trade with the EU members. When Austria, Finland, and Sweden accede to the EU in 1995, their external trade relations are adjusted to equate those of the EU member states.

Drawback

Drawback is coded as 1 between states party to a PTA that allows drawback or does not explicitly prohibit it, and as 0 for pairs party to a PTA that explicitly bars drawback. It is set at 0 between states not party to a common PTA and between states party to a common perfect customs union.

Self-Certification

Self-certification is set at 1 between states party to a PTA that requires self-certification rather than public certification or two-step private/public certification. It is set at 0 between states not party to a common PTA and between states party to a common perfect customs union.

Facilitation Index

The facilitation index is constructed on the basis of five regime-wide RoO (*de minimis*, diagonal and full cumulation, drawback, and self-certification). The latter four are set at 1 if the PTA allows for any of them (or does not explicitly bar drawback). *De minimis* is set at 0 if it is below 5 percent, and 1 if it is 5 percent or above. The index is subsequently constructed by summing up the values for the five different components. The index is set at 0 between states not party to a common PTA and between states party to a common perfect customs union.

Regime-Wide Indicators for PTAs that are not coded

The few country pairs for which a RoO value has not been computed here despite the existence of a common PTA (such as Georgia-Kazakhstan or Georgia-Russian Federation) are assumed *not* to have *de minimis* provisions, diagonal and full cumulation, or self-certification (i.e., these variables are set at 0), while they are assumed to allow drawback.

APPENDIX II. Construction of the Dataset for Intermediate Goods

This appendix details the construction of the dataset for analyzing the effects of RoO in final goods on trade in intermediates in the five sectors examined in this paper—chemicals, machinery, textiles, television and radio transmitters, and vehicles. Sectors are here defined as Divisions of the ISIC Rev. 3 classification system (Division 24 for chemicals, 29 for machinery, 17 for textiles, 32 for television and radio transmitters, and 34 for vehicles).

The dataset is constructed as follows. The differentiation of the HS 6-digit level products into intermediates and final goods is obtained from Akiko Suwa-Eisenmann's calculations based on the US input-output table. The calculation of the dependent variable—total trade flows in intermediates—for each sectoral model includes here only the trade of a bundle of intermediate goods that are being used particularly intensively in the production of final goods in the examined Division. The intensity of usage of an intermediate good in a given final good is also extracted from Suwa-Eisenmann's data. We exclude from the calculation the flows of intermediate goods used intensively in other Divisions or not used intensively in any Division in particular, but, rather, moderately in many. This is because flows of intermediates would in either of these two cases be crucially influenced by RoO in final goods in the other Divisions, rather than primarily by the RoO in the final goods in the Division under analysis. Examples of 6-digit level intermediate goods that are intensively used in the final goods of one particular Division (rather than in many Divisions) are man-made filaments in the Division of textiles and conveyor belts in the Division of vehicles.

The key independent variables, *ROORIFINAL* and *ROOSDFINAL*, are the average sectoral restrictiveness and sectoral standard deviation (per the RoO index), respectively, of all 6-digit level final goods (as defined as such per Suwa-Eisenmann's data) that fall within the ISIC Division under analysis (per UN correspondences tables for ISIC and HS).

The construction of the dataset for each of the five Divisions is carried out in four steps:

Step 1. Choosing a major ISIC Division and using a correspondence table to determine the HS 6-digit level final goods falling in that Division.

Step 2. Taking the average of the *ROORIFINAL* and *ROOSDFINAL* values of the selected HS 6-digit level final goods by Division (as defined in step 1).

Step 3. Defining the bundle of the HS 6-digit intermediate goods that are used most intensively in the production of the HS 6-digit level final goods in the examined Division.

Step 4. Obtaining pairwise trade data by year in 1988-2001 at the 6-digit level for the selected intermediate goods from COMTRADE, and aggregating the data into one “bundle-specific” measure for each pair for each year.

In sum, the ISIC Division that is chosen dictates the choice of the HS 6-digit level final goods for calculating the ROORI and ROOSD values; the set of final goods, in turn, dictates the choice of the intermediate goods. Note that while all the final goods in a given set necessarily fall in the ISIC Division under analysis, the intermediate goods used intensively to produce these final goods do not need to do so, but can hail from any Divisions of the tariff universe. The relationship of the three sets of data can be depicted as follows:

↓



C. HS 6-digit inputs
used intensively
in producing B

A. ISIC Division

APPENDIX III. Descriptive Statistics

Table III - 1 - Descriptive Statistics: Aggregate Trade 1981-2001

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Ln(Imports)	212,554	10.420	3.222	4.032	20.995
Ln(GDP imp)	379,513	23.354	2.441	17.379	29.829
Ln(GDP exp)	366,140	23.388	2.405	17.379	29.829
Ln(GDPPC imp)	377,696	7.633	1.602	4.439	13.396
Ln(GDPPC exp)	363,041	7.675	1.591	4.439	16.642
Ln(Distance)	490,823	8.757	0.781	4.394	9.899
Border	500,606	0.017	0.130	0	1
Common Language	500,879	0.122	0.327	0	1
Colonial Relationship	500,858	0.010	0.099	0	1
Common Colonizer	500,842	0.118	0.323	0	1
PTA	500,879	0.033	0.180	0	1
Restrict Avg	500,879	0.127	0.671	0	5.154
Ln(Restrict Avg + 1)	500,858	0.040	0.225	0	1.640
Restrict Sd	500,879	0.015	0.142	0	1.845
Ln(Restrict Sd + 1)	500,879	0.009	0.089	0	1.046
Facil	500,879	0.052	0.312	0	4.000
De Minimis	500,879	0.121	1.087	0	15.000
Diagonal Cumulation	500,879	0.009	0.097	0	1
Full Cumulation	500,879	0.005	0.068	0	1
Drawback	500,879	0.023	0.150	0	1
Self-Certification	500,879	0.001	0.037	0	1

**Table III - 2 - Descriptive Statistics: Intermediate Trade in Selected Sectors,
1988-2001**

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Ln(Intermed. Imports Chemicals + 1)	333,817	0.635	2.012	0.000	15.247
Ln(Intermed. Imports Machinery + 1)	333,817	0.615	1.957	0.000	13.737
Ln(Intermed. Imports Textiles + 1)	333,817	0.213	1.045	0.000	11.991
Ln(Intermed. Imports TV & Radio Transm. + 1)	333,817	1.050	2.595	0.000	16.440
Ln(Intermed. Imports Vehicles + 1)	333,817	0.784	2.317	0.000	16.031
Ln(GDP_imp)	263,550	23.423	2.413	17.512	29.829
Ln(GDP_exp)	256,996	23.465	2.391	17.512	29.829
Ln(GDPPC_imp)	262,741	7.656	1.615	4.439	13.396
Ln(GDPPC_exp)	254,667	7.695	1.606	4.439	16.642
Ln(Distance)	327,114	8.757	0.781	4.394	9.899
Border	333,635	0.017	0.130	0	1
Common Language	333,817	0.122	0.327	0	1
Colonial Relationship	333,803	0.010	0.099	0	1
Common Colonizer	333,792	0.118	0.323	0	1
PTA	333,817	0.042	0.200	0	1
Restrict_Avg Final Goods Chemicals	333,817	0.148	0.690	0	5.654
Restrict_Avg Final Goods Machinery	333,817	0.158	0.746	0	5.000
Restrict_Avg Final Goods Textiles	333,801	0.177	0.874	0	6.129
Restrict_Avg Final Goods TV & Radio Transm.	333,817	0.159	0.757	0	5.000
Restrict_Avg Final Goods Vehicles	333,817	0.161	0.768	0	5.000
Restrict_Sd Final Goods Chemicals	333,817	0.010	0.084	0	1.449
Restrict_Sd Final Goods Machinery	333,817	0.007	0.059	0	1.464
Restrict_Sd Final Goods Textiles	333,817	0.020	0.162	0	1.354
Restrict_Sd Final Goods TV & Radio Transm.	333,817	0.005	0.047	0	1.805
Restrict_Sd Final Goods Vehicles	333,817	0.000	0.022	0	1.694
Ln(Restrict_Avg Final Goods Final Goods Chemicals + 1)	333,801	0.048	0.238	0	1.732
Ln(Restrict_Avg Final Goods Machinery + 1)	333,808	0.050	0.250	0	1.609
Ln(Restrict_Avg Final Goods Textiles + 1)	333,801	0.054	0.273	0	1.813
Ln(Restrict_Avg Final Goods TV & Radio Transm. + 1)	333,801	0.050	0.252	0	1.609
Ln(Restrict_Avg Final Goods Vehicles + 1)	333,801	0.051	0.254	0	1.609
Ln(Restrict_Sd Final Goods Chemicals + 1)	333,817	0.008	0.063	0	0.896
Ln(Restrict_Sd Final Goods Machinery + 1)	333,817	0.006	0.047	0	0.902
Ln(Restrict_Sd Final Goods Textiles + 1)	333,817	0.012	0.102	0	0.856
Ln(Restrict_Sd Final Goods TV & Radio Transm. + 1)	333,817	0.004	0.035	0	1.031
Ln(Restrict_Sd Final Goods Vehicles + 1)	333,817	0.000	0.014	0	0.991
Facil	333,817	0.064	0.344	0	4.000

APPENDIX IV. Effects of Sectoral RoO Over Time

Figures IV - 1-5 in this appendix map out the responses of intermediate trade to interactions between year dummies for 1989-2001 on the one hand, and ROORIFINAL and Facil, on the other. These are implemented in the same way as in figure 3 in the body of the paper, but consider trade in intermediates.

Figure IV - 1 - Response of Intermediate Trade to RoO in Final Goods in Chemicals and Facil, 1988-2001

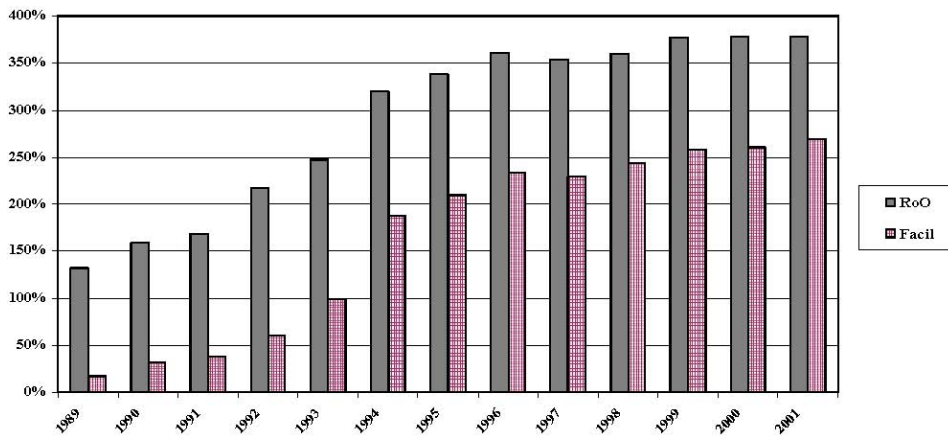


Figure IV - 2 - Response of Intermediate Trade to RoO in Final Goods in Machinery and Facil, 1988-2001

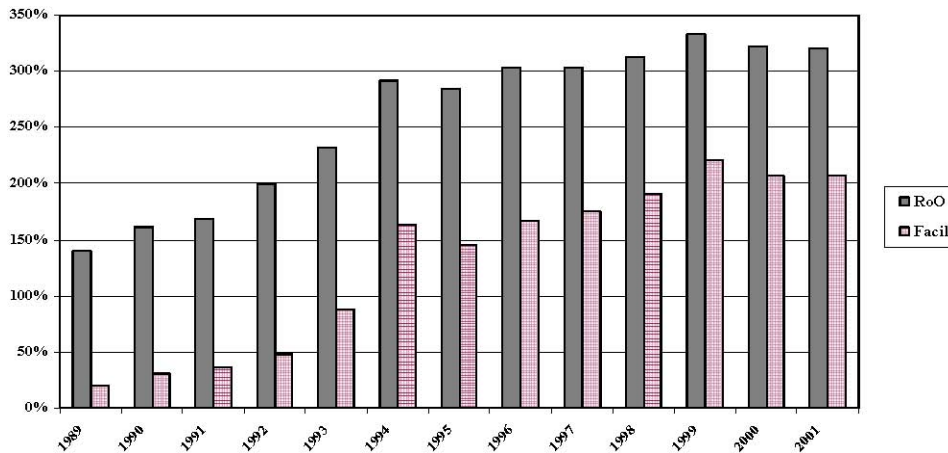


Figure IV - 3 - Response of Intermediate Trade to RoO in Final Goods in Textiles and Facil, 1988-2001

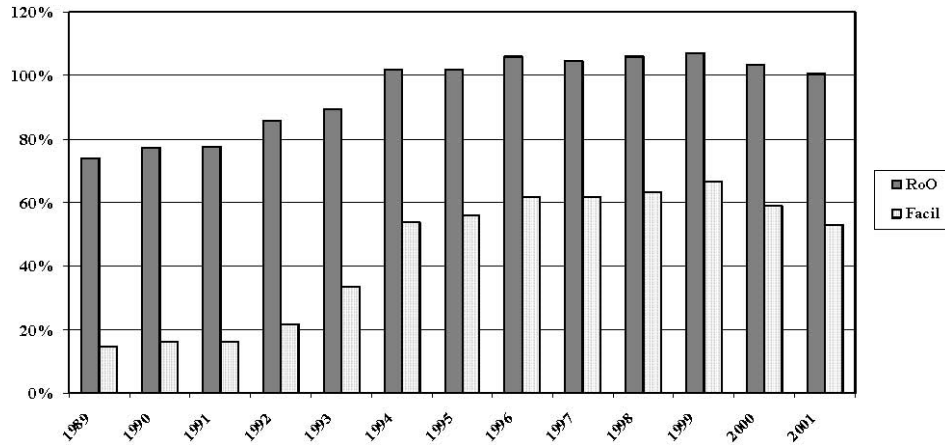


Figure IV - 4 - Response of Intermediate Trade to RoO in Final Goods in TV and Radio Transmitters and Facil, 1988-2001

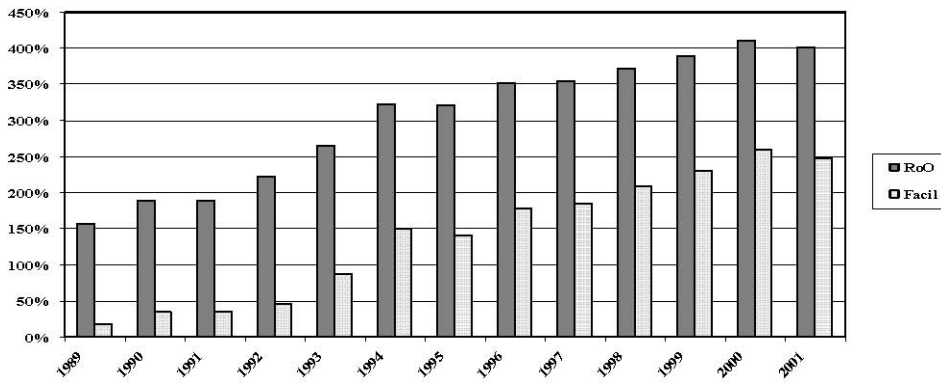
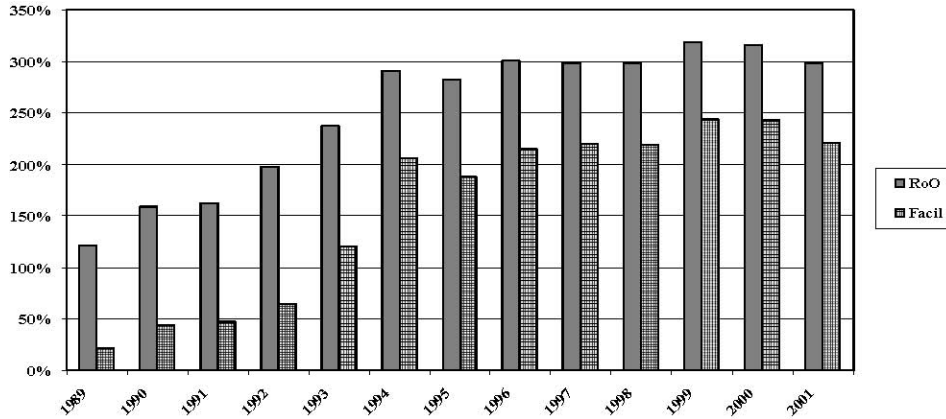


Figure IV - 5 - Response of Intermediate Trade to RoO in Final Goods in Vehicles and Facil, 1988-2001



APPENDIX V. Cross-Section Estimates

This appendix displays cross-section results for key variables for each year considered in this study, 1981-2001. Tables V - 1 and V - 2 present the results for aggregate trade for all pairs and among PTA pairs, respectively. They show that the restrictiveness of RoO has a statistically and economically significant effect on trade during all years under examination. The impact of RoO on aggregate global trade flows accentuates in 1994 upon the onset of the wave of PTAs carrying relatively restrictive RoO regimes, first and foremost NAFTA and the various bilaterals signed by the EU. However, this hump starts ebbing away in 1996-1997, which suggests that exporters around the world did indeed learn to play by the RoO—to adjust their production strategies to RoO, implement the appropriate technical requirements of the RoO, and to take greater advantage of the relatively lenient facilitation terms in the new regimes. Indeed, FACIL starts playing a statistically significant positive role in trade flows precisely in 1994.

Meanwhile, the effects of both ROORI and FACIL on trade among PTA pairs become significant only upon the launch of the stringent RoO regimes: it is likely the rise of the relatively complex and demanding RoO that undercut aggregate intra-PTA trade flows. Note that ROORI and FACIL have an additive rather than synergistic effect on trade: in annual regressions not shown here, the interaction term ROORI*FACIL was not significant at the 5 percent level and seldom even at the 10 percent level.

Year	Restrict Avg.		Facil	
	<i>coeff.</i>	<i>t-stat</i>	<i>coeff.</i>	<i>t-stat</i>
1981	-2.240	(1.23)	1.804	(1.28)
1982	-0.984	(1.47)	0.084	(0.70)
1983	-0.810	(1.80)	56.188	(0.52)
1984	-1.182	(1.69)	185.047	(0.15)
1985	-1.015	(1.46)	-0.248	(0.38)
1986	-0.797	(1.14)	100.472	(0.50)
1987	-0.613	(0.95)	2.005	(3.74)**
1988	-0.884	(1.53)	-282.026	(2.21)*
1989	-1.002	(1.68)	135.819	(0.45)
1990	-1.214	(3.10)**	271.859	(0.73)
1991	-0.915	(2.33)*	58.633	(0.54)
1992	-0.629	(1.58)	0.789	(1.52)
1993	-1.019	(2.79)**	1.476	(1.19)
1994	-0.975	(2.42)*	0.280	(1.40)
1995	-1.317	(3.21)**	0.874	(2.66)**
1996	-1.115	(2.47)*	0.692	(2.33)*
1997	-1.081	(2.60)**	0.482	(1.87)
1998	-0.854	(2.11)*	0.361	(1.74)
1999	-1.190	(2.73)**	0.395	(1.95)
2000	-0.626	(1.49)	0.203	(1.18)
2001	-0.502	(1.48)	-0.024	(0.19)

Absolute value of t-statistics in parentheses

* = significant at 5 percent level; ** = significant at 1 percent level

All regressions run with importer and exporter dummies

Table V - 3 extends the cross-section estimates to trade in intermediates, displaying the results on the key variables, ROOFINAL and FACIL. The results show that RoO have a positive effect on trade in intermediates across years, but also that the centripetal pull of RoO accentuates in the mid-1990s. The anomaly is chemicals, where RoO play a more important role in the early 1990s.

Table V - 3 - Effect of RoO in Final Goods and Facil on Trade in Intermediates by Year, Cross Section Regressions for Selected Sectors in 1981-2001

Year	Chemicals			
	Restrictiv. Avg.		Facil	
	<i>coeff.</i>	<i>t-stat</i>	<i>coeff.</i>	<i>t-stat</i>
1988	-0.378	(4.37) ^{***}	0.386	(7.38) ^{***}
1989	0.225	(1.96) [*]	0.143	(2.06) [*]
1990	0.444	(3.46) ^{***}	0.044	(0.56)
1991	0.855	(6.19) ^{***}	-0.164	(1.96) [*]
1992	1.255	(8.36) ^{***}	-0.373	(4.08) ^{***}
1993	0.743	(5.21) ^{***}	0.069	(0.76)
1994	0.001	(0.01)	0.641	(7.88) ^{***}
1995	0.025	(0.18)	0.604	(6.57) ^{***}
1996	0.372	(2.73) ^{***}	0.424	(4.59) ^{***}
1997	0.224	(1.63)	0.487	(5.20) ^{***}
1998	0.042	(0.31)	0.595	(6.45) ^{***}
1999	-0.019	(0.15)	0.606	(6.76) ^{***}
2000	0.063	(0.50)	0.581	(6.92) ^{***}
2001	0.065	(0.64)	0.764	(10.96) ^{***}

Year	Machinery			
	Restrictiv. Avg.		Facil	
	<i>coeff.</i>	<i>t-stat</i>	<i>coeff.</i>	<i>t-stat</i>
1988	-0.233	(2.66) ^{***}	0.324	(5.93) ^{***}
1989	0.263	(2.22) [*]	0.157	(2.12) [*]
1990	0.366	(2.79) ^{***}	0.112	(1.37)
1991	0.754	(5.41) ^{***}	-0.107	(1.23)
1992	1.023	(6.97) ^{***}	-0.288	(3.13) ^{***}
1993	0.743	(5.47) ^{***}	0.086	(0.94)
1994	0.102	(0.87)	0.626	(7.80) ^{***}
1995	0.263	(2.06) ^{***}	0.340	(3.70) ^{***}
1996	0.605	(4.78) ^{***}	0.157	(1.72)
1997	0.375	(2.94) ^{***}	0.340	(3.67) ^{***}
1998	0.403	(3.24) ^{***}	0.330	(3.67) ^{***}
1999	0.264	(2.22) [*]	0.455	(5.26) ^{***}
2000	0.108	(0.94)	0.542	(6.72) ^{***}
2001	0.184	(2.01) [*]	0.623	(9.29) ^{***}

Year	Textiles			
	Restrictiv. Avg.		Facil	
	<i>coeff.</i>	<i>t-stat</i>	<i>coeff.</i>	<i>t-stat</i>
1988	-0.039	(0.76)	0.104	(3.11) ^{***}
1989	0.304	(4.51) ^{***}	0.010	(0.23)
1990	0.351	(4.79) ^{***}	-0.035	(0.73)
1991	0.529	(6.76) ^{***}	-0.146	(2.84) ^{***}
1992	0.498	(5.76) ^{***}	-0.157	(2.75) ^{***}
1993	0.163	(2.06) [*]	0.139	(2.45) [*]
1994	0.101	(1.42)	0.223	(4.16) ^{***}
1995	0.022	(0.29)	0.245	(4.01) ^{***}
1996	0.214	(2.82) ^{***}	0.137	(2.27) [*]
1997	0.147	(1.90)	0.202	(3.25) ^{***}
1998	0.260	(3.45) ^{***}	0.108	(1.79)
1999	0.190	(2.58) ^{***}	0.161	(2.71) [*]
2000	0.261	(3.72) ^{***}	0.068	(1.23)
2001	0.323	(5.99) ^{***}	0.028	(0.64) ^{***}

Year	TV and Radio Transmitters			
	Restrictiv. Avg.		Facil	
	<i>coeff.</i>	<i>t-stat</i>	<i>coeff.</i>	<i>t-stat</i>
1988	-0.248	(2.64) ^{***}	0.355	(6.02) ^{***}
1989	0.141	(1.09)	0.216	(2.67) ^{***}
1990	0.359	(2.51) [*]	0.138	(1.54)
1991	0.565	(3.69) ^{***}	0.004	(0.04)
1992	0.913	(5.54) ^{***}	-0.220	(2.11) [*]
1993	0.774	(5.06) ^{***}	0.080	(0.77)
1994	0.173	(1.32)	0.554	(6.09) ^{***}
1995	0.232	(1.67)	0.361	(3.58) ^{***}
1996	0.553	(3.98) ^{***}	0.234	(2.32) [*]
1997	0.525	(3.77) ^{***}	0.272	(2.67) ^{***}
1998	0.442	(3.18) ^{***}	0.370	(3.65) ^{***}
1999	0.346	(2.59) ^{***}	0.395	(4.02) ^{***}
2000	0.307	(2.33) [*]	0.509	(5.42) ^{***}
2001	0.404	(3.78) ^{***}	0.511	(6.48) ^{***}

Year	Vehicles			
	Restrictiv. Avg.		Facil	
	<i>coeff.</i>	<i>t-stat</i>	<i>coeff.</i>	<i>t-stat</i>
1988	-0.291	(2.66) ^{***}	0.408	(5.91) ^{***}
1989	0.505	(3.40) ^{***}	0.034	(0.36)
1990	1.004	(6.21) ^{***}	-0.189	(1.86)
1991	1.196	(6.94) ^{***}	-0.287	(2.65) ^{***}
1992	1.511	(8.32) ^{***}	-0.505	(4.39) ^{***}
1993	1.140	(6.87) ^{***}	-0.061	(0.54)
1994	0.104	(0.73)	0.667	(6.72) ^{***}
1995	-0.015	(0.10)	0.570	(5.23) ^{***}
1996	0.334	(2.27) [*]	0.359	(3.35) ^{***}
1997	0.214	(1.48)	0.464	(4.36) ^{***}
1998	0.271	(1.94) [*]	0.387	(3.75) ^{***}
1999	0.465	(3.53) ^{***}	0.260	(2.64) ^{***}
2000	0.351	(2.71) ^{***}	0.396	(4.25) ^{***}
2001	0.149	(1.39)	0.639	(8.00) ^{***}

APPENDIX VI. Countries Included in the Sample

Algeria	Fiji	Mali	St. Lucia
Angola	Finland	Malta	St. Vincent and the Grenadines
Antigua and Barbuda	France	Mauritania	Sudan
Argentina	Gabon	Mauritius	Suriname
Armenia	Gambia	Mexico	Sweden
Australia	Georgia	Moldova	Switzerland
Austria	Germany	Mongolia	Syrian Arab Republic
Bangladesh	Ghana	Morocco	Tanzania
Barbados	Greece	Mozambique	Thailand
Belarus	Grenada	Myanmar	Togo
Belgium	Guatemala	Nepal	Tonga
Belize	Guinea	Netherlands	Trinidad And Tobago
Benin	Guinea-Bissau	New Zealand	Tunisia
Bolivia	Guyana	Nicaragua	Turkey
Brazil	Haiti	Niger	Uganda
Bulgaria	Honduras	Nigeria	Ukraine
Burkina Faso	Hong Kong	Norway	United Arab Emirates
Burundi	Hungary	Oman	United Kingdom
Cameroon	Iceland	Pakistan	United States
Canada	India	Panama	Uruguay
Cape Verde	Indonesia	Papua New Guinea	Vanuatu
Central African Republic	Iran	Paraguay	Venezuela
Chad	Iraq	Peru	Vietnam
Chile	Ireland	Philippines	Yemen
China	Israel	Poland	Zambia
Colombia	Italy	Portugal	Zimbabwe
Comoros	Jamaica	Qatar	
Congo, Republic Of	Japan	Romania	
Costa Rica	Jordan	Russia	
Cote D'Ivoire	Kazakhstan	Rwanda	
Croatia	Kenya	Samoa	
Cuba	Kiribati	Saudi Arabia	
Cyprus	Korea	Senegal	
Czech Republic	Kuwait	Seychelles	
Denmark	Kyrgyz Republic	Sierra Leone	
Dominica	Lao People's Dem. Rep.	Singapore	
Dominican Republic	Latvia	Slovak Republic	
Ecuador	Lithuania	Slovenia	
Egypt	Luxembourg	Solomon Islands	
El Salvador	Madagascar	South Africa	
Equatorial Guinea	Malawi	Spain	
Estonia	Malaysia	Sri Lanka	
Ethiopia	Maldives	St. Kitts And Nevis	

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APPENDIX VII a. PTAs Included in the Tables and Graphs and the Empirical Specifications, by Year of Entry into Force and Full Name

CACM	1961	Central American Common Market
CARICOM	1973	Caribbean Community
EU-ICELAND	1973	
EU-NORWAY	1973	
EU-SWITZERLAND	1973	
BANGKOK AGREEMENT	1976	
LAIA	1981	Latin American Integration Association
SPARTECA	1981	South Pacific Regional Trade and Economic Cooperation Agreement
ANZCERTA	1983	Australia-New Zealand Closer Economic Relations Trade Agreement
GULF CC	1983	Gulf Cooperation Council
US-ISRAEL	1985	
ECOWAS Trade Liberalisation Scheme	1990	Economic Community of West African States
NAMIBIA-ZIMBABWE	1992	
EFTA-CZECH REPUBLIC	1992	PANEURO
EU-CZECH REPUBLIC	1992	PANEURO
EU-HUNGARY	1992	PANEURO
EU-SLOVAK REPUBLIC	1992	PANEURO
EFTA-SLOVAK REPUBLIC	1992	PANEURO
EFTA-TURKEY	1992	PANEURO
EU-POLAND	1992	PANEURO
EU-BULGARIA	1993	PANEURO
AFTA	1993	ASEAN Free Trade Area
CEFTA	1993	Central European Free Trade Area/PANEURO
EFTA-BULGARIA	1993	PANEURO
EFTA-ISRAEL	1993	PE
EFTA-HUNGARY	1993	PANEURO
EFTA-POLAND	1993	PANEURO
EFTA-ROMANIA	1993	PANEURO
EU-ROMANIA	1993	PANEURO
BAFTA	1994	Baltic Free Trade Agreement/PANEURO
COMESA	1994	Common Market for Eastern and Southern Africa
EEA	1994	European Economic Area/PANEURO
NAFTA	1994	North American Free Trade Agreement
GEORGIA-RUSSIA	1994	
G3	1995	Group of Three
EFTA-SLOVENIA	1995	PANEURO
EU-LATVIA	1995	PANEURO
EU-LITHUANIA	1995	PANEURO
EU-ESTONIA	1995	PANEURO
MEXICO-BOLIVIA	1995	
MEXICO-COSTA RICA	1995	
ROMANIA-MOLDOVA	1995	
KYRGYZ REPUBLIC-KAZAKHSTAN	1995	
EFTA-ESTONIA	1996	PANEURO
EFTA-LATVIA	1996	PANEURO
EFTA-LITHUANIA	1996	PANEURO
SLOVENIA-LATVIA	1996	PANEURO
MERCOSUR-CHILE	1996	
GEORGIA-UKRAINE	1996	
GEORGIA-AZERBAIJAN	1996	
CZECH REPUBLIC-LITHUANIA	1997	PANEURO
POLAND-LITHUANIA	1997	PANEURO
SLOVAK REPUBLIC-ISRAEL	1997	PANEURO
SLOVENIA-ESTONIA	1997	PANEURO
CZECH REPUBLIC-ISRAEL	1997	PE
CZECH REPUBLIC-LATVIA	1997	PANEURO
SLOVAK REPUBLIC-LATVIA	1997	PANEURO
SLOVAK REPUBLIC-LITHUANIA	1997	PANEURO
SLOVENIA-LITHUANIA	1997	PANEURO
TURKEY-ISRAEL	1997	PE
CANADA-CHILE	1997	
CANADA-ISRAEL	1997	
MERCOSUR-BOLIVIA	1997	
CZECH REPUBLIC-ESTONIA	1998	PANEURO
HUNGARY-TURKEY	1998	PANEURO
ROMANIA-TURKEY	1998	PANEURO
SLOVAK REPUBLIC-ESTONIA	1998	PANEURO
SLOVAK REPUBLIC-TURKEY	1998	PANEURO
TURKEY-LITHUANIA	1998	PANEURO
CZECH REPUBLIC-TURKEY	1998	PANEURO
HUNGARY-ISRAEL	1998	PE
POLAND-ISRAEL	1998	PE
SLOVENIA-CROATIA	1998	PE
SLOVENIA-ISRAEL	1998	PE

PTA

ENTRY YR

FULL NAME/TYPE

MEXICO-NICARAGUA	1998	
EU-TUNISIA	1998	
GEORGIA-ARMENIA	1998	
EU-SLOVENIA	1999	PANEURO
POLAND-LATVIA	1999	PANEURO
CHILE-MEXICO	1999	
TURKEY-BULGARIA	1999	
EFTA-MOROCCO	1999	
GEORGIA-KAZAKHSTAN	1999	
HUNGARY-LITHUANIA	2000	PANEURO
POLAND-TURKEY	2000	PANEURO
TURKEY-LATVIA	2000	PANEURO
TURKEY-SLOVENIA	2000	PANEURO
HUNGARY-LATVIA	2000	PANEURO
TURKEY-SLOVENIA	2000	PANEURO
EU-ISRAEL	2000	PE
SADC	2000	Southern African Development Community
EU-MEXICO	2000	
EU-SOUTH AFRICA	2000	
MEXICO-ISRAEL	2000	
EU-MOROCCO	2000	
NEW ZEALAND-SINGAPORE	2001	

PTAs not included in the gravity model (due to entering into force later than 1 January 2001)

PTA	ENTRY YR	FULL NAME/TYPE
US-JORDAN	2001	
EFTA-MEXICO	2001	
HUNGARY-ESTONIA	2001	PANEURO
EFTA-CROATIA	2002	PE
EU-CROATIA	2002	PE
CACM-CHILE	2002	
JSEPA	2002	Japan-Singapore Economic Partnership Agreement
CHILE-COSTA RICA	2002	
CANADA-COSTA RICA	2002	
SAFTA	2003	Singapore-Australia Free Trade Agreement
EU-CHILE	2003	
EFTA-SINGAPORE	2003	
CHILE-SOUTH KOREA	2003	
US-CHILE	2003	

PTAs treated as "Perfect" CUs

PTA	ENTRY YR	FULL NAME/TYPE
EC/EU	1958	European Community/European Union
EFTA	1960	European Free Trade Area
EU-MALTA	1971	
EU-CYPRUS	1973	
EU-TURKEY	1996	
FSRs	1999	CU of four Former Soviet Republics

Notes: 1. The PANEURO system was launched in 1997. RoO protocols of FTAs forged prior to that by the EU were revised to be compatible with the PANEURO model.

2. PE indicates RoO protocols that are basically identical to the PANEURO model in product-specific RoO, but diverge from the PANEURO model in some regime-wide provisions, most notably by not being part of the PANEURO system of diagonal cumulation.

Entry dates obtained from the World Trade Organization and the Organization of American States.

APPENDIX VII b. Selected PTAs by Member States

PTA MEMBERS

AFTA Brunei, Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

ANZCERTA Australia, New Zealand

BAFTA Estonia, Latvia, Lithuania

BANGKOK Bangladesh, China, India, Republic of Korea, Laos, Sri Lanka
AGREEMENT

CACM Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua

CARICOM Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago

CEFTA Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak Republic, Slovenia

COMESA Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe

EEA EU, Iceland, Liechtenstein, Norway

EFTA Iceland, Liechtenstein, Norway, Switzerland

ECOWAS Benin, Burkina Faso, Cabo Verde, Ivory Coast, Gambia, Ghana, Guinea, Guinea Bissau, Mali, Liberia, Niger, Nigeria, Senegal, Sierra Leone, Togo, Namibia, Zimbabwe

FSRs Belarus, Kazakhstan, Kyrgyz Republic, Russia

G3 Mexico, Colombia, Venezuela

GULF CC Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates

JSEPA Japan, Singapore

LAIA Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela

MERCOSUR Argentina, Brazil, Paraguay, Uruguay

NAFTA US, Canada, Mexico

SADC Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe

SAFTA Singapore, Australia

SPARTECA Australia, New Zealand, Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, Western Samoa

Notes for the tables: