Rules of Origin: A World Map and Trade Effects[*]

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Introduction

The purpose of paper is five-fold: (1) to provide an overview of the objectives, types, and effects of rules of origin (RoO) used around the world; (2) to present a comparative analysis of the preferential RoO regimes in some of the main preferential trading arrangements (PTAs) in Europe, the Americas, Asia-Pacific, Africa, and the Middle East; (3) to measure the degree of restrictiveness and selectivity of product-specific RoO employed in the various RoO regimes; (4) to develop a facilitation index to capture the extent of flexibility instilled in RoO regimes by various regime-wide RoO; and (5) to empirically assess the effects of RoO on aggregate trade flows as well as trade on intermediate goods in the automotive sector through a modified gravity model. Our sample covers 156 countries and nearly a hundred PTAs around the world for 2001.

The empirical specification yields three main preliminary findings. First, regimes with restrictive RoO and with high degrees of sectoral selectivity discourage aggregate trade flows. Second, regime-wide RoO that allow for flexibility in the application of the product-specific RoO, such as cumulation and drawback, facilitate trade flows. As such, various regime-wide RoO provisions can counteract the negative effects on trade of restrictive RoO. Third, at the sectoral level, restrictive RoO in final goods encourage trade in intermediate goods, and could thus engender trade diversion in inputs.

The first section of this paper discusses the purposes of RoO, lays out the different types of product-specific and general RoO, and presents the latest empirical evidence on the effects of RoO. The second section examines the prevalence of the different types of RoO in more than eighty integration schemes in the world, and compares the relative restrictiveness of the various product-specific RoO within and across RoO regimes. Section three presents our empirical model and discusses the results. The fourth section outlines our next steps on the empirical part of the paper. Section five concludes.

I. Rules of Origin in FTAs: A World Map

A. Objectives of RoO

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 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.

The economic justification for preferential 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. As such, 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 rest of the world (ROW). RoO would be unnecessary in a customs union (CU) with a common external tariff (CET) that covered the whole tariff universe. However, in practice, RoO are widely used in CUs, as well, either as a transitory tool in the process of moving toward the CET, such as in Mercosur, 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. RoO are a feature of virtually all PTAs around the world; the Asia-Pacific Cooperation (APEC) forum is a prominent exception, with its members employing their respective domestic RoO (OECD 2002). APEC is based on a principle of open regionalism—extending tariff preferences on an MFN basis—which renders the need for preferential RoO obsolete.

Since RoO can serve as an effective means to deter transshipment, they can give rise to uses beyond and unrelated to the efforts to avert trade deflection. Indeed, with the lowering of tariff and non-tariff barriers and the concomitant proliferation of PTAs around the world, RoO have arguably become a widespread and potentially powerful trade policy instrument.[1] Analysts engaged in the nascent but lively debate on RoO are increasingly picking up on the political economy of RoO (Krueger 1993; Krishna and Krueger 1995; Jensen-Moran 1996; Garay and Estevadeordal 1996; Stephenson 1996; Scollay 1996; Ju and Krishna 1998, 2002; Appiah 1999; Falvey and Reed 2000; Estevadeordal 2000; Duttagupta 2000; Duttagupta and Panagariya 2000; Lloyd 1996, 2001a, 2001b; Rodriguez 2001; Brenton and Manchin 2002; Flatters 2002; Garay and Cornejo 2002; Hirsch 2002; Krishna 2002).

Most prominently, RoO can be employed to favor intra-FTA industry linkages over those between the FTA and the ROW, and, as such, to indirectly protect FTA-based input producers vis-à-vis their extra-FTA rivals (Krueger 1993; Krishna and Krueger 1995). Stringent RoO can compel intra-FTA firms with low-cost extra-FTA supply sources to turn to higher-cost inputs produced within the FTA in order to qualify for the PTA-conferred preferential treatment for their final products, particularly in sectors where preferential margins are wide. As such, RoO liken a tariff on the intermediate product levied by the importing country (Falvey and Reed 2000; Lloyd 2001), and can be used by one PTA member to secure its PTA partners' input markets for the exports of its own intermediate products (Krueger 1993; Krishna and Krueger 1995). In an en econometric study of the determinants of the restrictiveness of the RoO in the North American Free Trade Agreement (NAFTA), Estevadeordal (2000) shows that the same political economy factors that drive tariff protection also drive RoO. Flatters (2002) reaches similar conclusions in an analysis of the Southern African Development Community RoO, as do Estevadeordal and Suominen (2003) in a study of European Union's extra-regional FTAs with South Africa, Mexico, and Chile.

[1] That governments forego negotiating simple regional value added rules, and, rather, engage in prolonged, contentious bargaining over highly complex and different types of RoO suggests that RoO play a role beyond resolving the trade deflection problem.

If RoO introduce a price wedge in the intermediate market, they could be expected to engender opposition by downstream producers intent on retaining their extra-PTA low-cost supply sources while qualifying for the PTA-conferred preferential treatment. However, scholarly literature offers two theoretical reasons why downstream producers may accept or even favor stringent RoO. First, RoO may simply be the price that downstream producers have to pay for the PTA: despite risking costly trade diversion, restrictive RoO can help placate protectionist sectors so as to render PTA formation politically feasible (Duttagupta 2000). Second, downstream producers can draw contingent benefits from stringent RoO, and, as such, be willing to shoulder the heightened production costs. For instance, should the linkages between different stages of production in the industry be tight, extra-PTA final goods producers would likely be hard-pressed to locate approriate components witin the PTA and remain competitive vis-à-vis the intra-PTA producers in the PTA market. Even if extra-PTA firms were to locate in the PTA market via tariff-jumping-like "RoO-jumping", discrimination would continue until the regional sourcing met the RoO (Graham and Wilkie 1998).

RoO can thus be used to meet the political economy goal of extending protection to both intra-PTA input and final goods producers. Furthermore, given that RoO hold the potential of increasing local sourcing and affecting the locational decisions of investors, governments can use RoO to encourage investment in certain strategic or high-value sectors—for instance in order to create lucrative jobs (Jensen-Moran 1996; Hirsch 2002).

B. Types of RoO

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

i. Product-Specific RoO: Five Main Components

The Kyoto Convention recognizes two basic criteria to determine origin: wholly obtained or produced, and substantial transformation.[2] 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

[2] 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.

since 1908 through the inception of the Canada-US Free Trade Agreement (CUSFTA) and, subsequently, NAFTA (Reyna 1995: 7).[3]

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), sub-heading (6 digits) or item (8-10 digits) in the exporting country.

The second criterion is an exception attached to a particular CTC (ECTC). ECTC generally prohibits the use of non-originating materials from a certain sub-heading, 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 (or, alternatively, to remain below a certain ceiling percentage of value originating in the non-member countries). 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 for products meeting a minimum percentage of originating parts out of the total.

The fourth RoO component is technical requirement (TECH), which requires the product to undergo certain manufacturing operations in the originating country. TECH requires or prohibits the use certain input(s) and/or the realization of certain process(es) in the production of the good.[4] It is a particularly prominent feature in RoO governing textile products.

Table 1 summarizes the frequency of the various product-specific criteria in 93 PTAs—6 customs unions and 87 FTAs—around the world. The change of heading-requirement is the staple of PTAs. It is used either as stand-alone or in tandem with other RoO criteria. Also frequently used are the import content (usually ranging from 30 to 60 percent), value of parts, and technical requirements. Adding analytical complexity albeit administrative flexibility is that many RoO regimes provide two alternative RoO for a given product, such as a change of chapter or, alternatively, a change of heading + RVC.

[3] 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).

[4] TECH can be highly discretional given that lack of classification tools to objectively guarantee sufficient transformation in the production of the good.

Table 1 – Frequency of Various Product-Specific Criteria

PTAs	Criterion				
	CTH	VALUE CONTENT			TECH
		MC	RVC	VP	
Customs unions (6)	6	2 (40-60%)	2 (35-60%)	-	-
FTAs and other PTAs (87)	83	68 (30-60%)	7 (25-65%)	67	74

Source: World Trade Organization (2002).

ii. 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 or 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 non-originating 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 preferential treatment. Diagonal cumulation means that countries tied by the same set of preferential origin rules can use products that originate in any part of the area as if they originated in the exporting country. Full cumulation extends diagonal cumulation. It provides that countries tied by the same set of preferential origin rules among each other can use goods produced in any part of the area, even if these were not originating products. All the processing done in the zone is then taken into account as if it had taken place in the final country of manufacture.[5] As such, diagonal and full cumulation can notably expand the

[5] 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. While diagonal cumulation and, even more so, bilateral cumulation, promote the use of materials originating within the FTA, full cumulation is more liberal than diagonal cumulation by allowing a greater use of third-country materials. It is, however, rarely used.

geographical and product coverage of a RoO regime. Table 2 illustrates the frequency of general RoO provisions around the world.

Table 2 – Frequency of General RoO Provisions

PTAs	DE MINIMIS	TYPE OF CUMULATION			ROLL-UP
		Bilateral	Diagonal	Full	
Customs unions (6)	3	6	0	0	2
FTAs and other PTAs (87)	85	87	58	8	81

Source: World Trade Organization (2002).

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—increase the stringency of RoO.[6]

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 exported to a PTA partner market. Many developing countries in particular 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 good in the domestic market.[7] 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, PTAs may impose high administrative costs stemming from the method of certifying the origin of goods. The main models of certification employed in PTAs are self-certification by exporters, certification by an industry umbrella group, and certification by the exporting country government—or various combinations of the three. 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.

[6] To be sure, some countries argue that a system of cumulation merely introduces another layer of discrimination, since non-participating countries are not eligible for its benefits.

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

C. Effects of RoO

The complexity and stringency of RoO employed in PTAs has given rise to concerns over the diversionary effects that RoO may have on trade and investment flows. More generally, the often dauntingly complex RoO have led analysts to question the extent to which PTAs can create trade, boost welfare, and serve as stepping-stones in the march toward global free trade. From a legal standpoint, preferential RoO are feared to breach Article XXIV of the General Agreements on Tariffs and Trade (GATT), which in paragraph 8(b) defines a free trade area as "a group of two or more customs territories in which the duties and *other restrictive regulations of commerce*...are eliminated on *substantially all* the trade between the constituent territories in products originating in such territories."[8]

i. The Costs of RoO

RoO can affect trade by inflicting two types of costs—production and administrative costs. Both of these costs can introduce a protectionist bias. Production costs arise from the various technical criteria imposed by the RoO regime. In theoretical terms, a RoOless PTA could be expected to result in dramatic changes in trade patterns due to rise in transshipment through the country with the lowest tariff: without RoO, a PTA would be highly liberalizing given that the lowest tariff would apply to each import category (Krishna 2002). However, in the presence of stringent RoO, the potential for a PTA to boost trade between the members will likely be moderated by the rise in the cost of inputs for the intra-PTA final goods producers—which decreases final goods production and lowers the final goods' producers derived demand for intra-PTA inputs, undercutting intra-PTA trade in both inputs and final goods (Ju and Krishna 1998). The costs of production may be compounded by the fact that RoO are formulated on the basis of the Harmonized System, which was not designed with a consideration for the determination of origin. For instance, a product that undergoes a substantial transformation in practice may still fail to alter its tariff classification, and hence fail to meet the CTC test.

The administrative costs stem from the procedures required for ascertaining compliance with the RoO. These involve bookkeeping costs—the costs for the exporter of certifying the origin of a good prior to its export to the territory of another PTA member—and the costs to the partner country customs of verifying the origin of goods. The different certification mechanisms impose divergent costs on firms and governments alike, particularly when countries belong to several PTAs with different types of RoO. These costs are hardly trivial. In Brazil, for instance, the cost of obtaining certification for a single shipment from a certifying agency is estimated to range between US$6 and US$20; in Chile, the cost is US$7. Koskinen (1983) estimates the administrative costs for Finnish exporters under the European Community-EFTA FTA at 1.4 percent to 5.7 percent of the value of export transactions. In another pioneering study, Herin (1986) puts the cost of obtaining the appropriate documentation to meet the RoO at three to five percent of the FOB value of the good in the context of EFTA. Holmes and Shephard (1983) find the average export transaction EFTA to the EC to require 35 documents and

[8] Italics added.

360 copies.[9] In a recent study, Cadot et al. (2002) disentangle NAFTA's non-RoO related and RoO-related administrative costs, finding the latter to approximate two percent of Mexican exports to the US market.

Producers in sectors governed by RoO that are based on the VC criterion face the added administrative complexity of fluctuations in exchange rates and changes in production costs. Besides increasing unpredictability, changes in relative prices complicate the verification of origin by customs, and may give rise to subjective administrative discretion on the part of the importing country customs. The costs of RoO in particularly on goods produced in multiple countries has led Lloyd (2001a) 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.

ii. Impact on Trade and Investment Flows

Encouraging the use of intra-PTA inputs at the expense of extra-PTA ones even if the latter were cheaper, restrictive RoO can result in trade diversion. This is a concern particularly for small countries whose producers have grown to depend on supply sources beyond their domestic market (and outside the future PTA area) simply due to the lack of domestic supply of inputs. However, when their restrictiveness rises further, RoO can constrain intra-PTA trade altogether. With the production and administrative costs imposed by RoO rising to unsustainably high levels, producers of the final good would rather import their inputs from the ROW and sell their output at their home market than produce to the PTA partner's market at high input costs. Alternatively, final goods producers may act as producers in the ROW do—export their products to the PTA partner by paying the MFN tariff and hence foregoing the costs of meeting the RoO. To be sure, the higher the MFN tariff, the greater the willingness of firms to comply with the RoO, including to shift to intra-PTA inputs and furnish the certifying documentation.

Besides the short-run trade effects, RoO may in the longer-run encourage RoO-jumping investment, whereby extra-PTA producers locate plants within a PTA region in order to satisfy the RoO. If this occurs even when the PTA region was not economically the most optimal investment location, RoO can engender investment diversion. Moreover, RoO can produce investment diversion within the PTA area. For one, should final goods producers be hard-pressed to locate approriate components in the PTA area and remain competitive, they may simply choose to locate to the territory of the largest PTA market and the one with the lowest external tariffs—such as the United States in the context of NAFTA—and continue importing third-country inputs required for the final product.[10] Two, producers located in the PTA member with the lowest production costs can be placed in a disadvantage when the RoO are based on RVC, which is easier to meet in PTA members with higher production costs. As such, RoO may encourage investment to a large hub country that may well be an inefficient producer—and perpetuate it given the

[9] Quoted in Herin (1986).

[10] For example, a Mexican and a US firm selling at the US market and purchasing their inputs from outside the NAFTA region would be unequally treated under NAFTA, as the Mexican firm would be disadvantaged vis-à-vis the US firm by the former's failure to meet the RoO required to export to the US market (Graham and Wilkie 1998: 110).

agglomeration effects of foreign direct investment. Rodriguez (2001) shows formally that RoO can lead to distortions in production structures within the PTA area.

iii. Empirical Evidence

The potential effects of restrictive RoO have three immediate implications to the theoretical debate over the potential trade effects of PTAs. First, RoO can reduce the utilization rates of the PTA-provided preferences. Second, RoO can hamper PTA-induced trade liberalization, undercutting the trade effect that tariff lowering between the PTA partners would have in a PTA with loose RoO. Third, the relevance of RoO *per se*—and their importance as a constraint on commerce thereby—decreases with the lowering of MFN tariff barriers across PTA members. These issues have rendered some analysts to suggest that the expanding spaghetti-bowl of overlapping PTAs and RoO regimes should be accompanied by the principle of open regionalism and/or replaced by customs unions or a hybrid arrangment between and CU and FTA altogether, lest the benefits of preferential trade liberalization be lost.[11]

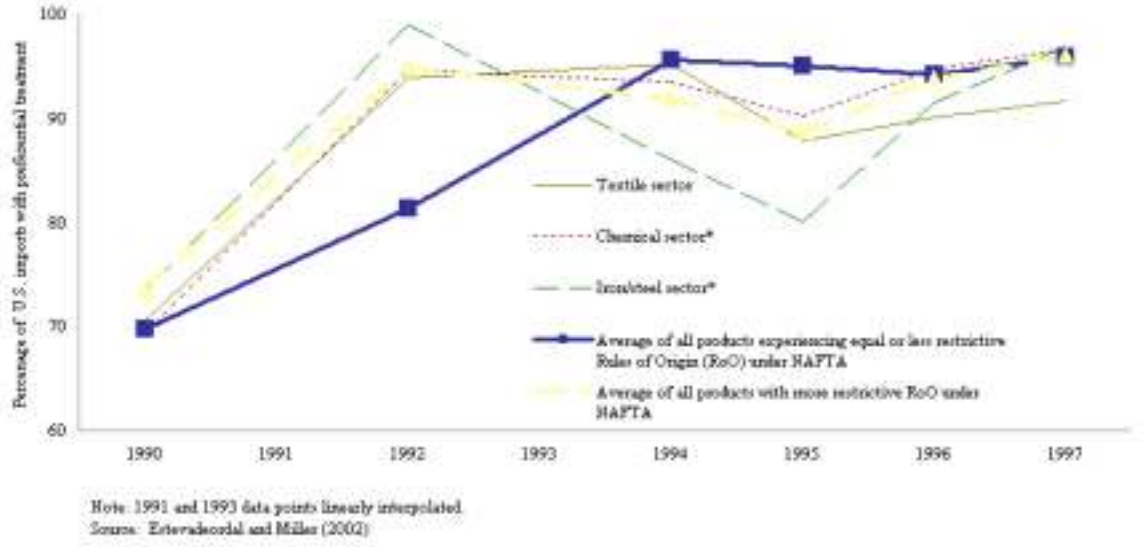
However, theoretical literature is has yet to specify the exact level of restrictiveness where RoO are loose enough to keep input prices low or restrictive enough for the price of inputs to rise to unsustainable heights and for the negative effects of trade diversion to kick in (Ju and Krishna 1998; Duttagupta and Panagariya 2000). As such, the relationship between the restrictiveness of RoO and intra-PTA trade flows in intermediate and final goods is relegated to an empirical matter.

Empirical evidence, for its part, is scarce given the difficulties of operationalizing RoO—translating the complex technical requirements into a variable that serves as a measure of the stringency of RoO. However, the pioneering works are rather clear on the dampening effect of the technical and administrative requirement of RoO on trade. Appiah (1999), examining NAFTA in a three-country, multisector Computable General Equilibrium (CGE) model, finds that RoO distort trade flows, diverting resources from their most efficient uses and undercutting global welfare. Estevadeordal and Miller (2002) document "missed preferences"—i.e., utilization rates below 100 percent—between the United States and Canada due to the tightening of the pre-FTA RoO under NAFTA launched in 1994 (figure1). Cadot et al. (2002) attribute the mere 64 percent utilization rate of NAFTA preferences in part to RoO, and also show that Mexican exports to the United States have been undermined by stringent RoO.[12] Canadian producers are reported to have opted to pay the tariff rather than going through the administrative hurdles to meet the RoO already in the context of the NAFTA predecessor, the US-Canada FTA (Krueger 1995).

[11] See Bergsten (1997); Wonnacott (1996).

[12] In January 1995, the US found a high compliance rate among the Mexican and Canadian exporters and producers on RoOs, or at 90 percentand 80 precent, respectively (Reyna 1995: 37-38). In NAFTA, the United States played a key role in establishing the agreement's Uniform Regulations and RoO enforcement mechanisms.

Figure 1 - From USA-Canada FTA to NAFTA:
Rules of Origin and Utilization Rates



In the EU context, Brenton and Manchin (2002), albeit not operationalizing RoO, attribute the low utilization rates of the EU's trading partners in the textile sector to excessive stringency of EU RoO. Augier, Gasiorek and Lai-Tong (2003) examine two different types of PTAs—one with RoO and the other whereby the RoO regime permits diagonal cumulation—finding preliminary evidence that when there is no cumulation between countries, trade is up to 52 percent lower than expected level of total trade; the impact is particularly notable in trade in intermediate goods. These contributions notwithstanding, much remains to be done to further the empirical understanding of the effects of RoO on trade and, in particular, on investment.

II. Rules of Origin around the World

This section turns to analyzing the structure of the RoO regimes 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 examines (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 different regime-wide RoO, such as *de minimis* and drawback.

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 EU-provided preferential treatment via diagonal cumulation—that was 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 the RoO protocols with the 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.[13] 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, providing for diagonal cumulation among the participating countries thereby. The Commission's regulation 46 of January 1999 reiterates the harmonized protocols, outlining the so-call single list RoO.

The PANEURO RoO have since 1997 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. However, the harmonized RoO do not represent a dramatic break with those of the pre-1997 era. For example, the RoO in nearly three-quarters of the products (in terms of tariff sub-headings) in PANEURO and the original EU-Poland RoO protocol published in 1993 are identical. Both the new and the old versions combine the CTC mainly at the heading level with VC and/or TECH. Indeed, the 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 option, alternative RoO, much like the first option RoO, combine different RoO criteria; however, the most frequently used alternative RoO is based on the import content criterion.

ii. 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

[13] See Driessen and Graafsma (1999) for review.

(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). The LAIA model is the point of reference to 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, in turn, 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 NAFTA model is also widely viewed as the likely blueprint for the RoO of the Free Trade Area of the Americas (FTAA).[14] The RoO regimes in these agreements may require a change of chapter, heading, sub-heading 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.

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 the Mercosur and NAFTA: it uses chiefly change in tariff classification only, but in a 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, likening the NAFTA RoO. Similarly, the recently forged Chile-South Korea FTA also features a high degree of sectoral selectivity à la NAFTA—and, indeed, the US-Chile FTA.

iii. Africa, Asia, Middle East: Toward Selectivity from Across-the-Board RoO?

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 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, the RoO to be based on import content; however, the percentage requirement in such instances is higher than

[14] NAFTA RoO enshrined in Chapter 4 constitute a maze of highly disaggregated trade regulations described in a 150-page long Annex.

in terms of the RVC. Most of these regimes also specify and alternative RoO based on the CTC criterion, most often change in heading or, in the case of ECOWAS that also has a relatively low RVC requirement at 30 percent, change in subheading.

However, both Africa and Asia-Pacific also feature RoO regimes of NAFTA- or PANEURO-like sectoral selectivity. The Southern African Development Community (SADC) RoO approximate the PANEURO model in both *types* of sectoral RoO and sectoral selectivity. Moreover, COMESA RoO are reportedly under renegotiation, which may well lead to greater selectivity. 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.

As noted above, the inter-continental RoO regimes of the US-Singapore and Chile-Korea FTAs—as well as the recently concluded EFTA-Singapore FTA where RoO follow the PANEURO model—have delivered additional complexity to the Asia-Pacific RoO theater. The future Mexico-Singapore, Canada-Singapore, India-Singapore, Mexico-Korea, Mexico-Japan, and US-Australia FTAs, among others, will likely compound this trend, as may the rise of further intra-regional FTAs in Asia-Pacific, such as between Japan and Korea, between Korea and Singapore, and between ASEAN on the one hand, and China, Japan, and/or Korea, on the other.[15]

iv. 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; these RoO apply to the roughly 55 percent of world trade that is conducted on a non-preferential basis (WTO 2003). Unlike preferential RoO that have thus far escaped multilateral regulation, non-preferential RoO have been under a process of harmonization under the auspices of the Committee on Rules of Origin (CRO) of the World Trade Organization (WTO) and the technical committee (TCRO) of the World Customs Cooperation Council. Propelled by concerns of RoO's effects on unfettered flow of trade, the harmonization drive was first launched in 1995 as mandated by the Uruguay Round's Agreement on Rules of Origin (ARO). Before the Uruguay Round, no multilateral rules existed in the GATT for determining the origin of goods in global commerce.

The harmonization work was initially scheduled to be completed by July 1998. However, the deadline has been extended several times since then. In June 1999, when the TCRO submitted the final results of its technical work on the Harmonization Work Program, 486 outstanding product-specific issues were before the Committee. By mid-2002, the WTO reported that 348 issues had been resolved, with 138 awaiting resolution. An examination of the Committee's reports and working documents issued since 1999 and relating to questions still under examination allows to conclude that the unresolved issues affect

[15] There have been impulses to establish separate, bilateral FTAs between ASEAN and Japan, China, and Korea rather than negotiating a single FTA encompassing all the players. Japan has reportedly also studied possible economic partnership agreements with Thailand and the Philippines, respectively.

about 40 percent of tariff subheadings (that is, these subheadings still feature two or more potential RoO as proposed by the various WTO member governments).

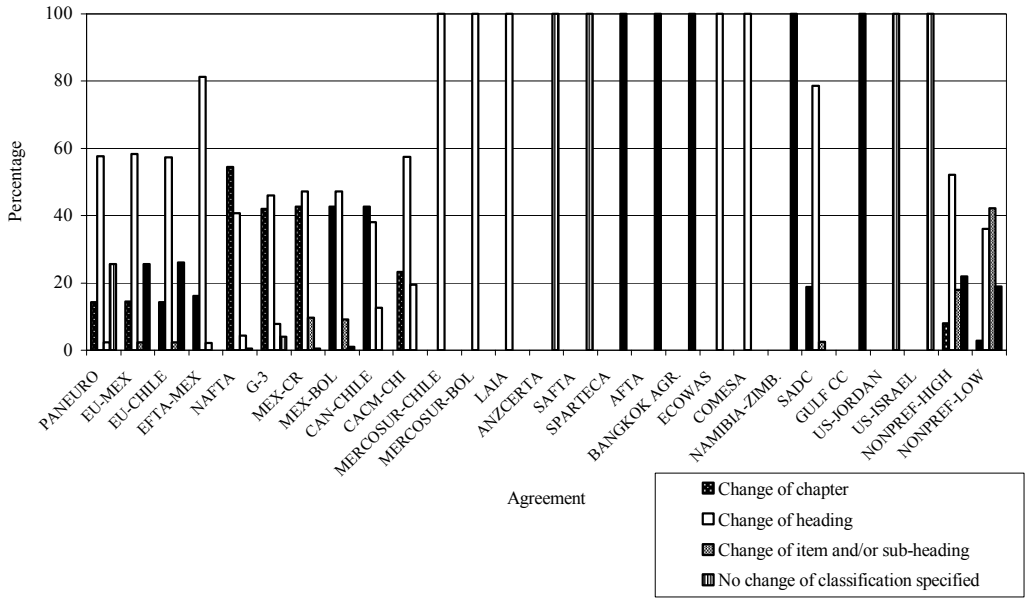
In their current structure, the non-preferential RoO approximate the PANEURO and NAFTA models in sectoral specificity; however, since several issues are still contested at the WTO, the final degree of complexity remains to be gauged. What is clear is that the definition of the non-preferential RoO is driven by the same political economy considerations as the definition 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.

v. Depicting Product-Specific RoO around the World

Figure 2 centers on the first RoO component, the CTC criterion, in three of EU's RoO regimes (PANEURO—where the RoO are basically fully identical to those of the EU-South Africa FTA—and the RoO in the EU-Mexico and EU-Chile FTAs); the EFTA-Mexico RoO that approximate the EU-Mexico RoO; five RoO regimes based on the NAFTA model gaining prominence in the Western Hemisphere (NAFTA, Group of Three, and Mexico-Costa Rica, Mexico-Bolivia, and Canada-Chile FTAs); the RoO in the CACM-Chile FTA, the RoO regimes in the FTAs between Mercosur on the one hand, and Chile and Bolivia, on the other; the LAIA RoO; and the RoO in force in three PTAs in Africa (COMESA, ECOWAS and SADC), three in Asia-Pacific (AFTA, Bangkok Agreement, and ANZCERTA), and the Gulf Cooperation Council in the Middle East. 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, or the extent to which the RoO impose demands on potential exporters, which will be discussed in the next section).[16]

[16] The figure is based on the first RoO only when two or more possible RoO are provided for a tariff heading or subheading. The recently published Chile-Korea and Japan-Singapore FTAs await future coding efforts.

Figure 2 - Distribution of CTC Criteria by Agreement



Source: Authors' calculations based on RoO protocols.

The change of heading-criterion predominates 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. Except for the SADC, the African and Asian PTAs considered here stand out for using either change of heading or change of subheading-criteria exclusively; similarly, LAIA and Mercosur's FTAs with Chile and Bolivia use the change of heading-criteria across the RoO. In contrast to the PANEURO and NAFTA models, non-preferential RoO feature also a strong change of subheading-component. Another notable difference between the various FTAs 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 impose 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.

Table 3 centers on the tariff sub-headings governed by VC only (or by VC as an alternative to a CTC criterion) in various RoO regimes, and, in particular, on the height 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 in 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).

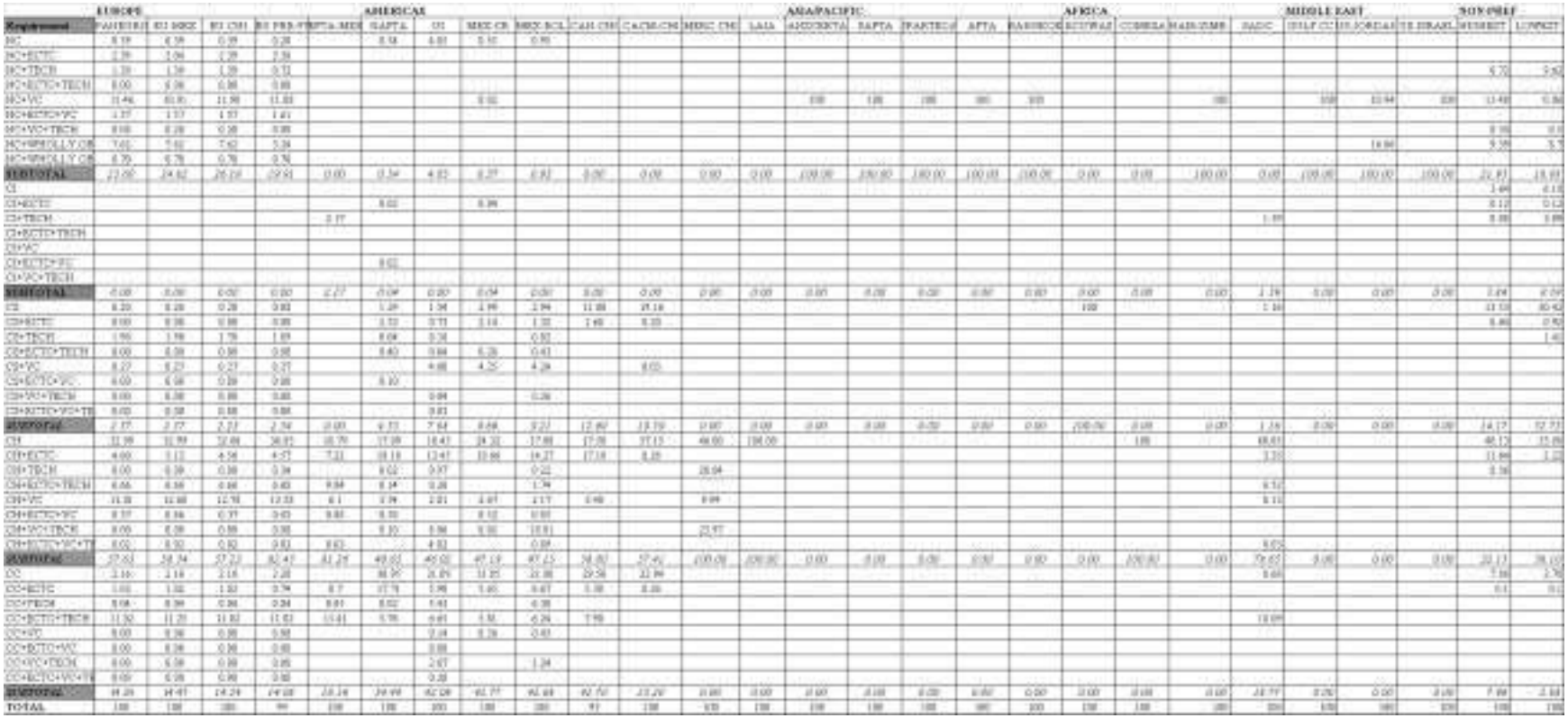
Table 3 – The Height of VC Criterion by Agreement

PTA	Value Content Criterion			Basis for Calculation
	MC	RVC	VP	
PANEURO (50)	50-30		Yes	Ex-works
PE (15)	50-30		Yes	Ex-works
EU-SA	50-30		Yes	Ex-works
EU-MEX	50-30		Yes	Ex-works
EU-CHILE	50-30		Yes	Ex-works
EFTA-MEX	50-30		Yes	Ex-works
NAFTA		60-50		60 fob; 50 cost prod.
US-Chile		45-35		45 build-down; 35 build-up[i]
G-3		55-50[ii]		Fob
MEX-CHILE		50-41.66		50 fob; 41.66 cost prod.
MEX-BOL		50-41.66		51 fob; 41.66 cost prod.
MEX-CHILE		50-40		50 fob; 40 cost prod.
CAN-CHILE		35-25		35 fob; 25 cost prod.
CACM		N/A		Fob
CACM-CHI		30		Fob
MERCOSUR	40	60		fob[iii]
MERCOSUR-CHILE	40			Fob
MERCOSUR-BOL	40			Fob
CAN	50[iv]			Fob
CARICOM-DR		N/A		Fob
LAIA	50			Fob
ANZCERTA	50-30			Factory cost
SAFTA	50-30			Factory cost
SPARTECA	50			Factory cost
AFTA	60			Fob
BANGKOK	50			Fob
Chile-Korea		45-30		45 build-down; 30 build-up
COMESA	60	35		60 cif; 35 factory cost
ECOWAS		30		Factory cost
NAMIBIA-ZIMB.		25		N/A
SADC	70-35			Ex-works
GULF CC		40[v]		Ex-works
US-JORDAN		35		Fob
US-ISRAEL		35		Ex-works
MEX-ISRAEL		45-35		45 fob; 35 cost prod.
NONPREF	60-40			Ex-works

Sources: World Trade Organization (2002); ALADI (2002); FTA texts.

Capturing the full scale of variation in the RoO regimes requires a look at the various combinations of RoO components. Table 4 displays the RoO combinations in selected FTAs around the world. Particularly notable is the high degree of selectivity of PANEURO, NAFTA, and non-preferential RoO, as opposed to the Africa and Asian RoO that are set at the same values across sectors within a given agreement.

Table 4 - Distribution of RoO Combinations, Selected PTAs (1st RoO only)



CC = CHANGE IN CHAPTER
CH = CHANGE IN HEADING
CS = CHANGE IN SUBHEADING
ECTC = EXCEPTION TO CHANGE OF TARIFF CLASSIFICATION
VC = REGIONAL VALUE CONTENT
TECH = TECHNICAL REQUIREMENT
* = 1.27 percent of RoO (by sub-heading) in EU-Poland FTA covered by Annex IV
Calculations at 6-digit level of the Harmonized System.
Source: Authors' calculations and Devlin, Robert and Antoni Estevadeordal. 2001. "What's New in the New Regionalism in the Americas? " INTAL-ITD-STA Working Paper 6. Buenos Aires and Washington, DC: INTAL and ITD (May).

vi. Regime-Wide RoO

Besides sectoral RoO, the different RoO regimes can be compared by their regime-wide RoO. Table 5 contrasts the various RoO regimes by their general, regime-wide RoO—*de minimis*, roll-up, cumulation, and drawback.

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, the 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. The 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. 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.

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."

Table 5 – Regime-Wide RoO in Selected PTAs

PTA	*De minimis (percentage)*	Roll-Up	Cumulation		Drawback Allowed?[vi]
			Bilateral	Diagonal	
PANEURO (50)	10	Yes	Yes	Yes (full in EEA)	No
PE (15)	10	Yes	Yes	Yes	No[vi]
EU-South Africa	15	Yes	Yes	Yes with ACP (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. prod.; 7% of weight in chs. 50-63	Yes except automotive	Yes	No	No after 7 years for Mex.
US-Chile	10 (excep. in agric. and processed agr. prod.)	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
Mercosur	Not mentioned	Yes except automotive	Yes	No	Yes (except automotive imports from Argentina and Brazil)
Mercosur-Chile	Not mentioned	Yes	Yes	No	Yes
Mercosur-Bolivia	Not mentioned	Yes	Yes	No	Yes
CARICOM	Not mentioned	Not mentioned	Yes	No	Possibly[vii]
CARICOM-DR	7	Not mentioned	Yes	No	Not mentioned
ANZCERTA	2	Yes	Yes	Yes (full)	Yes
SAFTA	2	Yes	Yes	No	Not mentioned
SPARTECA	2	Yes	Yes[viii]	Yes (full)	Yes
AFTA	Not mentioned	Not mentioned	Yes	No	Yes
BANGKOK	Not mentioned	Yes	Yes[ix]	No	Not mentioned
Chile-Korea	8 (not chs. 1-24 unless CS; 8% of weight in chs. 50-63	Yes	Yes	No	Not mentioned
COMESA	Not mentioned	Yes	Yes	No	Not after 10 years
ECOWAS	Not mentioned	Not mentioned	Yes	No	Not mentioned
SADC	10 (not chs. 50-63, 87, 98)	Yes	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 prod.; 7% of weight in chs. 50-63)	Yes	Yes	Yes (with US)	Not mentioned
Mexico-Israel	10 (excep. in agric. and industrial prod.; 7% of weight in chs. 50-63)	Yes	Yes	No	Not mentioned

Sources: World Trade Organization (2002); ALADI (2002); FTA texts.

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 FTAs.[17] These include FTAs between EU and third parties, such as the members of the European Free Trade Agreement (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 EEA agreement between EU and EFTA permits full cumulation. The EU-South Africa FTA also provides for full cumulation. It incorporates the "single territory" concept, whereby goods originating from countries party with South Africa to the Southern Africa Customs Union (SACU) are considered as originating in the EU-South Africa FTA area. Notably, AFTA and ANZCERTA models provide for full cumulation, while the Canada-Israel FTA allows for cumulation with the two countries' common FTA partner, the United States.

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, Mexico was allowed to employ drawback for the first two years under the EU-Mexico FTA, while Chile can do so through 2007, the fourth year of the FTA with the EU. NAFTA allowed Mexico to use drawback during the first seven years. NAFTA also provides for 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 permitting drawback. However, in Mercosur *per se*, no-drawback rule does govern Argentine and Brazilian imports of intermediate automotive products when the final product is exported to a Mercosur partner.

vii. Administration of RoO

The various RoO regimes diverge in their administrative requirements, particularly the method of certification (table 6).

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

Table 6 – Certification Method 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-CR	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)
CAN	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	Public (or delegated to a private entity)
Japan-Singapore	Public (or delegated to a private entity)
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 based on the texts of RoO protocols.

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. NAFTA and a number of other FTAs in the Americas as well as the Chile-Korea FTA, meanwhile, 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. The certification method in Mercosur, Andean Community, Caricom, AFTA, ANZCERTA, SAFTA, the Bangkok Agreement, Japan-Singapore FTA, 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 to burden of proof essentially 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 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.

B. A Comparative Analysis of the Levels of Restrictiveness of RoO

The NAFTA RoO family is based on the change of chapter rules, whereas the EU and most Asian and African RoO models feature a strong change of tariff heading-component. 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 sections presents two such measures: a restrictiveness index, and a facilitation index.

i. Restrictiveness of RoO Regimes

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 sub-heading, and so on; and (2) VC and TECH attached to a given CTC add to

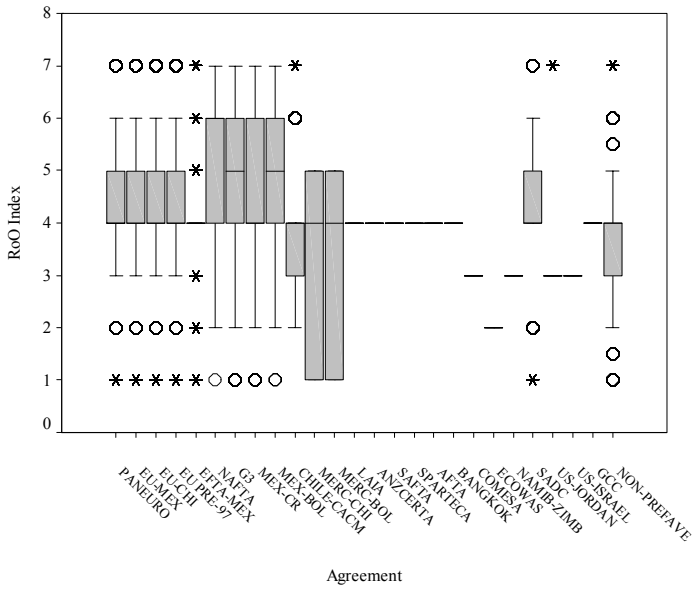
[18] The certificate in NAFTA and G3, CACM-Chile, will be valid for a single shipment or multiple shipments for a period of a year; in ANZCERTA and SAFTA, the certificate will be valid for multiple shipments for two years. In ECOWAS, certificate is not required for agricultural, livestock products and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

the RoO's restrictiveness.[19] While this paper builds on Estevadeordal's index, some modifications are made to the observation rule (specified in appendix I) to account for the structure of EU RoO—in particular the instances where the CTC criterion is not used.

Figure 3 reports the restrictiveness of RoO as calculated at the six-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; 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 exhibiting 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 operated in the Americas. The generality of the LAIA model is replicated by the Asian and African RoO regimes except by the SADC, while the complexity and restrictiveness of PANEURO and NAFTA RoO is carrying over to the non-preferential RoO. To be sure, some of the African RoO regimes are under renegotiation, which may yield greater sectoral selectivity in restrictiveness.

[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.

Figure 3 - 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 IQR. The lower adjacent value is defined as the smallest data point greater than or equal to x(25) + 1.5 IQR. Observed points more extreme than the adjacent values are individually plotted (extreme values are marked with "o" symbol).
Source: Authors' calculations based on RoO protocols.

ii. Comparing Sectoral RoO

In contrast to the general RoO regimes employed in many of the major FTAs in Asia-Pacific and Africa, economic sectors in the predominant RoO regimes in Europe and the Americas—those based on the EU and the NAFTA models, respectively—as well as the SADC RoO and the non-preferential RoO are governed by different types of RoO and RoO combinations, such as a high domestic value content for agricultural products, technical requirements for textiles products, and change of tariff heading in combination with RVC for automotives. But to what extent does the restrictiveness of RoO vary across economic sectors? Are some sectors more susceptible to the negative trade and investment effects of RoO than others?

We explore this question by focusing on six RoO regimes—the PANEURO, NAFTA, EFTA-Mexico, Chile-CACM, SADC, and non-preferential models. Table 7 reports the restrictiveness values aggregated by section of the Harmonized System that are established on the basis of these regimes.

Table 7 – Sectoral Restrictiveness of Sectoral RoO in Selected PTAs

HS Section	PANEURO	NAFTA	EFTA-MEX	Chile-CACM	SADC	Non-Pref. Av.
1. Live Animals	7.0	6.0	5.3	5.9	7.0	6.2
2. Vegetable Products	6.6	6.0	4.0	5.6	6.6	6.6
3. Fats and Oils	4.7	6.0	4.0	3.0	7.0	4.0
4. Food, Bev. and Tobacco	5.0	4.7	4.4	3.7	5.4	4.6
5. Mineral Products	3.5	6.0	3.5	5.3	4.0	4.8
6. Chemicals	3.9	5.3	3.8	2.6	4.0	2.5
7. Plastics	4.9	4.8	4.9	3.2	4.7	4.0
8. Leather Goods	3.3	5.6	3.5	3.7	3.8	3.4
9. Wood Products	2.9	4.0	2.9	3.2	4.8	3.3
10. Pulp and Paper	4.4	4.8	4.6	4.1	4.3	3.9
11. Textile and Apparel	6.1	6.9	6.1	4.5	6.1	3.4
12. Footwear	2.8	4.9	4.1	3.5	2.6	3.7
13. Stone and Glass	3.7	4.9	3.7	4.2	3.7	3.5
14. Jewelry	3.7	5.3	3.7	4.0	3.7	3.4
15. Base Metals	4.2	4.6	4.2	3.8	3.9	3.4
16. Machinery and Electrical Equipment	4.8	3.2	4.0	4.3	4.1	3.6
17. Transportation Equipment	4.7	4.8	4.2	3.4	3.8	3.8
18. Optics	5.0	4.0	4.4	4.0	3.9	3.5
19. Arms and Ammunition	4.0	4.7	4.0	4.0	3.1	4.0
20. Works of Art, Misc.	4.1	5.1	4.1	3.6	4.0	3.3
Average	*4.5*	*5.1*	*4.2*	*4.0*	*4.5*	*3.9*

Source: Authors' calculations based on the RoO protocols.

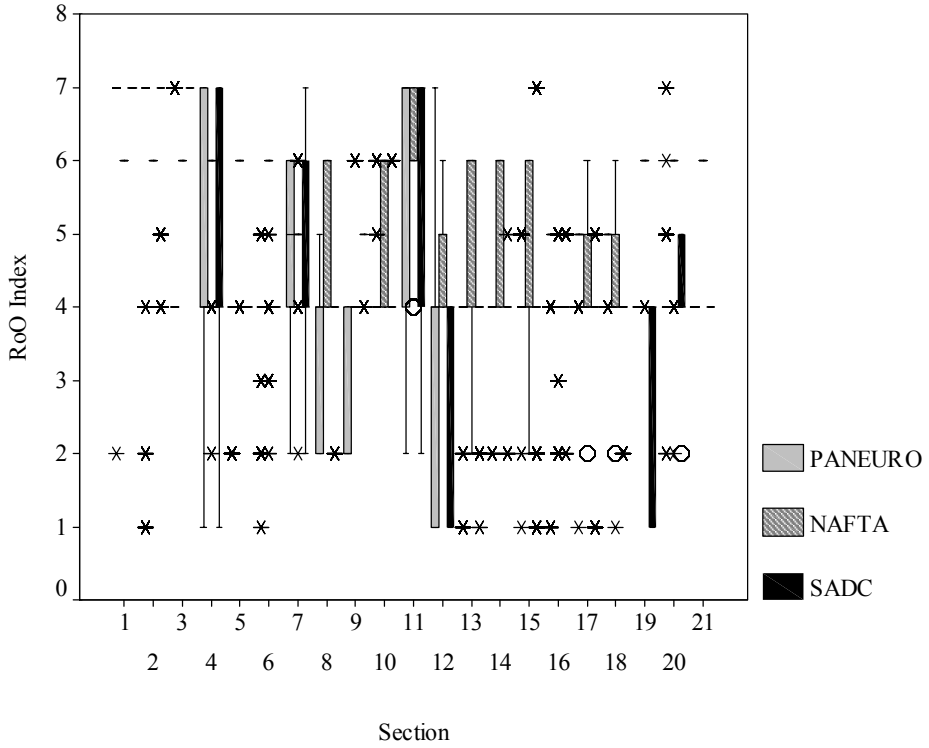
Two issues stand out. First, the average restrictiveness value for the PANEURO RoO falls between 4 and 5, which correspond to the change of heading and change of heading plus regional value content criteria, respectively. As such, the index conveys the same message as the analysis above of the predominance 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 agreement on one single RoO has yet to be identified, are less restrictive overall given the downward influence of the change of sub-heading and change of item criteria.

Second, the data reveal important variation in the degree of restrictiveness across economic sectors within the three regimes, as well as striking similarities in the variation of cross-sectoral restrictiveness within each agreement. Agricultural products and textiles and apparel are marked by a particularly high restrictiveness score in each regime, which provides precursory evidence 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

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 4 provide a more nuanced look at the sectoral restrictiveness across three major RoO regimes—the EU, NAFTA, and SADC models. The plots reveal some differences in the range of restrictiveness (or the lack of it) within sectors in each agreement. For instance, while EU RoO are nearly uniform with sections 13-21, NAFTA RoO vary more within these sections—and tend to be more restrictive than the EU RoO. Meanwhile, EU RoO in foodstuffs (section 4) feature a wide range of restrictiveness values, while the NAFTA RoO are highly uniform in the sector. SADC RoO are by and large more similar to the PANEURO than the NAFTA model.

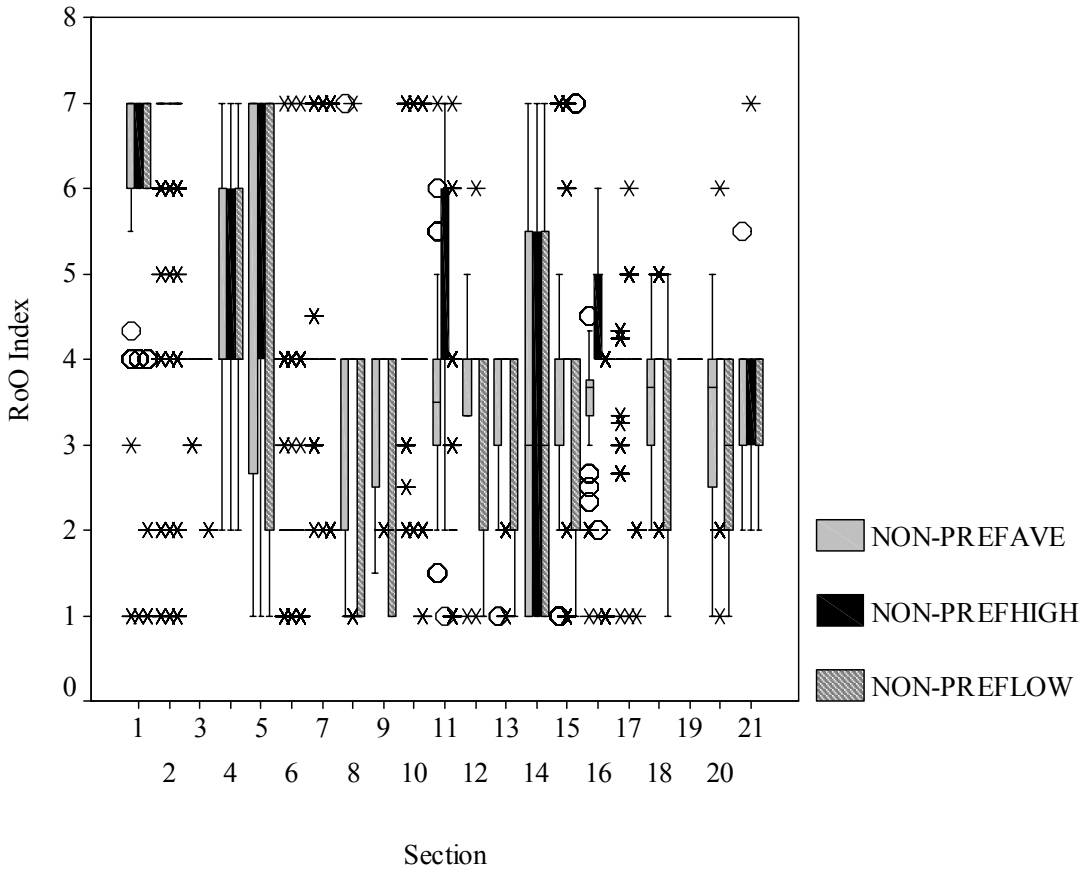
Figure 4 – Profiles of Sectoral Restrictiveness of RoO in EU, NAFTA, and SADC



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 based on the texts of EU and NAFTA RoO protocols and the latest revisions to the non-preferential RoO.

The methodology is replicated in figure 5, which provides a look at the various potential outcomes of the harmonization process for non-preferential RoO—with the RoO set at the average, lowest, highest levels of restrictiveness. The spread of restrictiveness values by sector is rather similar across the possible outcomes; neither are the overall restrictiveness values between the three possibilities are too divergent. Notably, however, unlike in many sectors in the PANEURO, NAFTA, and SADC models, few sectors in non-preferential RoO feature a uniform RoO, but rather display great intra-sectoral selectivity.

Figure 5 – Profiles of Sectoral Restrictiveness of RoO in Three Potential Non-Preferential RoO Regimes



iii. "Weighted" RoO: RoO's Coverage of Actual Trade Flows

A look at RoO's coverage of tariff sub-headings provides an indication of the prevalence of various types of RoO and RoO of different degrees of stringency in and across RoO regimes. However, an analysis of the potential trade effects of RoO benefits from exploring the coverage of actual imports by different types of RoO. Table 8 presents such a "weighted" RoO measure of NAFTA, PANEURO, Chile-CACM, and SADC RoO based on weighting by 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 one, the weighted RoO is 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 similarity between the weighted and unweighted RoO. Indeed, the weighted RoO tend to be less restrictive than the unweighted RoO; this may in and of itself be an indication that stringent RoO stifle commerce.

Table 8 – Weighted Restrictiveness of PANEURO, NAFTA, Chile-CACM, and SADC RoO

HS Section	PANEURO	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. and 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. Machinery and Electrical Eq.	4.9	1.01	3.8	1.20	4.6	1.07	4.0	0.96
17. Transportation Equipment	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 Ammunition	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
Average	4.2	*0.94*	*5.1*	*1.01*	*2.6*	*0.66*	*4.3*	*0.95*

Source: Authors' calculations based on the RoO protocols and UNCTAD TRAINS trade data for 2000.

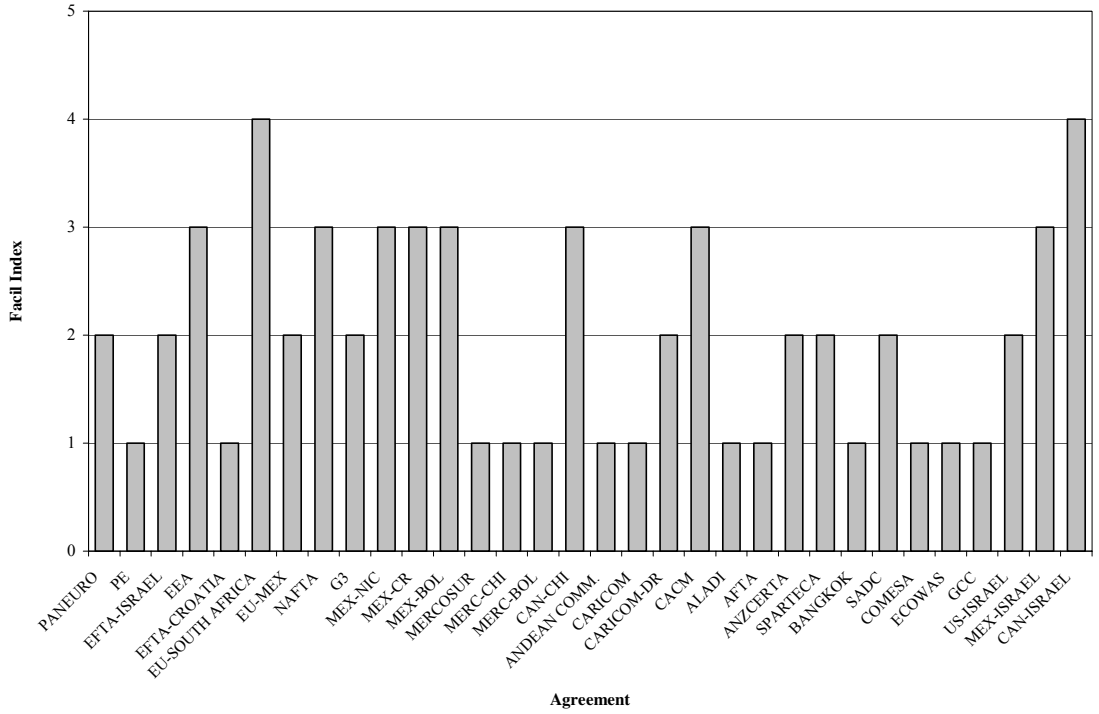
iv. Regime-Wide RoO: A Facilitation Index

Product-specific RoO in a given PTA absent of an across-the-board RoO can impose highly divergent requirements to the exporters of different goods. Furthermore, even an across-the-board rule applicable to all sectors 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 6 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 for Mexico. 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 most stringent RoO and 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 6 – Facilitation Index for Selected PTAs



III. Trade Effects of RoO: A Gravity Application

A number of rigorous theoretical studies, such as Ju and Krishna (1998) and Duttagupta and Panagariya (2000) have explored the impact of different degrees of restrictiveness of RoO on aggregate trade flows as well as trade in inputs and final goods, respectively. The results are, however, rather inconclusive, relegating the impact of RoO on trade to an empirical matter. The handful of empirical studies on RoO have given grounds to believe that stringent RoO undermine trade flows; yet, the understanding of the effects of RoO on global commerce is still relatively incipient.

The purpose of this section is to provide greater 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. In short, we put the RoO and facil indexes to work. Trade is here operationalized in two ways: as aggregate imports, and as imports in intermediate goods in the automotive sector. Our data covers 156 countries and nearly a hundred PTAs for the year 2001.

We strive to go beyond the existing studies in three ways. First, in contrast single-FTA empirical studies focused either on NAFTA or the PANEURO system, this analysis incorporates virtually all RoO regimes around the world. Second, rather than focusing on product-specific RoO or cumulation alone, we examine both product-specific RoO and various regime-wide RoO. Third, besides analyzing the impact of RoO on aggregate trade flows as in prior works,[20] this study explores the impact of RoO on their main target, trade in intermediate goods.

The first part of this section overviews the relationship of our gravity approach to the existing gravity models centered on assessing the effects of PTAs on trade. The second part puts forth the model for examining the impact of RoO on aggregate trade flows, discusses the data sources, and presents the results of the estimations. The third part extends the gravity model to explore the effects of RoO in final goods on trade in intermediate goods in the automotive sector.

A. The Impact of RoO on Trade: 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 decreases with their bilateral trade barriers relative to the average barrier to trade that the regions have with all their partners. Initially specified by Tinbergen (1962), Pöyhonen (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,

[20] Augier, Gasiorek, and Lai-Tong (2003) present evidence of the impact of cumulation on trade in intermediates.

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.[21]

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 approach has three potential contributions. First, it 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 sectoral restrictiveness and selectivity of RoO as an independent variable in the gravity equation, and (2) to extend Augier, Gasiorek and Lai-Tong's (2003) work on one central RoO regime provision, cumulation, to examine other RoO regime-wide provisions on trade patterns.

Second, this study contributes to the thus far small number of gravity applications conducted at the sectoral level.[22] The vast majority of gravity applications in general—as well as gravity models focused on PTAs, in particular—continue geared to explaining aggregate flows of trade, rather than allowing the 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 generating sector-specific independent variables.[23] 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 simultaneous impact of both TBTs and RoO on trade in future research.

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, no study focused on outsourcing has as yet incorporated rules of

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

[22] 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 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.

[23] 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).

origin, which, after all, is one of the most, if not the most, crucial determinants of trade in intermediates.

B. Testing the Impact of RoO on Aggregate Imports

This part presents the empirical specification for exploring the impact of RoO on aggregate trade flows between countries. The sample includes imports by partner for 156 countries for 2001. Nearly a hundred PTAs are considered (50 PTAs of the PANEURO system, 15 of the PE system, and 28 others specified in appendix III) around the world. The import data (imports cif) is drawn form the International Monetary Fund's Direction of Trade Statistics. 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 drawn from the authors' pre-existing datasets and also to a large extent constructed by the authors to cover all country pairs in the sample. The RoO-regime variables are constructed by the authors on the basis of RoO protocols of the various PTAs considered in this study.[24]

i. Empirical Specification

We estimate the following basic gravity equation using both OLS and Tobit:

$$[1]\ \ln(V_{ij}) = b_0 + b_1\ln(GDP\_PROD_{ij}) + b_2\ln(GDPPC\_PROD_{ij}) + b_3\ln(DIST_{ij}) + b_4\ln(BORDER_{ij}) + b_5\ln(COMLANG_{ij}) + b_6\ln(COL_{ij}) + b_7\ln(COMCOL_{ij})) + b_8\ln(ISLAND_i) + b_9\ln(ISLAND_j) + b_{10}\ln(ROORI_{ij}) + b_{11}\ln(DE\ MINIMIS_{ij}) + b_{12}\ln(CUMUDIAG_{ij}) + b_{13}\ln(CUMUFULL_{ij}) + b_{14}\ln(DRAWBACK_{ij}) + b_{15}\ln(SELFCERT_{ij}) + \varepsilon$$

where

V_{ij} is the value of imports of country i from country j;
GDP_PROD_{ij} is an "economic space" variable measured as the product of the two countries' GDPs;
$GDPPC\_PROD_{ij}$ is the product of the two countries' GDP per capita ratios;
$DIST_{ij}$ is the distance between the capitals of the two countries and serves as a proxy for transportation costs;[25]
$BORDER_{ij}$ 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;

[24] Rather than employing the trade-weighted ROORI, we employ the ROORI variable based on the observation rule in order to avoid endogeneity problems.

[25] 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 further 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 156 countries in the sample.

COL_{ij} is a dummy that takes value 1 when one country has been colonized by the other;
$COMCOL_{ij}$ is a dummy that takes value 1 when the two countries have been colonized by the same colonial power;
$ISLAND_i$ is a dummy that takes value 1 when country i is an island;
$ISLAND_j$ is a dummy that takes value 1 when country j is an island;
$ROORI_{ij}$ 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;
DE $MINIMIS_{ij}$ is a dummy variable that 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 for diagonal cumulation;
$CUMUFULL_{ij}$ is a dummy variable that takes value 1 when the PTA binding the two countries allows for full cumulation;
$DRAWBACK_{ij}$ is a dummy variable that takes value 1 when the PTA binding the two countries allows or does not explicitly prohibit the use drawback;
$SELFCERT_{ij}$ is a dummy variable that takes value 1 when the PTA binding the two countries allows for self-certification; and
ε is a normally-distributed error term.

We operationalize in two ways the five regime-wide variables for pairs that are not party to a same PTA and for pairs party to a "perfect" customs union[26] (i.e., country pairs not governed by rules of origin, or for which ROORI is zero). In the first approach, *de minimis* is set to 100 percent for such pairs, and the four other dyadic variables (diagonal and full cumulation, drawback, and self-certification) are set at 1, with the justification that such pairs are free of any RoO requirements. The second approach sets the values of the five variables to 0 for pairs not party to a PTA or party to the same CU.

The effect of GDP_PROD and GDPPC_PROD variables should be positive on trade, whereas DIST can be expected to have a negative sign. The impact of common border, cultural affinities, and land areas should be positive, while the island variable should have a negative coefficient. Our first key variable, ROORI, is expected to stifle aggregate trade between PTA partners. In contrast, the five "facilitation" indicators—DE MINIMIS, CUMUDIAG, CUMUFULL, DRAWBACK, and SELFCERT—are expected to have a positive impact on trade flows.

Columns 3-4 and 7-8 in table 9 reports the results. The traditional gravity variables behave largely as expected, even though ISLAND could be expected to be negative rather than positive. The ROORI variable, average restrictiveness of sectoral RoO governing

[26] The "perfect CU"-dummy applies to pairs where the CET of the common PTA essentially covers the whole tariff universe. It is employed here countries that are party to the EU, countries party to EFTA, countries party to the CU formed around Russia and that reportedly took hold in 1999 (Belarus, Kazakhstan, Kyrgystan, and Russia), and pairs where one party is an EU member and the other Cyprus, Malta, or, starting in 1996, Turkey. In contrast, when the customs unions is an aspiring one and hence where RoO continues governing trade between members in a portion of the tariff universe for which a CET has not been reached, it is here coded as an "imperfect" CU. The "imperfect CU"-rule applies to Mercosur, Andean Community, CACM, CARICOM, and Mercosur. The ROORI variable is set at 2 when the country pair is party to the same imperfect CU.

trade between i and j, has, as expected, a negative and significant impact on trade. This is the first main finding of this paper: *restrictive product-specific RoO undermine aggregate trade*.

The regime-wide variables require more elaborate interpretation. In the first approach of operationalizing the regime-wide RoO (columns 3 and 7), *de minimis* somewhat surprisingly has a negative and significant effect on trade, even though it could be expected to encourage exports between countries by allowing potential exporters to the PTA partner greater flexibility in their outsourcing strategies. The alternative definition of *de minimis* (whereby the indicator is set to 0 between non-PTA pairs and CU pairs) yields a positive sign but is not significant even at the 10 percent level. To be sure, the measure here is based on the overall *de minimis* in a given regime, even though in reality, most regimes contain a great degree of cross-sectoral variation in the level of *de minimis* (i.e., have lower values for *de minimis* or prohibit it altogether in many major sectors such as agriculture, textiles, and other selected manufactures). Thus, the effects of *de minimis* may be only fully captured in a sectoral application. Furthermore, the measure is thus far specified as a percentage value defined in the RoO protocol agreements, whereas an alternative measure based on some thresholds could be more useful.

Diagonal cumulation behaves as expected: a PTA's allowing for diagonal cumulation boosts trade. The result, much along the lines of that obtained by Augier, Gasiorek, and Lai-Tong (2003), is particularly notable in the second specification (columns 4 and 8 where cumulation for non-PTA pairs and CU pairs is set at 0). Full cumulation, in turn, has a negative and significant sign; this is surprising but possibly due to specification rather than actual effect potentially stemming from the estimation of CUMUFULL with CUMUDIAG.

The result for drawback is also positive and significant in the second specification. This allows to preliminarily conclude that *PTAs allowing drawback can notably encourage trade between the partner countries*. In contrast, a no-drawback rule would likely curb trade by reducing the profits (due to in effect imposing an import duty on inputs from ROW) previously obtained by exporters.

Self-certification behaves inconsistently across estimations and is not significant regardless of whether the first or second specification is employed. This may simply indicate that the method of certification does not affect commerce—i.e., that the different methods do not impose highly divergent costs on the exporters. However, the result may also imply that the coding for the PANEURO system, which is here coded as have a two-step rather than a self-certification system, should be altered to account for the fact that the PANEURO model does allow for self-certification for established and frequent exporters.

We estimate a variant of [1] by replacing ROORI-measure with ROOSD, which is the standard deviation in the ROORI values (as assigned at the 6-digit level) of a PTA regulating trade between the two countries.

[2] $\ln(V_{ij}) = b_0 + b_1\ln(GDP\_PROD_{ij}) + b_2\ln(GDPPC\_PROD_{ij}) + b_3\ln(DIST_{ij}) + b_4\ln(BORDER_{ij}) + b_5\ln(COMLANG_{ij}) + b_6\ln(COL_{ij}) + b_7\ln(COMCOL_{ij})) + b_8\ln(ISLAND_i) + b_9\ln(ISLAND_j) + b_{10}\ln(ROOSD_{ij}) + b_{11}\ln(DE\ MINIMIS_{ij}) + b_{12}\ln(CUMUDIAG_{ij}) + b_{13}\ln(CUMUFULL_{ij}) + b_{14}\ln(DRAWBACK_{ij}) + b_{15}\ln(SELFCERT_{ij}) + \varepsilon$

The ROOSD measure serves as a proxy for complexity or sectoral selectivity in RoO, which can be expected to result in particularly string trade effects in the sectors with most restrictive RoO.
Columns 1-2 and 5-6 of table 9 present the results. The ROOSD behaves much like the ROORI variable, entailing a negative effect on trade. It is significant at the 5 percent level in the Tobit estimation. The finding allows for preliminarily concluding that greater sectoral selectivity in RoO regimes undermines trade. To be sure, the ROOSD may serve as a proxy for the ROORI variable: the most restrictive ROO regimes—those based on the NAFTA model, PANEURO, and SADC—also have the highest ROOSD values. In turn, regimes where an across-the-board change of heading of change of subheading rules applies are less restrictive and in effect have a zero ROOSD.

The third model estimated here replaces the regime-wide RoO values with the facilitation index, FACIL, which, as described above, is constructed on the basis of five regime-wide indicators:

[3] $\ln(V_{ij}) = b_0 + b_1\ln(GDP\_PROD_{ij}) + b_2\ln(GDPPC\_PROD_{ij}) + b_3\ln(DIST_{ij}) + b_4\ln(BORDER_{ij}) + b_5\ln(COMLANG_{ij}) + b_6\ln(COL_{ij}) + b_7\ln(COMCOL_{ij})) + b_8\ln(ISLAND_i) + b_9\ln(ISLAND_j) + b_{10}\ln(PTA_{ij}) + b_{11}\ln(ROORI_{ij}) + b_{12}\ln(FACIL_{ij}) + \varepsilon$

where PTA_{ij} is a dummy variable that takes value 1 when the two countries belong to the same PTA, and the other variables as in [1].

We employ two additional ways of defining FACIL, FACIL1 and FACIL3, to that described above; the difference between the three specifications is the definition of *de minimis*. In FACIL2 described above, *de minimis* is basically a dummy set at 0 if it is below 5 percent, and 1 above 5 percent. In contrast, in FACIL1, the rule for *de minimis* is as follows: 0 if *de minimis* is 0 percent; 1 if 1-5 percent; 2 if 6-8 percent; 3 if 9-10 percent; and 4 if above 10 percent. FACIL3 sets *de minimis* at 0 if it is below 5 percent, 1 if between 5 and 10 percent, and 2 if above 10 percent. The aggregate value of each FACIL index is the sum of the *de minimis* values and the four other regime-wide dummies (diagonal and full cumulation, drawback, and self-certification). For pairs where the countries are not party to the same PTA or that are party the same perfect CU, FACIL is set at 0.

The results are reported in columns 4-6 in table 10. FACIL2 in particular but also FACIL3 have a significant and positive 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 serves to boost trade*. The ROORI variable behaves as expected in columns 5 and 6, entering the estimation with a negative and significant

sign. As expected, the PTA control variable has a positive and significant impact on trade.

As above, we also estimate [3] by replacing ROORI with ROOSD in the following equation:

[4] $\ln(V_{ij}) = b_0 + b_1\ln(GDP\_PROD_{ij}) + b_2\ln(GDPPC\_PROD_{ij}) + b_3\ln(DIST_{ij}) + b_4\ln(BORDER_{ij}) + b_5\ln(COMLANG_{ij}) + b_6\ln(COL_{ij}) + b_7\ln(COMCOL_{ij}) + b_8\ln(ISLAND_i) + b_9\ln(ISLAND_j) + b_{10}\ln(PTA_{ij}) + b_{11}\ln(ROOSD_{ij}) + b_{12}\ln(FACIL_{ij}) + \varepsilon$

The results are reported in columns 1-3 of table 10. In these models, each of the FACIL indexes has a positive and significant effect on trade, with FACIL2 again featuring the most robust result. This gives further grounds to our finding that regime-wide facilitation provisions can help boost aggregate trade flows. ROOSD, meanwhile, has a negative and significant sign across the models, as expected.

Table 9. Bilateral Trade and Rules of Origin Regimes
Dependent Variable: Ln Imports; Cross-Section 2001

	OLS Estimation				TOBIT Estimation			
GDP	1.67	1.67	1.69	1.67	2.17	2.16	2.19	2.17
	(111.877)	*(111.833)*	*(111.877)*	*(111.833)*	*(96.881)*	*(96.845)*	*(96.977)*	*(96.848)*
GDP per capita	0.21	0.21	0.20	0.21	0.24	0.24	0.23	0.24
	(10.267)	*(10.375)*	*(10.056)*	*(10.361)*	*(8.256)*	*(8.364)*	*(7.966)*	*(8.342)*
Distance	-1.74	-1.77	-1.70	-1.78	-2.28	-2.32	-2.22	-2.34
	(32.771)	*(33.802)*	*(31.867)*	*(33.811)*	*(30.177)*	*(31.146)*	*(29.225)*	*(31.229)*
Adjacent	1.26	1.27	1.26	1.24	0.84	0.84	0.81	0.78
	(4.517)	*(4.529)*	*(4.519)*	*(4.424)*	*(2.171)*	*(2.175)*	*(2.113)*	*(2.023)*
Language	1.18	1.18	1.17	1.17	1.51	1.51	1.48	1.49
	(9.195)	*(9.157)*	*(9.078)*	*(9.065)*	*(8.281)*	*(8.249)*	*(8.095)*	*(8.129)*
Colonial relationship	1.68	1.67	1.70	1.69	1.50	1.49	1.54	1.52
	(4.865)	*(4.842)*	*(4.927)*	*(4.88)*	*(3.165)*	*(3.143)*	*(3.244)*	*(3.192)*
Common colonial relationship	1.38	1.39	1.37	1.40	1.92	1.94	1.92	1.96
	(9.867)	*(9.944)*	*(9.855)*	*(10.01)*	*(9.562)*	*(9.641)*	*(9.552)*	*(9.729)*
Island (importer)	0.69	0.70	0.68	0.71	0.81	0.82	0.80	0.84
	(7.499)	*(7.581)*	*(7.438)*	*(7.662)*	*(6.06)*	*(6.151)*	*(6)*	*(6.261)*
Island (exporter)	0.22	0.23	0.22	0.24	0.03	0.04	0.02	0.06
	(2.435)	*(2.526)*	*(2.383)*	*(2.605)*	*(0.225)*	*(0.313)*	*(0.166)*	*(0.415)*
RoO "complexity" (sd)	-1.01	-1.65			-2.19	-2.94		
	(1.871)	*(1.936)*			*(2.946)*	*(2.531)*		
RoO "restrictiveness" (avg)			-4.14	-0.80			-6.81	-1.41
			(6.639)	*(2.342)*			*(7.856)*	*(2.976)*
RoO "facilitation" (De Minimis)	-0.03		-0.10		-0.03		-0.13	
	(3.09)		*(6.671)*		*(2.089)*		*(6.725)*	
RoO "facilitation" (Diag.cum.)	0.97		1.18		1.11		1.39	
	(1.914)		*(2.335)*		*(1.596)*		*(2.002)*	
RoO "facilitation" (Full.cum.)	-1.03		-0.60		-1.55		-0.88	
	(2.173)		*(1.247)*		*(2.372)*		*(1.338)*	
RoO "facilitation" (Drawback)	1.26		0.08		1.84		0.27	
	(2.214)		*(0.15)*		*(2.359)*		*(0.365)*	
RoO "facilitation" (Self-certification)	0.52		0.50		-0.39		-0.34	
	(0.609)		*(0.594)*		*(0.331)*		*(0.291)*	
RoO "facilitation" (De Minimis) [2]		0.12		0.07		0.16		0.08
		(1.508)		*(1.328)*		*(1.509)*		*(1.015)*
RoO "facilitation" (Diag.cum.) [2]		1.52		1.95		1.80		2.54
		(3.308)		*(3.85)*		*(2.842)*		*(3.652)*
RoO "facilitation" (Full.cum.) [2]		-1.44		-1.44		-2.14		-2.18
		(3.075)		*(3.111)*		*(3.315)*		*(3.378)*
RoO "facilitation" (Drawback) [2]		2.67		3.60		3.65		5.28
		(13.438)		*(8.025)*		*(13.004)*		*(8.48)*
RoO "facilitation" (Self-certification) [2]		-0.10		0.18		-1.25		-0.72
		(0.109)		*(0.209)*		*(0.96)*		*(0.593)*
Constant	-55.85	-57.16	-49.90	-57.08	-76.17	-77.86	-66.78	-77.70
	(63.71)	*(79.309)*	*(38.989)*	*(79.162)*	*(60.563)*	*(73.405)*	*(37.265)*	*(73.258)*
Observations	19,582	19,582	19,582	19,582	19,582	19,582	19,582	19,582
Pseudo R2	0.576	0.576	0.577	0.576	0.125	0.125	0.126	0.125

Absolute value of t-statistics in parentheses
Variables are in logs

Table 10. Bilateral Trade and Rules of Origin
Dependent Variable: Ln Imports; Cross-Section 2001

OLS Estimation						
GDP	0.91	0.91	0.91	0.90	0.91	0.91
	(124.385)	*(124.758)*	*(124.46)*	*(124.001)*	*(124.442)*	*(124.21)*
GDP per capita	0.04	0.05	0.05	0.04	0.04	0.04
	(4.846)	*(5.506)*	*(5.035)*	*(4.609)*	*(4.39)*	*(4.4)*
Distance	-0.82	-0.83	-0.83	-0.82	-0.82	-0.82
	(33.867)	*(34.212)*	*(34.067)*	*(33.592)*	*(33.642)*	*(33.73)*
Adjacent	1.21	1.18	1.19	1.23	1.22	1.22
	(10.994)	*(10.758)*	*(10.818)*	*(11.228)*	*(11.137)*	*(11.158)*
Language	0.56	0.53	0.55	0.59	0.57	0.58
	(9.8)	*(9.282)*	*(9.553)*	*(10.38)*	*(10.104)*	*(10.238)*
Colonial relationship	1.12	1.15	1.13	1.11	1.12	1.11
	(8.4)	*(8.6)*	*(8.494)*	*(8.267)*	*(8.395)*	*(8.336)*
Common colonial relationship	0.70	0.70	0.70	0.70	0.73	0.72
	(10.823)	*(10.808)*	*(10.73)*	*(10.768)*	*(11.31)*	*(11.023)*
Island (importer)	0.17	0.16	0.16	0.18	0.18	0.18
	(3.875)	*(3.659)*	*(3.748)*	*(4.219)*	*(4.224)*	*(4.212)*
Island (exporter)	0.14	0.13	0.13	0.15	0.15	0.15
	(3.271)	*(3.097)*	*(3.163)*	*(3.61)*	*(3.557)*	*(3.569)*
PTA	0.66	0.40	0.57	0.63	0.65	0.64
	(7.584)	*(4.125)*	*(6.184)*	*(5.529)*	*(5.754)*	*(5.69)*
RoO "complexity" (sd)	-1.39	-1.00	-0.79			
	(6.322)	*(6.576)*	*(5.225)*			
RoO "restrictiveness" (avg)				0.20	-0.43	-0.10
				(1.66)	*(3.363)*	*(0.893)*
RoO "facilitation" [1]	0.39			0.05		
	(7.588)			*(1.226)*		
RoO "facilitation" [2]		0.77			0.70	
		(10.041)			*(7.062)*	
RoO "facilitation" [3]			0.55			0.37
			(8.144)			*(4.573)*
Constant	-22.64	-22.79	-22.64	-22.54	-22.58	-22.51
	(66.96)	*(67.374)*	*(66.996)*	*(66.585)*	*(66.972)*	*(66.662)*
Observations	13,352	13,352	13,352	13,352	13,352	13,352
Adjusted R-squared	0.68	0.681	0.68	0.679	0.68	0.68

Absolute value of t-statistics in parentheses

C. RoO and Intermediate Imports: A Sectoral Approach

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 and other RoO regime variables on trade in intermediates in the automotive sector.

The dependent variable here is measured as the total imports at the 6-digit level of intermediate products (products classified as "parts and accessories for passenger or motor cars" in the Broad Economic Categories, BEC, Rev. 3 classification) falling within Division 34 of ISIC Rev. 3 (manufacture of motor vehicles, trailers and semi-trailers) for the year 2001. The key independent variables, $ROORI_{ijs}$ and $ROOSD_{ijs}$, are the average sectoral restrictiveness and sectoral standard deviation, respectively, of the 6-digit level final goods (goods classified as "passenger or motor cars" in BEC Rev. 3) that fall within the Division 34 of ISIC Rev. 3. We employ the BEC classification because it presents a more nuanced division of tariff lines into intermediate and final goods particularly in the vehicle sector than some other existing means of grouping products according to their location in the production chain.[27] The relatively aggregated level is chosen as highly disaggregated sectoral gravity models are problematic in that a given country may have no comparative advantage in a given narrowly defined sector.[28] We estimate two samples: sample one includes countries with positive trade flows in intermediate products, or 5,078 observations. Sample two includes all of the country pairs (with the dependent variable being the log of imports+1) as contained in the estimation of aggregate imports. Trade data for the sectoral application is from the UN's COMTRADE database.

i. Empirical Specification

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

$$[5]\ \ln(INPUT_{ijs}) = b_0 + b_1\ln(GDP\_PROD_{ij}) + b_2\ln(GDPPC\_PROD_{ij}) + b_3\ln(DIST_{ij}) + b_4\ln(BORDER_{ij}) + b_5\ln(COMLANG_{ij}) + b_6\ln(COL_{ij}) + b_7\ln(COMCOL_{ij}) + b_8\ln(ISLAND_i) + b_9\ln(ISLAND_j) + b_{10}\ln(ROORIFINAL_{ijs}) + b_{11}\ln(DE\ MINIMIS_{ij}) + b_{12}\ln(CUMUDIAG_{ij}) + b_{13}\ln(CUMUFULL_{ij}) + b_{14}\ln(DRAWBACK_{ij}) + b_{15}\ln(SELFCERT_{ij}) + \varepsilon$$

where

$INPUT_{ijs}$ is the value of intermediate imports of country i from country j in sector s (automotives); and $ROORIFINAL_{ijs}$ is the average of the restrictiveness of RoO-values

[27] For instance, one classification table employed by the WTO that divides 6-digits products of the Harmonized System into raw materails, intermediate goods, and final goods categorizes all goods falling within Div. 34 of ISIC Rev. 3 as final goods.

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

(as measured at the 6-digit level of disaggregation) in final goods in sector s. The other variables are defined as in model 1.

At the sectoral level, the effect of GDP_PROD and GDPPD_PROD can be expected to be particularly significant for sophisticated manufactures as well as sectors with prospects for scale economies and intra-industry trade (such as vehicles and computers), but should not be significant in more basic manufactures (such as the shoe or textile sectors).[29] Distance can be expected to have a negative and significant effect particularly for standardized, and bulky, transport-cost-intensive manufactured products, such as vehicles, base metals and furniture. Importantly, note that our key independent variable, $ROORIFINAL_{ijs}$, can now be expected to 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. Meanwhile, four regime-wide variables—de minimis, diagonal and full cumulation, and drawback—should now work to counteract the *positive* effect of RoO on trade.

Columns 4-6 of table 11 report the results for sample one and columns 10-12 for sample two. The key independent variable, ROORIFINAL, is, as expected, positively related to trade in intermediate goods in five of the six models, and significantly so in columns 4 , 10 and 11. This is the third major result of this paper: *the restrictiveness of RoO in final goods encourages trade in intermediate products*. This finding serves as preliminary evidence to the long-suspected impact of RoO on input trade—and impact that could divert trade in intermediates from ROW to the PTA area. ROORIFINAL works best in the regressions when the regime-wide variables are not controlled for; however, column 11 in particular provides an extension to the trade-enhancing effects of diagonal cumulation. The coefficient can now be interpreted to mean that members to a diagonal cumulation system will witness an important boost in their bilateral trade in intermediate goods.

Meanwhile, column 11 indicates that *de minimis* has a very small coefficient and drawback is not significantly different from zero. These findings may simply be caused by the fact that the estimation has yet to alter the regime-wide variables to accommodate sectoral deviations—as tend to be frequent in RoO regimes precisely in the cases of *de minimis* and drawback. Furthermore, the interpretation of the variables will need to be adjusted to account for the new dependent variable: generous *de minimis* and drawback provisions in a PTA should, after all, encourage intermediate trade *with the ROW* rather than from the PTA partner. That is, the facilitation terms should in essence help boost trade in final goods in the PTA area by allowing greater flexibility to the potential intra-PTA exporters in their outsourcing strategies. Notably, unlike in the regressions for aggregate trade flows, self-certification—which along with cumulation is genuinely regime-wide and hence a readily "sectoral" variable, or usable in a sectoral specification—now enters most models with a positive and significant sign. This may indicate that intermediate goods—where the per unit profits can be expected to be lower

[29] It can be hypothesized that as per capita incomes rise, the expenditures on relatively unsophisticated manufactures fall relative to the sophisticated ones. Indeed, in gravity modles incorporating the size of population, the coefficient for population tends often to be positive and significant for textiles, apparel, and footwear, and negative (albeit not necessarily significant) for sophisticated manufactures and chemicals.

than in final goods—are particularly sensitive to the added costs entailed by the more cumbersome and costlier public or private-public certification methods. This hypothesis will be explored in greater depth in future work.

The final estimation explores the impact of the complexity or sectoral selectivity of RoO in final goods in automotives on imports in intermediates by replacing ROORIFINAL by ROOSDFINAL through the following equation using OLS:

[6] $\ln(INPUT_{ijs}) = b_0 + b_1\ln(GDP\_PROD_{ij}) + b_2\ln(GDPPC\_PROD_{ij}) + b_3\ln(DIST_{ij}) + b_4\ln(BORDER_{ij}) + b_5\ln(COMLANG_{ij}) + b_6\ln(COL_{ij}) + b_7\ln(COMCOL_{ij}) + b_8\ln(ISLAND_i) + b_9\ln(ISLAND_j) + b_{10}\ln(ROOSDFINAL_{ijs}) + b_{11}\ln(DE\ MINIMIS_{ij}) + b_{12}\ln(CUMUDIAG_{ij}) + b_{13}\ln(CUMUFULL_{ij}) + b_{14}\ln(DRAWBACK_{ij}) + b_{15}\ln(SELFCERT_{ij}) + \varepsilon$

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.

The results are reported in columns 1-3 and 7-9 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. The results in column 8—which corresponds to column 11 measuring ROORIFINAL and elaborated on above—are particularly robust. Again diagonal cumulation and self-certification, the genuinely regime-wide variables and hence most fitting for the sectoral specification, enter with positive and significant signs.

In sum, the preliminary results here indicate that (1) both the restrictiveness and complexity of rules of origin has 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 foster aggregate trade; and (3) the restrictiveness and complexity of rules of origin in final goods significantly boosts trade in intermediates between PTA partners.

Table 11. Bilateral Trade in Intermediate Goods and Rules of Origin in Final Goods Sector
The Case of Trade in the Auto Sector; Cross-Section 2001

	OLS Estimates (Dep: Ln (Imports in Intermediate Goods)						OLS Estimation(Dep.: Ln (Imports+1 in Intermediate Goods)					
GDP	1.04	1.05	1.05	1.05	1.05	1.06	0.77	0.77	0.77	0.76	0.77	0.77
	(59.634)	*(61.261)*	*(61.375)*	*(60.955)*	*(60.648)*	*(61.422)*	*(72.536)*	*(74.319)*	*(74.174)*	*(73.338)*	*(73.428)*	*(74.166)*
GDP per capita	0.05	0.03	0.02	0.02	0.03	0.02	0.39	0.33	0.33	0.36	0.33	0.33
	(2.279)	*(1.257)*	*(1.162)*	*(0.976)*	*(1.206)*	*(1.117)*	*(26.397)*	*(22.269)*	*(22.07)*	*(24.591)*	*(22.223)*	*(22.014)*
Distance	-1.07	-0.85	-0.85	-0.87	-0.85	-0.85	-1.00	-0.60	-0.63	-0.61	-0.61	-0.62
	(24.568)	*(17.955)*	*(18.472)*	*(18.867)*	*(17.797)*	*(18.24)*	*(27.543)*	*(15.586)*	*(16.544)*	*(16.048)*	*(15.781)*	*(16.337)*
Adjacent	1.31	1.28	1.29	1.30	1.30	1.30	2.59	2.29	2.27	2.16	2.34	2.29
	(6.495)	*(6.352)*	*(6.402)*	*(6.505)*	*(6.437)*	*(6.451)*	*(12.137)*	*(10.867)*	*(10.83)*	*(10.31)*	*(11.13)*	*(10.947)*
Language	0.28	0.28	0.28	0.30	0.31	0.30	0.54	0.54	0.54	0.48	0.58	0.55
	(2.169)	*(2.164)*	*(2.171)*	*(2.401)*	*(2.381)*	*(2.318)*	*(5.549)*	*(5.728)*	*(5.706)*	*(5.067)*	*(6.06)*	*(5.805)*
Colonial relationship	0.92	1.02	1.02	0.95	0.99	1.00	1.93	2.11	2.08	2.06	2.07	2.07
	(3.87)	*(4.359)*	*(4.358)*	*(4.077)*	*(4.248)*	*(4.286)*	*(7.232)*	*(8.059)*	*(7.968)*	*(7.83)*	*(7.915)*	*(7.928)*
Common colonial relationship	1.01	0.99	1.02	0.93	0.97	1.01	0.23	0.22	0.24	0.14	0.21	0.23
	(5.793)	*(5.655)*	*(5.85)*	*(5.466)*	*(5.567)*	*(5.766)*	*(2.21)*	*(2.224)*	*(2.385)*	*(1.335)*	*(2.039)*	*(2.314)*
Island (importer)	0.10	0.19	0.20	0.17	0.19	0.20	0.37	0.42	0.44	0.35	0.42	0.44
	(0.979)	*(1.881)*	*(2.042)*	*(1.719)*	*(1.898)*	*(2.047)*	*(5.576)*	*(6.347)*	*(6.682)*	*(5.342)*	*(6.393)*	*(6.673)*
Island (exporter)	0.19	0.26	0.27	0.24	0.26	0.27	0.32	0.35	0.37	0.29	0.35	0.37
	(1.943)	*(2.676)*	*(2.807)*	*(2.517)*	*(2.69)*	*(2.802)*	*(4.775)*	*(5.422)*	*(5.731)*	*(4.535)*	*(5.464)*	*(5.723)*
RoO "complexity" (sd) Final Goods	3.50	2.05	1.64				8.12	6.17	2.24			
	(3.259)	*(1.874)*	*(1.476)*				*(6.029)*	*(4.584)*	*(1.565)*			
RoO "restrictiveness" (avg) Final Goods				0.77	0.45	-0.07				2.01	1.77	0.10
				(11.781)	*(0.892)*	*(0.359)*				*(28.418)*	*(3.818)*	*(0.386)*
RoO "facilitation" (De Minimis)		-0.02			-0.02			-0.08			-0.06	
		(3.49)			*(1.5)*			*(10.119)*			*(5.147)*	
RoO "facilitation" (Diag.cum.)		1.48			1.39			3.66			3.42	
		(4.907)			*(4.58)*			*(9.778)*			*(9.09)*	
RoO "facilitation" (Full.cum.)		-1.18			-1.23			-0.38			-0.66	
		(4.101)			*(4.236)*			*(1.056)*			*(1.807)*	
RoO "facilitation" (Drawback)		0.45			0.60			-1.17			-0.36	
		(1.529)			*(1.822)*			*(3.458)*			*(0.901)*	
RoO "facilitation" (Self-certification)		0.81			0.95			3.37			3.68	
		(1.693)			*(1.99)*			*(5.275)*			*(5.765)*	
RoO "facilitation" (De Minimis) [2]			0.03			0.04			0.18			0.18
			(0.976)			*(1.195)*			*(5.775)*			*(4.626)*
RoO "facilitation" (Diag.cum.) [2]			1.62			1.59			3.71			3.50
			(5.519)			*(5.072)*			*(10.596)*			*(9.411)*
RoO "facilitation" (Full.cum.) [2]			-1.27			-1.31			-0.77			-0.78
			(4.488)			*(4.523)*			*(2.234)*			*(2.222)*
RoO "facilitation" (Drawback) [2]			0.83			0.94			1.10			1.01
			(4.371)			*(3.34)*			*(7.474)*			*(3.111)*
RoO "facilitation" (Self-certification) [2]			0.99			1.00			3.21			3.32
			(2.036)			*(2.002)*			*(4.997)*			*(5.01)*
Constant	-32.68	-34.77	-35.29	-34.63	-35.46	-35.32	-30.87	-31.06	-33.28	-33.71	-33.95	-33.31
	(41.458)	*(42.307)*	*(44.037)*	*(43.569)*	*(31.788)*	*(44.068)*	*(60.694)*	*(53.006)*	*(65.129)*	*(66.16)*	*(35.483)*	*(65.18)*
Observations	5,078	5,078	5,078	5,078	5,078	5,078	22,016	22,016	22,016	22,016	22,016	22,016
Adjusted R-squared	0.539	0.553	0.554	0.55	0.553	0.554	0.444	0.469	0.471	0.463	0.469	0.471

Absolute value of t-statistics in parentheses

D. Methodological Issues

The coding methodology for the variables and different RoO regimes examined in this study is detailed in appendix II. Besides coding, there are three broader methodological issues concerning our approach.

First, the models assume homogeneous trade policy institutions beyond RoO regimes. One, preferential tariff liberalization is assumed to be alike across sectors as well as across agreements. This may, however, not be the case, as PTAs (and different sectors therein) tend to vary in the extent of preferential liberalization and the speed of tariff phase-outs. However, since the data for the cross-section is from 2001 while the bulk of the PTAs we consider entered into force in mid-1990s at the latest, we expect most manufacturing sectors to have by and large eliminated the preferential tariffs.[30] Two, the model also assumes that all countries' MFN tariffs are alike; this assumption is made as identifying the MFN tariff for each country in each sector is difficult, and as all countries' tariffs are increasingly harmonized and lowered by the multilateral trade rounds. However, since this essay is interested in the trade effects of RoO only, MFN and preferential tariffs will not be considered here

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. We have thus far considered only RoO applying to reciprocal liberalization schemes. One justification for doing so is that the coverage of the tariff universe by the GSP-provided preferences often varies by partner country, so that the RoO applicable to one GSP partner may not be applicable to another. Nonetheless, an analysis of the GSP RoO is important given the many complaints that the RoO regimes in these programs are too restrictive for developing countries to qualify for the preferential treatment.

Third, diagonal cumulation can have widely different implications on trade depending on the space whereby 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. In temporal terms, according to our preliminary findings, every expansion of an existing cumulation area, such as that of the PANEURO system, should contribute to eroding the restrictiveness or product-specific RoO. Such geographical determinants of the impact of cumulation are, however, beyond this paper and could be explored in future work.

[30] Cadot et al. (2002) show that the extent of preferential treatment and the restrictiveness of ROO are substitutes; as such, while ROO worsens the prospects for market access, preferential treatment improves it from pre-PTA access. The interplay of the two determines the extent of market access provided by the PTA, and, as such, arbitrates its trade effects. However, Estevadeordal (2000) shows that phase-outs are endogenous to the restrictiveness of ROO; as such, considering phase-outs with ROO might present a problem of multicolinearity. Nonetheless, Cadot et al. (2002) find that regressing ROO in preferential margin gives a positive and significant parameter estimate (i.e., consistent with substitutability of the two instruments), but an R^2 of only 10 percent, which suggests that the association is not sufficiently close as to be a problem in the estimation.

IV. Further Steps

This study will be expanded in four ways. First, we will seek to uncover the effects of RoO on aggregate trade through a panel for 1981-2001. Second, a panel will also be constructed for the automotive sector, as well as other selected manufacturing sectors. Three, we will examine the effects of different *types* of RoO in the sectoral applications by replacing ROORI with a vector of dummies for the different types of RoO, such as change in heading, VC, and TECH. Fourth, we will seek to estimate the trade effects of RoO on trade should all RoO regimes be set to have the values of the non-preferential RoO. Possible further refining involves the incorporation of interaction terms in the equations. For instance, as FACIL can be expected to moderate the impact of ROORI, we seek to introduce interaction terms between these two variables in further specifications.

V. Conclusions and Future Prospects

The empirical exersizes carrie out in this paper provide preliminary evidence that restrictive rules of origin stifle trade and hence counteract the liberalizing effects of PTAs. However, we have also found that various regime-wide provisions, such as drawback and cumulation, can encourage trade, and hence reduce the negative effects of RoO. At the sectoral level, our findings indicate that restrictive RoO encourage the use of intra-PTA inputs at the expense of extra-PTA ones, possibly even if the latter were cheaper. As such, restrictive RoO in final goods may result in trade diversion in intermediate goods.

This paper has also sought to draft a world map of RoO regimes. To be sure, the RoO panorama is evolving rapidly with the proliferation and expansion of PTAs around the world, as well as with the on-going tailoring of the non-preferential RoO at the WTO. Three developments are particularly likely to affect the shape of the global RoO mosaic in the near future.

First, the PANEURO model will not only consolidate its hold in the European theater, but also expand to FTAs forged between the EU (and other PANEURO adherents) with extra-European partners, most immediately with MERCOSUR and various Southern Mediterranean countries. To be sure, adjustment by many partners to the PANEURO system will be smoothened by the fact that the model already governs EU's GSP, applying thus to the numerous developing countries that enjoy EU's unilateral preferences. Nonetheless, the "formalization" of the PANEURO model in further, extra-regional and inter-continental PTAs will likely work to entrench the existing supply relations with the EU's partners. The attraction of the model to the EU's partner countries is the possibility for eventual accession to the PANEURO system of cumulation.

Second, the Western Hemisphere will likely become covered by a NAFTA-type RoO regime as a result of the Free Trade Area of the Americas-process. Much like in the EU case, the NAFTA RoO model—which, after all, is not dramatically different from that of the PANEURO model—will undoubtedly affect the shape of RoO regimes in the Asia-Pacific region thanks to the building of cross-Pacific FTAs first and foremost by Canada,

Chile, Mexico, and the United States—all of which apply the NAFTA model in their FTAs. The melding of the NAFTA model with the interests of East Asia's thus far foremost engines of inter-continental integration—Japan, Korea, and Singapore—could produce a slightly new brand of RoO regimes alongside the PANEURO and the NAFTA models.

Third, further integration and renegotiation of prior PTAs in Asia, Africa, and the Middle East can well spawn RoO of greater selectivity, as evinced in the Japan-Singapore agreement. Although such selectivity would likely follow the patterns of RoO (and sectoral restrictiveness of RoO) in place in Europe, the Americas, and the SADC, the final outcome could also rise to liken CACM's revised RoO—i.e., with the relatively general change of heading RoO (or VC) being interspersed by some exceptions, combinations with VC (or change of heading), and technical requirements, albeit to a more moderate extent than in NAFTA. The non-preferential RoO, while relying chiefly on the change of heading- or the change of subheading- criteria, appear to be similarly tending toward a combination of RoO to govern the market access of any given product. That the non-preferential RoO continue contested still today, eight years after the harmonization work was launched, attests to the complexity of interests seeking to affect the definition of origin around the world.

The expanding geographical reach of the PANEURO model, the convergence toward a single FTAA RoO regime in the Americas, and rise of the inter-continental FTAs between European and Western Hemisphere partners on the one hand, and partners in other regions, on the other, could be expected to lead to the application of two relatively similar RoO regimes on the global level. This potential *de facto* harmonization dynamic, along with (1) the harmonization of the non-preferential RoO at the WTO, and (2) the fact that many RoO regimes particularly in the Asia-Pacific and African PTA theaters are thus far relatively simple, with the same RoO often applying across the board, could facilitate eventual convergence toward a single global preferential RoO regime. However, the proliferation of intra-Asian FTAs and the potential diversity of the inter-continental agreements might also merely splinter the global RoO panorama further. The former outcome of global RoO convergence would be particularly beneficial to the "spoke" countries that implement divergent RoO regimes across their FTA partners, rather than applying a single, uniform RoO regime in operations across partners, as is done by the EU hub and, within the Americas, by the US and Mexico hubs.

The Doha Trade Round should provide the WTO further momentum to complete the task of harmonizing non-preferential RoO—and also propel multilateral agreements to start the process of *de jure* harmonization of preferential rules of origin. A further, albeit perhaps more distant, possibility would be to devise a multilateral mechanism to monitor the application of preferential RoO in order to guarantee transparency of RoO and to minimize their uses for distributional purposes. Multilateral approaches to RoO are all the more pressing in the face of PTA proliferation and the potential breach by the various RoO regimes of the tacit prohibition of "other restrictive regulations of commerce" put forth by Article XXIV of the GATT. To be sure, the key to undercutting RoO's negative trade effects lies ultimately in the success of multilateral liberalization. Preferential RoO are restrictive only as long as there are MFN tariffs. Should the multilateral trade rounds result in further 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 begin to fade.

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APPENDIX I

Estevadeordal's (2000) 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 he level of tariff item (8-10 digits), CS is change at the level of sub-heading (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.

There are a number of modifications to the observation rule in the case of those EU RoO for which no CTC is specified. 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 non-originating inputs is below 50 percent, as well as when an import content criterion is combined with a technical requirement. Second, RoO featuring an exception alone is assigned value 1 if exception concerns a heading or a number of headings, and 2 if the exception concerns a chapter or a number of chapters. Third, RoO based on the wholly-obtained criterion are assigned value 7.

The observation rule is admittedly somewhat crude for accounting for the subtleties of the EU RoO as it does not account for the "soft" CTC criterion used by the EU. However, it does allow for comparing the EU and NAFTA RoO regimes.

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 and the averages formed on the basis of these; in the handful of categories where there are more than four proposals, the four proposals included into the calculations are selected so as to capture the range of different proposals and restrictiveness values.

APPENDIX II

This appendix details the coding methodology for various country pairs in the dataset. Note that the discussion also extends to cover our forthcoming panel estimation.

PTA Indicators

PTA

PTA dummy is set at one 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).

Perfect CU

The "perfect CU"-dummy applies to pairs where the CET of the common PTA essentially covers the whole tariff universe. It is employed here countries that are party to the EU, countries party to EFTA, countries party to the CU formed around Russia and that reportedly took hold in 1999 (Belarus, Kazakhstan, Kyrgystan, and Russia), and pairs where one party is an EU member and the other Cyprus, Malta, or, starting in 1996, Turkey. A perfect or imperfect CU is automatically also a PTA; all perfect and imperfect CUs are PTAs and thus coded as one. In the panel, the same rule for CU entry dates applies as for PTA entry dates.

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.

ROORI

The average ROORI variable is the average of the restrictiveness values at the 6-digit level in the FTA agreements. 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 bulk of the FTAs have been reviewed for RoO, agreements for which restrictiveness values have yet to be obtained or 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 are also coded as 4. Canada-US FTA RoO that apply in 1989-1993 are coded as 5, slightly below NAFTA ROORI of 5.15.

The RoO variable is set at 2 when the country pair is party to the same customs union, but when the customs unions is an aspiring one and hence "imperfect", i.e. where RoO

continues governing trade between members in a 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 thus far 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.

Note that unilateral preferential relationships (such as provided by GSP) are not considered as PTAs and hence do not receive a coding for RoO.

ROOSD

The ROOSD variable is the standard deviation in the ROORI as assigned at the 6-digit level by PTA. It is set at zero for agreements for which restrictiveness values have yet to be calculated.

For vehicles, ROORI and ROOSD are averages of the restrictiveness values at the 6-digit level of final goods (goods classified as final in BEC) falling within the ISIC Rev. 3 division of vehicles. Values for all countries not party to the same PTA are set at zero.

Regime-Wide Variables

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

For imperfect CUs, regime-wide RoO variables apply and are coded depending on the requirements of each regime. 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, as such, the coding thus far 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.

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 100, with the justification that trade between such states is free from any origin requirements.

Diagonal and Full Cumulation

Diagonal and full cumulation are coded as one between states party to a PTA that allows for either or both of these systems of cumulation, and also to one between states not party to a same PTA or states party to the same customs union, given, again, that the outsourcing relations of such pairs are free of any RoO and thus in effect permit diagonal and full cumulation. A zero is assigned only for pairs whose common FTA does not allow diagonal and full cumulation, respectively.

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 one in the bilateral FTAs and full cumulation at zero. When EEA is launched, all EFTA members at 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 one between states party to a PTA that allows for drawback or does not explicitly prohibit it (i.e., where the PTA agreement does *not* put forth a no-drawback rule). Drawback is also one between states not party to a same PTA or states party to the same customs union. Drawback is set to zero for pairs party to a PTA that explicitly bars drawback.

Self-Certification

Self-certification is set at one between states party to a PTA that requires self-certification rather than public certification and/or two-step private and public certification. Under the same rationale of "RoO-free" pairs that applies to the other regime-wide dummies, self-certification is set at one also between states not party to a same PTA or states party to the same customs union, as these states effectively have no bilateral certification requirements.

Alternative Regime-Wide RoO

The alternative specifications of the de minimis and the regime-wide dummies diverge in our treatment of pairs not party to the same PTA or party to the same perfect CU from our prior treatment of "RoO-free" pairs. In this specification, each of the five variables is always set at zero when two countries are not party to a PTA or are party to the same CU; hence, positive values in any of the five variables are possible only among pairs party to the same PTA, depending on the provisions of the PTA.

Facilitation Indexes

Three facilitation indexes are constructed on the basis of five regime-wide variables (de minimis, diagonal and full cumulation, drawback, and self-certification). The latter four are set at one in every index if the PTA allows for any of them (or does not explicitly bar drawback). The indexes thus vary only in the observation rule for de minimis. In facil 1, the rule for de minimis is as follows: 0 if de minimis is 0 percent; 1 if 1-5 percent; 2 if 6-8 percent; 3 if 9-10 percent; and 4 if above 10 percent. In facil 2, the rule is as follows: 0 if de minimis below 5 percent, 1 above 5 percent. In facil 3, the rule is as follows: 0 if de minimis below 5 percent, 1 if 5 percent-10 percent, and 2 if above 10 percent.

All indexes are subsequently constructed by summing up the indicators for the five different components. Note that should cumulation considered a *single category* (i.e. if either diagonal or full cumulation or both, value 1 is assigned) and if de minimis 0 if

below 5 percent, 1 above 5 percent, the methodology would yield the same values as for facil 2.

Facilitation indexes are set to zero for pairs not party to the same PTA or pairs party to the same CU.

Regime-Wide Indicators for PTAs that are not coded

For country pairs whose common PTA has not been coded for any RoO (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 to zero) while they are assumed to allow drawback (given that the no-drawback rule is not highly prominent outside the NAFTA- and EU-models).

APPENDIX III
PTAs Included in the Study, by Year of Entry into Force and Full Name

PTA	ENTRY YR	FULL NAME/TYPE
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 IV
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 AGREEMENT	Bangladesh, China, India, Republicublic of Korea, Laos, Sri Lanka
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 Republicublic 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 tables:

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[i] The build-down method is
RVC = (AV B VNM)/AV x 100;
the build-up method is:
RVC = VOM/AV x 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.

[ii] 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.

[iii] Capital goods require 60 percent RVC; other goods are governed by a 40 percent MC.

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

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

[vi] Drawback not mentioned in Hungary-Israel, Poland-Israel, Slovenia-Croatia, Slovenia-FYROM. 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, 3 months in Turkey-FYROM, and two years in Israel-Slovenia.

[vii] 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 will review the use of drawback by members on an annual basis.

[viii] 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.

[ix] 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 fifty per cent of the ex-factory or ex-works cost of the goods in their finished state (emphasis added).