

**Free Trade Agreements and Rules of Origin: An Econometric Investigation**

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## **Abstract**

This paper uses three different Gravity type models to estimate the impact of the rules of origin on trade flow. The obtained results confirm the negative effects of these rules on the volume of trade, although these effects are reduced by countries' trade facilitation. In addition, the rules of origin effects are higher in the case where importer, the exporter, and the year fixed effects are considered. However, the final estimation that accounts for the interaction of year-rules of origin reveals these rules do not affect the trade flow of each year in the same manner.

## **Acknowledgment**

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## 1. Introduction

The number of preferential trade agreements has increased dramatically over the past decade, and now account for more than half of all world trade. It quadrupled from 50 agreements in 1990 to 200 in 2007, and is expected to increase to 400 by 2010 (Estevadeordal *et al.*, 2008, 1). All such trade agreements have a common policy tool called the 'Rules of Origin' (ROO). Rules of origin are included as an important stipulation in any discriminatory trade contract to prevent trade deflection. These rules are defined to distinguish origin of the traded goods, and to determine eligibility of the products for tariff reduction. The determination is essential in order to assess whether a good underwent "substantial transformation". The tariff classification rule, the value content rule, and the specific production process rule are the three main principles which are used to clarify goods' substantial transformation (Augier *et al.*, 2007).

However, the number and complexity of the rules of origin has increased over time due to the growth in the number of preferential trade agreements. Also, the heterogeneity of these rules extends distortionary effects of preferential trade agreements. For example, it increases preferential trade agreements' diversion effects, and creates protectionism. Researchers such as Gasiorok *et al.* (2007) and Hirsch (2002) offer some policy changes in order to define transparent rules of origin that play a role in preventing trade deflection.

The objective of this paper is to review some of the applied work on the economic impacts of ROO, and applying a panel data to estimate, using a modified Gravity type equation, the effects of the rules of origin on trade flow. The database covers 68 countries

over the period 1981-2001. Also, individual country and years' fixed effects are included in the analysis. The estimations are implemented not only for the Gravity model that is presented by Estevadeordal *et al.* (2008), but also on the Basic Gravity model that does not include any dummy for the cultural effects. Moreover, a year-ROO interaction dummy is added to the Gravity Equation in the final step to investigate the different effects of the ROO of each year on trade flow.

The empirical results of this paper confirm the negative impacts of the rules of origin on bilateral trade. However, many preferential agreements include De minimis to simplify the process of qualification for goods that include non-originated inputs by the relaxation of change in tariff classification (CTC) and technical requirement (TECH) criteria. Some of them also consider Diagonal cumulation that defines any final products as originated goods if they are produced in any part of zone of common set of ROO, and if the last process was more than a minimal operation. Few agreements extend Diagonal cumulation to Full cumulation where any final products that are produced in part of the zone are the originated goods even if they include non-originated inputs. Besides, most of the developing countries repay tariff on non-originated inputs, Drawback, to support trade. The estimation result shows that the rules of origin's negative effects are reduced by any importers' trade facilitations such as cumulation (diagonal, and full), De minimis, self certificate, and drawback. The effects are also much higher when different behaviour of countries and years' fixed effects are considered in the model. The study of the difference effects of the rules of origin on the trade flow of each individual year notably does not confirm the theory of "learning to play by the rules" which is explained by (Estevadeordal

*et al.*, 2008). However, the empirical results show that the rule of origin's effects for the years 1982, 1989, 1990, and 1991 are irrelevant to the trade flow.

The rest of the paper is as follows. Section 2 reviews the economic literature on the rules of origin. Section 3 presents the econometric analysis and includes three subsections. The data description is explained in 3.1, the model is presented in subsection 3.2, and finally the estimation results are shown in 3.3. Section 4 concludes.

## **2. Literature review**

### **2.1. Trade patterns and the basic concepts**

World commerce has evolved from multilateralism toward preferential trade agreements (PTA) over the two past decades (Augier *et.al*, 2007). In addition, the numbers of countries joining the custom unions, which are the “second level of regional integration following a free trade area (FTA)”, have increased over the time (Georges, 2008). The members of a custom union impose a common tariff on the goods exported from non-members. However, the members of a FTA area continue to levy their individual tariffs on non-members' traded goods while they enjoy either preferential or most favoured nation (MFN) tariffs. Therefore, members of a common union work toward a common trade policy with respect to the non-member, while the members of a free trade agreement have to negotiate over the rules of origin. The rules of origin have to be determined to prevent trade deflection. According to Georges (2008), these rules clarify the origin of traded goods in order to restrict “a non-member agent transit[ting] goods through the FTA member-country with the lowest-external tariff and then tranships duty-free (or with preferential

treatment) to the final destination”. However, bargaining over the rules of origin create a chance of lobby for producer.

Researchers categorize the classical effects of preferential trade agreements (PTA) in two main groups: trade creation and trade diversion (Augier *et al.*, 2007). Trade creation occurs when a new PTA causes less expensive goods to be imported from the member countries, replacing more expensive ones. Inversely, in trade diversion more expensive intermediate goods are imported from a PTA member replacing less expensive goods that are produced in non-member countries. Therefore, the trade creation increases welfare of a PTA member because the producers will have an access to the less expensive intermediate goods while trade diversion decreases the welfare.

According to Augier *et al.* (2007) the rules of origin play a role in strengthening the diversion effects that are created by free trade agreements. These rules are more of a constraint on trade: if the share of intermediate goods in production of final goods is high, if final and intermediate goods are related closely, or if most of final goods’ production satisfies export demands. In addition, a strict ROO causes a reduction in a trade flow where there is a “bigger cost difference between cumulating and non-cumulating countries”.

Despite the fact that ROO create barriers for a free trade agreement, Augier *et.al* (2007) confirms that the existence of ROO is necessary to distinguish originated goods from non-originated ones, and whether substantial transformation has occurred. They explain that these rules provide a support to “process of greater regional integration”.

ROO are classified into two categories: sectoral (product-specific) rules, and general (regime-wide) ROO (Estevadeordal *et al.*, 2008). According to the product-specific ROO, a commodity is recognized as an originated good in different ways such as: one,

“The wholly obtained or produced” which obligate entire process of production/growth in member country; two, “Value content” (VC) which determines a minimum value added for an exported commodity; three, Technical requirement (TECH), requires a good passes a certain manufacturing process in exporting country; four, ECTC, bans “The use of non-originated materials from a particular Harmonized System subheading, heading, or chapter in goods that qualify as meeting requirements via the substantial transformation criterion” (Estevadeordal *et al.*, 2008). Region wide ROO are determined by the degree of de minimis, roll up, and the types of cumulation. These three disciplines relax rules of origin, and include some trade policy exceptions. De minimis allows final goods to include non originated inputs as long as a commodity satisfies “minimum content of non-originated” input. This minimum content varies across countries. For example, EU ROO covers 10% higher De minimis than NAFTA.

According to Gibbon (2008) the roll-up rules:

“permits raw intermediate products which are not in themselves wholly obtained but which are counted as originating on the basis of meeting one or other of the rules mentioned earlier, to be counted as wholly originating for the purpose of determining the origin of a final product that incorporates them.”(Gibbon, 2008)

When inputs are produced in a member of a PTA, an intermediate good is recognized as the originated good in all three types of cumulation (bilateral, diagonal, full). The final goods that are produced inside a PTA zone however, include non-originated inputs (produced outside the PTA zone) which are considered to be originated products under full cumulation rule (Estevadeordal *et al.*, 2008). The European Economic Association (EEA) agreement, AFTA and ANZCERTA allow full cumulation. In addition, some countries relax the rules of origin by allowing duty drawbacks. They refund the levies

“when the imported goods are re-exported or used in the manufacture of exported goods” ([http://www.ic.gc.ca/eic/site/auto-auto.nsf/eng/h\\_am00614.html](http://www.ic.gc.ca/eic/site/auto-auto.nsf/eng/h_am00614.html), Retrieved Jun 3rd, 2009). This clause is included in most of the developing countries’ trade policy, and it extends investments and exports. In order to insure mandatory trade discipline and satisfaction of the ROO, the exported commodity has to be certified as well. The certification process may be performed by the exporter, importer, or by any third party.

If a country is a member of several different PTAs, in which each PTA includes diverse and complex rules of origin, the exporters have to consider and satisfy different trade rules. The administrative costs associated with complying with varied rules of origin assigned by multiple agreements hampers trade and leads to an inefficient allocation of resources. However, including cumulation, de minimis, or drawbacks rules in a country trade policy relax the countries rules of origin.

## **2.2. Two common measurements of the rules of origin**

Diversity in the rules of origin increases the cost of trade by creating many hurdles which exporters and importers must contend with. As long as exporters have to undergo bureaucratic certification methods, countries do not acquire the full benefits of free trade agreements (Estevadeordal *et al.*, 2008). The restrictiveness of ROO is measured by Estevadeordal *et al.* (2008) based on the degree of non-originated inputs that are allowed to be used in the production of the final goods without affecting the originated statues. The authors present two ways to make ROO restrictiveness index: one way is proposed by Estevadeordal (2000), and the other one is introduced by Harris (2007). The first index is based on seven categories where one shows the least restrictive rule and seven belongs to

the most restrictive one. The rules of origin is more stringent, closer to seven, when the non-originated input that is used in the production of the final good causes a change in level of chapter. And the rules are less strict when the non-originated intermediate goods change the heading, the subheading, or the lower levels of the final goods' tariff classification. Also, if the rules of origin include the value content rule (VC) or the Technical requirements rule, the rules' stringency increases.

Harris's (2007) measurement is quite similar, although he considers more detailed information of various PTAs and products. Besides, the trade policies which relax rules of origin such as cumulation (diagonal, and full), de minimis, drawback, and self certificate are measured as facilitation index by Estevadeordal (2000). This index has a zero value when a country does not provide any facilitation for its trading partner, and has a value of five when all possible arrangements are included in the trade policy. However, in both researchers' calculations there exist some exceptions based on the trade statues of the country (Estevadeordal *et al.*, 2008, 202).

Based on Estevadeordal's (2000) measurement of the rules of origins, the NAFTA and Pan-Euro agreements possess the highest levels for their rules of origin.<sup>1</sup> However, as these rules of origin are mostly based on a change in the tariff classification they are easier to follow than the rules based on value added, particularly when the fluctuations of the exchange rates comes to account in the calculation of the value added. In addition, drawback is allowed under this agreement. The NAFTA agreement has been a pattern for

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<sup>1</sup> Pan-Euro system launched to harmonize European Free Trade Association (EFTA) with highly uniform EU's rules of origin in 1997, and covers "27 EU members while gradually incorporating 15 other countries or territories" (Estevadeordal et . al, 2008). US-Canada free trade agreement began at 1987, and included Mexico in 1994 (NAFTA agreement).

many agreements such as the US-Chile, the US-Canada, the Canada-Chile, the US-Singapore agreements. According to Estevadeordal *et al.* (2008), among the rules of origins MERCOSUR are less stringent. Although, Central American Common Market (CACM) ROO is very similar to the MERCOSUR rules, its ROO is considered to be higher because the rules include more variety. The South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA) rules of origin contains mostly value added trade disciplines, though the stringency and complexity of the rules has been increased gradually because of new agreements which took place with Asia.

Australia–New Zealand Closer Economic Relations Trade Agreement (ANZCERTA) changed its rules of origin with the disciplines that are closer to the US-Australia trade policies. Diagonal cumulation exists in the Pacific Island and New Zealand preferential trade agreement, however it is not permitted for the New Zealand and Australia traded goods. The US-Singapore agreements follow the NAFTA complexity rules of origin. However, the agreements between the U.S. and Jordan, and the U.S. and Israel do not include much complexity and easily defines just the value added rule. The rules of origin of Chile-South Korea and US-Chile's free trade agreements include a high degree of selectivity among the industries in spite of that "the ROO of the Chile-Korea regime are overall less complex than either NAFTA or US-Chile ROO". Despite the complexity of the NAFTA and PENEURO's rules of origin, the preferential agreements of Asian, African, and Middle Eastern countries are relatively less difficult to follow, and mostly include the value added rule. Though most recent Africa and Asia-Pacific agreements are based on the high sectoral selectivity the preferential agreements between US-Singapore and Chile-Korea have made Asia-Pacific's rules of origin more complex. In comparison to other

PTAs, Asian Japan-Singapore Economic Partnership Agreement (JSEPA) includes more elaborated rules in its trade policy (Estevadeordal *et al.*, 2008).

One criticism on their measurement is that the values that are attached to the rules of origin and the facilitation index of the countries do not have a sufficient variation. Therefore, the actual measurement hardly has a value larger than 5.5 and less than 4 for the rules of origin. Similarly, the facilitation index generally has a range between 2 and 4. Many countries join multiple free trade arrangements. “Chile, for example, has free trade agreements with Mexico, Canada, MERCOSUR, the European Union, and is seeking similar arrangements with Australia and New Zealand (who have a free trade agreement of their own)” (Kurgman,1999). However, the authors are not clear what value is attached to the countries’ indexes when they participate in more than one arrangement. For example, Zambia and Zimbabwe joined to SADC in 2000 while they were members of COMOROS at the same time.<sup>2</sup> It is not clear as to what values are considered for the rules of origin and facilitation indexes of these two countries when they trade with each other. Moreover, they estimated the value of 4 for rules of origin index of Turkey during the time it was trying to join to the European Union free trade agreement. However, no measurement is available for countries in a position similar to that of Turkey. (eg. Spain and Portugal)

### **2.3. Literature’s empirical analysis on the rules of origin**

The relationship between tariffs and the rules of origin is studied by Estevadeordal *et al.* (2008). Two economic models are used, where the rules of origin restrictiveness index is the endogenous variable in the first economic model, and the second independent

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<sup>2</sup> COMOROS started at 1994.

variable represents length of phasing out of MFN tariffs in PTAs (“ a continues variable “). The structure of trade negotiations between the countries are explained by the explanatory variables. Thus, these variables reveal members’ decisions of an agreement about the rules of origin. They use “information regarding the NAFTA negotiation between Mexico and the United States where the database is constructed at 6 digit level of the Harmonized System”. Applying ordered probit estimation, and OLS regressions for the first and second model respectively, they conclude that the level of strictness of the rules of origin has a significant effect on the speed of tariff liberalization. In addition, their result shows that the products that are slow in liberalization have a higher degree of restrictiveness. According to Estevadeordal *et al.* (2008):

“Once tariffs have been completely phased out, origin requirements will remain, thereby implying that the degree of “protection” attached to the rules will remain in place: products that are relatively more protected (slow liberalization, high initial tariffs) will still be subject to more restrictive rules”.

The authors claim that world trade flows are influenced by the strict rules of origin in different ways. The strict trade rules reduce intra-PTA trade flow of final goods in comparison with trade flow of the less strict ROO. This reduction is caused by higher costs of production for final goods. Moreover, trade of the intra-PTA intermediate goods increases where ROO is more stringent, though this rise may occur in a short time. In addition, the trade flow of the PTA members with the rest of the world is higher when the rules of origin are relaxed. Therefore, they used the modified Gravity Equation that included ROO and FAC as explanatory dummy variables to examine the effects of ROO on world commerce. This empirical analysis utilizes two types of trading flow of 155

countries: the aggregate import and the intermediate goods' trade value of chemicals, machinery, textiles, television and radio transmitters, and vehicles' industries. The result of their first study, which includes the aggregate value of the trade flow, shows that ROO has a negative effect on the trade volume though the positive effect of the facilitate index reduces ROO negative externalities.

In the next step, Estevadeordal *et al.* (2008) hypothesises that countries' trade with "peak ROO" is affected more negatively in comparison to countries that have "across of board" rules of origin. To investigate this matter, they replace standard deviation of the rules of origin in each individual country by ROO dummy in the first regression. The authors explain that this variable should negatively influence the trade flow because the countries that have the highest ROO value also have the highest standard deviations for rules of origin. Their results reveal the greater negative effects of ROO on the trade volume in the countries with higher sectoral selectivity than the countries with the less sectoral selectivity. However, the negative effects of the rules of origin have been reduced in all of the estimations by the positive effects of the facilitation index on the trade flows. In addition, Estevadeordal *et al.* (2008) investigates the impacts of "product-specific of final goods" on the volume of the trade of intermediate goods. They define a modified Gravity equation, which includes average of "restrictiveness of ROO values in final goods" as a dummy variable. The result of this estimation suggests a positive effect of a stringent final goods' ROO on the trade volume of intermediate goods.

Researchers such as Augier *et al.* (2005) have tried to understand the effective changes in trade volume caused by the introduction of cumulation in the rules of origin of the members of PTAs. The EU trade agreement included diagonal cumulation in its rules

of origin in 1997. However, this instruction did not affect the EU's tariff, and it also did not cover all the traded goods (Augier *et al.*, 2005). Therefore, a comparison between the trade volumes of the affected group to the trade volume of unaffected goods (control group) would give a good estimation for the influence of the cumulation rules on restrictiveness of the rules of origin. Using a Gravity model, Augier *et al.* (2005) studied the influence of the cumulation of the EU agreement on the trade flow of 1995 to 1999. They consider the trade volume of the EU countries (Hub) and its neighbours where they have smaller economies (Spokes) compared to the EU.

The authors explain: The rules of origin reduce trade between the Spokes. However, the rules increase the trade flow between the EU and the Spokes. These effects are higher on the intermediate goods than on the final goods. Therefore, smaller economies, particularly when they are more dependent on the intermediate goods, are more sensitive to the rules of origin than the larger economies. In addition, these rules "affect trade more for those countries where vertical specialization is more widespread." In addition, they explain when common rules of origin are defined among FTAs' partners the distortionary effects of these rules are minimized though their effects are not reduced to zero. Finally, common set of rules of origin should not affect the volume of intermediate goods imported from the rest of the world (ROW). However, the increase in the input demand among the members of a FTA raises the demand for ROW's intermediate goods without violating the common set of ROO.

To examine the effects of the rules of origin on the trade flow of the EU countries (Hub) and its neighbours (Spokes) Augier *et al.* (2005) apply the "difference-in-difference" method to a modified Gravity model in the first step. Therefore, the equation includes the

ordinary Gravity variables plus some dummies for language, common border, and preferential trade arrangements effects. Two variables for Hub-Spoke and ROW-Spoke are introduced in order to estimate the rules effect on the trade direction. The equation includes also multi-country agreements (such as EU, EFTA, CEFTA and BAFTA) to capture the diversion effects. Therefore, two dummies are added to the equation for agreements among Pan-European Cumulation System (PECS) and between PECS and non-PECS. The “EU and its Spokes” agreements, the trade flow of PECS’ Spoke to Spoke in two situations: where there is not any trade agreement between the Spokes and where there is a trade agreement between the Spokes, are also included to the economic model.

In their study Augier *et.al* (2005) compares the treatment group, the countries whose trade flows raised by PECS, with a control group, the countries whose trade flows do not change by PECS. They used three control groups. The largest group includes all the trade agreements that are not in the treatment group. However, as this group contains the ROW exports’ volume, PECS’ affects on the ROW is ambiguous. Therefore, the second group eliminates all bilateral trade agreements that are included in the first group. However, to extract the pure effect of cumulation on the intra-Spoke trade to eliminate the effects of cumulation on the exports from EU to the Spokes, the third group “excludes all Hub-Spoke flows as well as all ROW-Spokes Flows”. Data are based on 38 countries, and were carried out on the “basis of total trade, manufacturing trade, and intermediate goods trade for the years 1995–99.”

The empirical results show that cumulation plays an important and positive role in the trade of intermediate goods. However the effect is smaller where the tariffs are high. Also, trade between the Hub-Spoke, the Spoke-Hub, the ROW-Spoke, and the Spoke-ROW

increased. Moreover, the inclusion of cumulation on PECS' trade policy positively effects the EU's Spokes, however the trade flow decreases, where cumulation does not exist among the EU's Spokes. In addition, a lower bound of 8-22% and an upper bound of 25-70% for the effects of rules of origin on the trade flow are estimated. In general, Augier *et al.* (2005) conclude that "Europe's implementation of 'cumulation' suggests a good way of reducing the welfare-reducing impact of overlapping rules of origin without gutting their fraud-fighting ability".

The rules of origin are designed to stop transshipment of the imported goods from the non- PTAs' member though in practice these rules play the role of "exporting protection from high tariff members to low tariff members" (Cadot *et al.*, 2008). Using Grossman and Helpman's agency model (1994), Cadot *et al.* (2008) study NAFTA's rules of origin effects on the trade volume of North (U.S.)- South (Mexico). In the model, North produces intermediate goods and South provides the final goods by assembling the intermediate goods. However, South's production of the final goods does not satisfy North's demand of the final goods. Therefore, part of the final goods demand of North is imported from rest of the world. The cost of final goods includes cost of the intermediate goods and the value added cost, which is the cost of mobile labours and capitals. The endogenous variables are "preferential tariffs as part of the PTA on Southern exporters' final goods and regional value add content of ROO". The exporters of final goods sell their goods under the trade policy rule if the goods satisfy these rules otherwise they trade under MFN regime. The result of this model gives a measurement for the regional value content of  $ROO(r)$ .

In next step the authors estimate the market access and the rules of origin. The 1994 to 2001 values of the trade flow and the tariffs between Mexico and the United States

(U.S.) have been used, under both MFN and preferential regimes and considering the Harmonized 6-digit level of aggregation. In order to investigate the market access, Cadot *et al.* (2008) estimated two equations. The dependent variable of the first equation is the value of Mexico's exports to the U.S. in time  $t$ . The explanatory variables are the Mexico's exports to the rest of the world under the NAFTA agreement and the rules of origin. The authors used the values of the rules of origin that are measured by Estevadeordal's (2000). The second equation has the same variables plus a variable for summation of  $r^3$  over "a vector of  $n$  binary variables for  $n$  legal forms of ROOs".

The result of the first equation gives an estimation of a cross-section's regional value content of ROO( $r$ ). Using the value content in the second equation, consumption of the goods is estimated. The main conclusion is that the introduction of rules of origin undercuts the benefits of free trade agreements, and the effect is stronger for final than intermediate goods.

Anson *et al.* (2005) also investigate the effects of rules of origin of North- South countries. Their study includes 149 countries' trade data (15280 observations). The OLS method is applied on a modified gravity model where effects of imperfect preferential trade agreements are estimated separately from perfect preferential trade agreements. Dummy variables for common language, common border, and common colonizer have also been introduced. They find a negative significant coefficient for the ROO variable. According to the authors, the compensative and administrative costs of rules of origin are mostly heterogeneous across firms, sectors, and countries. Therefore, the negative external effects of these heterogeneous rules substantially reduce preferential tariff positive effect. Also,

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<sup>3</sup>  $r = (\delta a \varphi_i) / (a_i P_i)$  Where  $\delta$  is the rate of preferences,  $p$  is the price of intermediate good,  $a$  is the Leontief input-output coefficient, and  $\varphi_i$  is the intermediate good's supply elasticity

they explain that rules of origin, which are basically designed to prohibit trade deflection, have become rules of “export protection” (Cadot *et al.*, 2007). The authors believe this protectionism was not created by circumstances, however structured to be part of the rules of origin. They explain that current rules of origin are not only complex and reduce the potential of future free trade agreements, but also disappoint “development-friendly intent of preferences’ schemas”.

The authors summarize the relationship between the rules of origin and trade preferences in: one, high degree of restricted ROO reduces usage of trade preference; two, Existence of high tariffs on traded goods in a given ROO increases utilization of preferences; three, industries’ decision about using trade preferences depend on hidden compliance costs; four, low tariffs among PTAs members discourage trade preferences and finally the relaxation of ROO or reducing the administration cost. (Cadot *et al.*, 2007)

The costs of the NAFTA rules of origin are also studied by Carrère and Melo (2008). As NAFTA’s rules of origin were fully enforced in 2001, their study is based on trade information from 2001 using the 6 digit Harmonized System level of aggregation. Considering the different costs for the similar rules of origin across PTAs, and also the diversity of ROO across the world, the authors estimate compensative and “administrative” components of the total cost for final and intermediate goods. They explain that the compliance costs are higher in technical requirements compared to the value added rules and changes in the tariff classification, in which possess the lowest costs among these categories. Also, rules which include regional value added do create more costs for final goods in comparison to intermediate goods. However, the authors show that

“administrative costs have [gradually] reduced in absolute value and in “percentage of total compliance”, using “non-parametric methods.

## **2.4. Researchers suggest policy changes**

International trade allocates unequal incomes and represents “winners and losers” (Hirsch, 2002). Interests of the owners of scarce resources are in conflict with the international trade, where their incomes increase under protectionism. However, “owners of abundant factors” support free trade as their incomes fall substantially under protectionism. According to Hirsch (2002) under protectionism, the producers gain at the expense of the consumers. The author states that rules of origin are applied instrument of protectionism when any of the following exists: “displacement effect”, “information asymmetry”, and “lack of effective legal norms to restrain this activity”. The displacement effects are: “if you reduce one kind of protection, another verity simply pops out elsewhere” (Hirsch, 2002). Therefore, the extreme rules of origin display the displacement effect. The variety and the complexity of the rules of origin cause an ambiguity in the influence of these rules. Professionals are required to describe these externalities through the rules’ descriptions, which are accessible for public. Thus, these rules create asymmetric information (Hirsch, 2002).

In order to study, and compare different PTAs’ rules of origin effects an efficient method of measurement is required. Hirsch (2002) argues if countries use the “local content rules [which] are base[d] on a percentage criterion” the measurement of the rules of origin’s protectionism would be more possible. He believes that the local content rules are the good selection toward a uniform scaling of the rules, and they are basically equal to

tariffication. However, he explains that various local content ROO should be assigned to different states because the production costs and the states' endowment are different in the different region. However, he concludes that the local content rate should be gradually reduced.

The rules of origin are a support to the "process of greater regional integration" (Gasiorek *et al.*, 2007). However, some trade's policy changes should be considered in order to reduce the cost effect of the rules. In a comparison of the different classification of the rules of origin Augier *et al.* (2007) found that the tariff-classifications are less costly, "predictable, and transparent"; however they are not designed "to determine the origin". Thus, a traded good may "remain in the same tariff heading", in spite of the fact they undergo a substantial transformation. The value-content rule is hard and complex to measure, and the technical test has "disadvantage of obsdence". The value- added rules are negotiable, and adding the cumulation rules is more possible. However, the diagonal cumulation is hard to reach, and it is more possible to be added to the rules in the case that countries have the similar rules of origin. The authors conclude that if rules of origin switch to just the value-added rule, and use the full cumulation rule, the rules of origin would be less costly.

The rules of origin "create a captive market" for the international producers by increasing price of the final productions. The external price, which was created by compliance costs, passes to the consumers (Cadot *et al.*, 2007). In order to have effective rules, which impose the lowest cost on traded goods Cadot *et al.* (2007) suggest that WTO should lead their decisions toward "harmonization, simplification, and relaxation" of the disciplines. They also offer "eliminating rules of origin requirements for tariff lines with

preferential margins below 3 or perhaps even 5 percent”. The authors explain that this relaxation creates more resources to use for other intentions. Also, they advise that these rules should be designed in a way that their implications benefit less developed countries. They use US–Africa trade rules in textiles (AGOA) as an example, where there is “a differential treatment not across the sectors, but across beneficiaries”. Cadot *et al.* (2007)

### **3. Empirical study**

#### **3.1- Data selection**

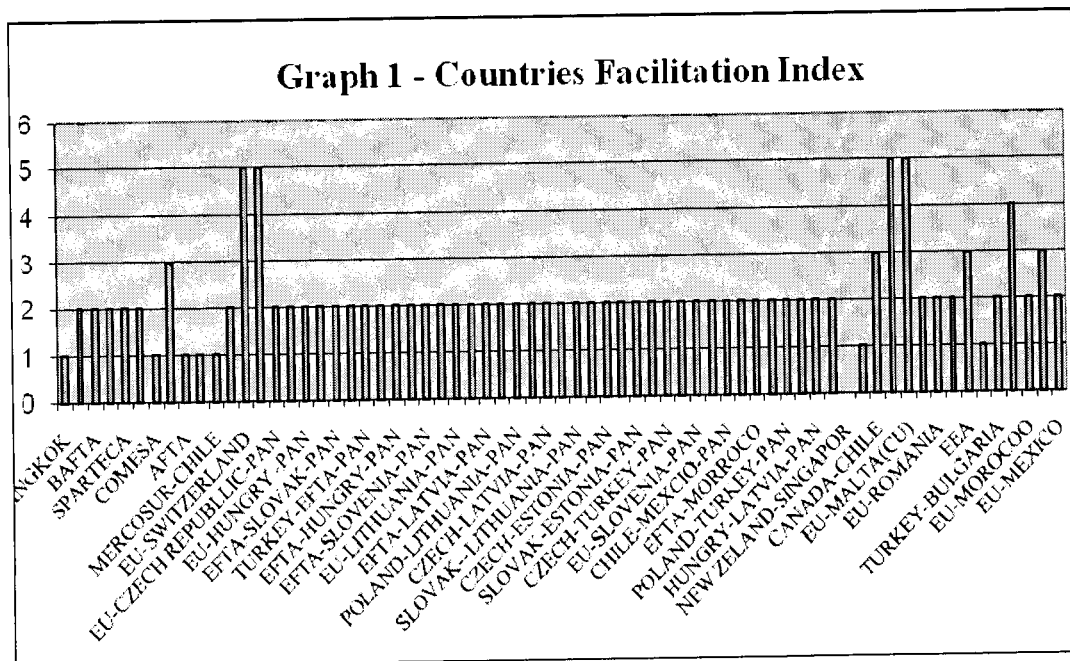
This paper uses three databases. First, the import data is extracted from The Global Trade Analysis Project 6 (GTAP 6) database. The GTAP database series are developed by the. Second, The GDP and the GDP per capita variables are extracted from the National Accounts Main Aggregate Database that is produced by the Economic Statistics Branch of the United Nation Statistics Division, and includes information on more than 200 countries’. The values of distance, colonization, common colonization, official common language variables are extracted from the Centre d’Etudes Prospectives et d’Informations Internationales database (CEPII).

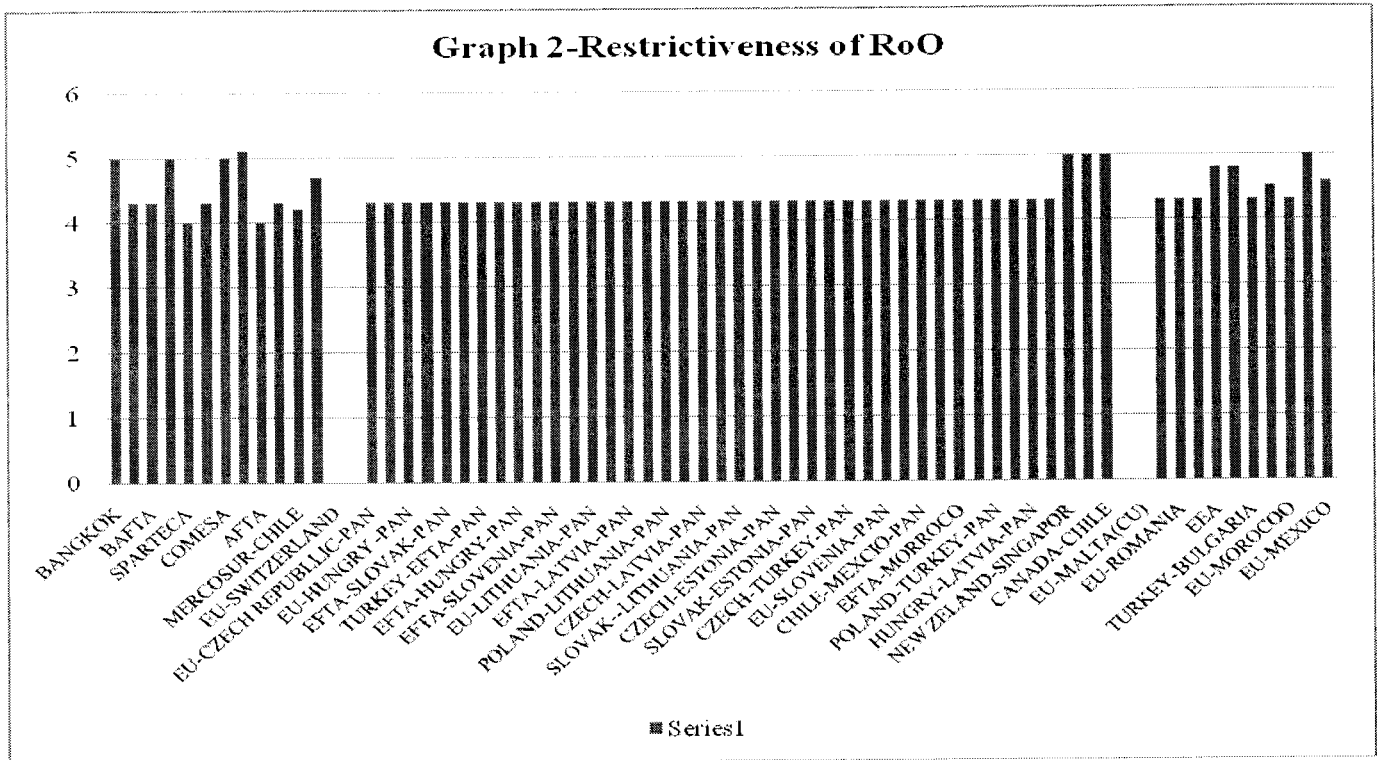
The preferential trade agreements that are included in the database are the agreements introduced in the Estevadeordal *et al.* (2008). (Appendix I) The value of the rules of origin and the facilitation indexes are measured from the two graphs in Estevadeordal *et al.* (2008, 41), and Estevadeordal *et al.* (2004, 33) respectively.

For this study, yearly data on 68 (Appendix I) developed and developing countries covering the 1981-2001 periods are used. The number of observation based on bilateral

imports is 95,683. The values of bilateral import data are in billions of U.S. dollars. The GDPs and GDPs per capita are also per U.S. dollars; GDP is expenditure based and in constant 1990 prices. The distance between the capitals of the countries is in kilometres. The tariff preferential dummy variable is defined to be one,  $PTA=1$ , if the preferential tariff is enforced on the first day of January of the year, and zero otherwise.

Graph 1 and 2 represent the utilized values of the facilitation and rules of origin indexes of each individual agreement respectively (More detailed graphs in Appendix II). The graphs clearly show that the values of the indexes hardly vary from one agreement to another. Therefore, large standard errors are expected for the rules of origin and the facilitation indexes.





### 3.2- The model

The Gravity model has been successful to study the bilateral trade of different regions (Head, 2003). However, different versions of this model are used by researchers. Therefore, in order to investigate the effects of rules of origin on countries' volume of trade three different Gravity models on the panel data of 1981-2001 are used.

The first model is the standard (Basic) Gravity model studied by Bergstrand (1985), Anderson (1979), and Head (2003).

The model is:

$$LN(Trade)_{ij} = \beta_0 + \beta_1 LN(GDP)_i + \beta_2 LN(GDP)_j + \beta_3 LN(DIS)_{ij} + \beta_4 (PTA)_{ij} + \beta_5 (ROORI)_{ij} + \beta_6 (FACIL)_{ij} + \varepsilon_{ij} \quad (1)$$

In this equation the index  $i$  represents the importer country and  $j$  the exporter country. The value of the imports of country  $i$  from country  $j$  is shown by  $(Trade)_{ij}$ . The variable  $(GDP)_i$  is the importers' GDP, and  $(GDP)_j$  comprises the exporters' GDP. The distance between the capitals of the two countries that serves a proxy for transportation costs is defined by the variable  $(DIS)_{ij}$ . Preferential agreements are defined by the dummy variable  $(PTA)_{ij}$ . The variables  $(ROORI)_{ij}$  and  $(FACIL)_{ij}$  are considered for the rules of origin and facilitation indexes. The residual term is represented by  $\varepsilon_{ij}$ .

This study is heavily based on Estevadeordal *et al.*'s (2008) study. To estimate the effects of the rules of origin on the volume of trade the authors used a modified Gravity model (Extended model) which includes dummy variables for cultural effects on the trade volume. Therefore, the second model of the paper includes some dummies for common official language, common border, and colonization.

The Extended model is:

$$LN(Trade)_{ij} = \beta_0 + \beta_1 LN(GDP)_i + \beta_2 LN(GDP)_j + \beta_3 LN(DIS)_{ij} + \beta_4 (PTA)_{ij} + \beta_5 LN(GDPC)_i + \beta_6 LN(GDPC)_j + \beta_7 (BORDER)_{ij} + \beta_8 (COMLANG)_{ij} + \beta_{10} (COMCOL)_{ij} + \beta_{11} (ROORI)_{ij} + \beta_{12} (FACIL)_{ij} + \varepsilon_{ij} \quad (2)$$

The variables  $(GDPC)_i$  and  $(GDPC)_j$  are the importer's GDP per capita and the exporter's GDP per capita respectively. The dummy variable  $(BORDER)_{ij}$  takes on the value 1 if the importer country and the exporter country share a land border, and 0 otherwise. The explanatory variable  $(COMLANG)_{ij}$  represents a cultural affinity and takes on the value 1 when the two countries speak the same language, and 0 otherwise. The colonization are presented by two variables  $(COMCOL)_{ij}$  and  $(COMCOL)_{ij}$ . The variable  $(COMCOL)_{ij}$  has a value 1 when the country has been colonized by the exporter country, and 0 otherwise. Finally,  $(COMCOL)_{ij}$  takes value 1 when the two countries have been colonized by the same colonial power, and 0 otherwise.

To investigate the exporters' different responses to the rules of origin of each year Estevadeordal *et al.* (2008) added dummies for the years –ROO interactions to the Gravity model. Based on the authors' explanation, the rules of origin increase gradually during the time affecting the countries' trade flow negatively more each year. However, exporters learn how to use more of importers' facilities, or how to adjust the source of their intermediate inputs demands in order to overcome stringent rules of origin. Therefore, "this ROO learning implies that the growing stringency of ROO around the world does not necessarily translate into a growing ROO interference over time" (Estevadeordal *et al.*, 2008). To account for this issue the third model is defined, in which adds a dummy variable for  $(ROOR)_{ij} * YEAR$  interaction to the model (2).

The importer and exporter dummies estimate “the multilateral resistance term applied by Anderson and van Wincoop (2001)”<sup>4</sup> (Estevadeordal *et al.*, 2008). Thus, to proxy the multilateral resistance term (country fixed effects), and to capture and compare importer and exporter countries’ “behavioural differences”, two more estimations are implemented in this paper. The first estimation represents the exporters’ fixed effect, and the second regression accounts both importers and exporters’ fixed effects. Finally, to study each individual year effects on the trade flow the next regression includes three dummies for the imports, and the exporters, and the years’ dummies. These estimations are implemented on both, the Basic and the Extend, Gravity models.

### **3.3- The estimation results**

Due to log-log structure of the model, the coefficients are in terms of elasticity that shows the percentage change of the predicted value influenced by the percentage change of explanatory variables.

Anderson (1979) states countries with a larger income have a tendency to spend greater amounts on imports. In addition, rich countries’ various production attracts a large share of other countries’ GDPs. Therefore, positives signs are expected for the GDP of the countries. The transportation costs make trade between two countries less attractive, acting as a wedge between production costs and consumption expenditure. Thus, if goods are imported from a considerable distance, the trade flow would be negatively influenced by

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<sup>4</sup> Indeed, Anderson and van Wincoop (2003) suggest that the inclusion of country fixed effects captures multilateral resistance and thus corrects misspecification. Estevadeordal et al. (2008)

the higher costs. The preferential trade agreements are expected to boost bilateral trade.<sup>5</sup> However, the rules of origin included in the agreements create/boost negative externalities such as protectionism or trade diversion. Therefore, these rules undercut the positive effects of the PTAs. The FACIL variable includes a scale for the importer treatment factors, such as de minimis, diagonal and full cumulation, and drawback, to the exporter country. As these factors boost countries' trades, positive effects are expected to be imposed by the components of the FACIL variable on the trade volume. Also, researchers believe that the variables which represent cultural effects should possess positive signs and encourage trades.

The estimations' results for the Basic Gravity model and the Extended Gravity models are in Table 1.

The outcomes of both models confirm that trade agreements boost the trade flow while the rules of origin discourage the volume of trade significantly. However, the negative effects are completely eliminated by the positive effect of the facilitation index. High values of the coefficients reveal their importance to bilateral trade flows among countries, though among these variables FACIL shows a greater effect. Therefore, countries which offer a high level of trade facilitation enjoy higher bilateral trade, as this offer reduces the negative rules of origin externality effects.

The Extended model's estimation result also reveals that the border variable also plays a significant role on the trade flow, like common language, and both variables are statistically significant. However, variables that represent distance, colonization, and

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<sup>5</sup> Preferential trade agreements change terms of trade of trading partners, and causes trade creation and trade diversion. Using gravity model these effects are studied by researchers like Augier (2004) and Martinez-zarzoso et al. (2008).

importer GDP per capita do not present the expected signs. Among these three variables just the variable COLONY is statistically significant compared with 5% level of signification. In addition, the result confirms that an increase in the importer and exporter countries' income boosts the trade flow significantly.

The estimation result of the Basic Gravity model that is presented in Table 1 shows that the bilateral trade flows not only is affected significantly by all the factors accounted in the model but they also possess the expected signs. For example, the distance variable which is not statistically significant in the Extended Gravity model is significant in the Basic model, at the 5% level of signification. The minus sign of this variable also confirms the expected negative effect of transportation's costs on the trade flow. However, the R-squared of the Basic model is slightly lower than the R-squared of the Extended Gravity model.

**Table 1-Effects of Restrictive ROO and Sectoral Selectivity of ROO on Trade, 1981-2001**

Independent variables	Dependent variable (Ln Trade),Period 1981-2001	(Ln Trade),Period 1981-2001, The Basic Gravity model	P-value
<i>LN(GDP<sub>i</sub>)</i>	430.94 (50.05)	432.79 (62.07)	0.00
<i>LN(GDP<sub>j</sub>)</i>	217.21 (30.07)	259.36 (41.77)	0.00
<i>LN(GDPPC<sub>i</sub>)</i>	-0.46 (-0.04)	-----	0.968
<i>LN(GDPPC<sub>j</sub>)</i>	124.36 (11.53)	-----	0.00
<i>LN(DISI<sub>ij</sub>)</i>	14.11 (0.78)	-384.96 (-22.70)	0.433
<i>PTA<sub>ij</sub></i>	1348.59 (19.89)	1392.46 (20.73)	0.00
<i>ROORI<sub>ij</sub></i>	-1341.78 (-26.84)	-1176.40 (-23.78)	0.00
<i>FACIL<sub>ij</sub></i>	2955.37 (26.46)	2540.19 (22.74)	0.00
<i>BORDER<sub>ij</sub></i>	4648.86 (56.62)	-----	0.00
<i>COMLANG<sub>ij</sub></i>	510.13 (10.80)	-----	0.00
<i>COLONY<sub>ij</sub></i>	-351.03 (-4.02)	-----	0.00
<i>COMCOL<sub>ij</sub></i>	481.88 (6.87)	-----	0.00
<b>CONS</b>	-16387.30 (-60.44)	-13252.80 (48.88)	0.00
<b>R-squared</b>	0.13	0.09	
<b>Number of obs</b>	8547	8547	

Value of t-statistics in parentheses

Table 2 represents the regression results of the Basic and the Extended Gravity models, which include importers, exporters, and years' fixed dummy variables. These effects are measured in three steps. In the first step the exporters fixed effects are estimated, then importers fixed effects are studied, and finally all three fixed effects are considered.

A comparison between the coefficients of the extended Gravity model presented in Table 1 to the first column of Table 2 reveals that excluding the exporters' behavioural effects (exporters' fixed effect) from the trade flow changes the explanatory variables' coefficients, the level of the signification, and their signs. The differences between the two results are explained by the level of the flexibility of the models. The model that excludes the exporters' fixed effect restricts the intercept and the slope parameters to vary across each individual country and over the time. Therefore, the model does not explain the individual countries or years' difference effects on trade flows. However, the model that includes exporter fixed effects allows the intercept to be different for each exporter country. However, the slope parameters are still the same for every country.

In the case where I do use exporter fixed effects the coefficients of the variables of the preferential trade agreements, the rules of origin, and the facilitation show higher effects on the trade flow. Particularly, the distance variable has the right sign and is statistically significant. However, the importer countries' GDPs do not show the expected signs. I believe there may be a good reason for including fixed effects; there may be something idiosyncratic about certain countries – Canada as an exporter is different than say U.S. as an exporter. As such, one must include fixed effect to account for these differences.

Table 2 presents that among the last three regressions that allow the parameters of the exporters, the importers, and the years vary across the cross-section units and across the time respectively, the last two ones show the same R-squared that is higher than the first one. Moreover, the coefficients of these two estimations are significantly different from the first one however, slightly different from each other. The positive sign of the facilitation parameter and the negative sign of the rules of origin parameter of all of the last three regressions, where the intercepts are flexible to change by the importers, the exporters and the years' behavioural differences, confirm the expected effects of these variables on the trade flow.

**Table 2- Effects of Restrictive ROO and Sectoral Selectivity of ROO on Trade, 1981-2001**

Independent variables	Dependent variable (Ln)		Dependent variable (Ln)		Dependent variable (Ln)	
<i>LN(GDPi)</i>	404.11	(48.32)	374.86	(4.45)	304.17	(2.95)
<i>LN(GPDj)</i>	-331.84	(-26.18)	53.17	(3.78)	51.58	(3.66)
<i>LN(GDPPCi)</i>	-32.33	(-2.89)	246.15	(4.70)	236.59	(4.25)
<i>LN(GPDPCj)</i>	576.75	(16.45)	275.16	(6.85)	249.94	(5.40)
<i>LN(DISij)</i>	-142.98	(-7.36)	-384.96	(-17.20)	-384.60	(-17.16)
<i>PTAij</i>	1528.88	(22.19)	1680.28	(23.65)	1680.83	(23.57)
<i>ROORIj</i>	-1511.82	(-30.80)	-1660.61	(-34.10)	-1659.07	(-34.01)
<i>FACILij</i>	3288.31	(30.07)	3591.34	(33.15)	3588.05	(32.97)
<i>BORDERij</i>	4382.19	(54.02)	4198.18	(51.59)	4198.74	(51.59)
<i>COMLANGij</i>	350.87	(7.21)	-113.86	(-2.20)	-113.79	(-2.19)
<i>COLONYij</i>	-492.14	(-5.66)	-509.40	(-5.79)	-509.03	(-5.79)
<i>COMCOLij</i>	419.43	(5.85)	-70.42	(-0.94)	-70.34	(-0.94)
Exporter fixed effect	Yes		Yes		Yes	
Importer fixed effect	No		Yes		Yes	
Year fixed effect	No		No		Yes	
CONS	-5417.84	(-12.94)	-10249.49	(-6.67)	-8437.45	(-4.06)
R-squared	0.19		0.24		0.24	
Number of obs	8547		8547		8547	

Value of t-statistics in parentheses

The next table presents the estimation result of the Basic Gravity equation in which the cultural effects and the GDP per capita variables are eliminated; however it includes the fixed effects dummies. In comparison to the first estimation's result of the Basic Gravity model, in which the model does not allow any changes in the intercept, all the parameters impose significantly lower effects on the trade volume. Also, the models' R-squared is much higher in the case that the fixed effects' dummies are included in the model compare to the model that does not include these effects.

The coefficients of the variables of the second regression that include both the importers and exporters' fixed effects represent a significant change in comparison to the regression that does not account the importers' fixed effects. This result reveals that the importers' behaviour influences the trade flow significantly. The sign of the parameter of the third estimation where all three fixed effects are included in the model represent the expected sign.

The result of all the models shows that the rules of origin's influences on the trade volume is less than the importer trade facilitation effects, in contrast to Estevadeordal *et al.* (2008) estimations' that presents a higher value for the rules of origin's variable than the facilitation index variable. This may be explained by the fact that my database covers fewer countries than Estevadeordal *et al.* (2008). Most precisely, my database includes countries that are, in most cases, involved in the EU agreement where the values of the rules of origin are considered to be zero and the values of Facilitation index is five. As such, I have less variation in the ROO variable than Estevadeordal *et al.*'s (2008) who covers a broader range countries.

Table 3- -Effects of Restrictive ROO and Sectoral Selectivity of ROO on Trade, 1981-2001

Independent variables	Dependent variable (Ln Trade), Period, 1981-2001	Dependent variable (Ln Trade), Period 1981-2001	Dependent variable (Ln Trade), Period 1981-2001
<i>LN(GDP<sub>i</sub>)</i>	393.44 (58.20)	881.50 (16.00)	535.02 (5.88)
<i>LN(GPD<sub>j</sub>)</i>	-306.96 (-24.13)	69.44 (4.91)	60.68 (4.25)
<i>LN(DIS<sub>ij</sub>)</i>	-562.65 (-31.38)	-867.23 (-43.88)	-871.03 (-43.96)
<i>PTA<sub>ij</sub></i>	1522.37 (22.14)	1829.47 (25.54)	1802.83 (25.02)
<i>ROORI<sub>ij</sub></i>	-1314.96 (26.12)	-1637.30 (-33.15)	-1631.03 (-32.96)
<i>FACILI<sub>ij</sub></i>	2877.30 (-26.80)	3454.41 (31.44)	3435.09 (31.13)
Exporter fixed effect	Yes	Yes	Yes
Importer fixed effect	No	Yes	Yes
Year fixed effect	No	No	Yes
CONS	1389.04 (3.66)	-14276.95 (-12.10)	-6695.16 (-3.42)
R-squared	0.22	0.22	0.16
Number of obs	8547	8547	8547

Value of t-statistics in parentheses

Estevadeordal *et al.* (2008) study the exporters learning process in two cases: on the entire sample, and then on a subsample that just includes the members of the PTAs. The first estimation result shows that “learning to play with the rules of origin” had happened. This fact is explained by the reduction of the coefficient of the rules of origin from (-.150) in 1982 to (-.009) in 2001. The authors explain that three factors may cause this reduction: one, the rules of origin dummy may be influenced by “the onset of the tariff phase-outs in the newer PTAs”, because the value of the PTA does not change from the first year of integration; two, exporters are willing to satisfy the rules of origin when these rules are reduced, and therefore learn how to deal with these rules during the time; three, reduction of the “multilateral tariff[s]” and the other non-tariff barriers have reduced the rules of origin effects after Uruguay Round.

However, Estevadeordal *et al.*'s (2008) estimation's on the subsample that just comprises the PTAs' members does not reveal similar results to the first estimation. The coefficients of the years-ROO interaction dummies show positive signs for some of the years, and they are inconsistent. The authors explain that the second sample's result

presents the PTA's member learned more how to deal with the rules of origin than the non-members, and they "altered their outsourcing strategies to comply with ROO; and, indeed, in a strategy that is not as readily available to extra-PTA producers" (Estevadeordal *et al.*, 2008).

The same estimation is implemented on the exciting database in order to investigate the learning process of the rules of origin using a panel data. The results are presented in the Table 4. However, the estimation does not confirm the first estimation result obtained by Estevadeordal *et al.* (2008). The absolute values of the coefficients are increasing over the time and the signs of the coefficients of 1982, 1990, and 1991, are positive. The paper's different estimation result as compared with Estevadeordal *et al.*'s (2008) estimation may be caused by the differences in the sample size and the countries that are included in the sample. The current database includes the European Union Common Cumulation as the only agreement up to 1981. Two new agreements, SPARTECA and BANGKOK, are included in 1981 sample. However, not all of the countries that joined to these two agreements are included in the database. Therefore, the database of 1981 just comprises a few changes. The number of the free trade agreements did not change from 1981 to 1982.

Therefore, the positive sign of the ROO-1982 dummy variable may just explain that, with time, exporters learn how to deal with existing PTAs, although the CU's exporters do not face any barriers for their trade.

The number of the PTAs that are included in the sample is the same from 1983 up to 1986. In 1986, few countries had joined the EU agreement. The only agreement that lunched in 1989 was Canada-US agreement. For the years after 1989 up to 1992 not any

new agreement is included in the sample. Therefore, the positive sign of the ROO for the years 1989 to 1991 may show the irrelevant effects of these rules on the trade flow, and/or it may indicate that the exporters learn how to deal with the existence PTAs during the time. However, for the years following 1991, a significant number of new PTAs included in the sample the rules of origin negative effects on the trade flow increases. Thus, it can be concluded that the complexity of the rules of origin reduces the benefits of the PTAs. Therefore, for each new agreement the exporters need to learn the new rules and the way that they should deal with them.

**Table 4-Interactive Effect of Time and ROO on Trade, 1981-2001**

Independent variables	Dependent variable (Ln Trade),Period, 1981-2001	P-value
<i>LN(GDPi)</i>	378.15 (3.66)	0.00
<i>LN(GPDj)</i>	53.83 (3.82)	0.00
<i>LN(GDPPCi)</i>	224.30 (4.03)	0.00
<i>LN(GPDPCj)</i>	257.89 (5.57)	0.00
<i>LN(DISij)</i>	-391.85 (-17.50)	0.00
<i>PTAij</i>	1673.33 (23.49)	0.00
<i>ROORIij</i>	-1546.66 (-9.48)	0.00
<i>FACILij</i>	4200.62 (35.35)	0.00
<i>BORDERij</i>	4188.55 (51.53)	0.00
<i>COMLANGij</i>	-105.75 (-2.04)	0.04
<i>COLONYij</i>	-510.48 (-5.81)	0.00
<i>COMCOLij</i>	-74.01 (-0.99)	0.32
<i>ROO*1982</i>	0.85 (0.00)	0.99
<i>ROO*1983</i>	-10.49 (-0.05)	0.96
<i>ROO*1984</i>	-17.23 (-0.08)	0.94
<i>ROO*1985</i>	-31.76 (-0.14)	0.89
<i>ROO*1986</i>	-32.30 (-0.14)	0.89
<i>ROO*1987</i>	-47.18 (-0.21)	0.83
<i>ROO*1988</i>	-71.90 (-0.31)	0.75
<i>ROO*1989</i>	894.34 (4.05)	0.00
<i>ROO*1990</i>	941.31 (4.26)	0.00
<i>ROO*1991</i>	1019.43 (4.62)	0.00
<i>ROO*1992</i>	-341.56 (-1.92)	0.05
<i>ROO*1993</i>	-272.91 (-1.56)	0.12
<i>ROO*1994</i>	-316.74 (-1.85)	0.06
<i>ROO*1995</i>	-395.88 (-2.36)	0.02
<i>ROO*1996</i>	-365.32 (-2.18)	0.03
<i>ROO*1997</i>	-331.81 (-1.98)	0.05
<i>ROO*1998</i>	-332.63 (-1.99)	0.05
<i>ROO*1999</i>	-403.02 (-2.42)	0.02
<i>ROO*2000</i>	-553.14 (-3.32)	0.00
<i>ROO*2001</i>	-579.55 (-3.48)	0.00
<i>CONS</i>	-9972.70 (-4.79)	0.00
<b>Importer Fixed effect</b>	Yes	
<b>Exporter fixed effect</b>	Yes	
<b>Year fixed effect</b>	Yes	
<b>R-squared</b>	0.24	
<b>Number of obs</b>	8547	

Value of t-statistics in parentheses

#### 4. Conclusion

The creation of economies of scale and the gains to foreign investment have increased the number of PTAs around the world, particularly in the past 15 years. However, all of these agreements include some rules of origin. The existence of ROO is necessary to distinguish originated goods from non-originated ones, and whether substantial transformation has occurred. Thus, countries define these rules to prevent trade deflection. Defining these rules in trade agreements does not force suppliers of intermediate goods to change their source, unless they wish to satisfy preferential tariffs. Thus, the rules of origin increase the negative externality of the diversion effects of preferential trade agreements (Augier et al., 2007). These effects influence trade flows when the share of intermediate goods is higher in final goods production, and when final and intermediate goods are closely related, or when most of the final production is to satisfy export demands. The complexity of the rules of origin, and their heterogeneity make them hard to understand, leading to high administrative costs that hamper the traded sector. In addition, researchers believe that owners of scarce resources use these rules as a protectionist tool, in which their interest conflict with international trade and their income increases under protectionism.

The current paper, which is heavily based on the recent work of Estevadeordal *et al.* (2008), estimates the impact of the rules of origin on trade flows using three Gravity type models. The first model is the standard Gravity model, which is studied by Bergstrand (1985), Anderson (1979), and Head (2003). It estimates the changes of the trade flow by the changes of the countries' GDPs and their distances. The second model adds countries' GDP per capita and the cultural affinity variables to the standard Gravity model based on Estevadeordal *et al.*'s (2008). The exporters, the importers, and the years' dummy variables

are added to both models in three steps in order to study countries and years' different behavioural effects on the volume of trade. Finally, the third model includes a dummy for the year-ROO interaction to investigate the effects of the rules of origin on the trade volume for each individual year.

The estimation results of all models confirm the negative effects of rules of origin on the imported goods. These effects are reduced by the positive influences of the facilitation index. The border and language variables in the Extended Gravity model do present a significant influence on the trade flow, and possess the expected sign. However, colonization and distance variables do not show the expected sign. All the variables introduced in the Basic Gravity model have the expected signs, and are significant at 5% level. The absolute values of the preferential trade agreements, the rules of origin, and the facilitation coefficients are higher in the model that includes the importers, the exporter's and the years fixed effects.

Despite Estevadeordal *et al.*'s (2008) explanation about "learning to play by rules", the coefficient of the year-ROO dummy does not decrease over time. However, for the years 1982, 1989, 1990, and 1990, where the number of the free trade agreements did not change, and/or the countries were mostly involved in CU agreements, the rules of origin's effects are irrelevant to trade. Thus, this result may confirm the learning process of the exporters. However, whenever a new agreement is added to the database the negative effects of the rules are higher to the prior year, presenting the need for exporters to learn the complexity of the new rules.

All reviewed researchers explain the importance of rules of origin in order to eliminate the trade deflection. However, most of them suggest that the rules have to be changed to reduce the negative externalities. Some of them explain that the value-added rules are negotiable, and are more flexible to include the cumulation. Diagonal cumulation is hard to reach, and it is more possible to be added to the rules in the case where countries have the similar rules of origin. The rules of origin would be less costly if countries' rules switch to the value-added rule which itself also includes the full cumulation rule (Gasiorek *et al.*, 2007). Authors such as Hirsch (2002), offer local content ROO which is equal to tariffication.

## References

- Anderson, J.E. (1979). A theoretical foundation for the Gravity equation. *American Economic Review*, 69, 106-116.
- Augier, P., Gasiorek, M., & Lai-Tong, C. (2005). The impact of rules of origin on trade flows. *Economic Policy*, 20, 567-624.
- Anson, J., Cadot, O., Estevadeordal, A., de Melo, J., Suwa-Eisenmann, A., & Tumurchudur, B. (2005). Rules of origin in North-South preferential trading arrangements with an application to NAFTA. *Review of International Economics* 13, 501-17.
- Carrère, C., & de Melo, J. (2004). Are differential rules of origin equally costly? Estimates from NAFTA . CEPR Discussion paper series, No. 4437, London.
- Cadot, O., & de Melo, J. (2007). Why OECD countries should reform rules of origin. *The World Bank Research Observer* 23, 77-105.
- Head, K. (2003). Gravity for beginners, Retrieved Feb 1, 2008, University of British Columbia Manuscript
- Estevadeordal, A. (2000). Negotiating preferential market access -- The case of the North American free trade agreement. *Journal of World Trade*, 34, 141-166.
- Estevadeordal, A., & Suominen, K. (2004). Rules of origin: A world map and trade effects. The World Bank, Washington, DC, 17-19 June 2004.
- Estevadeordal, A., Suominen, K., Harris, J., & López-Córdova, J.E., (Eds.). (2008). *Gatekeepers of global commerce: Rules of origin and international economic integration*. Washington DC: Inter-American Development Bank.
- Georges, P. (2008). Liberalizing NAFTA rules of origin: A dynamic CGE analysis. *Review of International Economics*, 16, 672-686.
- Gasiorek, M., Augier, P., & Lai-Tong, C. Multilateralising regionalism: Relaxing rules of origin or can those PECS be flexed? Paper presented at the conference on Multilateralising Regionalism, 10-12 September 2007, Geneva, Switzerland.
- Gibbon, P. (2008). Rules of origin and the European Union preferential trade agreements, with special reference to the EU-ACP economic partnership agreements. DIIS working paper no 2008/15.

Krugman, A.O. (1999). Are preferential trading arrangements trade-liberalizing or protectionist? *The Journal of Economic Perspectives*, 13, 105-124

Martinez-zarzoso, I., Felicitas, N.D., & Horsewood, N. (2008). Are regional trading agreements beneficial? Static and dynamic panel Gravity models. *North American Journal of Economics and Finance*, 20, 46-65.

Hirsch, M. (2002). International trade law, political economy and rules of origin: A plea for a reform of the WTO Regime on rules of origin. *Journal of World Trade*, 36, 171-188.

## Appendix I

Countries included in the database:

Albania	Germany	New Zealand	Uganda	Sweden	Tanzania
Argentina	Greece	per Peru	United Kingdom	Spain	Thailand
Australia	Colombia	Hong Kong	Madagascar	Sri Lanka	Tunisia
Austria	Croatia	Hungary	Malta	Portugal	Turkey
Bangladesh	Cyprus	India	Mexico	Republic of Korea	Venezuela
Belgium	Czech Republic	Indonesia	Morocco	Romania	Viet Nam
Botswana	Denmark	Ireland	Mozambique	Russian Federation	Zambia
Brazil	Estonia	Italy	Malawi	Singapore	Zimbabwe
Bulgaria	Finland	Japan	Malaysia	Slovakia	
Canada	France	Latvia	Netherlands	United States	
Chile	Lithuania	Slovenia	Philippines	Uruguay	
China	Luxembourg	South Africa	Poland	Switzerland	

The PTAs included in the database:

1958 EU(CU)  
 1960  
 1961 EFTA(CU)(MAY01,1960)  
 1971 EU-MALTA(CU)  
 1973 EU-SWITZERLAND  
 1976  
 1981  
 1983 ANZCERTA  
 1989 CANADA-US  
 1990 ECOWAS  
 1992 EFTA-CZECH REPUBLIC-PAN  
 1993  
 1994 BAFTA-pan  
 1995 G3  
 1996 EFTA-ESTONIA-PAN  
 CZECH REPUBLI-LITHUANIA-PAN  
 1997  
 1998 CZECH REPUBLI-ESTONAI-PAN  
 1999 EU-SLOVENIA-PAN  
 2000 HUNGARY-LITHUANIA-PAN  
 NEW ZELAND-SINGAPOR-  
 2001 Jan2001

EU-CYPRUS(CU)		
SPARTECA		
EU-CZECH REPUBLIC-PAN		EU-SLOVAK-PAN
EFTA-HUNGRY-PAN		AFTA
EFTA-SLOVENIA-PAN		NAFTA
EFTA-LATVIA-PAN		EU-LITHUANIA-PAN
POLAND-LITHUANIA-PAN		EU-TURKEY(CU)
HUNGRY-TURKEY-PAN		CZECH REPUBLI-LATVIA-PAN
POLAND-LATVIA-PAN		SLOVAK-TURKEY-PAN
POLAND-TURKEY-PAN		TURKEY-BULGARIA
		TURKEY-SLOVENIA-PAN

1958  
1960  
1961  
1971  
1973  
1976  
1981  
1983  
1989  
1990  
1992  
1993  
1994  
1995  
1996  
1997  
1998  
1999  
2000

EU-CYPRUS(CU)

SPARTECA

EU-CZECH  
REPUBLIC-PAN

EFTA-HUNGRY-PAN

EFTA-SLOVENIA-PAN

EFTA-LATVIA-PAN  
POLAND-

LITHUANIA-PAN  
HUNGRY-TURKEY-  
PAN

POLAND-LATVIA-  
PAN

POLAND-TURKEY-  
PAN

MERCOSUR( NOV1991)  
EC  
ROMANIA(MAY01,1993)

SLOVENIA-LATVIA-PAN

SLOVAK-LITHUANIA-PAN  
CZECH REPUBLIC-TURKEY-  
PAN

EU-TUNISIA  
PAN(MAY,01,1998)

SADC

EU-POLAND-PAN

CEFTA(MAR,1993)

COMESA(DEC1994)

SLOVANIA-  
LITHUANIA-PAN  
SLOVENIA-CROATIA-  
PE

EU-SOUTH AFRICA

CHILE-MEXICO  
PAN(AUG1999)



