

# The Impact of Rules of Origin On Trade Flows

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## Abstract

Within any preferential trade agreement (PTA) origin rules exist in order to prevent third countries from taking advantage of the PTA concessions. The rules thus are there to preserve the existing external protection of countries within the PTA. However, depending on their formulation, they can also increase that level of external protection, resulting in trade suppression and trade diversion. This paper provides the first serious empirical examination of the possible impact of rules of origin on patterns of trade in the European context. The methodology employed is that of an augmented gravity model where we focus on the impact within the Pan-european system of cumulation. The results suggest that rules of origin do indeed restrict trade, that the cumulation of such rules could increase trade in the order of 50%, and that the impact is greater on intermediate than manufacturing trade.

Key Words : international trade, rules of origin, gravity model

## Introduction

Within any PTA the determination of the origin of a given good is needed in order to establish whether the good is eligible for a reduction, or an exemption from customs duties. Preferential origin rules exist in order to prevent third country imports from taking advantage of the concessions which have been made by the parties to the preferential agreement (ie trade deflection). Rules of origin are thus a key feature of *all* preferential trading agreements (PTAs) yet, surprisingly, there is but a relatively small theoretical literature on the possible impact of rules of origin and of the “cumulation” of such rules, and an even smaller empirical literature. The theoretical literature identifies that rules of origin, and the cumulation of those rules can impact significantly on patterns of trade. This paper examines that proposition by providing the first serious empirical evaluation of rules of origin in the European context, where the methodology involves using an augmented gravity model.

An empirical evaluation of rules of origin is particularly relevant given the growing awareness of the impact and use of those rules for protectionist purposes. That growing awareness and use arises from a combination of several factors. First the significant reductions in customs duties, and non-tariff barriers achieved under the auspices of the GATT and then WTO have brought to the fore the importance of other instruments of trade policy. This applies both to the use of restrictive rules of origin as a direct form of protection, but also indirectly where the absence of origin has been used to justify the use of anti-dumping duties [Vermulst (1992)]. Second, the multiplication of, frequently overlapping, preferential trade agreements each of which with its own and differing rules of origin has highlighted the possible distortions created by those rules and of the incompatibilities between them<sup>1</sup>. Third, the perception that rules of origin are an issue of “technical detail”, coupled with and perhaps driven by their technical opaqueness, has meant that less attention has focussed on their use as

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<sup>1</sup> This has, for example, been a major stumbling block in the Agadir process where the issue has been the compatibility of the process Agadir rules of origin with the EU-Association agreement rules of origin, and with the proposed implementation of the Pan-European rules of cumulation of rules of origin.

protectionist tools<sup>2</sup>. It has perhaps also made it easier for firms/industries to influence the formulation of those rules [see eg. Hoekman (1993), LaNassa (1995)]<sup>3</sup>. Third, changing patterns of multinational production referred to variously in the literature as ‘fragmentation’, ‘vertical specialisation’, or ‘outsourcing’ [Hummels et.al. (2001), Jones & Marjit (2001), Deardorff (2001)] has focussed more attention on intermediate trade and on barriers to such trade.

In this paper we address the issue of the impact of rules of origin and their cumulation, by focussing on rules of origin in the context of EU - partner country PTAs. In the remainder of this paper we therefore, first briefly summarise the key issues discussed in the theoretical literature; secondly, we outline the relevant EU institutional context and present some stylised facts concerning trade and the possible role of rules of origin. The third section outlines the underlying model and data, and finally we discuss the results.

## **1) Rules of Origin and Trade:**

Where a product contains no materials or processing from outside the PTA area than there should be no difficulty in conferring originating status. Where a product contains material or processing from countries not party to the PTA it is then necessary to set limits within which such inputs are allowed. A good is deemed as originating from a given PTA country if ‘sufficient working or processing’ of that good has taken place therein. Sufficient ‘working or processing’ is in turn typically determined by either (a) a change in tariff classification rule, (b) on the basis of a minimum allowable value of intermediate imports as a certain percentage of the value of the final product, or finally (c) on the basis of conforming to specific production processes. It is worth noting that for any given PTA it is usually the case that each of the above rules are employed depending on the product, where products are dealt

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<sup>2</sup> For example the main text of a typical Association Agreement between the EU and a Barcelona process country is between 20-30 pages long, while the annex covering the rules of origin at the 6-digit HS level of aggregation is close to 100 pages.

with a high degree of disaggregation. Hence in the EU-partner country PTAs the rules of origin are listed at the HS-6 digit level.

***The impact of rules of origin:*** While rules of origin need to be in place in order to preserve the existing external protection of countries within a PTA, depending on how those rules are formulated, they can also serve to increase that level of external protection<sup>4</sup>. The actual impact of rules of origin will then depend on a number of factors, such as the nature of the underlying market structure [eg. Vousden (1987), Krishna & Krueger (1995)], or on how “sufficient working or processing is defined” [Krishna & Itoh (1988)], and of course of the costs of not being able to fulfill the originating requirement – in particular the height of the importers’ tariff [Hoekman (1993), Gasiorek et.al. (2002)]. Common threads in these analyses are that restrictive rules of origin do impact on patterns of trade and production by impacting on the composition of intermediate usage, and that countries are increasingly using rules of origin in this fashion. There is then also a literature which examines the welfare impact of rules origin and considers issues such as the circumstances under which restrictive rules of origin may be welfare increasing [eg. Mussa (1984), Falvey & Reed (2002), Panagariya & Krishna (2002)], the interaction between the welfare effects and the political viability of a given FTA [Duttgupta & Panagariya (2002)], as well as the impact on firm behaviour [Ju & Krishna (1998)].

To see the effect that restrictive rules of origin can have consider the following simple characterisation: Suppose there are four countries, the EU, countries B and C and the Rest of the World (ROW). Assume initially that the EU signs an FTA with country B (with rules of origin), and another FTA with country C (with identical rules of origin). Those rules of origin can easily serve to constrain trade between countries B & C, as they may be liable to tariffs on their exports to the EU if they fail to meet the originating requirements. Suppose, therefore that rules of origin are in this

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<sup>3</sup> Examples that are often cited here concern the role of the US automobile industry in drawing up the relevant NAFTA rules of origin, or the role of textile producers in both the EU and the US rules.

<sup>4</sup> For an overview of the possible impact of rules of origin see Hoekman (1993) or Falvey & Reed (2002)

manner *constraining*, then final goods producers need to weigh up the difference between the cost of imported inputs and the possible costs of access to partner country markets. There are then several possible outcomes. First, final goods producers could choose not change their sources of supply. Where they do not meet the origin requirement they would then continue to pay tariffs on exports to the EU, hence reducing the extent of the tariff reduction implied by the FTA. Secondly they could choose to change their sources of intermediate supply. This means either supplying a greater proportion of intermediates domestically which implies *trade suppression* or, supplying a greater proportion from the EU which implies *trade diversion*. Each of these latter two are welfare reducing.

***The impact of cumulation:*** The literature described above focusses on the application of rules of origin. However a further issue arises with regard to the impact of the *cumulation* of rules of origin – and this issue is by and large completely neglected in the analytical literature. Suppose the EU signs a PTA with two (sets of) countries denoted X and Y, with identical rules of origin. A good originating in X would have tariff free access to the EU, as would a good originating in Y. However, a good produced in X, using intermediates from Y which do not meet the rules granting originating status for X's exporters to the EU, would then be subject to tariffs on exports to the EU. Hence, a good directly exported from Y to A would be granted preferential access, but a good exported from X using Y's intermediates would not. A means of overcoming such an anomaly is to allow for the cumulation of the use of materials or processes across countries with parallel or overlapping preferential agreements, ie. to allow country X to include Y's intermediates in determining origin. Cumulation therefore encourages the use of materials and processing within the preferential area(s) while maintaining a common standard for treating third country non-preferential inputs. In principle there are three types of cumulation identified in the literature. These are bilateral cumulation (between any pair of countries), diagonal cumulation (between three or more countries which have interlinked trading agreements), and total cumulation (again between three or more countries, but involving more flexibility than with diagonal cumulation).

Now assume that a system of diagonal cumulation is introduced, between countries B and C following an FTA between these countries. There are then several possible effects which can be correspondingly identified. First, *trade creation* resulting in an increase in intermediate imports from the partner country, or from the rest of the world. Secondly, a switching of intermediate imports from the EU to either cheaper partner countries or cheaper sources in the rest of the world. This is the reverse of trade diversion, and which we call *trade reorientation*. Thirdly there is the possibility of *trade expansion* (arising from the decrease in the costs of imports). Finally it is possible that there will be *trade diversion* with respect to the rest of the world. The first three of the above effects are welfare increasing, whereas the last may be welfare reducing. Diagonal cumulation between the EU, B, and C (which is precisely the pan-European system) would in principle thus allow for much freer trade between these countries, even in the presence of bilateral FTAs between each pairing. These effects are summarised in Table 1.1 below, which identifies the changes in shares of apparent consumption for a given country as a result of joining the pan-European system of diagonal cumulation. Total domestic consumption in a given country derives either from domestic sources (DC), from the EU itself (EU), from other countries who are part of the pan-European system of cumulation (Pan-EU), or from the Rest of the World (ROW).

## **2) Rules of Origin and EU PTAs**

The principal form of diagonal cumulation between the EU and its partner countries is known as the pan-European system of diagonal cumulation. The pan-European system came into force in 1997 and applies to the agreements between the EU, the EFTA countries (Norway, Iceland, Lichtenstein, Switzerland), and the Czech and Slovak Republics, Hungary, Poland, Slovenia, Romania, Bulgaria, Estonia, Latvia and Lithuania, as well as with Turkey (since 1999)<sup>5</sup>. As part of the Barcelona process the EU has also signed Association Agreements with a number of Southern Mediterranean countries

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<sup>5</sup> For a detailed discussion of the pan-European system see Driessen & Graafsma (1999).

which include Morocco, Tunisia, Algeria, Egypt, Jordan, Israel, the Palestinian Authority, Lebanon, Cyprus and Malta. These agreements typically allow for bilateral cumulation, eg. that Egypt can use EU intermediate inputs and then export the good back to the EU without paying tariffs, and vica versa. But diagonal cumulation is only allowed in the agreements with Morocco and Tunisia, though this has not been implemented. The EU is extremely keen to widen the geographical application of the pan-European system as it sees this as central to the development of trade both with its partner countries, but also between the partner countries. Implicitly if not explicitly, therefore, the EU is accepting that the lack of cumulation restricts trade between the non-cumulating countries. Hence, in the context of the EU's relationship with its' Mediterranean partners cumulation of rules of origin is increasingly seen as playing an important role. At the Toledo ministerial meeting in March 2002, it was agreed that in principle each Mediterranean partners would adopt the pan-European system<sup>6</sup>.

So the picture is one of a group of EU partner countries (CEFTA, EFTA and the Baltic states) becoming part of a unified system of diagonal cumulation in 1997, and a group of other countries currently not part of the system but hoping to join in the future. Section 2 outlined how cumulation of rules of origin can impact on trade flows, and section 4 of this paper examines this proposition formally. Before turning to that formal analysis we first provide some stylised evidence which suggests the possible role of cumulation.

If the lack of diagonal cumulation is indeed empirically important than it seems reasonable to suppose that introducing the pan-European system in 1997 would have impacted on trade flow. First, one might expect an increase in trade among cumulating countries, but with a particular growth of intermediate trade relative to final goods trade. Secondly one might expect a differential pattern of changes of intermediate imports across sources of supply around the time of cumulation.

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<sup>6</sup> Note that in order to do so, a given Mediterranean partner would have to sign free trade agreements with all the other pan-European countries, and adopt identical (ie the pan-European) rules of origin.



To examine whether this is a prima facie case for the impact of cumulation consider Table 2.1 where we present data on imports for Poland, Slovenia and the Czech Republic. For each country the table gives the imports of intermediates and final goods over time from three sources: the EU, the other pan-European countries (ie CEFTA, EFTA and the Baltic states), and the rest of the world. For each year and category the imports are given relative to the value of imports in 1997. The aim is then to see if there is any change across the years, and across categories. Of course there are a number of factors other than cumulation that will have impacted upon trade flows (eg. tariff liberalisation, exchange rate movements). However, unlike cumulation these should impact similarly on both intermediate and final goods trade.

Hence we first compare the changes in intermediate and final good flows for each supplier. If we look at Poland it can be readily seen that imports of both final goods and intermediate goods from the other Pan-European countries steadily rose prior to 1997. After 1997, Polish imports of intermediates continued to rise (by 27%) while imports of final goods fell marginally. A similar though more marked pattern is true of Slovenia. Prior to 1997 there was a much more rapid rise of final goods imports than intermediate good imports, whereas after 1997 final goods imports declined, while intermediates continued to rise. For the Czech Republic there is a similar though less pronounced pattern of changes.

Similarly if we compare intermediate and final goods imports from the EU, we can also see a reorientation towards intermediates for both Slovenia and the Czech Republic. For each of these countries intermediate imports from the EU continued to grow after 1997, whereas final goods imports fell. If we now compare the pattern of imports across sources of supply the pattern is slightly more mixed. For Poland there was a greater increase of intermediates imported from the rest of the world, but this is not true of final goods. For Slovenia the reorientation towards intermediate goods is matched by a reorientation towards both EU and other Pan-EU countries. Finally for the Czech

Republic the greatest shift in intermediates is towards the other Pan-EU countries, and with respect to the rest of the world there is the largest decline in final goods imports.

Table 2.2 provides a similar set of data but now for two specific sectors: electrical machinery (HS85) and furniture products (HS94) both of which are mixed final/intermediate goods sectors. If rules of origin, and changes in those rules are likely to have an impact than one would expect this to be at the sectoral level, and therefore the use of aggregate data may mask some of the impact. It is of some interest therefore to examine the changes in trade at a more detailed level, though recognising that changes in other trade barriers and notable tariffs are also likely to have had an impact.

The changes in the pattern of trade after 1997 at the sectoral level are quite striking. For electrical machinery for Poland and Slovenia there is a big reorientation of imports towards imports from the EU. For the Czech Republic the change in imports is focussed primarily on the other Pan-EU countries, and imports from the rest of the world, and this is accompanied by a fall in imports from the EU itself. For the Furniture sector, there is a marked reorientation of trade away from imports from the EU in the period after 1997 for all three countries, and this is accompanied by a marked rise in imports from the other Pan-European countries (for Poland) and from both the other Pan-Europeans and the Rest of the world (for Slovenia and for the Czech Republic). In short, it seems quite clear that after 97 there was a shift in the composition and sources of supply of imports for these countries. This is true at the aggregate level and even more so with regard to particular sectors. Not surprisingly there will be a number of factors explaining these changes, but equally not-surprisingly it is likely that diagonal cumulation also had a significant impact. It is to a more formal examination of this that we now turn.

### **3) Rules of Origin – an empirical evaluation**

Despite the strong perception of the importance and use of restrictive rules of origin as a form of protection there is, to our knowledge, almost a complete absence of a empirical work on this. Many

studies either cite Herin (1986) who calculated that MFN tariffs were paid on 21.5% of EFTA's imports from the EC, and 27.6% of EC imports from EFTA because of the failure to meet the origin requirements, or give anecdotal evidence. More recently Mattoo et.al. (2002) assessed the African Growth and Opportunity Acts and suggest that the benefits to Africa would have been approximately five times greater without the restrictive rules of origin that were in place (in particular with regard to yarn). Also Brenton and Machin (2002) provide convincing arguments and supporting evidence suggesting that the restrictive rules of origin applied by the EU result in tariffs being paid on a substantial proportion of supposedly tariff-free GSP imports.

The absence of empirical work is no doubt a function of the technical opacity of the application of those rules coupled with the methodological difficulties of separating out the effects of restrictive rules of origin. However, by focussing on the cumulation of rules of origin, and in the change in the geographical application of those rules in 1997 we are able to use an amended gravity model in order to provide empirical evidence on the possible degree of restrictiveness of rules of origin.

A standard gravity model describes bilateral aggregate trade flows between two countries,  $i$  and  $j$ , as a function of the levels of GDP in countries  $i$  and  $j$ , their respective populations, the distance between  $i$  and  $j$ , other geographical factors such as adjacency, cultural similarities, and preferential trading links. Gravity models have been used widely in this context (see for example Frankel, 1997; Winters & Soloaga, 2000) and at least partial theoretical justification for such models can be found in the work of Bergstrand (1985), Helpman & Krugman (1985), and Deardorff (1997). Gravity models are usually supplemented with dummy variables in order to try and capture other factors, and in particular institutional arrangements between countries which are typically expected to impact upon trade flows (eg. regional trading arrangements, or dummies to capture cultural affinities between countries such as a common language).

In the standard gravity model the imports into country  $i$  from country  $j$ , can be expressed as:

$$\ln(X_{ij}) = \alpha_0 + \alpha_1 \ln(GDP_i) + \alpha_2 \ln(Pop_i) + \alpha_3 \ln(GDP_j) + \alpha_4 \ln(Pop_j) + \alpha_5 \ln(Dist_{ij}) + \alpha_6 Z$$

Where:

$X_{ij}$ : Exports by country  $i$  to country  $j$  (in thousands of dollars)

$GDP_k$ : GDP of country  $k$ , ( $k = i, j$ )

$Pop_k$ : Population of country  $k$  ( $k = i, j$ )

$Dist_{ij}$ : Distance between the respective countries.

$Z$ : the set of dummy variable

In our work we have amended the standard gravity model in order to evaluate the potential impact of the cumulation of rules of origin. In particular the aim is to explore whether the lack of cumulation between countries may act as a constraint on trade between them. Or specifically, the objective is to determine whether trade is lower in those cases where there an importing country (eg. Tunisia) has a PTA with the EU but there is no diagonal cumulation between that importing country and the exporting country (eg. Poland). We therefore introduce a further dummy variable, which is designed to capture this possible effect.

Note that, when considering the role of diagonal cumulation here, one is necessarily considering the relationship between three countries or country groupings: the exporting country, the importing country, and those countries which are part of the system of diagonal cumulation (in this case the Pan-European system). Given this three-part relationship which underlies diagonal cumulation the  $ROO_{ij}$  dummy takes a value of 1, if the importing country has a preferential trading agreement with the EU, without diagonal (Pan-European) cumulated rules of origin with the exporting country, and a value of 0 otherwise. If cumulation impacts upon trade flows we would thus expect a negative sign on the rules of origin dummy variable.

Our estimations are based on trade flows between 38 countries - all of the EU countries, 3 EFTA countries (Iceland, Norway and Switzerland), the CEFTA countries, the Baltic States, 6 countries

taking part in the Barcelona process (Turkey, Jordan, Israel, Egypt, Tunisia, Morocco), as well as the US, Canada, China, Japan and Australia), and were carried out on the basis of total trade, manufacturing trade, and intermediate goods trade for the years 1995 and 1999. We report on a series of estimations which allow for different levels of product aggregation as well as allowing for disaggregation in the rules of origin dummy variable into specific country groupings. The three groupings we consider are the CEFTA countries + the Baltic states, the Southern Mediterranean countries, and EFTA.

Finally, in considering the factors impacting upon bilateral trade flows it would be normal to suppose that tariffs would play a role. Interestingly tariffs are rarely included in gravity modelling. Instead the absence of tariffs is captured by dummy variables capturing preferential trading agreements. In this paper, however, we do explore the role of tariffs, though this is not straightforward for several reasons. First, tariffs impact at the level of the individual product and hence using tariff averages applied to aggregate flows may not adequately capture this. Secondly, an issue arises over whether one should use import weighted tariff averages or simple tariff averages. The former tend to understate the impact of high tariffs, whereas the latter do not take any account of the relative importance of different import categories. Thirdly, even if using simple tariff averages one still needs information on both MFN and preferential tariff rates that are being applied. Moreover, even with preferential rates ideally one needs to know what proportion of imports is actually eligible for those rates, and on what proportion tariffs are still paid because eg. origin rules have not been satisfied. In practice it is therefore extremely difficult to operationalise the use of tariffs. In this paper we do this by using simple tariff averages for each country and distinguishing between preferential and non-preferential tariff rates where this is applicable.

Hence the extended version of the gravity model equation used in this paper, estimated using a Tobit estimation procedure is<sup>7</sup>,

$$\begin{aligned} \ln(X_{ij}) = & \alpha_0 + \alpha_1 \ln(GDP_i) + \alpha_2 \ln(Pop_i) + \alpha_3 \ln(GDP_j) + \alpha_4 \ln(Pop_j) + \alpha_5 \ln(Dist_{ij}) \\ & + \alpha_6 PTA_{ij} + \alpha_7 Border_{ij} + \alpha_8 Language_{ij} + \alpha_9 Tariff_{ij} + \alpha_{10} ROO_{ij} \end{aligned}$$

where the following are the relevant dummy variables :

PTA <sub>ij</sub> :	represents the relevant free trade agreements (EU, CEFTA, and EFTA).
Border <sub>ij</sub> :	assesses the potential role of a common border between countries
Language <sub>ij</sub> :	assesses the potential role of a common language between countries
Tariff <sub>ij</sub> :	gives the bilateral MFN or preferential average tariffs between countries
ROO <sub>ij</sub> :	gives the rules of origin dummy variable as described above.

### 3.1 Gravity modelling with Rules of Origin and tariffs

Table 3.1, presents the results from the gravity modelling estimation for each of the years 1995 and 1999 for total trade, manufacturing trade and intermediates good trade<sup>8</sup>. For this first set of estimations we have amended the standard model simply with the addition of the ROO variable, and without including the tariff variable.

Almost all the coefficients across the estimations presented are statistically significant. The coefficients on GDP and on distance have the expected sign and show that bilateral trade flows increase with GDP and decrease with distance. The variables on regional trading blocs (EU, CEFTA, and EFTA) are as expected all positive for 1995, whereas for 1999 the variable on the EU is slightly

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<sup>7</sup> Strictly speaking because trade values are bounded from below by zero a Tobit procedure is the correct one to use. In practice in most cases there is little difference in the results between using the Tobit methodology and a standard OLS procedure. This was not the case for intermediate trade where there were a larger number of zero entries in the data, hence we report only on the results of the Tobit estimations.

<sup>8</sup> The underlying sources of data were as follows. Trade data was derived from the UN COMTRADE databank. Data on GDP and population are obtained from IMF International Financial Statistics cd-rom. "Great Circle Distances" are calculated from data on latitudes and longitudes of capital cities available from data on latitudes and longitudes of capital cities available at [www.wcrl.ars.usda.gov/cec/java/capitals.htm](http://www.wcrl.ars.usda.gov/cec/java/capitals.htm). Intermediates good trade was derived by aggregating the trade flows at the 2-digit HS level on the basis of the BEC classification of industries.

negative though also not statistically significant for total trade. The negative variable on the EU, is consistent with results obtained by previous studies (such as Winters & Soloaga, 2000), though it does appear counter-intuitive. The variables on border and language are typically not statistically significant though they do have the correct sign.

Most interestingly from the point of view of this paper is the negative and statistically significant variable on the rules of origin dummy in all the estimations. The size of the coefficient rises between 1995 and 1999 for each category of trade. The percentage equivalent of these dummies can be found by taking  $[\exp(\text{dummy})-1]*100$ , and applying this to the ROO dummy this suggests that where there is no cumulation of rules of origin between countries trade is between 44%-48% lower in 1995, and between 49%-52% lower in 1999. It is also worth noting that in 1999 as one moves from total trade through to intermediate trade the size of the coefficient becomes larger. This might suggest that lack of cumulation matters most for intermediates good trade which is what one would intuitively expect.

As outlined earlier Pan-European cumulation was introduced in 1997. The underlying ROO dummy matrix for 1999 is thus different to that for 1995 – in particular with regard to the CEFTA and Baltic countries as well as Turkey. Each of these did not have diagonal cumulation in 1995, but they did in 1999. The difference in the coefficients between 1995–1999 should not therefore be interpreted as representing an increase in the impact of the lack of cumulation per se on trade flows over time. Instead it should be represented as indicating that impact of the lack of cumulation was larger with respect to bilateral flows between those countries not part of the pan-European system in 1999, than those in 1995. Principally therefore this applies to CEFTA/Baltic – Mediterranean trade, Mediterranean – EFTA trade, and intra-Mediterranean trade.

The results in Table 3.1 indicate that trade between non-cumulating countries is lower by up to 52%. While the lack of cumulation is one obvious explanatory factor there may be others, and in particular the role of tariffs needs to be explored. Table 3.2 therefore presents the results where the model has

now been augmented with a tariff variable, and where we disaggregate both the ROO coefficient and the tariff variables by country groupings and where we have focussed the analysis on both manufacturing and intermediate goods trade.

The left hand panel gives the results for the aggregate ROO and the aggregate tariff variable. The tariff variable is only significant in the case of manufacturing trade in 1995. This either suggests (somewhat counter-intuitively) that tariffs do not appear to play an important role in bilateral trade flows or, as discussed earlier, it reflect the difficulties of using aggregate unweighted tariffs. The signs on the other coefficients are similar to those reported on previously. With regard to the key coefficient of interest here – the ROO variable – the inclusion of the tariff term slightly lowers the magnitude of the ROO coefficient, though it remains statistically highly significant, and with a substantial potential impact on trade flows.

The right hand panel of the table gives the results where we have disaggregated our countries into three groupings – these are the CEFTA and Baltic countries ( $ROO_{C+B}$ ), the southern Mediterranean economies ( $ROO_{MED}$ ), and the rest ( $ROO_{REST}$ ). There are a number of key conclusions from these results. First, where the aggregate tariff coefficient was generally not significant, the Mediterranean and the Rest tariff coefficients are now significant and of a similar order of magnitude. In contrast the coefficient for the CEFTA and Baltic countries is not significant. Second, these results show that the aggregate ROO masked some interesting variations across country groupings. While the ROO coefficients remain highly significant in most cases, they also suggest that the lack of cumulation was particularly important for the CEFTA and Baltic countries, then for the Mediterranean economies, and least of all for the Rest (except for the case of intermediates in 1999).

Third, the statistically significant ROO coefficients are higher in 1999 for the CEFTA and Baltic countries, as well as for the Rest, while they are lower for Mediterranean countries. It is worth recalling that the trade flows to which cumulation applied changed between 1995 and 1999 with the



CEFTA and Baltic countries, and Turkey becoming part of the pan-European system. Hence the increase in the CEFTA and Baltic countries, and Rest coefficient suggests that the lack of cumulation is more important for their bilateral trade with their non-EU partners, than with their EU partners. The lack of cumulation, therefore, could constitute a more important obstacle for the development of trade between those countries already part of the pan-European system, and those perhaps considering joining the system. This in turn could be a function of the increased size of the cumulated (export and import) market for those countries which are not members of the pan-European system. Similarly the decrease in the Mediterranean ROO coefficient suggests that the lack of cumulation was perhaps more important for Turkey, than perhaps for the remaining Mediterranean economies.

Fourthly, it is interesting to note that for the CEFTA and Baltic countries, as well as for the Rest, the lack of cumulation is clearly more important with regard to intermediate trade as opposed to manufacturing trade. This appears intuitively sensible but that then raises the question of why it does not apply to the Mediterranean countries. A possible reason could be the high level of tariffs combined with the use of drawback. This is discussed in more detail in the next section where we consider the interaction between tariffs and rules of origin requirements.

### **3.2 The interaction between rules of origin and tariffs**

We have so far assumed that cumulation and tariffs independently impact upon trade. However there may be important interactions between them, and in particular that the impact of the lack of cumulation depends on tariffs – the higher the tariffs the more likely it is that these are restricting trade as opposed to the lack of cumulation<sup>9</sup>. We thus divide the ROO matrix into two sub-matrices -  $ROO^{HIGH}$  and  $ROO^{LOW}$ .  $ROO^{HIGH}$  then includes all the cases where tariffs are equal to or above a certain threshold, and  $ROO^{LOW}$  all the cases where tariffs are below that threshold. However, as we do

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<sup>9</sup> Note that one could also expect there to be interaction between the absence of cumulation between a given pair of countries, and the EU's import tariff. This arises because the higher the EU's import tariff the greater the cost to firms should they fail to meet the rules of origin requirements. It was not possible to explore this more complex form of interaction in the context of the model used here, but we note that it is potentially important.

not know the appropriate level of the threshold we proceed by using an iterative procedure. The model was estimated by fixing a threshold level for different values in a range 0.5%-20% with a step size of 0.5. The threshold level selected is then the one, which provides the highest maximum log likelihood. The results of this are given in Table 3.3, where the third row gives this tariff threshold. Hence consider the first column of results. Here we see that the threshold tariff level for manufacturing trade in 1995 is 4.5%. Where tariffs are less than this the impact of the lack of cumulation between countries is high ( $ROO^{LOW} = -1.03$ ), and where tariffs are greater than or equal to this the impact of the lack of cumulation is much lower ( $ROO^{HIGH} = -0.35$ ). The same effect is present for intermediates though with the impact of low tariffs being greater. The last two columns give the results for 1999, where the threshold tariff is slightly lower (3.5%) and the pattern of results is very similar. These results suggest that the height of the tariff does indeed significantly affect the impact of the lack of cumulation – and that the higher the tariff, the smaller the impact.

In figure 3.1 we illustrate the same effect - but graphically. The figure plots the  $ROO^{LOW}$  and  $ROO^{HIGH}$  coefficients as the threshold level rises from 0.5% to 20%. Here we plot only the statistically significant coefficients for both manufacturing and intermediate trade for 1999<sup>10</sup>. The tariff threshold which maximises the log-likelihood as given in table 3.3 above is also indicated. Consider the  $ROO^{LOW}$  coefficient for manufacturing trade in 1999. Starting from the threshold level of tariffs, as tariffs rise we can see (a) that the impact of cumulation is greater the lower are tariffs, and (b) that as the tariff threshold rises the impact of the lack of cumulation slowly decreases<sup>11</sup>. For the high tariff economies the impact of the lack of cumulation initially remains fairly constant. However at higher tariff levels and in particular above 15% the lack of cumulation becomes more important.

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<sup>10</sup> The pattern of results for 1995 was very similar so is omitted here.

<sup>11</sup> Note that at very low tariff levels (below 2.5%) the picture is reversed somewhat with the lack of cumulation impacting more on the higher tariff economies. The reason for this, is that at these low tariff levels the only countries which are included in  $ROO^{LOW}$  are the Baltic countries. These countries have extremely low tariffs (notably Estonia), and are highly open economies with trade to GDP ratios typically over 1, hence typically the lack of cumulation matters less.

This is an interesting results which on the face of it appears counter-intuitive. However, another way of interpreting this result is that the lack of cumulation is more significant for the high tariff economies. The high tariff economies are the Mediterranean economies, almost all of whom operate a widespread system of drawback. Hence it is precisely for these economies that the high tariffs on certain intermediate imports from non-cumulating countries are effectively not imposed, and that therefore it is the absence of cumulation which restricts bilateral trade.

### **3.3 The impact of changes in cumulation**

The key message which emerges from the analysis so far is that lack of cumulation may restrict trade between countries. We now turn to the final set of estimations where we explore what can be deduced by formally comparing 1995 and 1999. As we are using dummy variables to capture the role of the lack of cumulation it is of course possible that these variables are capturing other factors. Given that the pan-European system of cumulation was introduced in 1997, if it is the case that lack of cumulation is significant then the introduction of cumulation for a set of countries in 1997 should therefore have impacted upon trade between those countries, which previously did not have that cumulation. Ideally, therefore one would wish to perform a time series analysis on these countries. However, as this applies largely to the CEFTA and Baltic countries time series of sufficient length are simply not available.

Instead, therefore, we proceed by running a regression on the 1999 dataset, where we include a dummy variable (RESROO) for all those 1995 countries who became part of the Pan-European system in 1997. The expectation therefore is that trade between these countries would thus have risen as a result of cumulation, and that this coefficient would therefore have a positive sign. We have run the regression for total trade, manufacturing trade and intermediate trade, and the results are given in Table 3.4. The results indicate very clearly that trade between countries that became part of the pan-European system of cumulation (principally the CEFTA countries and the Baltic states) was higher

relative to trade with other countries between 1995-1999. The RESROO coefficient is positive and significant for all categories of trade and shows that the rise in trade was up to approximately 43% higher between these countries.

## **Conclusions:**

This paper has focussed on a very specific set of issues – the possible impact of rules of origin and of the cumulation of those rules on patterns of trade. Both economic theory, and the descriptive statistics discussed in the paper have shown that there is a strong case for suggesting that rules of origin and their cumulation can materially impact upon patterns of trade. This was also strongly borne out by the formal empirical analysis. Despite the widespread belief by policy makers and industries themselves concerning the impact of rules of origin on trade, to our knowledge this is the first serious attempt to empirically evaluate the potential extent to which rules of origin may indeed be restrictive. There are several key conclusions emerging from this paper. First, that rules of origin do appear to restrict trade, and that in aggregate the cumulation of such rules could increase trade in the order of 50%. Secondly, there is evidence to suggest that the lack of cumulation is more important with regard to intermediate trade than manufacturing trade. Thirdly, the results suggest that the higher the tariffs the smaller the impact of cumulation, though the extent of this may depend on the possibilities for drawback.

Of course, there are a number of limitations with this analysis, and it is possible that the figures provide an outer bound, as there are likely to be other omitted variables impacting upon bilateral trade which are hard to formally capture. Another key limitation concerns the aggregate nature of the analysis. To the extent that rules of origin and their cumulation matter then this is likely to be at the individual industry or product level, and this was also borne out by the changes in trade flows discussed in section 2 of this paper. This is clearly an agenda for future research.

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**Table 1.1: Cumulation and Integration Effects**

Case	Description	Change in Share of Apparent Consumption			
		DC	Pan-EU	EU	ROW
1	Trade Creation	–	+		
		–		+	
		–			+
2	Trade Reorientation		+	–	
			–	+	
			–		+
				–	+
					–
3	Trade Diversion		+	+	–
					–

**Table 2.1: Changes in Intermediate and Final goods trade**

Country	Sector	Source	Year						
			1994	1995	1996	1997	1998	1999	2000
Poland	Int	EU15	0.55	0.75	0.93	1.00	1.08	1.06	1.09
		Pan-EU	0.54	0.82	0.91	1.00	1.09	1.11	1.27
		ROW	0.59	0.79	0.98	1.00	0.95	0.88	1.34
	Final	EU15	0.65	0.74	0.86	1.00	1.17	1.11	1.08
		Pan-EU	0.49	0.59	0.84	1.00	1.04	1.07	0.98
		ROW	0.59	0.73	0.88	1.00	1.08	0.91	0.98
Slovenia	Int	EU15	0.80	1.00	0.99	1.00	1.08	1.09	1.16
		Pan-EU	0.80	1.07	0.98	1.00	1.09	1.06	1.21
		ROW	0.72	0.94	0.99	1.00	0.85	0.83	0.94
	Final	EU15	0.65	0.81	1.05	1.00	1.04	0.96	0.91
		Pan-EU	0.58	0.82	0.96	1.00	0.89	1.00	0.93
		ROW	0.89	1.02	1.02	1.00	1.06	1.00	0.93
Czech Rep.	Int	EU15	0.45	0.90	0.94	1.00	1.19	1.13	1.25
		Pan-EU	0.75	1.09	1.18	1.00	1.04	0.95	1.16
		ROW	0.60	0.91	1.03	1.00	0.95	0.82	1.20
	Final	EU15	0.60	1.03	1.05	1.00	1.07	1.00	0.95
		Pan-EU	0.78	1.01	1.24	1.00	1.01	1.05	1.05
		ROW	0.52	0.74	0.85	1.00	1.00	1.07	0.93

**Table 2.2: Changes in trade flows by sector**

Country	Sector	Source	Year						
			1994	1995	1996	1997	1998	1999	2000
Poland	85	EU15	0.42	0.58	0.80	1.00	1.20	1.23	1.25
		Pan-EU	0.35	0.50	0.64	1.00	1.16	1.69	2.05
		ROW	0.43	0.61	0.88	1.00	1.27	1.23	1.50
	94	EU15	0.39	0.56	0.72	1.00	1.27	1.30	1.19
		Pan-EU	0.11	0.29	0.53	1.00	1.52	2.10	2.94
		ROW	0.48	0.57	0.63	1.00	1.41	1.00	1.43
Slovenia	85	EU15	0.69	0.91	0.99	1.00	1.18	1.26	1.33
		Pan-EU	0.77	0.80	1.00	1.00	1.46	1.68	1.76
		ROW	0.73	1.00	1.01	1.00	1.04	1.07	1.14
	94	EU15	0.69	0.95	1.01	1.00	1.06	1.10	0.98
		Pan-EU	0.11	0.45	0.73	1.00	1.13	1.33	1.27
		ROW	0.89	1.02	1.10	1.00	1.45	1.54	1.65
Czech Rep.	85	EU15	0.30	0.78	0.95	1.00	1.30	1.13	1.43
		Pan-EU	0.61	0.95	1.39	1.00	1.09	1.04	1.06
		ROW	0.49	0.78	0.94	1.00	1.32	1.22	1.54
	94	EU15	0.56	0.88	0.95	1.00	1.19	0.99	0.91
		Pan-EU	0.87	1.01	1.31	1.00	1.11	1.35	1.56
		ROW	0.27	0.44	0.91	1.00	1.25	1.33	1.39

Note: Sector 85 = electrical machinery; Sector 94 = furniture.

**Table 3.1: Trade and Cumulation**

Variables	Total		Manufacturing		Intermediates	
	1995	1999	1995	1999	1995	1999
Constant	0.04	-4.67***	-0.07	-4.89***	0.45	-4.56***
Ln(GDP <sub>i</sub> )	0.87***	1.16***	0.89***	1.19***	0.84***	1.17***
Ln(Pop <sub>i</sub> )	0.15***	-0.09**	0.20***	-0.05	0.15***	-0.11**
Ln(GDP <sub>j</sub> )	0.72***	0.94***	0.75***	0.97***	0.72***	0.90***
Ln(Pop <sub>j</sub> )	0.14***	-0.07**	0.13***	-0.09**	0.24***	0.08*
Ln(Dist <sub>ij</sub> )	-0.97***	-0.99***	-1.07***	-1.07***	-1.15***	-1.14***
EU <sub>ij</sub>	0.23***	-0.11	0.15	-0.19**	0.18*	-0.22**
EFTA <sub>ij</sub>	2.23***	1.92***	2.03***	1.36**	2.00*	1.58
CEFTA <sub>ij</sub>	1.32***	0.90***	1.32***	0.93***	1.49***	1.05***
Border <sub>ij</sub>	0.40*	0.24	0.32	0.16	0.45***	0.39**
Lang <sub>ij</sub>	0.21	0.29***	0.19	0.21*	0.09	0.13
ROO <sub>ij</sub>	-0.63***	-0.68***	-0.65***	-0.70***	-0.58***	-0.74***

\*, \*\*, and \*\*\* next to the coefficients denote statistical significance at the 10%, 5% and 1% levels respectively.



**Table 3.2: Trade Cumulation and Tariffs**

Variables	Manufacturing		Intermediates		Manufacturing		Intermediates	
	1995	1999	1995	1999	1995	1999	1995	1999
Constant	0.55	-4.74***	0.77	-4.55***	1.11	-4.33***	1.22	-4.37***
Ln(GDP <sub>i</sub> )	0.89***	1.19***	0.84***	1.17***	0.87***	1.18***	0.81***	1.16***
Ln(Pop <sub>i</sub> )	0.19***	-0.05	0.14***	-0.11**	0.19***	-0.04	0.15***	-0.09**
Ln(GDP <sub>j</sub> )	0.65***	0.95***	0.67***	0.90***	0.63***	0.89***	0.63***	0.81***
Ln(Pop <sub>j</sub> )	0.28***	-0.06	0.32***	0.08	0.30***	0.00	0.38***	0.17***
Ln(Dist <sub>ij</sub> )	-1.04***	-1.07***	-1.13***	-1.14***	-1.05***	-1.04***	-1.10***	-1.05***
EU <sub>ij</sub>	0.11	-0.18**	0.16	-0.22**	0.21**	-0.14*	0.26***	-0.18**
EFTA <sub>ij</sub>	2.13***	1.38**	2.05*	1.58	2.19***	1.44**	2.17*	1.67
CEFTA <sub>ij</sub>	1.15***	0.94***	1.39***	1.05***	1.37***	0.76***	1.90***	0.90***
Border <sub>ij</sub>	0.30	0.15	0.44**	0.39**	0.30	0.20	0.50**	0.50***
Lang <sub>ij</sub>	0.29**	0.22*	0.14	0.14	0.35**	0.19	0.15	0.03
ROO <sub>ij</sub>	-0.59***	-0.68***	-0.55***	-0.73***				
ROO <sub>C+B</sub>					-0.82***	-1.27***	-1.08***	-1.73***
ROO <sub>MED</sub>					-1.01***	-0.55***	-0.76***	-0.28
ROO <sub>REST</sub>					-0.11	-0.43***	-0.09	-0.55***
Tariff <sub>ij</sub>	-0.03***	-0.01	-0.01	-0.0005				
Tariff <sub>C+B</sub>					0.01	0.02	0.04	0.01
Tariff <sub>MED</sub>					-0.02**	-0.01*	-0.01	-0.02*
Tariff <sub>REST</sub>					-0.02**	-0.02	-0.03***	-0.05**

\*, \*\*, and \*\*\* next to the coefficients denote statistical significance at the 10%, 5% and 1% levels respectively.

**Table 3.3: The interaction between tariffs and cumulation**

	1995		1999	
	Manuf.	Intermediate	Manuf.	Intermediate
	4.5	4.5	3.5	3.5
<i>Tariff Threshold</i>				
Constant	0.74	1.05	-4.60***	-4.36***
Ln(GDP <sub>i</sub> )	0.88***	0.83***	1.18***	1.15***
Ln(Pop <sub>i</sub> )	0.20***	0.16***	-0.04	-0.09*
Ln(GDP <sub>j</sub> )	0.64***	0.65***	0.94***	0.88***
Ln(Pop <sub>j</sub> )	0.27***	0.31***	-0.06	0.09
Ln(Dist <sub>ij</sub> )	-1.02***	-1.11***	-1.05***	-1.12***
EU <sub>ij</sub>	0.10	0.14	-0.18**	-0.21**
EFTA <sub>ij</sub>	2.09***	1.98*	1.38**	1.58
CEFTA <sub>ij</sub>	1.52***	1.95***	0.95***	1.06***
Border <sub>ij</sub>	0.32	0.47**	0.17	0.42***
Lang <sub>ij</sub>	0.28*	0.12	0.21	0.12
ROO <sup>LOW</sup>	-1.03***	-1.19***	-1.03***	-1.24***
ROO <sup>HIGH</sup>	-0.35***	-0.19	-0.51***	-0.50***
Tariff <sub>ij</sub>	-0.03***	-0.03***	-0.01	-0.01

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels respectively.

**Table 3.4: Cumulation over time**

	Total 1999	Manufacturing 1999	Intermediate 1999
Constant	-5.04***	-5.32***	-4.88***
Ln(GDP <sub>i</sub> )	1.18***	1.20***	1.18***
Ln(Pop <sub>i</sub> )	-0.10**	-0.06	-0.12**
Ln(GDP <sub>j</sub> )	0.95***	0.99***	0.91***
Ln(Pop <sub>j</sub> )	-0.08**	-0.093***	0.07*
Ln(Dist <sub>ij</sub> )	-0.98***	-1.07***	-1.14***
EU <sub>ij</sub>	-0.09	-0.17**	-0.21**
EFTA <sub>ij</sub>	1.94***	1.39**	1.60
CEFTA <sub>ij</sub>	0.67***	0.66***	0.85***
Border <sub>ij</sub>	0.23	0.14	0.39**
Lang <sub>ij</sub>	0.30***	0.22**	0.14
ROO <sub>ij</sub>	-0.64***	-0.66***	-0.70***
RESROO	0.31**	0.36***	0.26*

**Figure 3.1: The interaction between cumulation and tariffs**

