THE MATHEMATICAL INDEXES USED FOR THE ANALYSIS OF THE EFFECTS OF RULES OF ORIGIN ON INTERNATIONAL TRADE: A GENERAL OVERVIEW AND A THEORETICAL CONTRIBUTION

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Abstract:

In recent years, the pace of industrialization has accelerated, and the pace of international trade has accelerated with it, which has increased the importance of rules of origin in international trade between global economic partners. The international organizations, with their different components, have tried to give a unified definition of these mechanisms. In general, the rules of origin are the passport of industrial products. Rules of origin play a major role in international trade, as they contribute significantly to improving the origin of industrial products between various international trading partners. The results we reached highlight that the most important indicators used are divided into two parts, first, the facilitation index, which determines how easy the rules of origin are for economic actors; secondly, the restrictiveness index, which highlights the complexity of the rules of origin for companies, on the other hand, the goal of these indicators as In general, it is to know the impact of the disposition of rules of origin on international trade, and that is based on empirical studies. By analyzing the legal texts of the different FTA between countries, we discovered that other indicators could be proposed to measure the rules of origin in international trade.

Keywords: Rules of Origin, International Trade, Facilitation Index, Restrictiveness Index, Moderation Index, Overall facilitation Index

JEL Classification: F1, F13

1. INTRODUCTION

With the development of international exchanges between various trading partners, the rules of origin (ROfO) have an important place in the economy. (A. Estevadeordal & Suominen, 2005), The ROfO plays a very important role in international trade. They have become a major part of export and import operations and an element of most contracting strategies. In general, the ROfO can be defined. As a set of various laws, legal regulations and technical procedures determining where an imported product originates. The ROfO varies from country to country and is often specified in free trade agreements (FTA). However, the rules relating to a certain amount of inputs, processing, transformation, etc., must be carried out in the country. (CNUCED, 2019; A. Estevadeordal et al., 2009; WCO, 2017).

Generally, by referring to the literature on global trade, we frequently discover that a group of scientific studies has dealt with the effects of ROfO on global trade; For several years, the study

of the ROfO has been a very important topic for a group of researchers and specialists, as scientific research interest has increased in this problem that is a fundamental pillar within the global trade system, among the studies we find the following:

(Andersson, 2016; Augier et al., 2005; C. Y. Baldwin & Clark, 2005; R. Baldwin & Lopez-Gonzalez, 2015; Bamber et al., 2013; Bjuggren, C., & Lundström, 2012; Brenton, 2011; Brenton & Manchin, 2002; O Cadot et al., 2006; Oliver Cadot et al., 2002; Olivier Cadot & de Melo, 2008; Olivier Cadot & Ing, 2015; Chang & Xiao, 2015; CNUCED, 2019; Crook, 2017; David Palmeter, 1987; de Melo & Portugal-Perez, 2014; Deardorff, 2018; Devlin & Estevadeordal, 2004; Thang N. Doan & Xing, 2018; Thang Ngoc Doan & Le, 2020; Esho, 2015; A. Estevadeordal & Suominen, 2005; Antoni Estevadeordal & Suominen, 2005; Felbermayr et al., 2019; Gretton & Gali, 2005; Harrison & Weigel, 1993; Hayakawa et al., 2017; Hayakawa & Laksanapanyakul, 2017; Hoekman & Inama, 2018; Inama, 2009; Jinji & Mizoguchi, 2016; Khiati & Dinar, 2022; Kim et al., 2013; Krishna & Kruger, 1995; Medalla & Balboa, 2009; Recherche et al., 2007; Varavithya & Esichaikul, 2007; WCO, 2014, 2017, 2020), In general, this paper is intended to answer the following question:

- What are the most important indexes used to analyze the effects of ROfO on international trade?

- Is it possible to suggest other indexes to measure the impact of ROfO on international trade?

To shed light on this question, we will try to follow a qualitative methodology to analyze the most important findings of the economic literature regarding the use of statistical indicators to analyze the effects of rules of origin on global trade to know the flexibility or complexity of this ROfO. On the other hand, and to suggest other indexes, we will focus on the legal aspect of the rules of origin in various FTA.
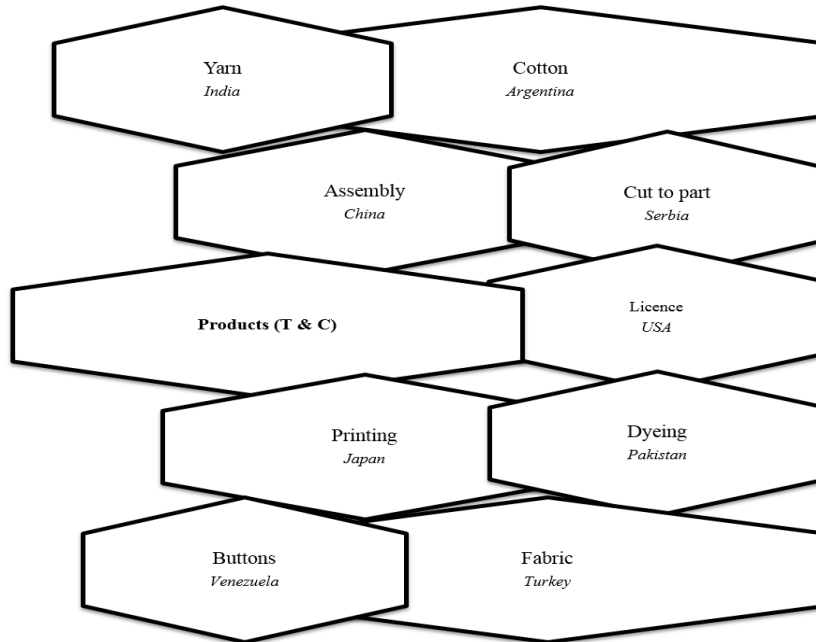
2. LITERATURE REVIEW

We are talking here about the ROfO in international trade, its historical development, and its various dimensions

2.1. Rules of origin in international trade

In international trade, ROfO can be defined in various ways. From a legal point of view (Krishna, 2005), ROfO is the criterion used to determine a product's national source. Their significance stems from the fact that, in some cases, duties and restrictions vary depending on the source of imports. Also, the ROfO is often identified as the primary reason FTA is underutilized. FTA liberalizes trade based on a product's origin using ROfO, which designates a product's origin; many countries may participate in the manufacturing process of a good. Still, there must be only one country of origin. (Andersson, 2016; Thang Ngoc Doan & Le, 2020; WTO, 2019; Y, 2007)
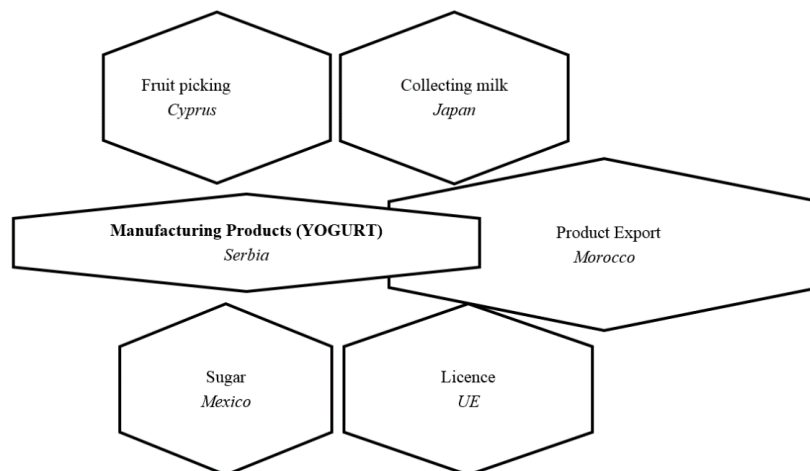
Fig 1: Manufacturing of products (T & C)

Yarn
India

Cotton
Argentina

Assembly
China

Cut to part
Serbia

Products (T & C)

Licence
USA

Printing
Japan

Dyeing
Pakistan

Buttons
Venezuela

Fabric
Turkey

Source: Authors

In this example, we note that there is a group of countries involved in the manufacture of the clothing product, where the cotton is from Argentina, the fabric is from Turkey, the used buttons are from Venezuela, the dyeing operations are in Pakistan, the printing is in Japan, and the spinning is in India, in addition to the cutting operations are in Serbia, The final assembly of the product is made in China, and the license is sourced from the USA.

Fig 2: Manufacturing Products (YOGHURT)

Fruit picking
Cyprus

Collecting milk
Japan

Manufacturing Products (YOGURT)
Serbia

Product Export
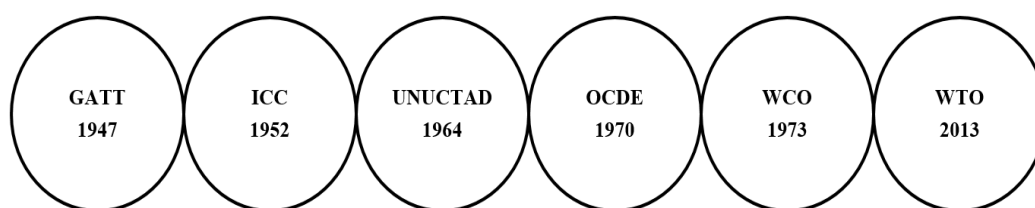*Morocco*

Sugar
Mexico

Licence
UE

Source: Authors

In this example, we noticed that the final product of the "Yogurt" was manufactured in Serbia, using pineapple fruit from Cyprus, milk from Japan, and sugar from Mexico. It will be exported to the kingdom of Morocco, so several countries are contributing to determining the ROfO; according to the UNCTAD report, ROfO is now a barometer for world trade. (CNUCED, 2019)

2.2. ROfO : History & Dimensions

A look at the history of ROfO reveals that its development began in 1952, with the International Chamber of Commerce (ICC) recommending to GATT contracting parties to define the nationality of imported goods. The problem's working group examined a text proposed by the French delegation in particular. This proposal established the substantial transformation (ST) criterion as the fundamental element for determining product origin. The diagram below highlights how a group of organizations attempted to provide a unified interpretation and study the ROfO from various dimensions.

Fig 3 : The historical Evolution of RofO

Source: Authors

Following that, several attempts were made at the intergovernmental level to regulate the issue of ROfO at UNCTAD in 1964, the OECD in 1970, the WCO in 1973, and finally, the WTO agreement on ROfO in 2013, which aims to harmonize ROOs and ensure that these rules do not create unnecessary obstacles to world trade and GVC's (GATT, 1953; Inama, 2009; UNCTAD, 2003)

Regarding the dimensions of ROfO in international trade, the economic literature refers to two dimensions, ROfO at the sector level and ROfO at the general system level. The following tables summarize the dimensions of ROfO (A. Estevadeordal & Suominen, 2005; ITC, 2020c, 2020e, 2020g, 2020a, 2020h, 2020d, 2020f, 2020b)

Table 1 : Sector rules of origin

SECTOR RULES OF ORIGIN	
CRITERIA	**CHARACTERISTICS**
Wholly obtained (OW)	Foods and allied items grown, harvested, or extracted on the territory of the State Party in question fall under the product category WO or produced, which only affects one Party to an FTA.

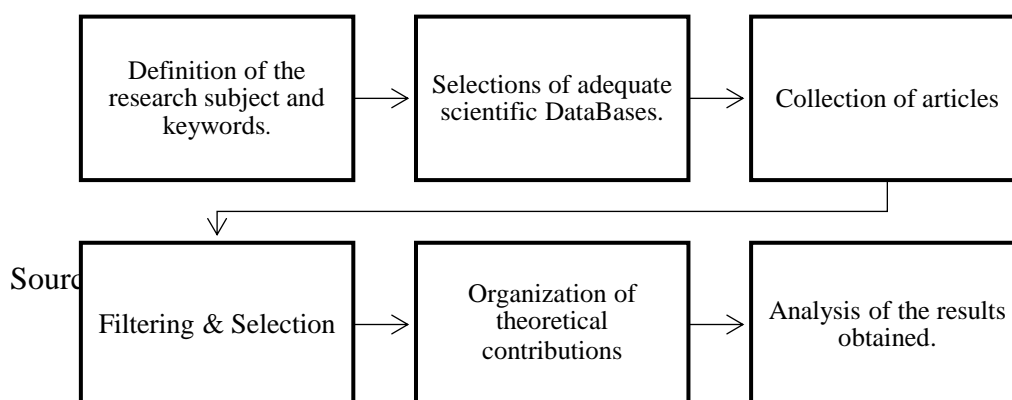| Change of tariff classification (CTC)	The CTC between manufactured goods and materials originating in countries is not a party to a preferential trade agreement used in the industrial transformation process.
Value-added content (VAC)	The VAC is an important rule that requires manufactured goods to have a minimum domestic value in the exporting country.
Technical prescription (TP)	The TP requires or prohibits using specific inputs or implementing one or more manufacturing processes for the product in question. This rule is an important component of the Textiles ROfO.
Source: (A. Estevadeordal & Suominen, 2005)	

Table 2 : System-wide rules of origin

Characteristics	
Tolerance	The Minims level rule allows a maximum percentage of non-originating items to be used without affecting the origin.
Roll-Up	This rule preserves intermediate products' original character when used in subsequent manufacturing operations.
Accumulation	Accumulation enables a party's producers to use elements from another party to the preferential trade agreement (or other parties) without losing the finished product's preferential status.
Drawback	The restriction on reimbursing customs fees on non-originating goods later incorporated into completed goods exported to parties to preferential trade agreements
Certification	The restriction on reimbursing customs fees on non-originating goods later incorporated into completed goods exported to parties to preferential trade agreements

Source: (A. Estevadeordal & Suominen, 2005)

3. METHODOLOGY

We have established some steps about the methodology used in this article connected to the general overview of the most significant indicators used to assess the consequences of laws of origin in global trade, as indicated in the figure below.

Fig 4 : Research Steps

Source

This graph highlights the approach and methodology used in this research, where we defined the research topic. After that, based on the most important Databases of important data, the important articles were selected and filtered, and after that, they were collected and data analyzed. The table below highlights the most important elements used to select articles

Table 3: Selection criteria

Inclusion Criteria	Exclusion Criteria
We choose articles that address the subject of RI & FI	Duplicate article removal, off-topic article removal
We only kept articles that were written in English.	Articles were detached where the relationship between RI & FI in world commerce was not explicitly addressed.
We will concentrate on articles that define econometric studies.	

Source: Authors

After that, we collected most of the scientific articles in the Mendeley program through the most important databases such as Elsevier, Springer, JSTOR, and Google Scholar to choose the most important.

In our scientific methodology, we will focus on selecting articles that stand out on the indicators used to measure the effects of ROfO on international exchanges, especially econometric studies using literary models; the following table summarizes the articles we have selected:

Table 4 : some empirical studies about IR & IF

Econometric Studies			Model	ROfO Index
Subject	Authors	Date		
Impact of ROfO in trade	Estevadeordal Suominen	2004	MGM	RI & FI
ROfO , spaghetti bowl & FTA with	Estevadeordal Suominen	2005	MGM	RI & FI
Multilateralising ROfO	Harris , Estevadeordal Suominen	2009	MGM	RI & FI
ROfO in NAFTA FTA	Estevadeordal De Melo Cadot Tumurchudur Suwa-Eisenmann	2002	MGM	RI
ROfO in regional FTA	Estevadeordal Verdier Cadot Suwa-Eisenmann	2006	MGM	RI & FI

ROfO in ASEAN FTA	Cadot De Melo Perez	2007	CLM	RI
ROfO in ASEAN FTA	Medalla Balboa	2009	MGM	RI
ROfO & world Trade	Inama	2009	MGM	RI
ASEAN's ROfO	Cadot Ing, L.	2016	MGM	RI
The restrictiveness of ROfO in FTA	Gretton Gali	2005	MGM	RI
Restrictiveness indices	Looi Kee Olarreaga	2009	MGM	RI
Firm heterogeneity, ROfO of accumulation	Bombard Gamberoni	2013	MGM	RI
FTA & ROfO	Chang Xiao	2015	MMIO	RI

Source: Authors

FI: Facilitation Index

RI: Restrictiveness Index

CLM: Classical Linear Model

MGM: Modified Gravity Model

MMIO: Mathematical Model of International Oligopoly

4. RESULTS

Through the previous data, we conclude, on the methodological level, the existence of several indicators that were used to measure the economic effects of the ROfO; in short, the indicators can be divided into two parts:

4.1. Restrictiveness Index of Estevadeordal (RI)

The ordinal index developed by Estevadeordal (2000) is obtained by using the ROfO applicable in the regime of the NAFTA Agreement as a reference to determine how difficult it is for exporters to comply with it; each rule is assigned a value between 1 (Rule among the least restrictive) and 7 (Rule among the most restrictive).

The index evaluates product-specific rules based on two assumptions: the requirement for a change is more restrictive at the Harmonized System chapter level than at the heading level, and so on; technical requirements associated with a change in tariff classification and the regional content requirement add to the restrictiveness of an origin rule. (Oliver Cadot et al., 2002; CNUCED, 2019; A. Estevadeordal et al., 2009; A. Estevadeordal & Suominen, 2005; Antoni Estevadeordal & Suominen, 2004, 2005).

Table 5: Specificities of RI in international trade

Elements	Characteristic
Wholly Obtained	a higher index characterizes the ROfO of WO products
Transformation	A higher index also characterizes the ROfO based on high domestic content requirements
	ROfO based on a CTP at the chapter level is more difficult to satisfy and, therefore, more restrictive than at the CTP level.
	the ROfO resulting in a CTP change of tariff position are more stringent than at the UP under position level
Measurement Scales	the ROfO at the UP level, which, in turn, are stricter than at the tariff level
	This index can help to compare the ROfO within the FTA between the different products concerned by the same FTA
	The IR can take values between 1 and 7.

Source: Authors

CTP: Change of tariff position

UP: Under position

FTA: Free trade agreement

According to the authors, the methodology for measuring restrictiveness this present as follows (A. Estevadeordal et al., 2009)

$$
\begin{aligned}
Y &= (1) \quad IF \quad (y) \quad * \le (CI) \\
Y &= (2) \quad IF \quad (CI) \quad < y * \le (CS) \\
Y &= (3) \quad IF \quad (CS) \quad < y * \le (CS) \ et\ VC) \\
Y &= (4) \quad IF \quad (CS) \ \& \ (VC) < y* \le (CH) \\
Y &= (5) \quad IF \quad (CH) \quad < y * \le (CH) \ et\ (VC) \\
Y &= (6) \quad IF \quad (CH) \ \& \ (VC) < y * \le (CC) \\
Y &= (7) \quad IF \quad (CC) \quad < y * \le (CC) \ \& \ (TECHN)
\end{aligned}
$$

Through this equation, y* represents ROfO latent level of restrictiveness (rather than its practical level of restrictiveness); CI is a tariff classification change at the tariff item level (HS 8-10), CS is a tariff classification change at the subheading level (HS-6), CH is a tariff classification change at the heading level (HS-4). CC is a tariff classification change at the chapter level (HS-2). VC stands for value content, and TECHN stands for technical requirement. (A. Estevadeordal et al., 2009)

In 2004 Suominen modified the observation rule three times in the case of ROfO for which no CTC is specified to allow coding of such ROfO in the SADC, PANEURO, and other regimes were not all ROfO feature a CTC component. (A. Estevadeordal et al., 2009)

Table 6 : Suominen Approach 2004

No	Suominen Approach 2004
First	ROfO based on the import content rule, is equated to a heading change (value 4) if the content requirement allows up to 50.00% of non-originating inputs (NOI) of the product's EXW price. When the share of permitted NOI is < 50.00%, and the import content criterion is combined with a TECHN requirement, a value of 5 is assigned
Second	ROfO with a single exception is assigned a value of 1 if the exception concerns a heading or a group of headings and a value of 2 if the exception concerns a chapter or a group of chapters.
Third	The value of 7 is assigned to ROfO based on the entirely obtained criterion (WO)

Source : (A. Estevadeordal et al., 2009)

4.2.   Restrictiveness Index Hariss

The Harris index criterion (A. Estevadeordal et al., 2009) suggests that agreements to which the USA is a party and ROfO regimes between more developed trading partners tend to be more restrictive and African agreements to be more generous. Gretton and Gali (Gretton &

Gali, 2005) find similar results, namely high restrictiveness of the NAFTA Agreement and EU agreements;

Their method is also based on the characteristics of the ROfO model and therefore adopts an ex-ante approach. Still, it widens the range of the constituent elements of the ROfO examined and includes, for example, details on the regional value content and factors affecting market access. The result may be that in the face of increasing globalization and the rise of pressure groups representing exporters, governments have been pushed to find ways to compensate industries facing increasing pressure from imported products. More restrictive ROfO are a means of compensating potential losers from liberalization. Strict ROfO also discourages producers of final products from relocating their production abroad. The results obtained with this index also seem to indicate that the large developed markets are in a dominant position because the availability of inputs is greater there, and they can then impose more restrictive ROfO. Thus, the analysis of the NAFTA Agreement application shows that thanks to its restrictive rules of origin, the USA has been able to sell its textiles at a higher price to clothing manufacturers operating in Mexico.

Table 7 : Mathematics of IR in international trade (Hariss)

	Points	Equations	Value
RI According To Harris	**Change Of Classification**	(ΔI)	+(2)
		(ΔS)	+(4)
		(ΔH)	+(6)
		(ΔC)	+(8)
		(ΔS/ΔH) W/(AI4)	+(2)
	Exception	(Exi)	+(4)
		> (Ex-I) & $\leq$ (Ex-S)	+(5)
		> (Ex-S) & $\leq$ - (Ex-H)	+(6)
		> (Ex-H) & $\leq$ (Ex-C)	+(7)
		(exC)	+(8)
	Addition	(addI)	-(5)
		> (add-I) & $\leq$ (add-S)	-(6)
		>(add-S) & $\leq$(add-H)	-(7)
		> (add-H) & <(add-C)	-(8)
		(Add) without CC47	+(8)
	Value Test	(0%) & $\leq$ (40%)	+(5)
		> (40%) & $\leq$ (50%)	+(6)
		> (50%) & $\leq$ (60%)	+(7)
		(60%)	+(8)
	Net Cost	-	+(1)
	Technical Requirement	-	+(4)
	Alternative Rule	-	-(3)
	WO	-	+(16)

Source **:** (A. Estevadeordal et al., 2009)

4.3. Facilitation Index (FI)

As studies on ROfO have developed, a set of indicators has emerged to measure the effects of the provisions on trade; the indicators are mainly aimed at explaining the different provisions that these rules represent for businesses. Among the most important indicators we find in the economic literature, the ROfO 'IF index was developed mathematically by Estevadeordal in 2000; it is based on five components of the ROfO by the regime, namely: Tolerance, Diagonal cumulation, Total cumulation, drawback and Self-certification, the maximum value of the index is (5) occurs when the allowed level of tolerance is 5% or more, and when the other four variables are allowed by the ROfO regime. (A. Estevadeordal et al., 2009; Antoni Estevadeordal & Suominen, 2004)

The empirical study (Antoni Estevadeordal & Suominen, 2004) focused on the impact of the ROfO facilitation index on the volume of international trade; their results using a gravity model show that the ROfO facilitation index of trade has a positive effect on trade flows, which means economically that the combined effect of the different provisions of the ROfO at the scale of the regime gives flexibility to their application by producers and serves to stimulate foreign trade between economic partners in the international trade market.

In their empirical work on the NAFTA area, (Antoni Estevadeordal & Suominen, 2004) proposed a mathematical methodology for the calculation of an ROfO facilitation index

composed of the different ROfO to analyze the degree of ROfO facilitation as well as to include several legal and technical ROfO provisions in a single analysis index; specifically, the authors point out that the facilitation index they proposed is indeed a composite index of ROfO provisions, this indicator is based on five ROfO components per regime namely: Tolerance Rule, Diagonal Cumulative, Total Cumulative, Drawback and Self-Certification, the maximum index value of 5 occurs when the allowed level of Minimis is 5% or more and when the other four variables are allowed by the ROfO regime.

Table 8: Variables calculations

Elements Of Calculation	Rules Of Origin		Value
Parameters Proposed By Estevadeordal In 2000	Tolerance	(β)	1
	Diagonal Accumulation	(ε)	1
	Total Accumulation	(α)	1
	Drawback	(φ)	1
	Self-certification	(σ)	1
Facilitation Index	FI =	X	5

Source: Author

$$(X) = (\beta) + (\varepsilon) + (\alpha) + (\varphi) + (\sigma) + (\acute{\omega}) + (\vartheta)$$

5. DISCUSSION

We will provide a detailed explanation of the mathematical indexes that have been proposed for a deeper analysis of the economic effects of ROfO on international trade; these indexes are OFI & IM

5.1. Improvement of the Esteveadordal facilitation index

As we have already mentioned and based on the international trade literature, authors have always tried to approach the problem of ROfO through a set of complex indicators, where we find the suggestions made by Estevadeordal (2000), the author presented an indicator called IF, which we explained earlier, where this measurement index is methodologically based on five components of ROfO per regime namely: Threshold, Diagonal Accumulation, Total Accumulation, Drawback Law and Self-Certification, After that, the authors (Antoni Estevadeordal & Suominen, 2004) used it as a variable in the gravity equations in several empirical studies, especially at NAFTA level, as researchers, we have to criticize the author's use of this indicator. Why didn't the authors use other rules in this indicator to get a clearer interpretation? Based on the legal texts of several FTA countries, we note that there are other important rules, namely direct transportation and Roll-up, in this wake; the comparative studies conducted by (WCO, 2017) show that there are other important legal provisions that can provide a fundamental basis for explaining the degree of flexibility of ROfO.

We also note that these provisions of the ROfO are found in most FTA; in what follows, we will attempt to analyze the legal arsenal of some ACP from a technical and legal point of view.

The table below briefly highlights the concentration of these two ROfO in the different FTA:

Table 9 Direct transport & Roll-up legislation (EUROMED, NAFTA, and PTP)

FTA	LEGAL ARSENAL OF ROfO IN INTERNATIONAL TRADE	
	ROLL-UP	DIRECT TRANSPORTATION
EUROMED	1. if a product that has acquired origin status by fulfilling the requirements at the list level for that same product is used in the production of another product, the conditions applied to the product in which it is incorporated do not apply to it. Any non-originating materials (NOM) that may have been used in its manufacture are not considered.	1. The preferential treatment provided by the relevant CPA applies only to products that fulfill the conditions and are transported directly between or through the territories of the contracting parties with which the accumulation is applicable by Article 3. However, products constituting one single consignment may be transported through other territories, where appropriate, with logistical operations (transshipment & warehousing) in those territories, provided that the products remain under the customs supervision of the country of transit or warehousing and do not undergo operations other than unloading or reloading or any operation designed to ensure (ITC, 2020d; WCO, 2017)
NAFTA	2. the NOM used by the manufacturer in the transformation of the product cannot calculate the RVC of the product following the provisions of paragraphs 2 or 3, including the value of the NOM used to produce OM, which is subsequently used in the production of the product.	A product will not be considered originating solely because its production satisfies the provisions of Section 401 if, after its production, it is the subject of further production or any other operation outside the territories of the parties, other than unloading, reloading or any other operation necessary to maintain it in good condition or to transport it to the territory of a Party
PTP	1. FTA Parties shall ensure that a NOM that, after undergoing further production, meets the requirements of this Chapter shall be treated as MO when the originating status of the following product is determined, whether or not the producer of the product produced that material.	1. Each Party shall take steps to ensure that an originating product retains its originating status if it is transported to the importing Party without passing through the territory of a third State

Source: Author based on the WCO comparative study (WCO, 2017)

Based on all the above, the facilitation index of the ROfO 'IF can be as follows. We take the ROfO'IF facilitation index provided by the international trade literature and add the basic Roll-up & Direct transportation rules of origin so that the result is as follows:

Table 10: Components of general facilitation Index

Elements of Calculation	Rules of Origin		Value
Parameters Proposed By Estevadeordal 2000	Tolerance	(β)	1
	Diagonal Accumulation	(ε)	1
	Total Accumulation	(α)	1
	Drawback	(φ)	1
	Self-certification	(σ)	1
Facilitation Index	FI =	X	5
New Parameters	Roll-Up	($\acute{\omega}$)	1
	Direct Transportation	(ϑ)	1
Overall Facilitation Index	ROfO'OFI =	Y	7

Source: Author

In all the above, the facilitation index can be based first on easy ROfO'FI provided theoretically by the economic literature. Then, we add other provisions of the proposed ROfO'RI so that the result is as follows, first according to the calculation method of Esteveadeordal; the ROfO'FI calculation equation takes the following form:

$$(X) = (\beta) + (\varepsilon) + (\alpha) + (\varphi) + (\sigma)$$

After adding the new parameters, the mathematical equation becomes :

$$(X) = (\beta) + (\varepsilon) + (\alpha) + (\varphi) + (\sigma) + (\acute{\omega}) + (\vartheta)$$

With :

$(\acute{\omega})$: Roll-up

(ϑ) : Direct transport

$$(Y) = (X) + (\acute{\omega}) + (\vartheta)$$

$$(ROfO'OFI) = (ROfO'FI) + (\acute{\omega}) + (\vartheta)$$

Therefore, the facilitation index of ROfO laws will be based on the number (7) and what strengthens our suggestion is that in the study we conducted, we fed our gravity equation with both ROfO as variables in the gravity model. As a result, we obtained significant and positive results that clearly explain the effect of ROfO on exports.

5.2. Moderation Index :

In the international trade literature, other indicators have been developed by several authors to measure the effectiveness, simplicity and complexity of ROfO by the regime and by specific product, including the complexity indicator also developed by Estevadeordal (2000), which is based on a rating of 1 to 7 to measure the restrictiveness of product ROfO. We also find the indicator developed by Harris (2007), which also plays an important role in measuring the difficulty of ROfO. In the wake of this, the calculation of RI is a methodologically debated issue. For example, the requirement of a transformation at a certain level can have a very different effect from one product to another.

The moderation index can be expressed by dividing the Overal Facilitation Index (OFI) we proposed by the restrictiveness index (RI)

- **Facilitation Index**

First, mathematically, we have the following equation:

$$(OFI) = (\beta) + (\varepsilon) + (\alpha) + (\varphi) + (\sigma) + (\acute{\omega}) + (\vartheta)$$

On the other hand, the facilitation index can be modeled as follows :

$$
\begin{aligned}
&R\,OfO\,'Tolerance\ (\beta) = 1\\
&R\,OfO\,'DiagonalCum\ (\varepsilon) = 1\\
&R\,OfO\,'TotalCum\ (\alpha) = 1\\
&R\,OfO\,'Drawback\ (\varphi) = 1\\
&R\,OfO\,'SelfCertification\ (\sigma) = 1\\
&R\,OfO\,'RollUp\ (\acute{\omega}) = 1\\
&R\,OfO\,'DirectTransportation\ (\vartheta) = 1
\end{aligned}
$$

- **Restrictiveness index**

As for the restrictiveness index proposed mathematically by Estevadeordal (2000), it can be modeled as follows (A. Estevadeordal et al., 2009) :

$$
\begin{aligned}
Y &= (1) \quad IF \quad (y) \quad * \leq (CI)\\
Y &= (2) \quad IF \quad (CI) \quad < y * \leq (CS)\\
Y &= (3) \quad IF \quad (CS) \quad < y * \leq (CS)\ et\ VC)\\
Y &= (4) \quad IF \quad (CS)\ \&\ (VC) < y* \leq (CH)\\
Y &= (5) \quad IF \quad (CH) \quad < y * \leq (CH)\ et\ (VC)\\
Y &= (6) \quad IF \quad (CH)\ \&\ (VC) < y * \leq (CC)\\
Y &= (7) \quad IF \quad (CC) \quad < y * \leq (CC)\ et\ (TECH)
\end{aligned}
$$

Finally, after dividing the facilitation index by the restrictiveness index, we get the suggested moderation index, which the following equation can express

$$
(ROfO\,'MI) = \frac{(ROfO\,'OFI)}{(ROfO\,'RI)}
$$

With :

ROfO 'MI = Moderation Index

ROfO 'OFI = Overal Facilitation Index

ROfO 'RI = Restrictiveness Index

The additions we have made to the facilitation index are very important, as the various legal texts of the FTA have highlighted the important role of these rules; the purpose of these simple suggestions is to open the door to other elements to interpret these rules in the context of international trade, but the methodology that has come up in the literature remains subject to wide criticism by other research. The same is true in the methodology we have proposed. It must be tainted after the methodological gap, and this ROfO'MI indicator allows us to compare two indicators: ROfO'FI and ROfO'RI. The first is related to the simplicity of ROfO , and the

second is related to the difficulty of ROfO. Thus, we will be able to better understand the degree of influence of ROfO provisions on external trade by developing logical explanations

6. CONCLUSION

 The ROfO laws in the global management of international trade constitute one of the fundamental mechanisms that characterize the global mosaic of cross-border trade in the twenty-first century, especially with the extraordinary proliferation of Mega-FTA in the different continents, in addition to being economically part of a new catalyst for global trade, these norms constitute another central discipline of access to the different markets of cross-border trade that is part of almost all FTA. Therefore, as a very powerful instrument of international trade strategy that governs access to international commodity trade markets and impacts various export flows, external supplies of raw materials and global investment decisions, this paper sought to answer the following central question: What are the most important indicators used to analyze the effects of ROfO on international trade?

The aim of this research was, on the one hand, to enrich the knowledge of the theoretical underpinnings of the emergence of the use of different types of ROfO provisions in cross-border trade and, on the other hand, to provide empirical evidence on the impact of ROfO on foreign trade. It should be noted that, In general, the most important indicators that aim to analyze the impact of ROfO on international are the facilitation index & restrictiveness index, these indicators contribute clearly to understanding the impact of ROfO on international trade, and we have tried in this article to put simple suggestions about other indicators.

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