

THEORIES AND METHODS OF REGIONAL INTEGRATION AND  
FREE TRADE AGREEMENTS

*TEORÍAS Y MÉTODOS DE INTEGRACIÓN REGIONAL  
Y TRATADOS DE LIBRE COMERCIO*

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ABSTRACT

This paper provides an introduction on the most relevant theories and types of regional integration on one hand and the most important methodologies to assess the net economic growth effects of the Free Trade Agreements (FTAs) between countries on the other. The first section briefly describes a basic theoretical framework about international integration and FTAs. The second part summarizes the current methodologies used for assessing the effects of the FTAs, as the gravity models and the Computable General Equilibrium Models (CGE), it also explains some aspects about the data. Finally, the third section presents conclusions.

*Keywords:* Free Trade Agreements; Economic Growth Effects; Computable and Other Applied General Equilibrium Models; Gravity Models.

## RESUMEN

Este documento ofrece una introducción, por un lado, sobre las teorías y tipos de integración regional más relevantes, y por otro, sobre las metodologías más importantes para evaluar los efectos netos del crecimiento económico de los Acuerdos de Libre Comercio (TLC) entre países. La primera sección brevemente describe un marco teórico básico sobre la integración internacional y los TLC. La segunda parte resume las metodologías actuales utilizadas para evaluar los efectos de los TLC, como los modelos de gravedad y los Modelos de Equilibrio General Computable (CGE), también se explican algunos aspectos sobre el manejo de los datos. Finalmente, en la tercera sección se presentan algunas las conclusiones.

*Palabras Clave:* Acuerdos de libre comercio; Efectos del crecimiento económico; Modelos computables y otros modelos aplicados de equilibrio general; Modelos gravitacionales.

*JEL Classification:* F43, F53, R11, C01, C68, C70, D58.



## 1. INTRODUCTION

Currently, scholars still debate about the origins, scope and dimensions of the process of globalization. Some of them argue that globalization is a contemporary phenomenon, while others described it as a historical process, at the same time there are several groups who defend the globalization, who propose alternatives and who are against it. For these reasons, it is pretty important to describe these phenomena's from different angles in order to find the differences and correlations between economic globalization, global integration, regional integration and free trade agreements.

Particularly, the process of economic globalization is characterized by the global and regional integration especially through Regional Trade Agreements, which were integrated in to the economic agendas of the countries after Second World War. With the Bretton Woods Agreement signed in 1944 and the creation of the GATT, more than one hundred of regional agreements have been signed worldwide and hundreds of free trade agreements among them. It represents a very important research field to the scholars interested in the theories and effects of the regional integration in the world in process of globalization.

The scope of this paper also focuses on characterizing some useful methodologies to assess the net economic growth effects involved in the Free Trade Agreements (FTAs), using as a starting point the empirical studies of Plummer, Cheong and Hamanaka (2010). There is a large set of empirical literature that uses economy wide, multi-sectoral computable general equilibrium models (CGE), gravity models, game theories models and others used in the assessment of the economic and social impacts of FTAs. The first part of the paper describes the main frameworks related to the regional integration especially in its form of FTAs; the second part focuses on analyzing different methods in order to find alternatives for those scholars who want to assess the impacts of the FTAs signed by different countries. Finally, some conclusions are presented.

## 2. GLOBALIZATION AND INTERNATIONAL INTEGRATION

David Held argues that the four main four stages of globalization are: pre-modern globalization (9-11 millennia); early modern globalization (1500-1850), modern globalization (1850-1945); and contemporary globalization (after 1945). Globalization is the center of intense debates and the attitudes

towards it ranges from unconditional support (the hyperglobalists) through the skeptics and those who seek alternative solutions (the alterglobalists) to those who severely reject the process (the anti-globalists) (Held, McGrew, Goldblatt and Perraton, 1999).

According to the International Monetary Fund, one historical process resulting of human innovation and technological progress is called economic globalization: "It refers to the increasing integration of national economies around the world, particularly through the movement of goods, services and capital across borders. This process of economic international integration, also refers to the movement of labor and knowledge across international borders" (IMF Staff *et al.*, 2008).

According to Benczes, (2010), economic globalization is a phenomenon with several inter-connected dimensions, such as: (1) the globalization of trade of goods and services; (2) the globalization of financial and capital markets; (3) the globalization of technology and communication; and (4) the globalization of production. This concept only shows the economic dimension of globalization; however, globalization is a complex process that includes all social aspects as cultural, political and environmental. Thus, from an economic perspective, economic globalization is possible due to the international integration of the economies and its inter-connected dimensions, which is finally possible through the different types of regional integration.

Nowadays, some scholars describe the process of globalization as a stance (or a paradigm) led by the core countries, who support the hypothesis that international integration, principally evidenced in the free movement of goods, services and capital across borders, including the movement of labor and knowledge across international borders, is a necessary condition for allowing peripheral countries also enjoy the profits of the globalization (Rodrik, 2011) (Wallerstein, 1976), (Prebisch, 1981). Despite this, the development gap of the world economy is evidenced in the center-periphery relations with asymmetrical interdependences in which the center exploits the periphery (Szentos, 2003).

Rodrik (2011) calls the attention on the rights of democracies to protect their own social pacts which need to be independent of the requirements of the global economy. That is to say, that the over-expanding of markets should be controlled, in order to avoid the negative direct impacts upon national well-being. Rodrik (2011) explains that the globalization has the capability to reduce poverty and diminish inequality. In contrast to the doctrine that the powers of globalization can only be assimilated when there is a completely free flow of capital with low levels of regulation, Rodrik describes that the paradox of globalization is to bring economic benefits for its equal distribution among the entire society, which means that in order to achieve this goal national democracies needs to be strengthened and international law need to be focused on the protection of all the actors involved.

From the point of view of the core-periphery process of integration, Wallerstein (1976) explains that in the capitalist world-economy, the international relations of semi-peripheral states is supported by the Marxist idea of class

division (bourgeois-proletarian) and the division of labor (core-periphery). The core-periphery analysis characterizes those regions with high-profit, high-technology, high-wage, diversified production is concentrated (the core countries) from those characterized by low-profit, low-technology, low-wage, less diversified production (the peripheral countries). Thus, in this asymmetric scenario, the major part of the profits will be always of the core producers, which can produce another crisis consequently.

Prebisch (1981) describes that the crisis of capitalism is a result from the social changes derived from the evolution of technology. The disequilibria produced by these changes affect the internal economies of both the central and the peripheral countries on the one hand and the centre-periphery relations on the other. In order to correct the external disequilibrium in the periphery, it is necessary to promote trade and financial openness, the implementation of a model of import substitution at the sub-regional and regional levels, as well as the renegotiation of the external debt, which implies the extension of maturity periods and reduction of interest rates. In order to overcome the internal disequilibrium, the global surplus should be regulated democratically including the active participation of all the social groups and actors involved.

Szentes (2003) presents an analysis of the asymmetrical interdependences involved in the structure, behavior and relations between the developed and underdeveloped countries. Szentes describes, how the dichotomy between development and underdevelopment within the world economy has been evolved during the last centuries as a concomitant, on the one hand, of the rise, in only a certain part of the world, of modern industrial capitalism in the form of national market economy and, on the other hand, of the gradual unfolding of a capitalist world economy which is uneven. Therefore, the Centre-Periphery relations with asymmetrical interdependences allow to understand the international development gap and causes of underdevelopment.

According to Szentes (2003), in order to study the manifestations and consequences of the unequal international conditions, it is necessary to view the manifestations and effects of the disintegrated internal structure of the economy. These manifestations can be mainly characterized by the six different types of asymmetrical interdependences: 1. Asymmetrical patterns of international trade of products and services; 2. Asymmetrical ownerships relations stemming from FDIs; 3. Asymmetrical relations resulting from labor migration and technical assistance; 4. Asymmetrical interdependence in international financial and monetary relations; 5. Asymmetrical interdependence in technology transfers; 6. Asymmetrical interdependence in information flows.

Finally, Palánkai (2014) argues that international integration has been developed fundamental changes in the world economy after the World War II, as a result, the development and operation of national economies are determined by global conditions when the process of global integration is consolidated by regional integrations. The global and regional integrations together represent international integration; thus, international integration is a new type of international cooperation; it creates new frameworks and structures of organization and

the working of the economy. Therefore, “a distinction should be made between globalization and global integration. The former is a long and complex process, while the latter is only one but important dimension of globalization. Global integration is a phenomenon only of recent decades” (Palánkai, 2014, p.13)<sup>1</sup>.

## 2.1. REGIONAL INTEGRATION AND REGIONAL TRADE AGREEMENTS

As a result of the Bretton Woods conference in 1944, there emerged the three global organizations that started to play the major role in international economic relations, that is, in international integration: The International Monetary Fund (IMF, 1945), the World Bank (1945) and the World Trade Organization (WTO, 1945). This research focuses on the WTO because this institution is responsible for the international trade after WWII. The WTO has its roots in the International Trade Organization (ITO) created in 1946, the ITO Job's established rules relating to world trade, business practices and international investments. However, when the idea of an ITO died in 1950, the agreements on tariffs and trade rules came into force as a separate agreement known as the General Agreement on Tariffs and Trade (GATT) (Gerber, 2013).

Gerber (2013) explains that the GATT functions through a series of trade rounds in which countries periodically negotiate a set of incremental tariff reductions. From the Kennedy Round in the 1960s and the Tokio Round in the 1970s, trade rules, tariffs, the problems of dumping subsidies to industry and non-tariff barriers to trade began to be addressed. The ignored sectors as agriculture, textile, apparel, trade services and the increased importance of non-tariff trade barriers led to the demand for a new extensive set of negotiations. These demands were consigned in the Uruguay Round of trade negotiations that started in 1986 and concluded in 1993. The GATT was successful in bringing down trade barriers gradually and increasing international trade as we can see in Table 1. After 1995, the idea of a WTO was discussed by trade ministers of the member's countries and finally, in 2001, the Doha Round proposed a Doha Development Agenda to consider trade issues of importance to developing countries consolidating the idea of the WTO.<sup>2</sup>

<sup>1</sup> Palánkai (2014), highlight two important aspects of globalization process: “1) The present stage of globalization is a certain qualitative turning point in the history of mankind and 2) One of the main features of present stage of globalization is that it is largely based on global integration” (p.14).

<sup>2</sup> See more about an economic theory of the GATT in Bagwell & Staiger, (1999)

TABLE 1. THE GATT ROUNDS

Round	Year	Number of Participants
Geneva I	1947	23
Anneey	1949	13
Torquay	1951	38
Geneva II	1956	26
Dillon	1960-1961	26
Kennedy	1964-1967	26
Tokyo	1973-1979	62
Uruguay	1986-1993	105
Doha (WTO)	2001	153

Source: Gerber (2013).

In the post-war years, the global integration was established by the multilateral trade negotiations of the GATT, the liberalization of trade and investment, deregulation and privatization of national industries and the reduction in the costs of foreign trade as a result of the evolution of the information and communications technologies and of the transportation systems. At the same time, with this trend towards globalization was the phenomena of regional integration better known as regionalism; the European Economic Community (EEC) created in 1958 is a real evidence of the regionalism in the Western Europe. Other similar trends were in Africa, Central and South America, but they were more just good intentions than a real process of regional integration. Around 239 regional trade agreements (RTAs) were notified to GATT by the end of 2001 which is the World Trade Organization (WTO). Nevertheless, many of these RTAs did not last long and starting with 2002, only 162 agreements continued to be in force (Urata, 2002).

In 1995, the General Agreement on Trade in Services (GATS) marked the beginning of the liberalization of trade in services among WTO members. The countries decided on the principles they want to apply and the sectors that would be covered, nevertheless, just some sectors are covered and the selected sectors are different among members. In the words of Cole and Guillin:

For example, in 2005, developed countries had an average of 106 sub-sectors committed, while developing countries had an average of 42 out of 160 possible sub-sectors. In fact, even within country groups, the average number of sub-sectors committed varies significantly; from 87 to 117 for developed countries and from 1 to 123 for developing economies. (Cole and Guillin, 2015, p. 69)

The foundations of all WTO and GATT agreements are the principles of national treatment and non-discrimination. National treatment is the requirement that foreign goods are treated similarly to the same domestic goods once they enter a nation's market. Non-discriminatory is personified in the concept of most-favored nation (MFN) status. MFN requires all WTO members treat each other, as well as they, treat their most-favored trading partner (this is a prohibition against discrimination) (Gerber, 2013).

The regional integration evidenced in different trade blocs and trade agreements created after the WWII made important contributions to the global integration. Since the 1980s, till 2000, the industrial production was a special feature of the developed countries like the EEUU and the EU, those who had moved their productions to the Eastern countries using the incentives as cheap labor and better production opportunities. Taking into account that the competitive advantage in domestic and international markets improved in the developing countries, the developed countries started to adopt technology and innovation-intense production models and trade policies. At the same time, the particular process of industrialization in the Far East countries is associated with the increasing of the investments in the fields of innovation and technology by the developed countries (İncekara and Ustaoglu, 2012).

## 2.2. TYPES OF REGIONAL TRADE AGREEMENTS

The development of regional integration and trade liberalization after the World War II is closely related to the creation of the GATT and with the signing of hundreds of bilateral, multilateral and regional trade agreements. Therefore, RTAs between two or more countries are another important institution (such as the IMF, WB, or WTO) in the international integration process, the more remarkable examples are the North American Free Trade Area (NAFTA) and the European Union (EU). The works of Urata (2002), Gerber (2013) and Palánkai (2014), characterize the basic forms of regional integration in different types of regional trade agreements, as described in Table 2:

TABLE 2. TYPES OF REGIONAL TRADE AGREEMENTS.

Type of Agreement	Characteristics
Partial trade	Free trade in the outputs of one or a few industries.
Free trade areas	Free trade of goods and services, removing tariffs and quotas within the group.
Customs unions	Free-trade area including common tariffs for countries outside the group.
Common market	Customs unions including a free flow of factors of production (capital and labour).
Single market	This represents a complete liberalization, that is, 'internal market' conditions, with the removal customs tariffs and quantitative restrictions, on one hand and all restrictions of a 'non-tariffs' nature on the other.



Economic union	Common market including the unification and harmonization of economic policy, which, in its final phase, can lead to the unification of domestic economic policies at the community level (community, 'common' or union policies). <sup>5</sup>
Political union	This involves the gradual transfer of power and legislative authority (parliament, government, jurisprudence, etc.) to the community level. It assumes the establishment of 'supranational structures' which can make decisions which are mandatory for all the member states.

Source: Urata (2002), Gerber (2013) and Palánkai (2014).<sup>5</sup>

One of the strongest arguments of international trade theories is that intensification of trade between states may produce improvements in the level of welfare among them, it has been the argument adopted by the nation's in order to increase the number of accords between different countries in the last three decades (Incekara and Ustaoglu, 2012). Harry Johnson (1953), about the theories of trade agreements, argues that without trade agreements, countries would attempt to exploit their international market capacity by taxing trade and the subsequent balance would not impact positively the involved countries. In this sense, Maggi and Rodriguez-clare (2007) explain that international trade agreements are an alternative to prevent trade wars in one situation where governments are a subject to political pressures.

Bagwell and Staiger (1999) argue that the trade agreements are designed in order to eliminate the inefficiency (high level of transaction costs) in international trade; consequently, the member governments may provide higher levels of welfare to its population. The assumption that a trade agreement must distribute the outcomes for its member governments in an equitable way, it should eliminate the terms-of-trade-driven restrictions in trade, which is a feature when policies are designed and applied unilaterally. Nevertheless, in order to achieve the main goal of governments to maximize national income, the manifest political constraints under which governments work in the real world need to be overcome.

### 2.3. THE FREE TRADE AGREEMENTS (FTAs)

As presented above, in another stage of regional integration, a customs union seeks to unify tariff regimes. The main aims of a common market are to allow free flows of goods and services as well as factors of production (i.e., labor and capital). A common market with a monetary union is called an economic union. Whereas, in an FTA, signatory members aim to remove tariffs across member states, but maintaining independent tariff regimes on imports from countries outside of the agreement (Plummer *et al.*, 2010).

<sup>5</sup>Economic and monetary union is the most highly developed form of economic integration and apart from the common currency, it also requires a common monetary policy and a central bank (Palánkai, 2014).

According to Bonciu and Moldoveanu (2014), after the failure of the Doha Round a partial solution for the problems of international integration arises in the global arena with the name of Free Trade Agreements (FTAs). The WTO recognizes FTAs in GATT Article 24 and in Article 5 of the GATS and are exempt from the most-favoured nation (MFN) rule. Nonetheless, the WTO uses the term regional trade agreements (RTAs) to refer to FTAs and other regional preferential trade agreements (Urata, 2002). Nowadays, we can find bilateral FTAs as well as two types of multilateral FTAs as described in Table 3.

TABLE 3. MOST COMMON TYPES OF FTAs

Number of signatories	Parties involved	Example
2	Both are countries	The Japan - Mexico FTA
> 2	All of them are countries	The NAFTA signed by United States, Canada and Mexico.
> 2	One or more are countries and also at least one of the parties is represented by an organization of economic integration that includes several countries	The FTA China - ASEAN and the FTA European Union - Colombia, Perú, Ecuador.

Source: Urata (2002).

According to Gerber (2013), the economic integration process, in its state of free trade agreement is a step for the countries to enjoy economic growth, welfare and other benefits of the economic globalization. In this scenario, the economic integration is possible through the regional trade agreements as the FTAs which are closely linked to free-trade areas. In a free-trade area, states trade goods and services across international boundaries without the limitations derived by the tariffs and quotas, which are direct limits established on imports. With a free-trade area, nations usually keep their own health, safety and technical standards and may deny entry of imports if they do not meet national standards.

Among the arguments against FTAs, we can find the studies of Grafe and Mauleon (2000), where they argue that a free trade agreement between developed and developing countries allows the free movements inputs and outputs, also may create negative outcomes or externalities. They, consider that the negative externalities are private or depletable externalities.

A private or depletable externality (acid rain, trash dumped on private properties, etc.) as the one in which one victim's consumption of the externality reduces that of others. One example of these externality is, for example, the depletable waste (like trash) emitted by the factories located in each country that is supported by the inhabitants of the emitting country without affecting other countries (Grafe and Mauleon, 2000, p. 64).

In addition, Ornelas (2005) studies the political viability of free trade agreements (FTAs). His object of analysis is the “rent destruction” that these arrangements induce. Ornelas (2005) argues that the rent destruction shows the lack of political viability of FTAs in terms of welfare. Meanwhile, Jacob Viner (1950) introduced the welfare variable into the theory of international trade in general and mainly into the theory of customs unions. Viner was the first who used the term *trade creation* and *trade diversion*, he was also the first one who explained that the welfare increased because intra-union trade expanded with the abolition of tariffs on imports from member countries. Viner also described that the reduction in the level of welfare was the result of the importers behavior, who moved from cheap world sources to expensive priced member country sources after tariffs dropped to zero on intra union trade.

The contribution of Johnson (1953) is that the concept of trade diversion and trade creation introduced by Viner should be well defined in order to differentiate its welfare effects. In this sense, when there is *trade creation* the welfare changes are a manifestation of displacement from higher cost domestic production and/or higher cost imports to lower-cost imports and when there is *trade diversion*, the welfare changes are a result of the movement of imports from a low-cost source by imports from a higher cost source.

Plummer *et al.* (2010) describe some of the most important long-term cumulative effects (i.e., dynamic effects) in the context of FTAs such as: a) economies of scale and variety, which are a result of the capability of managing transaction costs and improving technical efficiency in large-scale production; b) technology transfer and foreign direct investment (FDI), where the multinational corporations enjoy the benefits of the creation of new markets because of regional division of labor with low transaction costs and exploit economies of scale, it is necessary take in to account that the multinationals have preferential access to the FTA market; c) structural policy change and reform, which means the harmonization of the national economic policies of members; and, d) competitiveness and long-run growth effects, which occur when the improvements of productivity and efficiency helps to increase FTA members' long-run growth prospects.

The different theories described above show that the main impacts of free trade agreements affect the welfare from different angles that can be explained by using the trade creation and trade diversion analysis and this effects may also be negative externalities as the rent destruction among others. Thus, in order to assess the different impacts, the economic literature has a set of methodologies which include ex-ante and ex-post econometrical methods, with some of them are described below.

### 3. SOME METHODOLOGIES FOR IMPACTS ASSESSMENT OF FREE TRADE AGREEMENTS

Within the models of analysis of static effects, we found models like the basic conceptual model developed by Viner (1950), which introduces the fun-

damental concepts of trade creation and trade diversion, this model is only focused in a single market. In the case of models of the effects of an FTA in multiple markets the most used are general equilibrium models as Meade–Lipsey and Wonnacott–Wonnacott Models, the Lloyd–Maclaren Model and the Kemp–Wan Theorem (Plummer *et al.*, 2010). This section, is a brief review on the theoretical fundamentals of the two main important modeling methods in assessing the effects of an FTA such as: Computable General Equilibrium (CGE) models used for ex-ante analysis and gravity models used for ex-post analysis.

### 3.1. COMPUTABLE GENERAL EQUILIBRIUM MODELS

In the last two decades, theorists and scholars interested in the field of regional integration have been applying several methods and techniques in order to understand the effects of Trade Agreements (TAs). Among them, we can find an extensive literature on multi sectoral computable general equilibrium models (CGE) focused on the study of the welfare impacts of TAs, among them, the studies of McKittrick (1998), Monteagudo and Watanuki (2003), Boyer and Schuschny (2010), Plummer *et al.* (2010) and Kinnman and Hagberg (2012), Aslan, Mavu and Oduncu (2015). Wing (2004) presents his description about CGE models arguing that:

Computable general equilibrium (CGE) models are simulations that combine the abstract general equilibrium structure formalized by Arrow and Debreu with realistic economic data to solve numerically for the levels of supply, demand and price that support equilibrium across a specified set of markets. CGE models are a standard tool of empirical analysis and are widely used to analyze the aggregate welfare and distributional impacts of policies whose effects may be transmitted through multiple markets, or contain menus of different tax, subsidy, quota or transfer instruments (p. 2).

The main findings of these studies are: (a) TAs increase welfare among the members and the rest of the world and (b) aggregate trade creation is higher than trade diversion.

According to Plummer *et al.* (2010), there are four reasons for selecting CGE models for assessing FTAs: (i), CGE models are supported on a consistent microeconomic theoretical framework. (ii), CGE models produce consistent quantitative results, in this regard, policy makers can identify the winners and losers from an FTA. (iii), the CGE methods are more simple than other mathematic methods. (iv), the CGE models allow the economic policies analysis allowing the creation of new criticisms on some economic assumptions about the impacts of an FTA.

The findings of Plummer *et al.*, (2010) describe that the study of the market linkages is possible by using mathematical modeling and real world data. The neoclassical economic assumptions of the mathematical model are mainly

regarded with the motivation of agents in the economy, consumer preferences, production technology, market structure and market equilibrium conditions, which are translated into mathematical language that shows the behavior of different parameters and most of these parameters are elasticities, or share parameters such as the share of consumption demand in aggregate demand.

Plummer *et al.*, (2010) describe the simulation that shows what the economy would look like in a possible scenario of an FTA. The simulation of FTA may be successful if the model produces outcomes that match the actual observed values of endogenous variables (i.e., as trade volumes or prices) to simulate the baseline context. Therefore, the simulation of an FTA is possible by removing trade barriers between FTA partners in the model. In this manner, the model can be applied and produce new estimates. The CGE modeler can study the impact in the variables presented in Table 4.

TABLE 4. FREE TRADE AGREEMENT EFFECTS GENERATED BY COMPUTABLE GENERAL EQUILIBRIUM MODELS

Impact on welfare: <i>Yes</i> (estimated via equivalent or compensating variation)
Impact on production: <i>Yes</i> (disaggregated and aggregated)
Impact on factor returns: <i>Yes</i> (e.g., effects on skilled and unskilled labor, capital, land)
Impact on price: <i>Yes</i> (by sector, terms of trade)
Impact on trade volume: <i>Yes</i> (aggregated and disaggregated, imports and exports, changes in trade balances)
Impact on custom income: <i>Yes</i>
Impact on "dynamic" variables: <i>Depends</i> (some models don't; some include economies of scale/imperfect competition, changes in capital flows, foreign direct investment, productivity spillovers)

Source: Plummer *et al.* (2010).

Based on the quantitative model of the world economy, the approach presented by Francois and Manchin (2014) studies scenarios where there are varying levels of liberalization for non-tariff barriers (NTBs). They examine the effects of tariffs (where liberalization is relatively immediate) separate from those for NTBs (which may be gradually liberalized). After the agreement comes in to force, tariffs might be eliminated first and NTB reduction could be gradual.

### 3.2. GRAVITY MODELS

According to Plummer *et al.*, (2010), gravity models are another option for the researchers who are interested in assessing FTAs impacts from an ex-post approach. The ex-post approaches attempt to estimate the effects of trade flows if there had been no FTA. These approaches create an alternative scenario where the actual flows can be compared. Thus, we can estimate the effects in trade flows produced by an FTA.

Plummer *et al.*, (2010) explain that trade flows can be estimated by using the econometric methods named the gravity models. Tinbergen (1962) has been considered as the pioneer of gravity models, he compared the size of bilateral trade flows between two countries. Furthermore, such authors as Anderson (1979) and Bergstrand (1985) propose theoretical models based on gravity equation for trade.<sup>4</sup> One of the benefits of the gravity model in assessing an FTA is that it allows to the modeler to control on the effects of all trade determinants involved in a FTA and allow to isolate the impacts of a particular FTA on trade. The basic gravity model of trade, is inspired by the Newton's law of universal gravitation in physics, established a positive relation between the imports of country  $i$  from country  $j$  ( $M_{ij}$ ) to the gross domestic product (GDP) of the importing country ( $Y_i$ ) and the GDP of the exporting country ( $Y_j$ ) and a negative relation to the geographical distance between the importing and exporting countries ( $D_{ij}$ ):

$$M_{ij} = A \frac{Y_i Y_j}{D_{ij}} \quad [1]$$

where  $A$  is a constant.

As econometric models, the gravity models aim to explain bilateral import demand ( $M_{ij}$ ) where some of the different explanatory variables can be represented by the following variables:

- ( $Y_i$ ) represents the income of the importing country,
- ( $Y_j$ ) represents the income of the exporting country,
- ( $N_i$ ) is the per capita income of the importing country,
- ( $N_j$ ) is the per capita income of exporting countries,
- ( $D_{ij}$ ) represents a variable of the distance between the importing and exporting countries and
- ( $V_i$ ) is a vector of additional variables that may be employed if thought to be relevant.
- ( $\ln e_{ij}$ ) represents the random error term,

Translated in logarithmic language the basic gravity equation can be expressed as:

$$\ln M_{ij} = A + \delta_1 \ln(Y_i * Y_j) + \delta_2 \ln(N_i * N_j) + \delta_3 \ln D_{ij} + \delta_z \ln V_z + \ln e_{ij} \quad [2]$$

where the  $\delta$ 's are coefficients<sup>5</sup>. The assumptions of the gravity model establish that  $\delta_1$  and  $\delta_2$  must be positive, while  $\delta_3$  must be negative. In the

<sup>4</sup> The World Trade Organization (WTO) has been using this models in order to analyze the impact of several types of regional trade agreements and even disasters.

<sup>5</sup> According to the standard trade theory the coefficients of the explanatory variables could have the following signs:  $\delta_1 > 0$ ,  $\delta_2 > 0$ ,  $\delta_3 < 0$  and the behavior of the rest could be related with the additional explanatory variables.

gravity equation, geographical distance between the importing and exporting countries is represented by a proxy for trade costs, which impede bilateral trade. Other explanatory variables which implies transaction costs in the trade among members may be added to this basic equation. The effects of gravity models are summarized in the Table 5.

TABLE 5. FREE TRADE AGREEMENT EFFECTS GENERATED BY GRAVITY MODELS

Impact on welfare: <i>No</i> (estimated via equivalent or compensating variation)
Impact on production: <i>Yes</i> (disaggregated and aggregated)
Impact on factor returns: <i>No</i> (e.g., effects on skilled and unskilled labor, capital, land)
Impact on price: <i>No</i> (by sector, terms of trade)
Impact on trade volume: <i>Yes</i> (aggregated and disaggregated, imports and exports, changes in trade balances)
Impact on custom income: <i>No</i>
Impact on "dynamic" variables: <i>Yes</i> (effects are captured via regional binary variables)

Source: Plummer *et al.* (2010).

For specific cases such as NAFTA, the gravity model estimated by Jayasinghe and Sarker (2008) is based on pooled data and generalized least squares methods. His conclusions show that firstly, the share of intraregional trade is growing within NAFTA, secondly, NAFTA has affected the global trade and thirdly, despite NAFTA has increased trade among its members, it reduced the degree of openness. Additionally, Koo, Kennedy and Skripnitchenko (2006) estimate a standard gravity trade equation in order to analyze the economic effects of regional preferential trade agreements (RPTA) on agricultural trade and their possible trade creation and trade diversion effects.

Caliendo and Parro (2014) created a method to estimate sectoral trade elasticities consistent with any trade model that can be represented in a gravity equation. Based on a Ricardian model of sectoral linkages, trade in intermediate goods and sectoral heterogeneity in production, they analyze the trade and welfare effects derived from tariff changes. In the last decades, gravity models have been used as a new tool to assess the Ex-post impacts of an FTA, some of the studies related with this field are the works of Rana (2008), Hur, Alba and Park (2010), WTO and UNCTAD (2012), Arkolakis, Costinot and Rodríguez-Clare, (2012), Baier, Bergstrand and Feng (2014), Dai, Yotov and Zylkin (2014) and Anderson and Yotov (2016).

- *Gravity Model Data*

The most important data used in a gravity equation is bilateral trade, GDP, exchange rates, common language, colonial ties and distances. The International Monetary Fund Direction of Trade Statistics, or the United Nations Commodity Trade (Comtrade) Statistics Database provide information about bilateral trade flows. The International Monetary Fund's International Financial

Statistics, or the World Bank's World Development Indicators provide data on GDP in current US dollars, converted at current exchange rates. The Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) provides information about distances along with other geographic and trade-related variables.<sup>6</sup>

#### 4. CONCLUSIONS

The international integration is composed by global and regional integration; in this context, the international integration is also possible thanks to the regional trade agreements, including free trade agreements. As we seen from above, the history of regional integration and trade liberalization after the World War II is closely related to the creation of the General Agreement on Tariffs and Trade (GATT) (now the World Trade Organization-WTO) and signing of countless bilateral and regional trade agreements.

Many scholars currently have developed econometric models in order to assess the impacts of FTAs, specifically those related to economic growth and social and economic welfare of the signing parties. These methodologies rested in different types of analysis as the gravity and computable general equilibrium analysis. By using these models, it is possible to understand the ex-ante effects and ex-post effects of a FTA.

The econometric models such as CGE models and gravity models are useful to analyze the economic impacts of an FTA on the welfare of member countries, but these models do not pay attention to the social impacts of an FTA, for example, the impacts on the labor rights, social protection and welfare systems and others.

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<sup>6</sup> See more about the CEPII database in [www.cepii.fr/anglaisgraph/bdd/distances.htm](http://www.cepii.fr/anglaisgraph/bdd/distances.htm)



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