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Article

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Suggested Citation: de Azevedo Couto Firme, Vinícius; Vasconcelos, Cláudio R. Fóffano (2015) : Evolution in the use of antidumping mechanism after Uruguay round, EconomiA, ISSN 1517-7580, Elsevier, Amsterdam, Vol. 16, Iss. 3, pp. 321-342, <https://doi.org/10.1016/j.econ.2015.09.004>

This Version is available at:

<https://hdl.handle.net/10419/179603>

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Evolution in the use of antidumping mechanism after Uruguay round

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Received 14 September 2014; received in revised form 14 September 2015; accepted 15 September 2015

Available online 23 October 2015

Abstract

This paper analyzed how the main economies have used the antidumping measures (AD) after the Uruguay round, between 1995 and 2012. Therefore, some techniques were employed in order to reveal the main AD users and the trend, of using this instrument, associated to each one of them. We also tested the hypothesis that countries could converge in terms of the number of AD cases and if spatial effects could be involved in this process. Finally, a criterion was established and a model was estimated in order to identify countries that usually favor the most competitive sectors through AD practice. The results revealed that Brazil was the only heavy AD user that was counter to the general downward trend verified on the AD cases. Meanwhile, China was not only the main target of this mechanism but the cases against this country showed a growth trend also. Furthermore, we found that the number of AD cases opened by traditional and nontraditional users is converging. Finally, both the index and the estimated model have indicated that Turkey and the EU seem to be favoring the most competitive industries through the AD practice.

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JEL classification: F10; F13; F14; F15

Keywords: International economy; Commercial policy; Trade barriers; Antidumping

Resumo

Este artigo analisou o uso do mecanismo antidumping (AD) após a rodada Uruguai, entre 1995 e 2012. Para tanto, técnicas foram empregadas no intuito de revelar os principais usuários do AD e a tendência de uso associada a estes. A hipótese de que países poderiam estar convergindo em termos da aberturas de casos AD e de que efeitos espaciais estariam envolvidos neste processo também foram testadas. Por fim, um critério foi estabelecido e um modelo foi estimado a fim de identificar países que favorecem os setores mais competitivos via AD. Os resultados revelaram que o Brasil foi o único grande usuário que esteve na contramão da tendência geral de queda na abertura de casos AD. Enquanto isso, a China não apenas foi o principal alvo deste mecanismo como os casos AD, iniciados contra este país, apresentaram uma tendência de crescimento. Verificou-se ainda que o número de

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Peer review under responsibility of National Association of Postgraduate Centers in Economics, ANPEC.

casos AD, iniciados por tradicionais e não-tradicionais usuários deste instrumento, parece estar convergindo. Por fim, tanto o índice quanto os modelos estimados indicaram que Turquia e União Europeia parecem usar o AD para favorecer as indústrias mais competitivas.

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Palavras-chave: Economia Internacional; Política Externa; Barreiras Comerciais; *Antidumping*

1. Introduction

Since the General Agreement on Tariffs and Trade (GATT) creation,¹ in 1947, the world witnessed an effective reduction of the traditional commercial barriers (Ossa, 2011). However, at the beginning of the 70s, by way of obscure rules, a new kind of protective measure, termed “non-tariff barrier” (NTB), became largely used and was object of discussion of GATT/WTO in the Tokyo Round during 1973–79 (Quinn and Slayton, 1982). The situation worsened in the 80s and the *antidumping* mechanism (AD) became known as the main NTB type in use at that time.² According to Bloningen and Prusa (2001, p. 1): “since 1980, GATT/WTO members have filed more complaints under the AD statute than under all other trade laws combined, or that more AD duties are now levied in any one year worldwide than were levied in the entire period 1947–1970.”

This scenario brought the AD measures back to the GATT/WTO negotiating table as the main subject on the agenda during the Uruguay Round (1986–1994). Prusa (1999) argues that these meetings were marked by opposition between the countries considered “traditional” users of the AD measures (headed by the USA and European Union) and the “non-traditional” ones (mostly developing countries). Due to the USA’s and the European Community’s efforts, it was not possible to restrict the use of the AD.

This result ended up increasing the use of this mechanism by nontraditional countries. According to Davis (2009, p. 3): “from the end of the Uruguay Round in the mid-1990s, other users began to emerge, and developing and emerging economies now constitute the majority of users”. However, Aggarwal (2004) states that developing countries are not yet entirely familiarized with the use of AD. Actually, they are using it as a way of retaliate the traditional users due to their excessive number of AD cases opened against developing countries. He suggests that traditional users should reduce their use against developing countries, in order to avoiding an even more excessive use of AD around the world.³ In fact, even the use of AD by new users could spread the use of this mechanism by other countries. According to Vandenbussche and Zanardi (2008), there would be a “contagion effect” associated to AD. They argued that some countries could learn by seeing other nearby countries using AD. These both effects together (retaliation and contagion), could help to explain the proliferation of antidumping after Uruguay round.

Although the *antidumping* mechanism had been created for the purpose of avoiding unfair trade, preventing the big businesses from monopolizing the market, some authors defend that it is only a new way of protectionism (Nelson, 2004; Davis, 2009) that could be used for political ends (Feinberg, 1989, 2005; Araújo et al., 2001; Aggarwal, 2004;

¹ Later would become the World Trade Organization (WTO).

² Regarding the obscure character of the AD legislation, Knetter and Prusa (2003) stated that two criteria must be met for it to be considered *dumping*. First, there must be proof that the national industry suffered a great loss caused by importation. Secondly, the imported products must be commercialized at inferior prices than the “normal price” of domestic market. Since the “normal price” is usually indirectly estimated, by taking the export price charged in other countries (*the price-based method*) or via indicators associated to the production costs in the origin country (*the constructed-value method*), the result may be questionable and even manipulated by regulatory agencies, exposing the AD mechanism to pressure from the interest groups (e.g.: local businesses). Nelson (2004, p. 554–555), in discussing this mechanism, discloses that: “It is, instead, about protection and, both because it wraps itself in the mantle of fairness and because it is obscure and because its details permit greater protection to be delivered than would be the case with simple legislated protection, antidumping protection is particularly bad protection”. According to Evenett (2006, p. 733): “An important feature of the implementation of anti-dumping laws is that there is considerable room for discretion by administering officials. (...) This is not to suggest that officials are breaking the law, rather that they may be using the discretion available to them to respond to incentives to supply protection to influential domestic interests and constituencies.”

³ According to him: “AD will spread among developing countries not only due to greater liberalization pressures but also due to the fact that more and more countries would like to create an AD ability to counter the AD use against them. This may have chain effect on the use of AD and may reverse the trade gains that liberalization may ensure to them. It is therefore important to restrain the use of AD against developing countries.” (Aggarwal, 2004, p. 1053–1054).

Knetter and Prusa, 2003; Niels and Francois, 2006; Vasconcelos and Firme, 2011). Theuringer and Weiss (2001) also suggest that *antidumping* could benefit the big businesses' interests in detriment to the interests of firms with reduced level of competitiveness.

Therefore, since there was a turnaround among AD users after the Uruguay Round, this article seeks to analyze how countries began to use the *antidumping* instrument in the 1995–2012 period. Thus, this paper not only updates researches as Araújo et al. (2001), but it also revises some issues that had been established by literature, such as the definition of the “traditional” and “non-traditional” countries that use this tool, proposed by Zanardi (2004). Besides this, it advances in the subject by verifying whether: (1) the countries are converging in terms of the number of AD cases; (2) there is some type of spatial effect associated with this process; (3) the AD measures could be being used in order to benefit the more competitive sectors, as was suggested by Theuringer and Weiss (2001).⁴

Besides this introduction, this present article is structured as follows: Section 2 presents a brief history of the *antidumping* instrument evolution, as well as the main articles that motivated this project. Section 3 presents the methodology and database used to verify: (i) the associated trend to each WTO member regarding the use of AD after the Uruguay round; (ii) the countries' similarities when using the AD instrument; (iii) the hypothesis of convergence of the number of AD cases among countries and whether there is some spatial autocorrelation in this process; (iv) which kinds of sectors have been favored by the AD mechanism. The results are presented in Section 4, followed by conclusion and references.

2. The evolution in the use of the *Antidumping* instrument

The *antidumping* mechanism (AD) was developed by GATT/WTO, based on the Viner (1923) definition, aiming to avoid unfair competition. When dealing with international trade, this means that a domestic company could use this instrument whenever a foreign company would attempt to enter in its country selling products below the usual domestic price. Although the confirmation procedure of *dumping* has been honed,⁵ it is still a target of various criticisms.

Nelson (2004) states that the *antidumping* mechanism is used more for protection than for avoiding the unfair-trade. According to him, it is due to the AD legislation itself, which is obscure and excessively detailed, and, in many cases, allows the applicant to obtain a better protection than if it had sought other legal means.⁶ In the author's opinion: “*antidumping protection is particularly bad protection. This is a classic “political economy problem”: a policy this bad can't be the product of rational policy making, it must be the product of a process distorted by politics.*” Davis (2009, p. 1) summarizes how this instrument has been used lately: “*Most economists are of the opinion that antidumping has little to do with ‘unfair’ trade. In general, suspicions are high that domestic industries are turning to antidumping as a form of protectionism.*”

This lack of transparency about the AD regulation has contributed to boost this practice and nowadays it is one of the most used protection tools. Araújo et al. (2001) point out yet another reason for the vast use of this resource. According to the authors, under the argument of “unfair trade”, these measures end up turning the attention away from the lack of competitiveness of the domestic companies. It makes the *antidumping* actions attractive as an instrument of protection and grants them some political appeal.

Therefore, the AD measures, based on the fair-trade argument, are generally used to favor the less competitive companies. Although this kind of protection not follow the paradigms of orthodox theory that each country should export what it produces with greater efficiency in a barrier-free environment (Smith, 1776; Ricardo, 1821; Heckscher, 1919; Ohlin, 1933), the heterodox stream does not ignore the possible benefits caused by protection mechanisms. For the

⁴ According to Aggarwal (2004), the non-traditional users of AD would be using this tool as a way of retaliation against traditional users. According to him, the retaliation would be the main reason to explain the increased number of AD by non-traditional countries. Once convergence would imply in a reduction of AD cases by the main users and an increase in the use by non-traditional users, it could reduce the overall use of AD by reducing the retaliation effect. The hypothesis that there could be some spatial effect on the opening of AD cases was proposed by Vandenbussche and Zanardi (2008). They argued that some countries could learn by seeing other countries using AD. This process of “learn by seeing” from nearby countries may generate clusters (with a geographical dimension) of AD users.

⁵ Knetter and Prusa (2003) disclose that two criteria must be met in order to have a *dumping* practice. First, there must be proof that the national industry has suffered loss, such as a decline in profitability, caused by the importation. Secondly, the imported products must be commercialized at inferior prices than the “normal price” of the domestic market.

⁶ Nelson (2004) states that: “*A simple summary of research on dumping and antidumping would be that: dumping appears not to be much of a problem; but antidumping is a much worse problem than what its small coverage and marginal contribution to aggregate protection would imply.*”

latter group, free-trade could be harmful, mainly for the least developed and competitive economies. According to List (1841), who became known for his favor toward the protection of “Infant Industries”, countries with underdeveloped industries would not be able to compete with economies that hold a mature industrial park without some type of protection or State intervention.⁷

In spite of the controversy regarding the AD use as an instrument of protection, there is an application that goes beyond these two currents of economic thought. Theuringer and Weiss (2001) raised the hypothesis that the AD mechanism could be used not only to favor the less competitive companies, but also those that already have a high level of competitiveness. Thus, the AD instrument could cause an opposite effect to that one expected by its policy makers. In other words, rather than inhibiting the unfair-trade by protecting the less competitive companies, it would be acting as an entry barrier against new competitors, and consequently, it would be contributing to the strengthening of the already consolidated companies. Firme and Vasconcelos (2012, p. 271) also point out this possibility for AD instrument use. For them this mechanism could be used to inhibit the entry of new competitors in any specific market. Peng et al. (2008, p. 925) argue that researches related to entry barriers have concentrated efforts on economic variables, such as economies of scale and product differentiation. Therefore, papers based on institutional variables that consider trade barriers, such as the AD laws, as an entry barrier are rare.⁸

Independently of the type of AD use, it has spread. Bloningen and Prusa (2001) state that, in the last 25 years, the AD have emerged as one of the main tools of trade protection. While the traditional barriers, such as tariffs and quotas, were eliminated by the GATT/OMC treaties,⁹ the AD spread.¹⁰ Quinn and Slayton (1982) reveal that in the 70s this type of protection had evolved to the point that it became an explicitly discussed issue at the Tokyo round, promoted by GATT/OMC during 1973–79.

Regarding the distribution of its use among countries, Davis (2009, p. 3) declared that the AD instrument suffered a turnaround after 1994, with the end of the Uruguay Round: *“In terms of global usage, the introduction of a requirement for countries to report anti-dumping actions in the 1980s revealed the US and EU as heaviest users throughout the 1980s and early 1990s, followed by Australia. They continue to be heavy users. But from the end of the Uruguay Round in the mid-1990s, other users began to emerge, and developing and emerging economies now constitute the majority of users”*.

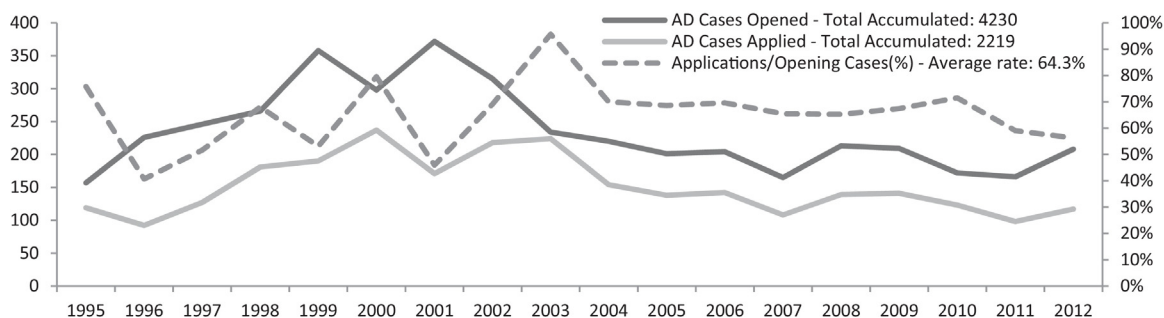
However, Aggarwal (2004) states that developing countries are not yet entirely familiarized with the use of AD. He argues that these countries are using it as a way of retaliate the traditional users due to their excessive number of AD cases opened against developing countries. He suggests that an overall reduction in the use of AD could be possible if traditional users could reduce the use against developing countries. To Vandenbussche and Zanardi (2008) the widespread use of AD among developing countries has helped to boost the overall use of this mechanism by itself. According to them, there would be a “contagion effect” associated to AD (i.e.: some countries could start to use AD just by seeing other nearby countries using it). The retaliation and the contagion effect could help to explain the proliferation this tool after the Uruguay round.

⁷ The author states that the nations’ advantages (absolute and relative) are actually constructed/built and not inherited. Thus, the state should work toward creating the necessary conditions for such advantages to excel, which many times requires an amount of protection for infant industries. Based on List, diverse authors began to criticize the classical commercial liberalism (Prebisch, 1949, 1951; Kaldor, 1972, 1977, 1981; Thirlwall, 1979). Subsequently, Chang (2002), when debating the economy of the XIX century, would say that part of the liberalizing discourse of the classical school would be influenced by the nationalist interests from the more developed economies of that time. The author wrote an interesting book on this subject retracing the history of several countries that were considered developed at that time, concluding that many of them, including USA and others, used protectionist practices before reaching a high level of development.

⁸ Regarding the possible use of AD measures as an entry barrier, Mascarenhas and Akker (1989) show that the obstacles that a firm needs to overcome to enter into a new market would be the main motive for the formation and maintenance of groups and would help to explain the good performance of companies, sectors and even countries. According to Porter (1979, 1989), if barriers did not exist any well succeeded strategy would be quickly imitated and countries would tend toward equal profitability. Thus, once AD measures may hinder the entry of foreign firms, this instrument could be used to maintain a regular market to domestic firms, avoiding the competition of new international firms.

⁹ “According to WTO statistics, industrialized countries have cut their tariffs on industrial products by an average 36 percent during the first five GATT rounds (1942–62), an average 37 percent in the Kennedy Round (1964–67), an average 33 percent in the Tokyo Round (1973–79), and an average 38 percent in the Uruguay Round (1986–94).” (Ossa, 2011, p. 122–123).

¹⁰ The growth in AD cases was so intense that, in the words of Bloningen and Prusa (2001, p 1): “since 1980, GATT/WTO members have filed more complaints under the AD statute than under all other trade laws combined, or that more AD duties are now levied in any one year worldwide than were levied in the entire period 1947–1970.”



Graph 1. Number of Antidumping measures (AD) initiated and applied between 1995 and 2012 and the acceptance rate of these commercial protection requests (applications/openings).

Source: Own elaboration according to WTO data (2013).

Regarding to Uruguay round, [Prusa \(1999\)](#) reveal that the *antidumping* issue was one of the main topics of this round of negotiations (which was marked by the opposite position between traditional and non-traditional countries about the AD use). “Broadly stated, the debate pitted the traditional users of antidumping, essentially industrialized countries such as the US and EC, against traditional non-users, primarily developing countries” ([Prusa, 1999](#), p. 1). The author reveals that, due to the efforts of The USA and The European Community, it was not possible to restrict the use of the AD. Consequently, the Uruguay Round was not only incapable of reducing the AD use among the traditional users, but ended up encouraging the less traditional countries in its use. According to [Zanardi \(2004\)](#), this meeting ended up boosting an expansion of the AD use among traditional users (such as The United States, Canada, The European Community, Australia and New Zealand) as well as in countries without tradition in the use of *antidumping* measures (such as Mexico, Brazil, Argentina and South Africa, among others).

The [Graph 1](#) shows that the number of AD cases initiated by the WTO’s countries actually rose at the end of the Uruguay Round (in 1994). The rise is noteworthy until 2001. From 2002 on, there seems to be a general decrease in the use of such measures. Literature still does not completely grasp the facts that cause oscillations in the number of AD cases. Nonetheless, [Ahn and Shin \(2011\)](#), when analyzing the number of cases that were initiated between 1995 and 2009, argue that “the overall trend of AD investigations clearly shows the counter-cyclical movement that the increases of AD investigations during the early and the late 2000s have coincided with global economic recession.” This hypothesis is also defended by [Bown \(2011\)](#). According to him, the use of the major measures of trade protection (which include the antidumping) frequently rise when there is an economic crisis. He observed this phenomenon into the following crises: 1990–1991, 1997–1998 and 2001–2002. After 2001–2002 recession, the number of AD started to decline and became more stable. This reduction in the use of AD could be explained by the end of 2001–2002 recession and due to the further liberalization negotiations, carried out by WTO members in 2001, under the ideas of Doha Round ([Bown, 2011](#)).¹¹ For [Feinberg \(2010\)](#), the role of developing countries, regarding the use of AD, increased after Uruguay Round. Consequently, the AD cases started to depend, more and more, of these countries.¹²

In 2003, maybe due to the excess of cases initiated in the last period, the relation between the quantity of open cases and the quantity of AD measures applied, reached its peak: a percentage of 95.6%. This result may be explained by the accumulation of judged measures in 2003. However, on the other hand, it could also indicate certain benevolence of the regulative authorities toward the petitioners firms. Anyhow, this relationship has stabilized in the following years. In 2008, 2009 and 2012 the number of opened cases grew again. This new rise could be related to the American

¹¹ The Doha Round was started in November 2001.

¹² To [Feinberg \(2010, p. 8\)](#): “antidumping has largely become a problem of the developing world, both in terms of major importing country users (e.g., the three largest users in 2008 were India, Brazil, and Turkey, the three largest users in 2009 so far have been Pakistan, India, and Argentina), and of targets (with China by far the largest exporting country hit by antidumping petitions, but Thailand, Taiwan and Indonesia the next largest targets of cases filed in 2008)”.

real-estate sector crisis, which spread throughout the world generating negative reflexes in the economic activities of diverse countries.¹³

Therefore, this section showed that, because of the obscure regulation of the *antidumping* practice, this mechanism has become one of the main instruments of protection of our day. Although the Uruguay Round had discussed this problem, it was not able to reduce the use of AD measures. Actually, several countries which were considered non-traditional in the use of this resource began to use it more intensely at the end of this meeting. As mentioned in this section, this phenomenon could be connected to the retaliation and the contagion effect. Furthermore, the increase in the number of AD cases during this period led some authors to suggest that this instrument has been used as an entry barrier in order to avoid new competitors and favor companies that are already competitive. Hence, given the current utilization of the AD instrument, some issues arise: (1) which countries contributed more to the increase/decrease of the number of AD cases after the Uruguay Round? (2) Which of them became the main targets of these measures? (3) Could the AD use by a country be influenced by its neighbors (contagion effect)? (4) Are these countries converging in terms of the use of this instrument? (5) How could they be grouped in terms of the AD use? (6) Are the more competitive sectors being privileged?¹⁴ These are some issues that the methods introduced in the next section seek to clarify.

3. Methodology and database

3.1. Some trends associated to the AD practice¹⁵

As shown in [Graph 1](#), the amount of AD cases initiated between 1995 and 2012 seems to be decreasing, mainly after 2001. However, this Graph does not reveal who the most responsible for this decrease would be. Thus, an attempt was made to test the trend of the AD use, associated to each country member of WTO, during this period. So, we verified the trend, associated to each country, of opening AD and of being target of these measures. For this purpose, a simple deterministic linear trend model was used, according to the description of [Perron and Yabo \(2009, p. 1\)](#)¹⁶:

$$NC_t = \mu + \beta t + \varepsilon_t \quad (1)$$

Where NC_t are the AD cases initiated during the period t ; μ is the average or constant; β is a trend parameter, determined by $t = 1, \dots, n$. Finally, ε_t is an error term.¹⁷

It is important to point out that the model proposed in Eq. (1) presents two weaknesses that we will not expound upon in this paper. Firstly, it does not consider the possibility that other variables could interact with the trend variable and, maybe, affect the results founded in Eq. (1).¹⁸ A second issue refers to the degree of freedom of the regressions. Once the *World Trade Organization* (WTO) database for countries and sectors are grouped in annual periodicity, there were only 18 observations for each regression. Alternatively, we could have used smaller periodicities (bi-annual, quarterly, monthly. . .). Although this information has already been compiled by [Bown \(2014\)](#) and is available in the World Bank website, we would need to make these database compatible with the 4125 AD cases initiated in the world

¹³ [Niels and Francois \(2006\)](#) remind us that the *antidumping* investigations in the USA and in the European Community are notably influenced by macro-economic conditions such as the level of economic activity. Nevertheless, there are no indications that the number of initiated processes will return to the high level that was seen in the 1998–2002 period.

¹⁴ The definition of “competitiveness” used in this article is based on the Exporting Base theory (see Section 3.4).

¹⁵ [McGee \(2008\)](#) and [Bown \(2011\)](#) have also analyzed the annual trend associated with the opening of AD cases. However, the first author has relied only on graphical analysis and has focused only in the main Asian economies. Meanwhile, the second author has tested different kinds of trends to several developed and developing countries.

¹⁶ In spite of being simple, this specification is still used in relevant articles. [Vogelsang and Fomby \(2002\)](#) used this function to evaluate the global warming tendency. [Bunzel and Vogelsang \(2005\)](#), using the same equation, showed that there is a trend of deterioration of the trade terms associated with the commerce between a country that export manufactured products and another one that export commodities. Regarding the antidumping literature, [Bown \(2011\)](#) has also used this type of model in order to capture the trend of opening of AD cases, associated with importing and exporting countries.

¹⁷ Note that, when we tested the trend of a country to be a target of AD measures, the NC_t variable was actually, the number of cases in which this country was target of AD measures in each t period.

¹⁸ Some authors suggest that macro-economic variables could influence the opening of AD cases ([Aggarwal, 2004](#); [Feinberg, 1989, 2005](#); [Knetter and Prusa, 2003](#); [Niels and Francois, 2006](#); [Vasconcelos and Firme, 2011](#)). In spite of being a promising agenda, this was not the aim of this research.

between 1995 and 2012, what would be an exhaustive task and consist in itself of a new research agenda.¹⁹ Thus, the results presented in [Tables 1 and 2](#) are merely an indicative of trend and do not settle the issue.

3.2. Grouping of AD users by target sectors

The aim of the *Clusters* analysis (CA) method is to verify the existence of groups within a set of observations. Therefore, it was possible to group the WTO members according to the intensity of their use of AD measures by target sector. Therefore, if a group of countries is concentrating the opening of AD cases against some specific sectors, the CA would be in charge of including them in the same *cluster* or group. Thus, it was possible to group the members of WTO according to the distribution of the AD measures initiated by these countries between 1995 and 2012 among sectors. The first step of this procedure is the definition of a similarity criteria (or dissimilarity) and a process of agglomeration (or disagglomeration) in order to maximize the homogeneity between the intra-group elements and maximize the heterogeneity of the inter-group elements ([Mingoti, 2007](#)).²⁰

Due to the wide use of the Euclidean distance,²¹ it was chosen as a measure of similarity ([Manly, 1986; Kageyama and Leone, 1999; Pereira, 2002](#)). In order to select which technique of agglomeration (or *cluster* formation) will be used, we need to define whether the model is going to be a Hierarchical model or not. [Andrade \(2009, p. 63–64\)](#) argues that the non-hierarchical methods are preferable when working with an elevated amount of information. According to him “the computational algorithms used in the non-hierarchical methods are not of the interactive type, yet they have greater capacity of analysis when it comes to data clusters with large numbers of observations than the hierarchical methods.” However, when there are a reduced number of individuals, the hierarchical analysis presents the advantage of exhibit the aggregation process of the whole sample. Thus, it is possible to trace a “historical tree” of the grouping process, from the moment in which each individual is included alone in a single group (maximum homogeneity), until the moment in which all individuals are in the same group (maximum heterogeneity). All this grouping process can be viewed by a figure called “Dendrogram” that allows recognizing the outliers from the data set ([Timm, 2002](#)).²² For this research, the dendrogram is attractive due to the reduced amount of information (just 47 countries initiated AD cases within 1995–2012) that enabled a complete view of the individual (country) grouping process. Thus, the agglomerative hierarchical analysis, which consists in initiating the grouping process considering each individual as a group, was chosen. Thereafter, a measure of similarity is used to continually group the elements until there is only one group with all the individuals ([Kageyama and Leone, 1999](#)).²³ Finally, a hierarchical grouping method must be defined. Literature points out 5 options: (1) simple linkage, (2) average linkage, (3) complete linkage, (4) centroids’ method, (5) Ward’s method.²⁴

3.3. The influence of spatial factors on the AD cases and convergence

This section describes the methods used to test the existence of spatial autocorrelation and the convergence hypothesis associated to the number of AD cases initiated by traditional and non-traditional countries during the period of 1995

¹⁹ In the case of Brazil, [Vasconcelos and Firme \(2011\)](#) used quarterly data instead of annual in order to verify whether the macroeconomic factors could explain the opening of AD cases.

²⁰ It is important to remember that this method evaluates the interdependent relations among the variables without establishing a causal relationship (it is not a regression).

²¹ Considering an analysis for the case of 2 vectors, X_l and X_k , with $l \neq k$, the Euclidian distance is: $d(X_l, X_k) = \sqrt{[(X_l - X_k)I(X_l - X_k)]2}$, where I represents an identity matrix.

²² The non-hierarchical techniques require a previous specification of the number of desired groups (k). Thus, in each stage of grouping process new *clusters* may be established through the division or junction of the groups formed in earlier steps until reaching the k groups. In other words, if in any step of the algorithm two elements are placed in a same group, they may be replaced and not remain together in the final partition. Therefore, in opposite to the hierarchical models, the possibility of building dendograms does not exist ([Andrade, 2009; Mingoti, 2007](#)).

²³ The “Divisive” approach could be used too. In this case, dissimilarity criteria are used to disaggregate the initial group (with all individuals) until each group contains one individual alone ([Mingoti, 2007](#)).

²⁴ The average linkage produces groups with similar variance and it tends to present better partitions than the simple and complete linkages ([Mingoti, 2007](#)) while the Ward’s method (1963) tends to produce *clusters* with minimum variance and with a similar amount of intra-group elements. [Afonso and Melão \(2007\)](#) tested these 5 methods and verified that only the average linkage and the Ward method created groups with economical coherence. In this paper, we chose the average linkage.

and 2012.²⁵ In other words, it was verified whether the number of cases opened by a country can be explained by the amount of cases initiated by its neighbors (if it is true, there will be spatial autocorrelation) and whether the number of AD measures initiated by traditional and non-traditional countries tend to converge.

In order to measure the spatial autocorrelation, the Moran's I index, proposed by Cliff and Ord (1981), was calculated. Thus, I values higher than their expected value $E(I) = -1/(n-1)$ indicate that there is a positive spatial autocorrelation.²⁶ To Vandenbussche and Zanardi (2008) there would be a "contagion effect" associated to AD (i.e.: some countries could start to use AD just by seeing other nearby countries using it). Therefore, we have used the Moran's I test in order to verify if there is some evidence that corroborate this contagion effect. Thereby, a positive value in the test would indicate that the number of AD measures, opened by a country i , would increase if the number of AD measures, opened by its neighborhood countries, increased (in this case, there would be an evidence of contagion effect). Formally, the Moran's I statistic is:

$$I_i = \left(\frac{n}{S_0} \right) \left[\frac{(z'_t W z_t)}{(z'_t z_t)} \right] \quad t = 1, \dots, n \quad (2)$$

Where z_t is a vector with n observations (measured by the deviation in relation to the average) for the t year.²⁷ W is a matrix of spatial weights: the w_{ii} elements on the diagonal are equal to zero, while the w_{ij} elements indicate the way in which a region i is spatially connected to another j . The S_0 term is a scalar equal to the sum of all elements of W .²⁸ Aiming to raise the rigor of this test; several spatial matrices were tested²⁹ in order to identify which one would capture the largest spatial autocorrelation associated to our variable of interest $\{NC_t\}$ within the analyzed period.³⁰

Having done this, the hypothesis of absolute convergence (β convergence) was tested for the number of AD cases initiated between 1995 and 2012. Vandenbussche and Zanardi (2008) stated that until the 80s there were only 5 users of AD (Australia, Canada, EU, New Zealand and USA). From this decade on, there was an accelerated growth in the number of AD cases initiated by developing countries (new users). According to these authors, 61 countries have started to adopt antidumping laws between 1980 and 2003. To them, the retaliation could explain this proliferation of AD in the last years.

Zanardi (2006) argues that, although developing countries have started to use the AD as a way of retaliation against the traditional users, the use of AD is no longer a simple question involving "developing *versus* developed countries". According to him, the AD cases initiated by developing countries in the last years had this same group of countries as targets. Therefore, it is possible that these countries have started a retaliation process among themselves. As mentioned by Bown (2011), the great amount of AD cases involving developing countries has led the disputes to a "south-south" context.

Nevertheless, Aggarwal (2004) states that developing countries are not yet entirely familiarized with the use of AD. He argues that these countries are using it to retaliate the traditional users due to their excessive number of AD cases against developing countries. He also suggests that an overall reduction in the use of AD could be possible if traditional users could reduce their use against developing countries.

Therefore, this paper tries to verify if these AD users are converging in terms of the number of AD cases during 1995 and 2012. If this hypothesis is confirmed, there will be an indication that countries that adopted many AD measures in the past are reducing the use of this resource, while those that were not contumacious users are increasing.

²⁵ The spatial autocorrelation could confirm the "contagion effect" described by Vandenbussche and Zanardi (2008), while the convergence among traditional and nontraditional AD users could reduce the retaliation, as mentioned by Aggarwal (2004).

²⁶ In this case, the majority of countries fit within the profile High-High (HH) and Low-Low (LL). Therefore, the countries that opened many AD cases tend to have neighbors that have also initiated a high number of cases (HH) and the countries that have not used so much AD measures tend to be near to the others that have also not used it intensely. In the case of negative spatial autocorrelation, associations such as High-Low (HL) and Low-High (LH) prevail.

²⁷ In this article $z_t = NC_t$. So, it represents the amount of AD cases initiated by the WTO members between 1995 and 2012.

²⁸ When the spatial weight matrix is normalized on the row, and the elements of each row become equal to one, the Eq. (2) is expressed as follows: $I_i = (z'_t W z_t / z'_t z_t)$, and $t = 1, \dots, n$.

²⁹ Diverse specifications of spatial matrixes were tested for the nearest K neighbors ($K = 1, 2, 3, 4, 5, 10$).

³⁰ The selection of the spatial weight matrix is based on Baumont's (2004, p. 13) criterion and have been used by Oliveira et al. (2011), Carvalho and Almeida (2010), Maranduba and Almeida (2009), Firme and Simão Filho (2014). Therefore, according to this procedure the matrix of $K = 2$ nearest neighbors was chosen.

For this purpose, the number of AD cases, opened by 232 countries, was subdivided in 2 periods of 9 years.³¹ Thus, the average of the AD cases initiated between 1995 and 2003 was considered the initial period ($t - 1$). Meanwhile, the average of the 2004–2012 was the subsequent period (t). This procedure avoids the incidence of zeros (in some years there were countries which have not opened AD measures).

Returning to [Graph 1](#) it is possible to notice that $t - 1$ corresponds to a period of elevated number of *antidumping* cases (just after the Uruguay Round, in 1994, diverse untraditional users began to use this instrument more intensely), whereas the period t is marked by the diminishing and relative stabilization of the AD use. This global diminishing verified within these periods is not a guarantee that the number of AD cases is converging among the countries. For this to occur, the intensive users in $t - 1$ must be the largest responsible for the reduction of AD cases verified between the periods.

Since this procedure of subdividing the sample can be considered ad hoc, we have also tested the convergence with a panel data model. In this case, the yearly measures initiated by 46 WTO's member (all of them AD users), between 1995 and 2012, were considered.³²

It is worth mentioning that the use of intensive variables (rather than the absolute ones) is preferable when using spatial data.³³ According to [Anselin \(2005\)](#) it avoids the influence of the population size or the geographical area on the variables. Therefore, this procedure diminishes the probability of obtaining spurious spatial correlations. Thus, 2 models were estimated. One of them considered the number of AD cases in its absolute form (NC_t), whilst the other pondered the number of AD processes by the Gross Domestic Product (GDP), measured in purchasing power parity dollars (NC_t/GDP_t). The weighting of AD cases by some economic factor was also used by [Zanardi \(2006\)](#). According to this author, considering only the number of antidumping cases initiated by a country would be unfair.

The convergence analysis in economy comes from the neoclassical work derived from [Solow's model \(1956\)](#).³⁴ In this paper we have used an adapted specification of these neoclassical models and some potential spatial effects were also considered. Formally:

$$\Delta NC_t = \beta_0 + \beta_1(NC_{t-1}) + \rho W(\Delta NC_t) + \varepsilon \quad (\text{Spatial Lag Model}) \quad (3)$$

$$\Delta NC_t = \beta_0 + \beta_1(NC_{t-1}) + u \quad \text{Being : } u = \lambda Wu + \varepsilon \quad (\text{Spatial Error Model}) \quad (4)$$

Where: ΔNC_t represents the AD measures variation between 1995–2003 ($t - 1$) and 2004–2012 (t); β_0 is the constant and β_1 is a coefficient that, when negative, indicates that there is convergence among the AD users. ρ is a coefficient that follows the spatially lagged dependent variable. Thus, $\rho \neq 0$ suggests that there is spatial autocorrelation. u is an autoregressive spatial error term. Therefore, $\lambda \neq 0$ indicates that the errors are spatially correlated. Finally, ε represents a normal distributed error term, with zero average and constant variance $\{\varepsilon \sim (0, \Omega)\}$ and W is the spatial weights matrix used (i.e.: $K = 2$ nearest neighbors – see footnote 30). We have also tested Eqs. (3) and (4) using intensive variables as follows:

$$\Delta(NC_t/GDP_t) = \beta_0 + \beta_1(NC_{t-1}/GDP_{t-1}) + \rho W[\Delta(NC_t/GDP_t)] + \varepsilon \quad (5)$$

$$\Delta(NC_t/GDP_t) = \beta_0 + \beta_1(NC_{t-1}/GDP_{t-1}) + u \quad \text{Where : } u = \lambda Wu + \varepsilon \quad (6)$$

³¹ Firstly, we considered all the 232 countries presented in the world maps from Frame 1. Thus, both AD users as countries which do not use AD were included. Thereafter, in the models with panel data, only the 46 AD users were considered.

³² Usually, when applying models with panel data, we have to estimate a *pooled ordinary least squares* (POLS) using the [Breusch-Pagan's](#) test to verify if there is some unobserved effect (c_i), in this case, the null hypothesis is: $H_0 : \sigma_c^2 = 0$. If H_0 is true, POLS is the most indicated model, otherwise (if $\sigma_c^2 \neq 0$), we have to estimate the Random Effects (RE) and the Fixed Effects (FE) models, using the [Hausman's \(1978\)](#) test to select which one should be used. This procedure verifies if the explanatory variables (X_{it}) are correlated with c_i , being $H_0 : E[c_i | X_{it}] = 0$. If H_0 is true, both FE and RE are consistent, but RE will be more efficient, otherwise, if H_0 is reject, only FE is consistent. In this case, the Breusch-Pagan's test is unnecessary. More details about panel data models in [Wooldridge \(2002\)](#).

³³ To transform an absolute variable into an intensive (or spatially dense) one, it is necessary to divide it by some “intensity factor” (e.g.: *per capita* variables, per area variables, or yet, those divided by the amount of work or capital).

³⁴ To [Barro and Sala-i-Martin \(1995\)](#), convergence is one of the key aspects of these models and implies that an economy that initially finds itself below its steady-state tends to have a quicker growth. Thus, the poorer economies tend to exhibit higher growth rates than the more wealthy economies. Consequently, the income of these economies would tend to converge.

Where: Eqs. (5) and (6) represent, respectively, the Spatial Lag and Spatial Error model. Both of these expressions are using the intensive variables form (weighted by GDP). The β_0 , β_1 , ρ , λ , u , ε and W terms, included in (5) and (6), have the same characteristics of Eqs. (3) and (4).³⁵

The confirmation of convergence in Eqs. (3) and (4), in which case β_1 is negative and significant, implies that any country that adopted many AD measures in the past (traditional users) will adopt less in the future; while the reverse is valid for the untraditional users. However, these specifications do not consider the economic size (GDP) of each country. Therefore, convergence would be an improbable result, since it would indicate that, in the long run, countries with a high GDP (e.g.: USA, China, among others) would converge, in absolute terms of AD use, with the less relevant countries in terms of GDP.³⁶ In Eqs. (5) and (6), the AD cases started by each country are weighted by the GDP. Consequently, the weight of each country is considered and a convergence becomes more plausible.

3.4. The profile of AD users according to the type of protected sector

This section verified if countries would be using AD to privilege the more competitive sectors in detriment of the less competitive ones, as suggested by Theuringer and Weiss (2001).

For this purpose, the Exporting Base theory was utilized to define a criterion of competitiveness. Consequently, the more representative sectors in the exportation's agenda of their respective countries were considered more competitive. This theory, developed initially by North (1955), was one of the first attempts to explain the different levels of regional growth. According to it, there is a group of economic activities that generally contains markets outside the region and would have the capacity to boost the growth, justifying some of the regional disparities. Thus, the rise of the exporting base would exert a multiplying effect on the non-basic activities associated to the domestic market, increasing both the employment level as the per capita income (Sirkin, 1959; Tiebout, 1977; Souza, 1980; Balassa, 1989).³⁷ Therefore, aiming to verify whether countries are privileging the more competitive sectors through the AD practice, the following procedure was used:

$$I_j = \text{Corr} \left(\frac{NC_{ij}}{\sum_i NC_{ij}}, \frac{EXP_{ij}}{\sum_i EXP_{ij}} \right) = \left\{ \left[\left(\frac{NC_{i=1,j}}{\sum_{i=1}^{i=21} NC_{i,j}} \right) \cdots \left(\frac{NC_{i=21,j}}{\sum_{i=1}^{i=21} NC_{i,j}} \right) \right] \left[\begin{array}{c} \left(\frac{EXP_{i=1,j}}{\sum_{i=1}^{i=21} EXP_{i,j}} \right) \\ \vdots \\ \left(\frac{EXP_{i=21,j}}{\sum_{i=1}^{i=21} EXP_{i,j}} \right) \end{array} \right] \right\} \quad (7)$$

Where: I_j is a correlation index, associated to the country j , which measures how the distribution of the AD cases initiated by this country j against foreign sectors, is related to the sectoral distribution of the exportation of this country. NC_{ij} is the number of AD cases initiated by the country j against products from sector i ; EXP_{ij} represents the products exported by the country j that coming from the domestic sector i (values in US\$ purchasing power parity). Additionally, as j represents the WTO country member that initiated AD cases between 1995 and 2012, $j = 1, \dots, 47$. In the case of i , the 21 sections of the MERCOSUL Common Nomenclature (MCN) were used to define the sectors. Thus, $i = 1, \dots, 21$.³⁸

Therefore, if a country “ j ” is an intensive exporter of products coming from a group “ g ” of domestic sectors, and at the same time, concentrates a good part of its AD measures against these same sectors abroad “ g^* ”, it will indicate

³⁵ It is worth mentioning that all years between 1995 and 2012 are included separately in the panel data models. Therefore, $\Delta NC_t = (NC_t - NC_{t-1})/NC_{t-1}$, where: $t = 1995, 1996, \dots, 2011, 2012$. The same is valid to $\Delta(NC_t/GDP_t)$.

³⁶ Thus, there would be a number of AD measures common to these countries (e.g.: they would initiate “ x ” cases p.a.).

³⁷ Note that the exporting base alone is not able to explain the wholly global economic growth, especially when a region becomes industrialized and expands its relevance. After all, if you think on the World as a big country, you will conclude that there is no export; nevertheless, the income still grows (Tiebout, 1977).

³⁸ I_j was multiplied by 100. Therefore, this index may vary between -100 (in this case, the country would initiate AD processes in order to favor the least relevant sectors in terms of exportation) and $+100$ (where AD measures would be used opportunely by the sectors with the greatest exportation potential).

that this country is favoring the most competitive domestic sectors through the AD practice and I_j will be larger than zero.

In order to make the result of this index a little more reliable, Eq. (8) was estimated to verify if the effect verified via index would change after including the retaliation effect:

$$NC_i = \mu + \beta_1 EXP_i + \beta_2 NC_i^* + \varepsilon_t \quad (8)$$

Where: NC_i represents the distribution of the AD cases initiated by a country i against foreign sectors (i.e.: 21 sections of the MCN) and EXP_i is the sectoral distribution of the exportation of the country i among the 21 sections of the MCN (both specified just like in Eq. (7)). μ represents the model's constant, β_1 and β_2 are parameters and ε_t is an error term. Once retaliation is one of the main reasons to explain the use of AD (Vandenbussche and Zanardi, 2008) and its effect could explain the concentration of AD among those sectors, the distribution of AD cases, opened between 1995 and 2012, against the country i (NC_i^*) were included into the model.

3.5. Database

The annual number of AD cases opened, discriminated by applicant and targeted countries and by the 21 sections of the MERCOSUL Common Nomenclature (MCN), is available at World Trade Organization (WTO, 2013). The current annual GDP valued at Purchasing Power Parities (PPP), used in Section 3.3, was obtained at the World Economic Outlook Database available at the International Monetary Fund (IMF, 2013). Whereas the annual exports, disaggregated by sectors and countries, used in Section 3.4, are available at the *International Trade Center* (ITC, 2013).³⁹

4. Empirical results

The results coming from Eq. (1) reveal that there was a general downward trend in the opening of AD cases between 1995 and 2012 (Table 1). As mentioned by Bown (2011), this reduction in the use of AD could be explained by the end of 2001–2002 recession and the further liberalization carried out by WTO members after 2001 under the ideas of Doha Round.

Considering all members of WTO, denominated “world” in Table 1, we see that an average of 296 cases was initiated per year. Furthermore, we detected a decreasing trend of approximately 7 cases p.a., which represents a yearly decrease of almost 2.4% per year.⁴⁰ India, European Union and USA were the main responsible for the verified reduction during this period. Together, they contributed to reduce around 4.6 AD measures p.a., which represents more than 65% of the total trend associated to AD cases. Individually, Venezuela seems to have made the most effort in order to reduce the AD. The country showed a reduction of more than 7% per year. However, its participation in the total cases is too timid (barely 0.75%) to influence the global trend in a significant way. On the other hand, Brazil appears to be running in an opposite direction and was the only great AD user that achieved a positive and significant trend of opening cases.⁴¹ Besides this, its yearly growth rate (7.7% p.a.) was the largest among the analyzed countries.

Table 2 shows that China was not only the greatest target of AD cases between 1995 and 2012, but was also the only big country to present a positive trend in this aspect. Every year, approximately 1.5 new cases involving this country were added to its high average of almost 35 cases per year. Although we have verified an overall downward trend of almost 2.4% per year, this does not appear to occur with China. Actually, the cases against this country rose by approximately 4.4% per year. Similar results were found by McGee (2008) and Bown (2011). The last one revealed

³⁹ Although the exportation presents disaggregation for 99 chapters of NCM, we needed to aggregate them among 21 sections.

⁴⁰ The trend coefficient (presented in Tables 1, 3 and 5) reflects, in absolute terms, the path of the dependent variable. Thus, it shows the number of AD cases that should be added to the average every year. Therefore, when dividing this value by the constant (which is the average number of AD cases initiated every year) it is possible to obtain the trend in relative terms. In other words, this procedure verifies the trend in relation to the average. Therefore, by multiplying this value by 100 we can get an annual relative trend in percentage values. So, if a country opens 50 cases per year in average (constant = 50) and a decreasing trend of 5 cases per year is found. The relative effect will be $(-5/50) \times 100 = -10\%$.

⁴¹ Countries with more than 100 AD cases accumulated between 1995 and 2012 were considered “great users”. In this way, Turkey also fits this profile. However, the trend associated to this country, although positive, is not significant.

Table 1

Estimated effect on countries that are requiring protection via AD processes (importers) (Considering the number of initiated investigations between 1995 and 2012).^a

Countries	Total cases	Total participation (%)	Estimate via OLS: Obs = 18			Relative effect (%)
			Constant	Trend	R ²	
Positive trend						
Brazil	258	6.25	8.29**	0.64*	0.17	7.72
China	195	4.73	6.65	0.44	0.06	–
Colombia	56	1.36	2.54*	0.06	0.02	–
Pakistan	71	1.72	–2.14	0.64**	0.26	–
Taipei – China	56	1.36	0.94	0.09	0.04	–
Thailand	56	1.36	1.76	0.14	0.02	–
Turkey	154	3.73	6.10	0.26	0.03	–
Ukraine	40	0.97	–0.39	0.27***	0.40	–
Negative trend						
South Africa	216	5.24	27.96***	–1.68***	0.55	–6.01
Argentina	301	7.30	23.14***	–0.68	0.13	–
Australia	241	5.84	21.59***	–0.86*	0.22	–3.98
Canada	165	4.00	15.25***	–0.64**	0.23	–4.20
Chile	20	0.48	2.19***	–0.11*	0.16	–5.02
South Korea	112	2.72	9.83***	–0.38	0.13	–
Egypt	71	1.72	5.88**	–0.20	0.06	–
India	663	16.07	37.41***	–0.06	0.00	–
Indonesia	96	2.33	5.63***	–0.03	0.00	–
Israel	45	1.09	3.84***	–0.14	0.08	–
Malaysia	48	1.16	3.65**	–0.10	0.04	–
Mexico	106	2.57	8.97***	–0.32*	0.21	–3.57
New Zealand	56	1.36	6.31***	–0.34**	0.34	–5.39
Peru	71	1.72	6.40***	–0.26	0.15	–
European Union	444	10.76	39.20***	–1.53**	0.34	–3.90
USA	465	11.27	39.50***	–1.44*	0.17	–3.65
Venezuela	31	0.75	5.12***	–0.36***	0.42	–7.03
The rest of the World	111	2.69	10.37***	–0.44*	0.18	–4.24
WORLD	4125	100.00	296.00***	–7.03**	0.28	–2.38

Source: Elaborated by the author based on the results of EVIEWS software and WTO data (2013).

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

The relative effect refers to the trend divided by the constant (calculated only when both are significant).

^a The E.U. members (and their membership year) are: Germany (1952), Austria (1995), Belgium (1952), Bulgaria (2007), Cyprus (2004), Denmark (1973), Slovakia (2004), Slovenia (2004), Spain (1986), Lithuania (2004), Luxemburg (1952), Malta (2004), Netherlands (1952), Poland (2004), Portugal (1986), United Kingdom (1973), Czech Republic (2004), Romania (2007) and Switzerland (1995) (http://europa.eu/about-eu/countries/index_pt.htm), access in 2013.

that, between 1990 and 2009, China was target of almost 4 times more AD measures than the second country with more cases against it.

Among those that have stopped being target of AD measures, United Kingdom, Poland, Spain, France, Italy and Germany can be highlighted. On average, the number AD cases against products from these countries fell around 5.7% per year. Another relevant result refers to Brazil. It appears that Brazilian products also became less recurring targets of AD (decrease of almost 3.6% p.a.). Thus, it is curious to notice that its AD use is rising (Table 1), in spite of the reduction of cases opened against Brazil (Table 2). According to Moreira and Ornelas (2008), Brazil has gotten a good performance on the last dispute settlements of WTO (with favorable results in many disputes). Therefore, it could encourage the use of AD by this country. However, the end of 2001–2002 recession and the liberalizing ideas proposed at Doha Round seem to have been efficient to decrease the number of AD cases in other WTO's countries (Bown, 2011). Thus, the reduction of AD cases, against Brazil, can be just following the general trend of WTO members.

Table 2

Estimated effect on countries that are target of AD processes (exporters) (Considering the number of initiated investigations between 1995 and 2012).

Countries	Case total	Total participation (%)	Estimate via OLS: Obs = 18			Relative effect (%)
			Constant	Trend	R ²	
Positive trend						
Argentina	35	0.85	1.89**	0.01	0.00	–
China	884	21.43	34.70***	1.52**	0.26	4.38
Malaysia	105	2.55	5.54***	0.03	0.00	–
U. E. (Other Countries)	90	2.18	4.35**	0.07	0.01	–
Vietnam	34	0.82	0.04	0.19**	0.32	–
Negative trend						
South Africa	62	1.50	6.15***	–0.28**	0.28	–4.55
Germany	93	2.25	10.51***	–0.56***	0.65	–5.33
Brazil	116	2.81	9.78***	–0.35**	0.25	–3.58
Canada	39	0.95	3.14***	–0.10	0.09	–
Chile	31	0.75	2.77***	–0.11	0.13	–
South Korea	299	7.25	23.19***	–0.69**	0.24	–2.98
Spain	47	1.14	5.76***	–0.33***	0.53	–5.73
France	43	1.04	4.95***	–0.27**	0.31	–5.45
India	160	3.88	11.89***	–0.32*	0.17	–2.69
Indonesia	168	4.07	12.11***	–0.29	0.11	–
Italy	52	1.26	5.97***	–0.32***	0.55	–5.36
Japan	170	4.12	14.32***	–0.51**	0.27	–3.56
México	56	1.36	4.21***	–0.12	0.08	–
Poland	31	0.75	3.91***	–0.23***	0.50	–5.88
Romania	38	0.92	3.86***	–0.18*	0.19	–4.66
United Kingdom	44	1.07	6.07***	–0.38***	0.53	–6.26
Russia	127	3.08	11.51***	–0.47*	0.21	–4.08
Singapore	47	1.14	3.84**	–0.13	0.04	–
Taipei – China	223	5.41	14.63***	–0.24	0.06	–
Thailand	168	4.07	10.63***	–0.13	0.03	–
Turkey	57	1.38	3.20***	–0.00	0.00	–
Ukraine	67	1.62	6.54***	–0.30**	0.30	–4.59
USA	237	5.75	17.20***	–0.42**	0.24	–2.44
The rest of the World	602	14.59	53.33***	–3.26***	0.40	–6.11
WORLD	4125	100.00	296.00***	–7.03***	0.28	–2.38

Source: Elaborated by the author based on the results of the EVIEWS software and WTO data (2013).

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

The relative effect refers to the trend divided by the constant (calculated only when both are significant).

The rise in the use of *antidumping* measures against China and the reduction of cases against European countries could be reflecting a change in international trade that occurred in the last years. According to Amiti and Freund (2008, p. 2): “China’s real exports increased by more than 500 percent over the last 15 years.”⁴² Therefore, the massive entry of Chinese products in the international Market probably contributed to the increase of the AD cases against China. On the other hand, the fall of productivity verified in the European countries in the later years could have driven this group away from the focus of the AD measures. Kappel (2011, p. 3), when comparing the European Union (EU) members with the BRICs (Brazil, Russia, India and China) declares that: “In the last three decades, having started at a high level, the EU’s growth rates are on average lower than those of the regional powers. This indicates a lack of dynamism which gives rise to a creeping loss of economic significance.”

⁴² According to these authors, the explanation for this phenomenon would be resultant of a strong change in the Chinese exportation structure. – “China’s export structure has transformed dramatically since 1992.”

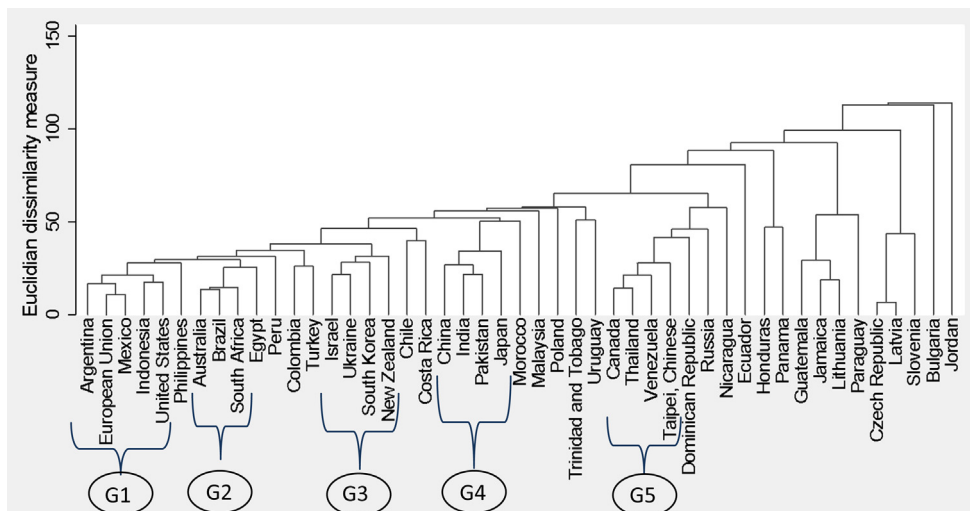


Fig. 1. Dendrogram of the Users of *Antidumping* Measures by target sector: 1995 to 2012.

Footnotes: (1) Sectors without any AD case were excluded. (2) The sectors' code is: I. Live animals and animal products; II. Vegetable Products; III. Fats, oils and animal and vegetable wax; IV. Convenience Foods; beverages, liquors, vinegar, tobacco; V. Mineral Products; VI. Chemical and related Industries; VII. Plastic and rubber Articles; VIII. Casing, skin, leather, bags and etc.; IX. Wood, coal, cork and basketry articles; X. Cellulose, Paper, cardboard and articles; XI. Textile and articles; XII. Shoes, headgear, umbrellas, artificial flowers and etc.; XIII. Stone works, plaster, cement, asbestos, mica, glass and etc.; XIV. Pearls, stones and precious metals; coins; XV. Common Metals and its works; XVI. Machinery and Electric Equip.; XVII. Transportation Material; XVIII. Watches, Cameras and Video Recorders, Medical Devices; XX. Diverse Manufactured Articles.

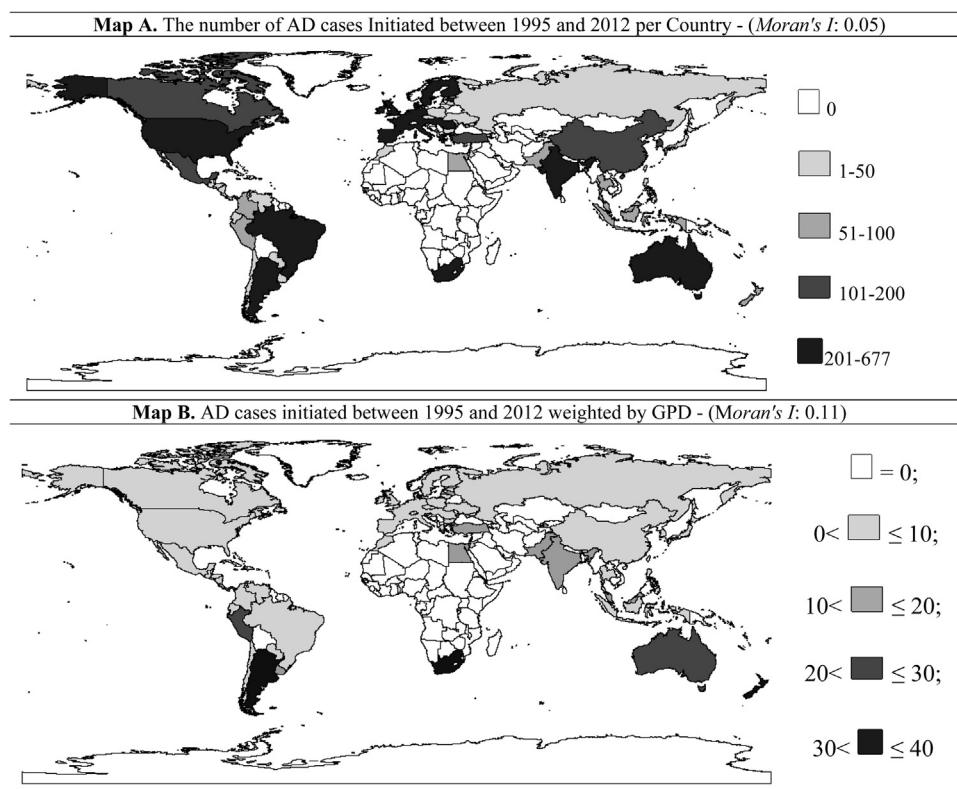
Source: Elaborated by the author based on the results of the STATA software and WTO data (2013).

Fig. 1 shows the countries' similarity concerning the distribution of AD use among the 21 sections of the MCN during the period of 1995 to 2012. Note that, the unions closer to zero, on the vertical axis, are more homogeneous, while the more distant ones would be *outliers*. Therefore, Brazil, Australia and South Africa comprise an important group (G2) that represents almost 18% of all the AD cases initiated in this period. This cluster seems to be intense in the AD use against the Common Metal Industry and its Works (XV), Plastic and Rubber Items (VII) and Chemicals (VI). On average, 25% of the cases initiated by these countries have targeted the XV sector, 23% the VII sector and 14% the VI sector.

Another group, a little less cohesive than the latter one, but yet more intense in the use of the AD practice against the Metals sector (XV) is formed by Argentina, European Union, Mexico, Indonesia and USA (G1). On average, 38% of the cases initiated by these countries have this sector as a target. The Chemical industry is the second sector most affected and is involved in more than 15% of the cases. Notably, these 5 economies represent almost 34% of all the AD cases initiated between 1995 and 2012. Besides these, China, India, Pakistan and Japan (G4), which together are responsible for almost 23% of the AD cases, appear as an Asiatic group that is extremely intense in applied measures against the Chemical sector (VI). This sector alone was responsibility for almost 50% of the AD cases initiated by these countries. Only the group comprised of Canada, Thailand, Chinese Taipei and Venezuela (G5) focused more AD measures against one sector alone (more than 60% of the measures initiated by this group has the Metal sector as a target). Finally, the Machinery and Electric Equipment sector (XVI) is a great target of AD measures initiated in Israel, South Korea, Ukraine and New Zealand (G3). This sector is target of almost 16% of the cases initiated by this group (Fig. 1).

The Map A shows which countries initiated more AD cases between 1995 and 2012 (Frame 1). The results infer that India (677), USA (469), European Union (451), Argentina (303), Brazil (279), Australia (247) and South Africa (217) became the main users of AD after the Uruguay Round. According to Davis (2009), the USA, European Union and Australia were already considered traditional users of this tool even before this period. On Map B, the number of cases was divided by the GPD of each country in order to consider the economic weight of each one. This procedure showed the excess of Argentina (38.3) and South Africa (31.2) in their use of the AD instrument.

Still in Frame 1, the positive (although small) result of the *Moran's I*, presented in Map A, reveals a small indication of spatial autocorrelation AA-BB type. In other words, countries that initiate many AD cases (traditional users) would



Frame 1. Some spatial data results.

Source: Elaboration with base on the Softwares ArcView and Geoda and database from [WTO \(2013\)](#) and [IMF \(2013\)](#).

tend to be close to countries that also open a high number of processes. The reverse also applies to the case of non-traditional users. Thus, there would be some evidence of contagion effect, as proposed by [Vandenbussche and Zanardi \(2008\)](#). A curious fact occurs when the economic weight of these countries was considered. In this case, the *Moran's I* presented in Map B more than doubled in relation to Map A (going from 0.05 to 0.11). This result indicates that there may be some “neighborhood effect” associated to the AD processes. Therefore, the number of AD cases opened by a country can be affected by its neighbors.

The division of the AD cases in 2 periods ($t = \sum_{2004}^{2012} NC$ and $t - 1 = \sum_{1995}^{2003} NC$) allowed us to verify whether the number of cases is converging among 232 countries. The results, shown in [Table 3](#), reveal that convergence does not exist when the economic weight of these countries is not considered (where ΔNC_t is the dependent variable – models “a”, “b” and “c”). This was an expected result (see Section 3.3) and indicates that, even in the long run, countries with different levels of GDP will not use AD measures in a similar fashion. This means that “big” countries will continue opening more cases than the “small” ones.

However, there seems to be convergence when the economic weight of the countries is considered [where $\Delta(NC_t/PIB_t)$ is the dependent variable – models “g”, “h” and “i”]. Therefore, countries like Argentina that have been using a high number of AD measures, even having a small participation in world economy, would tend to reduce the use of this resource, while countries like Japan, who initiated only 7 cases during the whole period, would tend to use it more. Consequently, both would converge to an approximate number of measures in the long run ([Table 3](#)).

In spite of these results, we found convergence, either considering or not the economic weight, while only the 46 WTO's members (users of AD) were considered (panel data models “d”, “e”, “f”, “j”, “k” and “l” from [Table 3](#)). Therefore, countries could be converging their use of AD in both cases [i.e.: considering $\Delta(NC_t)$ or $\Delta(NC_t/PIB_t)$].

As mentioned by [Aggarwal \(2004\)](#), the retaliation effect could be reduced if the traditional users were able to reduce their use of AD against nontraditional countries. Thus, the convergence could be a good way of reducing the overall use of AD. We also have tested whether the variation in AD cases could be influenced by the variation in the cases

Table 3

Convergence and spatial effects on the variation of AD cases opened between 1995 and 2012.

Cross-section data considering 232 countries: Convergence and spatial effects analysis (Obs: 232)				Panel data considering the 46 WTO's members: Only convergence analysis (Obs: 799)		
Dependent variable: ΔNC_t						
	(a)	(b)	(c)	POLS (d)	RE (e)	FE (f)
Constant	4.75	4.76	4.78	21.70***	22.45***	44.40***
NC_{t-1}	−1.60	−1.60	−1.59	−1.00*	−1.15**	−5.51***
$W_{-}\Delta NC_t$	−	0.01	−	−	−	−
$W_{-}\varepsilon_t$	−	−	0.01	−	−	−
R^2	0.0045	0.0047	0.0047	0.0076	0.0076	0.0900
AIC	2869.73	2971.69	2869.70	9863.58	−	9738.16
BIC	2876.62	2882.03	2876.59	9872.95	−	9747.52

Dependent variable: $\Delta(NC_t/PIB_t)$						
	(g)	(h)	(i)	POLS (j)	RE (k)	FE (l)
Constant	0.86	1.01	0.86	19.47***	19.78***	22.17***
(NC_{t-1}/GDP_{t-1})	−1.57***	−1.56***	−1.56***	−0.55***	−0.57***	−0.77***
$W_{-}[\Delta(NC_t/GDP_t)]$	−	0.40	−	−	−	−
$W_{-}\varepsilon_t$	−	−	0.01	−	−	−
R^2	0.0586	0.0598	0.0589	0.0225	0.0225	0.0388
AIC	2674.77	2676.55	2674.72	9735.11	−	9668.16
BIC	2681.66	2686.89	2681.62	9733.48	−	9677.52

Source: Own Elaboration based on ArcView, Geoda and STATA Softwares and on WTO (2013) and IMF (2013) data.

* $p < 0.10$.** $p < 0.05$.*** $p < 0.01$.

The cross-section models have considered $\Delta NC_t = \left[\left(\sum_{2004}^{2012} NC \right) - \left(\sum_{1995}^{2003} NC \right) \right] / \left(\sum_{1995}^{2003} NC \right)$, while the panel data models consider $\Delta NC_t = (NC_t - NC_{t-1}) / NC_{t-1}$, where $t = 1995, \dots, 2012$.

Hausman's test (1978):

(f) vs. (e): $\chi^2 = 80.6$; $Prob. > \chi^2 = 0.00$.(l) vs. (k): $\chi^2 = 12.7$; $Prob. > \chi^2 = 0.00$.

initiated by the neighborhood (spatial lag model – “b” and “h” from Table 3) and if another unknown spatial factor could explain this process (spatial error model – “c” and “i”). Nevertheless, these effects were not significant in any of the estimated models (Table 3).

The correlation between AD measures initiated between 1995 and 2012 by countries members of WTO (distributed by target sector) and the exports of these countries (also distributed by sectors) shows that, in some cases, AD measures may be used to benefit sectors that already show a high level of competitiveness (Table 4).⁴³ Although most of the countries do not appear to be favoring sectors in a systematic way, since extreme coefficients (close to 100 or −100) were rare, some cases need attention.

Among those with a high coefficient, we can mention two great users of the AD practice. Turkey, responsible for opening 162 AD cases, obtained a coefficient equal to 58.7, while the European Union, which opened 451 processes, obtained an index of 50.4. Therefore, these two economies present a profile that indicates a favoring of the more competitive sectors through the *antidumping* practice. However, it is noteworthy that this index, in spite of indicating a

⁴³ It is important to remember that an index close to 100 indicates that a country “y”, intensive exporter of products originating from a sector “z”, tends to concentrate a good part of its AD measures against products coming from this same sector “z” located abroad. Thus, based on the hypothesis that a country intensive in the exportation of a specific product is efficient in its production (see Section 3.4), there would be an indication that this country is privileging the more competitive sectors rather than that ones with less competitive capacity. Analogically, a coefficient near to −100 would indicate that the sectors privileged by AD practice are the less competitive ones.

Table 4
Profile of the antidumping users according the type of protected sector (index ranging from –100 to 100).

Positive correlation (+)		Negative correlation (–)	
Lithuania	87.17	Bulgaria	–0.05
Panama	77.25	Morocco	–0.13
Venezuela	72.75	Honduras	–0.26
Trinidad and Tobago	70.45	Indonesia	–0.38
Costa Rica	64.64	Egypt	–0.61
Turkey	58.67	China	–1.75
European Union	50.40	Japan	–2.06
Ecuador	36.49	Thailand	–4.04
Chile	36.30	Brazil	–4.13
Korea Republic	35.75	New Zealand	–6.47
India	33.34	Australia	–8.20
Guatemala	32.47	Colombia	–9.28
Jamaica	29.74	Malaysia	–10.54
Poland	15.36	Israel	–11.70
United States of America	14.98	Paraguay	–12.15
Dominican Republic	14.45	Czech Republic	–12.19
Pakistan	13.59	Philippines	–13.52
Canada	7.78	Slovenia	–15.56
Peru	7.44	Jordan	–15.64
South Africa	5.70	Argentina	–18.26
Taipei Chinese	5.24	Uruguay	–21.27
Mexico	4.54		
Latvia	2.98		
Ukraine	1.17		
Nicaragua	0.89		
Russian Federation	0.57		

Source: Own elaboration based on STATA software and WTO (2013) and IMF (2013) data.

profile associated to AD users, it does not settle the issue and is subject to problems associated to data aggregation.⁴⁴ Thus, there could be another explanation for the concentration of these measures. Davis (2009, p. 1) highlights that the European Union has intensified the AD use against foreign products belonging to sectors in which the European comparative advantage is declining.

Regarding the negative coefficients (that indicate cases where the less competitive sectors are favored by AD practice), the results are less recurrent and had less magnitude than the positive ones. Among the analyzed countries, the smallest index (–18.3) was obtained by Argentina. So, this country could be using AD measures as an instrument of industrial policy, aiming to protect their less competitive domestic industries from external competition. Although some results draw attention, most countries showed coefficients of small magnitude. South Africa (5.7), Mexico (4.5), China (–1.7) and Brazil (–4.1) achieved coefficients not far from zero. These results indicate a small or inexistent correlation between the use of AD measures and the degree of domestic sector competitiveness. In other words, we cannot affirm that these countries are privileging the more or less competitive sectors through AD practice.

In order to make our index a little more reliable, we tested if the most expressive results of Table 4 would be maintained after including the retaliation effect. Thus, a model was estimated (see Eq. (8)) with the distribution of the AD cases initiated by a country *i* on the left side (dependent variable) and the distribution of the exportation of this country *i* and the distribution of AD cases opened against the country *i* on the right side (explanatory variables). The results helped us to verify if the effect of the distribution of the exportation would change after including the retaliation effect (Table 5).

⁴⁴ Note that the analysis of these coefficients is affected by the disaggregation of the sectors. Thus, the smaller the disaggregation, the greater will be the possibility in obtaining misleading results. This is because at the limit (with only one sector containing all products), all AD measures initiated by a country would have this sector (abroad) as a target. But, since this sector (domestic) is also responsible for 100% of the exported products by this country, the result would lead the researcher to conclude that the country considered is privileging a competitive sector, when it may not be the case.

Table 5

The Effect of sectoral distribution of the exportation and retaliation on the use of antidumping.

	Turkey		European Union		South Korea		India		United States		Argentina	
EXP_i	0.887 ^{***}	0.711 [*]	0.748 ^{**}	0.242 [*]	0.310	0.153	0.532	0.210	0.290	0.160	−0.210	−0.396
NC_i^*		0.152		0.992 ^{***}		0.458 ^{**}		0.862 ^{***}		0.333		0.472
Cons.	0.592	0.721	1.329	−1.230	3.633 [*]	2.050	2.461	−0.378	3.738	2.673	6.369 ^{**}	4.866 [*]
R^2	0.34	0.37	0.25	0.88	0.13	0.39	0.11	0.65	0.02	0.10	0.03	0.18
$R^2_{adj.}$	0.31	0.29	0.21	0.87	0.08	0.31	0.06	0.60	−0.04	−0.01	−0.02	0.08
AIC	132.22	133.44	134.27	101.04	130.38	125.69	143.02	127.41	150.13	150.55	132.01	130.87
BIC	134.11	136.28	136.16	103.87	132.27	128.53	144.91	130.25	152.02	153.38	133.9	133.71

Source: Own elaboration based on STATA software and WTO (2013) and IMF (2013) data.

Only countries with index higher than 10 or lesser than −10 and with more than 100 AD measures, accumulated between 1995 and 2012, were considered.

^{*} $p < 0.10$.^{**} $p < 0.05$.^{***} $p < 0.01$.

Similarly to Table 4, the results from Table 5 showed a positive relation between the distribution of the exportation (EXP_i) and the distribution of the AD cases initiated by Turkey, European Union, South Korea, India and United States. Therefore, these economies would be favoring the most competitive sectors via AD. Nevertheless, the estimation revealed that only the relation verified in Turkey and the European Union was significant. When the distribution of AD cases opened against these countries (NC_i^*) was added in order to capture the retaliation effect, we noted a positive and significant coefficient to European Union, South Korea and India. Thus, there is evidence that these countries are using AD as a retaliation mechanism. In the case of European Union and India, the improvement of R^2 and the adjusted R^2 , after including NC_i^* , indicated a strong motivation to use AD to retaliate other users. However, the signal and significance of EXP_i , to Turkey and European Union, does not changed when NC_i^* was included. So, both of them seem to be favoring the most competitive sectors, just as we had found in Table 4.

5. Conclusion

The *antidumping* literature revealed that, due to its lack of transparent legislation, that frequently favors the petitioner, the *antidumping* instrument (AD) has become one of the most important protectionist barriers of this day. Although GATT/OMC have discussed this problem in the Tokyo rounds (1973–1979) and, more emphatically, in Uruguay (1986–1994), the traditional users of AD, headed by USA and European Union, prevented imposing restrictions to its use. Thus, countries that were not considered big users of AD began using it with more intensity after the Uruguay Round. To Aggarwal (2004), these countries, without tradition in using AD, would be using this tool to retaliate traditional users. According to him, this way of using could be reduced if the traditional users were able to reduce their use of AD against nontraditional countries. However, the challenge to inhibit the AD use can be encouraging other countries to use it, generating what Vandenbussche and Zanardi (2008) have called contagion effect. This excessive use has led authors to suggest that AD is far from its original purpose of avoiding unfair competition. Theuringer and Weiss (2001) have suggested that AD could be being used to benefit the big businesses' interests in detriment of firms with reduced level of competitiveness.

Therefore, the goal of this article was to analyze the evolution of the AD use after the Uruguay Round, in the period of 1995 to 2012. For this, several techniques were used aiming to identify the main AD users and which trend of using this tool could be associated to them. Besides this, the hypothesis that the number of AD cases could converge among the countries, which could reduce the retaliation effect, was verified. We also tested if the number of AD cases opened by a country could be explained by the amount of cases initiated by its neighbors, which would be an indicative of contagion effect. Finally, a criterion was created and a model was estimated in order to define whether the countries would be favoring the more competitive sectors through the AD practice.

Although the AD cases have risen significantly between 1995 and 2001 (as a result of the Uruguay Round), we noticed a general downward trend associated to AD use, in the period of 1995 to 2012, at almost 2.4% per year. This reduction can be associated to the end of 2001–2002 recession and the liberalizing ideas proposed at Doha Round. The main responsible for this reduction were India, European Union and USA. Meanwhile, Brazil seems to follow an opposite direction and was the only great user that achieved a positive and significant trend of using antidumping. Among the AD targets, China was not only the most affected by AD as was also the only great economy to present a growth trend in this area. In spite of the general reduction verified on the number of AD cases, the processes against China rose almost 4.4% per year. It can be explained by the sharp rise of Chinese exportations in recent years.

On the other hand, the European countries are among those that stopped being target of AD cases. It seems that the European productivity loss accumulated in the last 3 decades, may have taken this group away from the focus of AD measures. In addition, the Brazilian products became less recurring targets AD as well. Thus, it is curious to notice that the use of this instrument by this country is rising in spite of the reduction of cases against it. Probably, the Brazil's good results on the last dispute settlements of WTO have encouraged the use of AD by this country while the reduction of AD cases, against Brazil, have just followed the general trend of WTO members.

The *cluster* analysis, revealed that Brazil, Australia and South Africa, which represent 18% of the AD cases initiated in the period, are using this resource intensely against the Metal and its Works, Plastic and Rubber Products and Chemical sectors. Meanwhile, Argentina, European Union, Mexico, Indonesia and USA, which respond for almost 34% of the processes, are using the AD practice even more intensely against the Metal sector. Besides these, China, India, Pakistan and Japan, responsible for almost 23% of the cases, appear as an Asian group that is extreme in use of AD against the Chemical sector.

The data also indicated that India, USA, European Union, Argentina, Brazil, Australia and South Africa have become the main AD users after the Uruguay Round. Since USA, The European Union and Australia were already considered traditional users, the other mentioned countries arise as the main new users of AD. However, when the number of AD cases was weighted by the GDP of each country, it is clear that Argentina and South Africa are using AD measures much more intensely than the others. The spatial analysis of the data revealed, through *Moran's I*, the presence of a weak spatial autocorrelation of the AA-BB type. In other words, countries that initiate many AD cases would tend to be close to other countries that also open a high number of processes. Thus, there would be a weak evidence of contagion effect. Nonetheless, when pondering the AD processes by the GDP, the *Moran's I* coefficient more than double. Therefore, the “neighborhood effect” on the number of AD cases is stronger when the economic relevance of each country is considered.

Regarding the convergence in the AD use, the results with cross section data have not indicated signs of convergence while the economic weight of the 232 countries considered was not considered. This result was already expected and indicates that, even on the long run, countries with different levels of GDP will not use AD measures in a similar fashion. In other words, big countries will continue opening more cases than the small ones. However, the convergence is confirmed when the AD cases are pondered by the GDP of each country. Therefore, countries like Argentina, which uses a high number of AD measures even having a small participation in world economy, would tend to reduce the use of this resource. While countries like Japan, which has a great GDP and was responsible for only 0.2% cases during the whole period, would tend to use it more. Consequently, both would converge to an approximate number of AD cases in the long run.

In spite of these results, we found convergence in the AD using, either considering or not the economic weight of 46 WTO's members (users of *antidumping*), while using panel data models. Therefore, countries could be converging their use of AD in both cases.

To Aggarwal (2004), the retaliation effect could be reduced if the traditional users were able to reduce their use of AD against nontraditional countries. Thus, the convergence could be a good way of reducing the overall use of AD. Furthermore, the spatial models have revealed that the variation in AD cases initiated by a country does not seem to be influenced by the variation in the amount of cases opened by its neighbors or of any other unknown spatial component. Therefore, we cannot confirm the contagion effect.

Finally, the criteria used to verify if there are countries using AD to privilege the more competitive sectors indicated that, although most of the countries may not appear to be favoring sectors systematically, there are some cases that call for attention. Among the main AD users, Turkey and the European Union have presented this profile. On the other hand, Argentina seems to be using AD as an instrument of industrial policy, aiming to protect their less competitive domestic industries from external competition. However, our estimations have showed that this effect is only significant to Turkey and European Union. This result did not change even after including a variable to capture the retaliation effect. So, both countries seem to be favoring the most competitive sectors. In order to improve these results and confirm which kind of sectors has been favored by AD, we recommend, as a future research agenda, a higher sectoral disaggregation and the inclusion of other relevant variables to explain the use of AD into the model.

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