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Import protection through antidumping filings and economic activity¹

Sergio Goldbaum² and Euclides Pedrozo Jr³

Abstract

Despite the well-documented counter-cyclical relationship between import protection and GDP growth, the deep economic recession that has been affecting Brazil since 2014 was followed by a decrease in the number of antidumping investigations. To investigate the relationship between import protection through antidumping (AD) filings and economic activity we updated and adapted the Bown and Crowley 2012 and 2013 papers. We run a negative binomial panel regression model where the independent variable and the main independent variable are on a country-bilateral basis. Our database included samples from both emerging economies and developed countries. The results suggest that the counter cyclical relationship between AD filings and imposing country GDP is valid only for developed countries, while emerging economies show rather a pro-cyclical trend. Results should be regarded with caution since the expected negative relationship between exporting country GDP and AD filings has not been confirmed and annual data may not be appropriate to analyze the relationship under scrutiny.

Keywords: Trade Policy, Trade Defence, Antidumping

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1 Introduction

Import protection through Temporary Trade Barriers (TTB) in general and antidumping (AD) duties in particular has become increasingly relevant in emerging economies since the inception of the World Trade Organization (WTO) in 1995. Blonigen and Prusa (2016), for instance, show that traditional TTB's users (Australia, Canada, the European Union and the United States) have been replaced by new users, mostly emerging economies (Argentina, Brazil, China, India and Turkey); and that the main targets of these new users are also emerging economies, mainly China⁴. Furthermore, they highlight the importance of analyzing the use of TTB by these emerging economies:

"The emergence of AD use by developing country users is arguably the most significant development in AD in the last two decades and remains a topic in need of additional study". (Blonigen and Prusa, 2016, p. 16)

In a 2013 paper, Bown and Crowley empirically examined the responsiveness of time varying import protection to macroeconomic shocks for emerging economies between 1995 and 2010 and found a counter-cyclical relationship between GDP growth and aggregate level TTBS⁵. They also show that (i) real appreciation of the bilateral exchange rate relative to a trading partner, (ii) weak foreign GDP growth in a trading partner, and (iii) a surge in bilateral import growth are all associated with subsequently more import restrictions.

However, when analyzing the impact of the International Financial Crisis (IFC) of 2008-09 on new import protection in emerging economies, Bown and Crowley (2013) noted that the counter cyclical relationship between GDP growth and TTBS could have been replaced by a pro-cyclical one:

"While the IRR [Incidence Rate Ratio] of 0.93 on real GDP growth in the years before the crisis is indicative of the counter-cyclical relationship between macroeconomic slowdowns and TTBS, the IRR of 1.11 [suggesting a pro-cyclical relationship between those two variables] in 2009-2010 is both statistically greater than 1 and statistically different from the 1995-2008 IRR". (Bown and Crowley, 2013, p. 21).

The authors warn that this result should be regarded with caution "given that identification is coming off only two years of data" (p. 22) and stress, in the Conclusion, the relevance of the issue:

"An important question for future research is whether such changes [the differences of trade policy actions in 2009-2010 relative to the pre-Great Recession period] persist over time or whether they were temporary aberrations during the recent crisis. (Bown and Crowley, 2013, p. 27).

⁴ "If one computes the share of AD activity due to new users one finds that at no time during the post-Uruguay Round period have the new users accounted for less than half of worldwide AD activity, and in most years they have accounted for more than 70% of the cases. Interestingly, most of the AD disputes initiated by new users have targeted imports supplied by other developing countries – South-South protectionism" (Blonigen and Prusa, 2016).

⁵ "In terms of our specific results (...) we find an important counter-cyclical relationship between macroeconomic slowdowns and aggregate-level new import protection through TTBS for the period 1995-2010. For these emerging economies, a decrease in domestic real GDP growth or an increase in the domestic unemployment rate leads to significantly more imported products subject to TTBS in the subsequent year". (Bown and Crowley, 2013, p. 5).

In fact, the deep economic recession that has been affecting Brazil since 2014 was followed by a decrease in the number of antidumping investigations. Brazil's recent GDP growth was 3.0% (2013), 0.5% (2014), -3.8% (2015), and -3.6% (2016). At the same time, the number of AD new investigations fell from 65 (2013), to 43 (2014 and 2015), and 24 (2016)⁶.

In this line, we update Bown and Crowley (2013) and discuss the main results. We extend the period of analysis up to 2015 (which is the most recent available data, since the World Bank TTB databank was discontinued in 2016) and check if the trade protection policy through AD duties in emerging countries can be considered counter- or pro-cyclical after the 2008-09 IFC.

We also include developed countries in our sample and investigate whether there are different behaviors between emerging economies and developed countries. Finally, we analyze the role of China as a trading partner of both emerging economies and developed countries.

Section 2 revises the theoretical work regarding macroeconomic shocks and new import protection, Section 3 introduces the empirical model and describes the panel dataset, and Section 4 presents the results. A final Conclusions section summarizes the main findings.

2 Theoretical background and review of literature

The countercyclical relationship between trade protection and economic growth is a well-established empirical fact in economic literature but a theoretical puzzle. Among the many papers that discuss both the theoretical background and the empirical evidence of this relationship are Bagwell and Staiger (1996), Knetter and Prusa (2000), Rose (2012) and Bown and Crowley (2012 and 2013).

Bagwell and Staiger (1996) provide a theoretical model for the relationship between trade protection and economic growth, a “business cycle theory of protection”. According to them, there are two alternative approaches trade protection policies in terms of distributive goals: a “domestic political economy approach”, where trade policy would protect import-competing sectors at the expense of export-driven domestic sectors, and a “beggar-thy-neighbor approach”, where trade policy intends to promote domestic industry at the expenses of foreign exporters. To provide a counter-cyclical theory of protection, both approaches must explain why governments would protect import-competing sectors in recessions but would not do so during economic booms.

Concerning the first approach, Bagwell and Staiger (1996) mention Cassing, McKeown and Ochs (1986), who draw a distinction between declining “old regions”, which are dominated by import-competing industries, and growing “new regions”, dominated by export industries:

“... export interest dominates the political process during booms, since further expansion is only possible in new regions; by contrast, during recessions, excess capacity develops in the import-competing industries, so the payoff to securing protection is high for the import competing industries in the old region” (Bagwell and Staiger, 1996, p. 1).

⁶ GDP growth data are from IBGE, the Brazilian Institute for Geography and Statistics (www.ibge.gov.br); AD new investigations data are from the Brazilian Ministry of Development, Industry and Commerce (MDIC, www.mdic.gov.br).

Bagwell and Staiger's (1996) theoretical model adopts the second approach, where countries are tempted to exploit the terms of trade effects resulting from protectionism during recessions.

Trade volumes are usually considered to be pro-cyclical, which could suggest a pro-cyclical relation between economic growth and protection. Whether rising imports are met with greater liberalization or increased protection depends on whether they are part of a cyclical uptrend in trade volume or a transitory increase in import levels of a specific sector. This is an important feature of the Bagwell and Staiger (1996) model, since it allows transitory and sector-specific increase in import levels even during economic recessions.

Countries engage in a constant trade-off between the gains off deviating unilaterally from international free trade agreements and the discounted expected future benefits of maintaining them. Bagwell and Staiger (1996) show that counter-cyclical trade policy can emerge because the terms-of-trade gain from a tariff increase as a response to a transitory increase in import volume can exceed the long-run cost of a trade war in a persistent recession, during which future growth is expected to be low.

Bagwell and Staiger (1996) conclude that countries can sustain low tariffs in a persistent boom phase characterized by fast growth in the volume of trade and that transitory and non-cyclical increases in the level of trade may result in more protection. Moreover, these conclusions are robust, arising in both the "international business cycle" case, where countries move together between booms and recessions, and the "national business cycle" case, where countries move between booms and recessions independently.

Knetter and Prusa (2000) examine the impact of macroeconomic variables in the filing of AD investigations. More precisely, they examine the impact of the exchange rate and of domestic real GDP growth in two of the three criteria needed in order to impose duties on foreign suppliers named in AD suits: the evidence of dumping and the evidence of "material injury" to the domestic firm.

A successful AD investigation must fulfill three requirements: first, there must be evidence of dumping; foreign suppliers must be found to be pricing at a "less than fair value" (LTFV), or - to make it simple - the price charged in the domestic market by the foreign supplier must be below the price charged for the same product in the supplier's market. Second, there must be evidence that the domestic industry has suffered "material injury". Third, there must be evidence of a causal nexus between the dumping imports and the material injury⁷.

Knetter and Prusa (2000) state that at a theoretical level, the relationship between the real exchange rate and the AD filing is ambiguous. On the one hand, the appreciation of the domestic currency may lead exporting firms to increase the price of shipments to the domestic market by exporting firms, which, in turn, reduces the chance that the foreign firm is charging LTFV prices. On the other hand, following the "pricing-to-market" literature⁸, the price increase in foreign currency units does not

⁷ The economic literature reviewed here does not explicitly discuss the importance of this third requirement. In footnote #26, Bown and Crowley (2012) downplay its role in the trade policy decision making: "... the extent to which such policy decision are made based on evidentiary criterion found in the legal statutes versus other political and economic factors, such as those under investigation [in their paper] is an open research question and the subject of an extensive literature". Nevertheless, they suggest that the global trade collapse after the 2008-09 could explain the relative little import protection that arose after the International Financial Crisis.

⁸ See Goldberg and Knetter (1997)

typically offset the full effect of the domestic currency appreciation, thus the domestic currency price of foreign goods will fall, which in turn increases the likelihood of finding material injury on the domestic industry.

At the empirical level, Knetter and Prusa (2000) compare a 1999 Goldman Sachs report, which documents a rise in AD cases associated with the appreciation of the U.S. dollar, with a paper from Feinberg (1989), which finds that AD filings increase with a weaker dollar. They conclude that the empirical relationship between exchange rate and AD filings is also an open question.

The relationship between domestic GDP growth and AD filings seems to be more established. A decrease in the importing country's economic activity facilitates fulfilling both criteria. First, it eases a finding of material injury since it makes poor performance of the domestic firm more likely. Second, it leads foreign firms to reduce prices of shipments to the importing country, which reduces the likelihood of finding dumping evidence.

Finally, the relationship between the export country GDP and AD filings in the import country is also "less clear". Knetter and Prusa (2000) claim that a weak foreign economy increases the likelihood that foreign firms will cut prices in all markets – "especially in their own home market" - to maintain overall levels of output. This behavior might cause injury to domestic firms, but it also makes finding evidence of dumping less likely.

The authors mention that the Trade Defense Authority usually has alternative methods of finding positive dumping margins (like the "constructed value" method) so the "conventional wisdom" among practitioners is that finding dumping evidence is usually an easier test to pass than finding material injury evidence. As a result, Knetter and Prusa (2000) expect a negative relationship between the export country GDP and AD filings: the lower the export country GDP, the higher the possibility of injury, the more AD investigations filings.

Knetter and Prusa (2000) develop a duopoly model of trade showing the ambiguous effect of the real exchange rate on AD filings: a real currency appreciation increases the likelihood of injury and decreases the likelihood of LTFV. They also perform an empirical test to examine which effect prevails in AD filings. Using data on AD filings from Australia, Canada, the European Union, and the United States (1980-1999) they find that a real appreciation of the filing country's currency will lead to a significant increase in AD filings.

Rose (2012) refutes the hypothesis of counter-cyclic protectionism. Asking "[h]ow does protectionism responds to business cycle fluctuations", it focuses on a time series analysis, rather than a cross section variation of protectionism. After gathering a number of databases ranging from 1869 to 2009, encompassing as many as 155 countries (but mainly the United States)⁹ and applying several filters¹⁰, a variety of controls and eighteen different tests of protectionist measures and seven business cycle measures, Rose (2012) concludes that while protectionism has not been counter-cyclical since WWII, it may have been so before WWI.

⁹ Including the data appendix of Magee and Young (1987), and databases from the Penn World Tables 7.0, Balke and Gordon (1986) and the Bureau of Economic Activity (BEA).

¹⁰ Filters applied include Hodrick-Prescott filtering; Christiano-Fitzgerald filtering; residuals from a linear time trend; and annual growth rates.

Rose's (2012) provocative last paragraph deserves to be quoted in full:

"If – and it's a big if – the efforts of the economic profession are part of the reason that protectionism is no longer counter-cyclic, then the profession deserves a collective pat on the back. But in that case the profession should also consider setting its sights higher. If economists have helped reduce the cyclicalities of protectionism, then perhaps they should focus on simply reducing protectionism". (Rose, 2012, p. 11).

Our paper follows Bown and Crowley (2012, 2013), who analyze the relation between TTB measures (including AD duties, safeguards, subsidies countervailing duties and China-specific safeguards) and macroeconomic variables (bilateral real exchange rate, bilateral imports, economic activity proxies) in developed countries (2012) and emerging economies (2013). Both papers use a constructed measure of import protection built up from disaggregated, product level data, and focus their analysis at the bilateral level, or between a policy imposing economy and a specific trading partner. This is an important feature of the models given the trading-partner specific nature of import protection.

They formally model TTBs formation as generated by a negative binomial distribution, where the number of imported products under TTBs investigations follows a Poisson process after conditioning on the explanatory variables and unobserved heterogeneity. The dependent variable exhibits over-dispersion in that the variance of the number of investigations per time period exceeds the mean.

In the 2012 paper, the authors use quarterly data for developed countries (the United States of America, the European Union, Canada, Australia and South Korea) to estimate the impact of macroeconomic shocks on import protection policies over 1988-2010. They find that "[i] increases in domestic unemployment, [ii] real appreciations in bilateral exchange rates and [iii] changing macroeconomic conditions in important trading partners result in substantial, countercyclical increases in import protection" (Bown and Crowley, 2012, p. 4).

Bown and Crowley (2012) also focus on the 2008-09 IFC and analyze why the trade policy response was so "mild" relative to such as a severe shock. The model predicted a surge in import protection one year after the outbreak of the 2008 IFC, but the actual surge turned out to have been milder than the expected reaction.

In a second paper, Bown and Crowley (2013) use annual data to empirically examine the responsiveness of time-varying import protection to macroeconomic shocks for emerging economies over the period 1989-2010.

Two institutional differences between the trade policy of high income and emerging countries motivated Bown and Crowley's separate study of use of TTBs by emerging economies. First, for any given year, emerging countries exhibit average applied tariffs that make them less open to trade than developed countries. Second, emerging countries exhibit "water" at their tariff structure, i. e. a sizeable difference between bound and applied tariffs, which allows them to make WTO-consistent increases to their applied Most Favored Nations (MFN) tariffs instead of resorting to TTBs. This second institutional difference is explicitly addressed in their empirical approach by introducing a variable representing emerging countries' tariff structure "water". They provide evidence that:

“... emerging economies implement TTB import protection during periods when a greater number of their imported products have become subject to the WTO disciplines that constrain the countries’ ability to raise applied MFN tariff rates”. Bown and Crowley, 2013, p. 4)

Bown and Crowley (2013) main results for emerging economies during the 1995-2010 period confirm a counter-cyclical relationship between economic activity slowdowns and aggregate level new import protection through TTBs. Results also show that real appreciation of the bilateral exchange rate relative to a trading partner, weak foreign GDP growth and surges in bilateral imports are also associated with more import restrictions.

The paper results also show that when comparing the General Agreement on Trade and Tariffs (GATT 1989-1994) to WTO (1995-2008), emerging economy import protection through TTBs is becoming more counter-cyclical and responsive to macroeconomic fluctuations over time. This is in sharp contrast with Rose’s (2012) conclusions, above, that there has been a secular decline in the sensitivity of import protection to economic activity. Bown and Crowley (2013) seem to be particularly critical of Rose’s (2012) work:

“[Rose’s (2012) paper] does not address the inter-temporal substitution of trade policy instruments – i.e., away from applied import tariffs and toward temporary trade barriers – that is explicitly addressed through our approach”. (Bown and Crowley, 2013, p. 5).

“(…) Furthermore, the most relevant policy instrument in that paper is a coarse measure of annual antidumping cases for policy-imposing countries. Our measure includes all TTBs and is constructed from the commonly-defined HS-06 level, with trading partner variation”. (Bown and Crowley, 2013, p. 25, footnote #23).

As referred at the outset, Bown and Crowley (2013) noted that the counter cyclical relationship between macroeconomic slowdowns and TTBs could have been replaced by a pro-cyclical relationship as a result of the 2008-09 IFC. The next section updates their model and tests this result.

3 Model and data

Following Bown and Crowley (2012, 2013), we model AD investigations filings formation as generated by a negative binomial distribution, where the number of imported products under AD investigations, y_{ijt} , follows a Poisson process after conditioning on the explanatory variables, x_{ijt} , and unobserved heterogeneity, $u_{ijt} > 0$. Specifically,

$$y_{ijt} | x_{ijt}, u_{ijt} \sim \text{Poisson}(u_{ijt}m(x_{ijt}, \beta)), \text{ where } u_{ijt} \sim \text{gamma}(1, \alpha)$$

The distribution of product counts subject to AD filings, y_{ijt} , given x_{ijt} , follows a negative binomial distribution with conditional mean and variance:

$$E(y_{ijt} | x_{ijt}) = m(x_{ijt}, \beta) = \exp(x_{ijt} \beta) \text{ and } \text{Var}(y_{ijt} | x_{ijt}) = \exp(x_{ijt} \beta) + (\alpha \exp(x_{ijt} \beta))^2$$

The dependent variable, y_{ijt} , is the number of products imported from country i against which the importing economy j initiates an AD investigation in a year, t . This dependent variable is a non-

negative count and exhibits over-dispersion, that is, the variance of the number of investigations per time-period exceeds the mean.

The set of independent variables includes (i) bilateral exchange rate against most important trade partners¹¹; (ii) bilateral imports; (iii) GDP growth in the imposing policy country; and (iv) GDP growth among the most important trade partners; and, finally (v) a “tariff water” measure. The construction of the latter variable was based on the ratio between country-specific weighted average bound tariff rates and the weighted average applied MFN tariff rates. The higher the ratio, the lower the “tariff water” level, or the lower the possibility for tariff increases under WTO rules.

Table 1 summarizes the dataset for emerging countries and Table 2 for developed countries. The AD imposing countries and their most important trading partners are the same as in Bown and Crowley (2012, 2013) studies, with the only exception of Philippines, which was excluded because it initiated only one AD investigation in the updated analysis period. Each country’s dataset is summarized in Subsection 7.3 of the Appendix.

Table 1: Data summary – Emerging economies

	(1)	(2)	(3)	(4)	(5)
		Developing countries*			
VARIABLES	N	mean	sd	min	max
AD filings	2,085	1.611	4.335	0	58
Bilateral exchange rate	2,085	360.7	1,641	0.000120	16,018
Bilateral Imports (US\$ bi)	2,085	11.2	25.53	0	225.2
GDP growth (Imposing country, %)	2,085	4.71	3.68	-10.9	14.2
GDP growth (Trading partner, %)	2,085	4.08	3.44	-10.9	15.2
Applied/Bound tariff	2,085	0.414	0.223	0.0824	1.579

Sources: constructed by the authors from TTBD (Bown, 2017), USDA’s agricultural exchange rate dataset, TradeMap, World Bank, IMF and WITS data. *. Emerging economies include Argentina, Brazil, China, Colombia, India, Indonesia, Mexico, Malaysia, Peru, Thailand, Turkey and South Africa.

We proceed with some observations on the data from emerging economies. The highest AD filing registry is Argentina’s against China in 2009. The lowest (and, reciprocally, the highest) exchange rate is the Indonesian Rupee against the Euro in 2005. The highest bilateral imports registry is China’s imports from the European Union in 2005. The lowest (most negative) GDP growth among imposing countries is Argentina’s one in 2002, and the highest (most positive) GDP growth is China’s in 2007. Among trading partners, Singapore registered the most positive GDP growth in 2010. The highest ratio Applied/Bound Tariff is China’s in 2001, the lowest, Peru’s growth in 2015.

¹¹ See the list of each imposing country’s most important trade partners in the Appendix.

Table 2: Data summary – Developed countries

	(1)	(2)	(3)	(4)	(5)
		Developed countries*			
VARIABLES	N	mean	sd	min	max
AD filings	1,050	2.463	7.342	0	85
Bilateral exchange rate	1,050	80.12	283.5	5.88e-05	1,798
Bilateral Imports (US\$ bi)	1,050	47.27	86.48	0	504.0
GDP growth (Imposing country, %)	1,050	2.30	1.73	-4.35	7.43
GDP growth (Trading partner, %)	1,050	3.63	3.24	-5.96	14.2
Applied/Bound tariff	1,050	0.645	0.191	0.262	1.237

Sources: constructed by the authors from TTBD (Bown, 2017), USDA's agricultural exchange rate dataset, TradeMap, World Bank, IMF and WITS data. *. Developed countries include Australia, Canada, European Union, Republic of Korea, and United States of America.

The highest AD filing registry corresponds to United States against Korea in 2015. The highest (and the lowest) bilateral exchange rate is the US dollar against the Indonesian Rupee in 2001. The highest bilateral imports registry is United States imports from China in 2015. The most negative GDP growth among imposing countries is the European Union's in 2009, while Korea's was the most positive in 2002. Among trading partners, the most negative is Turkey's in 2001 and the most positive is China's in 2007. The highest Applied/Bound tariff measure was registered in Canada in 2003¹², the lowest in Australia, 2011.

Details of the independent variables x_{ijt} in the way they were entered into the model and their expected signals can be seen below:

- *bilat_exchange_rate_1*: the lag (year t-1) of the natural logarithm of the bilateral real exchange rate. Following Knetter and Prusa's (2000) conclusions, its coefficient sign is expected to be negative: an increasing e (representing an exchange rate depreciation) is expected to result in less AD filings.
- *bilat_import*: the lag (year t-1) of the natural logarithm in the bilateral imports. The expected coefficient sign is positive: increasing bilateral imports are expected to result in more AD filings.
- *gdp_imp_cty_1*: the lag (year t-1) of the natural logarithm of the Purchasing Power Parity GDP (international prices) in the AD imposing country. The expected coefficient sign is under scrutiny. As we saw in Section 2, Rose (2012) argues for a pro-cyclical relation between GDP growth and AD filings, while Bown and Crowley (2012, 2013) strongly advocate for counter-cyclical behavior.
- *gdp_partner_cty_1*: the lag (year t-1) of the natural logarithm of the Purchasing Power Parity of the GDP (international prices) in the most important trading partners. Following the economic literature, we expect the coefficient sign to be negative: an increase in the trading partner GDP should result in fewer AD filings.
- *tariff_wat_1*: the lag (year t-1) of the "tariff water" measure, built as the natural logarithm of the unity subtracted by the ratio between weighted average bound tariffs and weighted average applied MFN tariffs. The "tariff water" measure indicates the possibility that countries will increase their MFN tariffs instead of launching AD filings to protect their markets under

¹² The ratio between Applied MFN tariffs and Bound tariffs should always be equal or less than the unity, since applied tariffs are always lower than bound tariff. This is not the case for China in the first years of its accession to WTO (between 2001 and 2004) because the tariff convergence process timetable and for Canada in 2003, for unknown reasons. All the ratios that were higher than the unity have been capped at one.

WTO rules. The higher the “tariff water” measure (the closer the ratio is to the unity), the less room for tariff increases, so the higher the probability of launching an AD investigation to protect a country domestic market.

- *dummyIFC_1*: the lag (year $t-1$) of the dummy variable corresponding to the IFC. A significant and positive coefficient means that countries have become more protectionist after the IFC, already discounting the exchange rate, imports and GDP growth effects.

Regarding the dataset, there are some notable differences between this paper and Bown and Crowley (2012, 2013). First, we updated the original period of analysis from 1995-2011 to 2001-2015. We did not extend the dataset beyond 2015 because the World Bank TTB databank was discontinued.

Second, we gathered data from both emerging economies and developed countries and performed a joint analysis, instead of dividing the analysis into two different papers, each one dedicated to a specific set of countries. In contrast to Bown and Crowley’s (2013) choice of countries, we excluded Philippines since this country initiated only one antidumping investigation in the updated analysis period. Nonetheless we preserved the same country-specific trading partners the authors selected in both their papers.

Third, for simplicity, we limited our analysis to AD duties, since Bown and Crowley (2012, 2013) did not show substantially different results when testing all TTBs (including AD duties, safeguards, countervailing measures and China-specific safeguards) against an AD limited dataset.

Fourth, our data is annual for both sets of countries, whereas Bown and Crowley (2012, 2013) used annual data for emerging economies and quarterly data for developed countries. It should be noted that the use of annual data might weaken the results, since the lag between the filing of and AD investigation and the immediately preceding economic growth might be distorted.

A more important distinction is that we used the “tariff water” variable for both sets of countries, since this variable does not show a different pattern in developed countries like Australia and Korea when compared to emerging economies (see Figure 9 and Figure 10). However, our “tariff water” measure, based on the ratio of the weighted MFN applied tariff average and the weighted average bound tariff is a simplified version of the original one, based on a sector-specific ratio.

Finally, we did not include a time trend variable, since we understand that the possible learning effect of imposing AD duties after the Antidumping Treaty had already been depleted in the updated period of analysis.

4 Results

We run two sets of simulations, the first (Table 3) with all imposing countries and their most important trading partners, and the second (Table 4) excluding China as a trading partner for all countries.

Table 3 presents our main results. We run three groups of simulations. The first group (models (1), (2) and (3)) included all AD imposing countries from the dataset. Model (1) covers the full period of analysis (from 2001 to 2015, “Period 0”); Model (2) covers only the period prior to the IFC (2001-2008, “Period 1”); and Model (3) only the period after (2009-2015, “Period 2”).

The second group of simulations (models (4), (5) and (6)) considered only emerging economies as AD imposing countries, and the third group (models (7), (8) and (9)), only the developed countries.

We present all the results in incidence-rate ratios (IRR). Coefficients above (below) the unity represent a positive (negative) relationship between the dependent and independent variables.

Coefficients for the bilateral exchange rate in all models suggest an expected negative relationship between the bilateral exchange rate and AD filings. In Group I, the coefficient for the Period 0 indicate that a 1% rise in the bilateral exchange rate (a 1% depreciation of the domestic currency) results in a decrease of 2.4% in the counts of AD filings between these two countries. However, it seems to be significant that there is a 5% level of confidence only in models (3), (5), (7), and (9), or especially when considering all countries in Period 0, only Emerging economies on period 1, and Developed countries in Period 0 and Period 2.

Coefficients for the bilateral imports in all models (except (6)) are all above the unity, as also expected. The coefficient in Model (1) suggests that a 1% increase of the bilateral imports results in a 15.3% increase in AD filings, and this coefficient is significant at 1%. That coefficient seems to be especially sensitive in all models of Group III – Developed countries, whose import levels usually are already higher. The strong coefficient in Model (9) indicates that Developed countries became even more sensitive to import increases in Period 2, after the IFC, though a 111.6% increase in AD filings as a reaction against a 1% increase in imports – which seems to be unrealistic.

The coefficient for the GDP growth of the imposing country is our most important result. The breakdown in Emerging economies (Group II) and Developed countries (Group III) shows that import protection through AD filings seems to be pro-cyclical in Emerging countries and counter-cyclical in Developed countries. The coefficients are quite significant and sensitive in both Groups II and III. Considering Model (4), a 1% GDP increase in an emerging economy results in a 52.8% increase in AD filings. In Model (7), the same 1% GDP increase leads to a 42.4% decrease of counts of AD investigations. Sensitivity seems to be intensifying in both groups: coefficients in Models (6) and (9) are more intense and significant than in Models (5) and (8) respectively.

The GDP growth coefficient for the of the most important trading partners is the weak part of the analysis. We expected a negative relationship between GDP growth of the trading partner and AD filings, following Bown and Crowley (2012, 2013), Knetter and Prusa (2000) and especially Crowley (2011), who finds “strong evidence that economic weakness in a foreign industry is associated with an increase in the probability of antidumping protection” (Crowley, 2011, p. 1). However, all nine models show positive relationships between GDP in the exporting country and AD filings in the importing country. They are significant at 1% in models (1) - (6), mainly in Emerging countries (Group II); and they are particularly intense in Model (6), Emerging countries in Period 2: a 1% GDP increase in the exporting country results in a 99% percent increase in AD filings.

The coefficients for the “tariff water” are positive in all models for Period 1 (before the IFC) and negative in all models for Period 2 (after the IFC). This suggests that tariff structure has become a limiting factor in AD filings only after the IFC.

Finally, the coefficient of the dummy variable for the IFC is significant at 1% and negative. It indicates that the protectionist reaction after the IFC was less than expected and suggests that opening an AD filing has become more difficult since then.

We also run a second set of simulations, this time excluding China as a trading partner for both emerging economies and developed countries. The implicit assumption is that the gradual accession of such a big player to the WTO had country-specific effects that should be treated separately. Thus, the objective was to analyze the behavior of the coefficient for the imposing countries and the trading partners' GDP growth without this factor.

We did not register any relevant difference between the coefficients for the bilateral exchange rate, bilateral imports, "tariff water" and dummy for IFC variables. Concerning the imposing country GDP growth, the resulting coefficients gained strength and significance in Groups I and II, suggesting that the pro-cyclical relationship between AD filings and GDP growth is robust in Emerging economies. Regarding the trading partner GDP growth, all the resulting coefficients lost strength and significance, but remained positive and significant in models (1') and (4'), for all countries, Periods 0 and 2; and (3') and (6'), for emerging economies, also Periods 0 and 2.

Table 3: Model results by group of countries and time periods

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
num_cases	GROUP I: ALL COUNTRIES			GROUP II: EMERGING ECONOMIES			GROUP III: DEVELOPED COUNTRIES		
	2001-15	2001-08	2009-15	2001-15	2001-08	2009-15	2001-15	2001-08	2009-15Y
	b/p	b/p	b/p	b/p	b/p	b/p	b/p	b/p	b/p
bilat_exchange_rate_1	0.976 (0.134)	0.970 (0.224)	0.929*** (0.007)	0.962* (0.064)	0.935** (0.034)	0.932* (0.066)	0.924*** (0.008)	0.967 (0.493)	0.864** (0.010)
bilat_import_1	1.153*** (0.002)	1.159** (0.024)	1.205** (0.036)	1.056 (0.305)	1.099 (0.216)	0.888 (0.340)	1.642*** (0.000)	1.492** (0.013)	2.116*** (0.000)
gdp_imp_cty_1	1.123* (0.060)	1.065 (0.542)	1.291** (0.011)	1.528*** (0.000)	1.315** (0.038)	1.993*** (0.000)	0.676*** (0.004)	0.690* (0.089)	0.571** (0.020)
gdp_partner_cty_1	1.431*** (0.000)	1.341*** (0.001)	1.510*** (0.000)	1.417*** (0.000)	1.334*** (0.005)	1.652*** (0.000)	1.309** (0.033)	1.405 (0.115)	1.214 (0.399)
Tariff_wat_1	0.938 (0.612)	1.645** (0.026)	0.295*** (0.000)	1.134 (0.387)	1.398 (0.182)	0.508** (0.018)	1.195 (0.671)	5.759*** (0.006)	0.349* (0.087)
dummyIFC_1	0.760*** (0.000)			0.652*** (0.000)			0.962 (0.779)		
N	2545	1138	1008	1762	789	679	783	349	270
N_g	182	163	144	126	113	97	56	50	45
chi2	141.42	67.66	80.17	125.18	51.03	54.75	70.84	21.76	38.14

Exponentiated coefficients. Numbers in parenthesis are p-values.

* p<0.10, ** p<0.05, *** p<0.010

Table 4: Model results by group of countries and time periods, excluding China as a partner country

num_cases	(1')	(2')	(3')	(4')	(5')	(6')	(7')	(8')	(9')
	GROUP I: ALL COUNTRIES			GROUP II: EMERGING ECONOMIES			GROUP III: DEVELOPED COUNTRIES		
	2001-15 b/p	2001-08 b/p	2009-15 b/p	2001-15 b/p	2001-08 b/p	2009-15 b/p	2001-15 b/p	2001-08 b/p	2009-15Y b/p
bilat_exchange_rate_1	0.9703* (0.0807)	0.9622 (0.1518)	0.9114*** (0.0021)	0.9498** (0.0221)	0.9152*** (0.0092)	0.9123** (0.0391)	0.9162*** (0.0046)	0.9702 (0.5506)	0.8631*** (0.0089)
bilat_import_1	1.1211** (0.0164)	1.1051 (0.1529)	1.0938 (0.3372)	1.0594 (0.3078)	1.0764 (0.3631)	0.8726 (0.2947)	1.4471*** (0.0002)	1.3183* (0.0866)	1.7019*** (0.0030)
gdp_imp_cty_1	1.1673** (0.0226)	1.2015* (0.0969)	1.4232*** (0.0017)	1.6643*** (0.0000)	1.5365*** (0.0029)	2.2584*** (0.0000)	0.8114 (0.1534)	0.8727 (0.5343)	0.7945 (0.3966)
gdp_partner_cty_1	1.1989*** (0.0035)	1.1062 (0.3048)	1.3621*** (0.0023)	1.1789** (0.0211)	1.1086 (0.3481)	1.4515*** (0.0027)	0.9694 (0.8194)	1.0093 (0.9670)	0.7238 (0.1978)
Tariff_wat_1	1.0139 (0.9233)	1.7812** (0.0188)	0.2481*** (0.0000)	1.3943** (0.0431)	1.6217* (0.0741)	0.5998 (0.1576)	0.8964 (0.8182)	5.2060** (0.0223)	0.1979** (0.0267)
dummyCFI_1	0.8304** (0.0274)			0.6536*** (0.0000)			1.1266 (0.4583)		
N	2321	1026	896	1608	712	602	713	314	240
N_g	166	147	128	115	102	86	51	45	40
chi2	72.18	50.03	42.69	108.82	51.25	44.59	25.78	12.70	18.95

Exponentiated coefficients. Numbers in parenthesis are p-values.

* p<0.10, ** p<0.05, *** p<0.010

5 Conclusions

Despite the well-documented counter-cyclical relationship between import protection and GDP growth, the deep economic recession that has been affecting Brazil since 2014 was followed by a strong decrease in the number of antidumping investigations. In particular, since imports have dramatically fallen, new cases have failed to meet the requirement of a causal nexus between dumping and injury. This decrease apparently did not fit with existing literature and motivated us to examine it in more detail. Recent papers from Bown and Crowley (2012, 2013) and Rose (2011) have engaged in this debate.

To investigate the relationship between AD filings and GDP growth, we updated the Bown and Crowley (2012, 2013) papers and consolidated the analysis in a single work, combining both emerging economies and developed countries. After gathering data, making some adaptations to the original model, and running the econometric model, our main results are:

- Both the negative relationship between bilateral exchange rates and AD filings, and the positive relationship between bilateral imports and AD filings have been confirmed.
- The relationship between the imposing country GDP growth and import protection through AD filings seems to be counter-cyclical in developed countries and pro-cyclical in emerging economies. Sensitivity seems to be intensifying after the IFC.
- However, the model resulted in an unexpected positive relationship between most important trading partners' GDP growth and AD filings, mainly in emerging economies, especially after the IFC.
- The tariff structure of the imposing countries proved to be a limiting factor in AD filings only after the IFC.
- The IFC coefficient proved to be negative, suggesting that it was more difficult to open an AD filing after 2009 than before the International Financial Crisis.

All these results must be regarded with caution, especially because the expected negative relationship between exporting country GDP and AD filings has not been confirmed and the annual data may not be appropriate to analyze the relationships under scrutiny.

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7 Appendix

7.1 List of most important trade partners for each imposing policy country, emerging economies

Argentina: Australia, Brazil, Switzerland, China, European Union, Indonesia, India, South Korea, Malaysia, Paraguay, Russia, Thailand, United States, South Africa. These economies were the source of 80% of imports. (Bown and Crowley, 2013: 85%)

Brazil: Argentina, Chile, China, European Union, India, Japan, South Korea, Mexico, Pakistan, Russia, Thailand, United States, South Africa. These economies were the source of 74% of imports. (Bown and Crowley, 2013: 84%)

China: European Union, Indonesia, India, Japan, South Korea, Malaysia, Russia, Singapore, Thailand, United States. These economies were the source of 52% of imports. (Bown and Crowley, 2013: 67%)

Colombia: Brazil, China, European Union, Indonesia, South Korea, Mexico, Malaysia, Russia, Thailand, Trinidad and Tobago, United States. These economies were the source of 74% of imports. (Bown and Crowley, 2013: 75%)

Indonesia: Australia, China, European Union, India, Japan, South Korea, Malaysia, Russia, Singapore, Thailand, Turkey. These economies were the source of 72% of imports. (Bown and Crowley, 2013: 74%)

India: Canada, China, European Union, Indonesia, Japan, South Korea, Malaysia, Russia, Saudi Arabia, Singapore, Thailand, United States, South Africa. These economies were the source of 51% of imports. (Bown and Crowley, 2013: 69%)

Mexico: Brazil, Canada, China, Colombia, European Union, Japan, South Korea, Russia, United States. These economies were the source of 88% of imports. (Bown and Crowley, 2013: 91%)

Malaysia: Australia, Canada, China, European Union, Hong Kong, Indonesia, India, Japan, South Korea, Philippines, Thailand, United States. These economies were the source of 70% of imports. (Bown and Crowley, 2013: 77%)

Peru: Argentina, Brazil, Chile, China, Colombia, European Union, Indonesia, India, Mexico, Pakistan, Russia, United States. These economies were the source of 73% of imports. (Bown and Crowley, 2013: 77%)

Thailand: Argentina, China, European Union, Indonesia, India, Japan, South Korea, Malaysia, Russia, South Africa. These economies were the source of 57% of imports. (Bown and Crowley, 2013: 65%)

Turkey: China, Egypt, European Union, Hong Kong, Indonesia, India, Israel, Malaysia, Pakistan, Russia, Saudi Arabia, Thailand. These economies were the source of 62% of imports. (Bown and Crowley, 2013: 73%)

South Africa: Australia, Brazil, China, European Union, Indonesia, India, South Korea, Pakistan, Russia, Thailand, Turkey, United States. These economies were the source of 65% of imports. (Bown and Crowley, 2013: 78%)

7.2 List of most important trade partners for each imposing policy country, developed countries

Australia: Brazil, Canada, China, European Union, Indonesia, India, Israel, Japan, Republic of Korea, Mexico, Norway, Turkey, Taiwan, United States of America, South Africa. These economies were the source of 70% of imports.

Canada: Australia, Brazil, Switzerland, China, European Union, Indonesia, India, Japan, Republic of Korea, Mexico, New Zealand, Turkey, Taiwan, United States of America, South Africa. These economies were the source of 89% of imports.

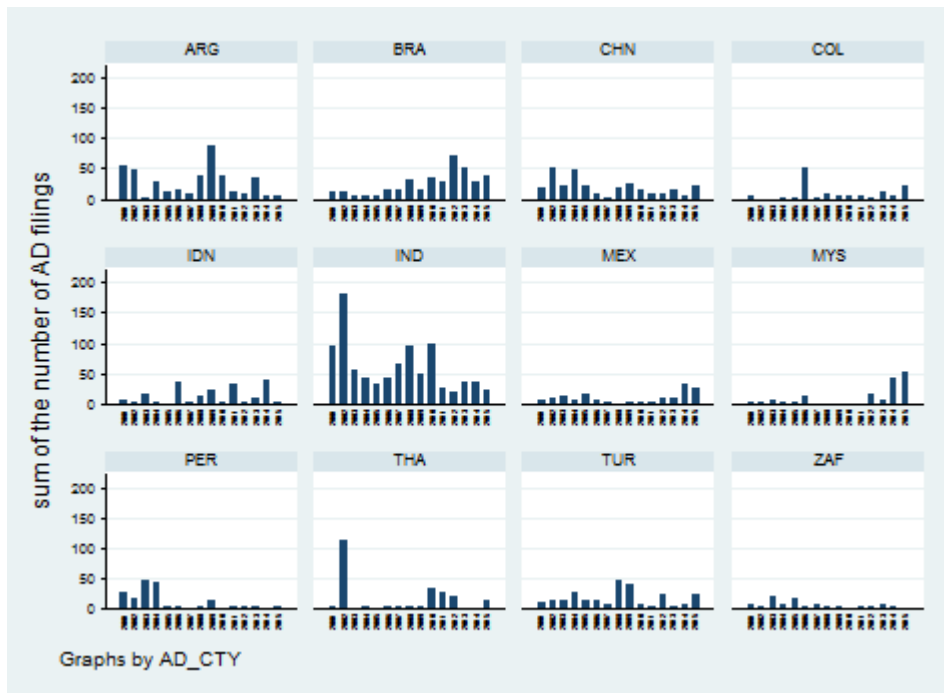
European Union: Australia, Brazil, Switzerland, China, Indonesia, India, Japan, Republic of Korea, Mexico, Norway, New Zealand, Turkey, Taiwan, United States of America, South Africa. These economies were the source of XX% of imports.

Republic of Korea: Canada, Switzerland, China, European Union, Indonesia, India, Japan, New Zealand, Taiwan, United States of America. These economies were the source of 59% of imports.

United States of America: Australia, Brazil, Canada, Switzerland, China, European Union, Indonesia, India, Japan, Republic of Korea, Mexico, New Zealand, Turkey, Taiwan, South Africa. These economies were the source of 79% of imports.

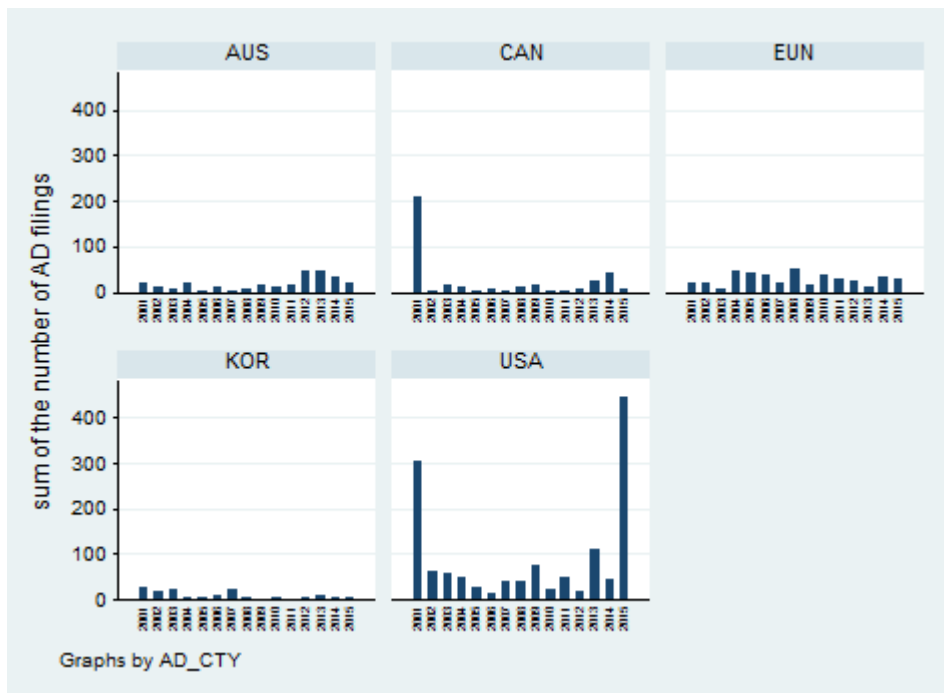
7.3 Dataset graphs

Figure 1: Number of AD filings, Emerging economies, 2001-2015



Source: TTBD (Bown, 2017)

Figure 2: Number of AD filings, Developed countries, 2001-2015



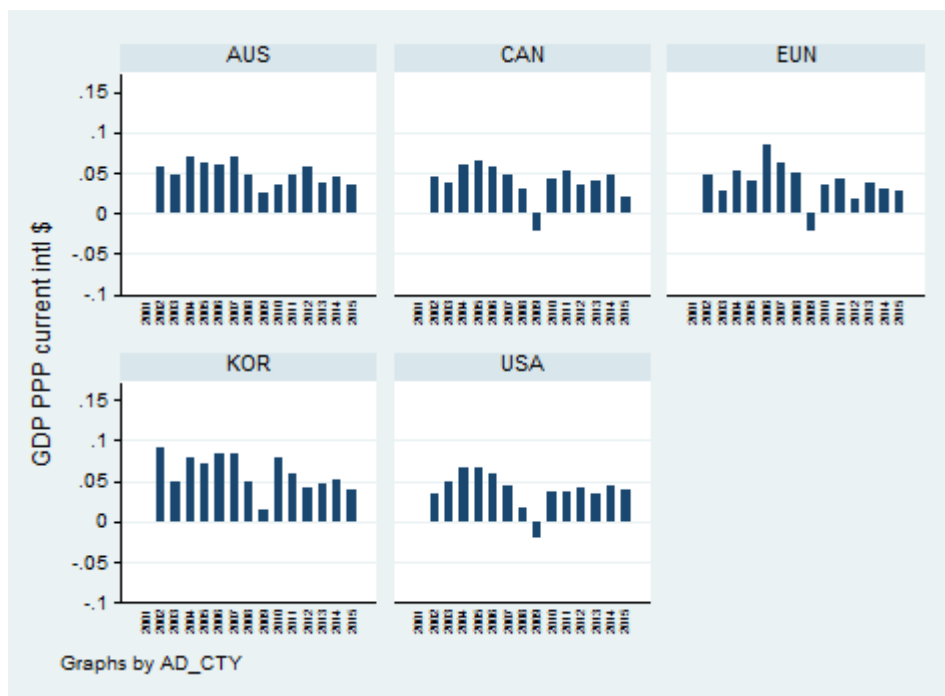
Source: TTBD (Bown, 2017)

Figure 3: GDP growth, Emerging economies, 2001-2015



Source: World Bank/IMF

Figure 4: GDP growth, Developed countries, 2001-2015



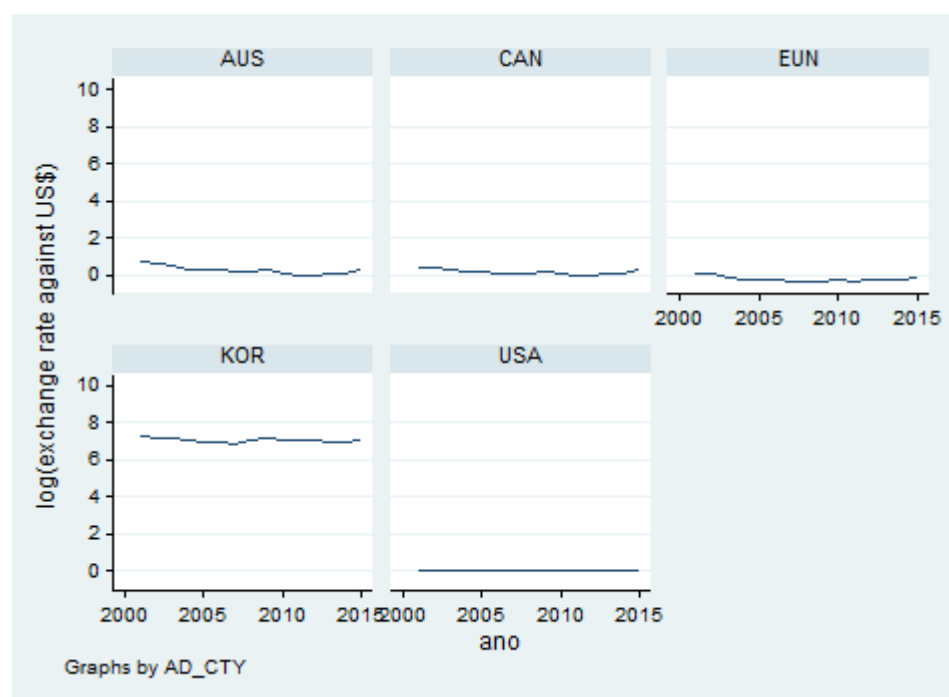
Source: World Bank/IMF

Figure 5: Exchange rate against U.S. dollar (log), Emerging economies, 2001-2015



Source: USDA

Figure 6: Exchange rate against U.S. dollar (log), Developed countries, 2001-2015



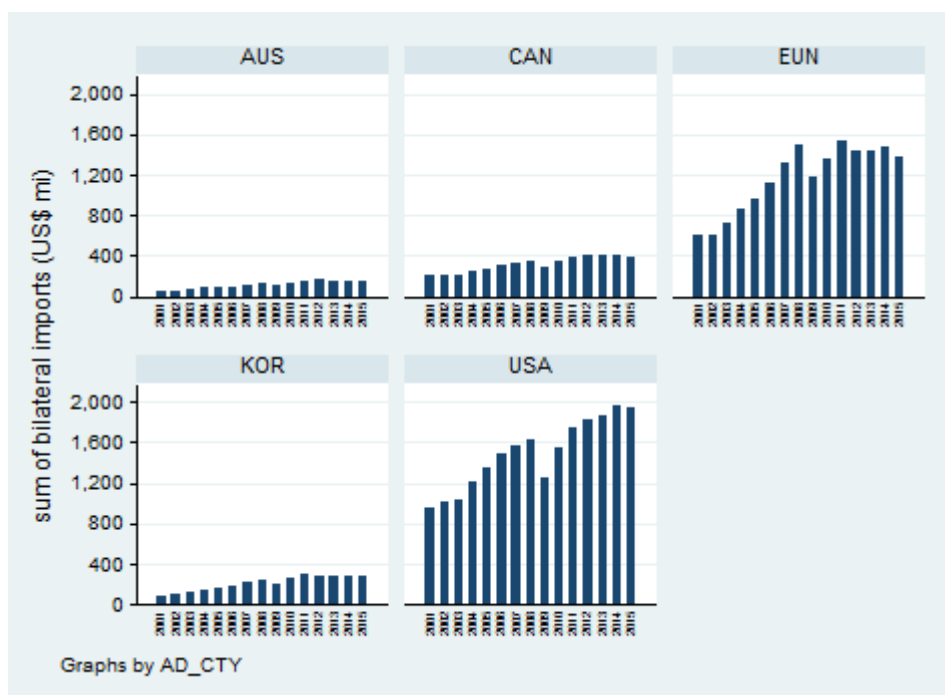
Source: USDA

Figure 7: Imports from main sources, Emerging economies, 2001-2015



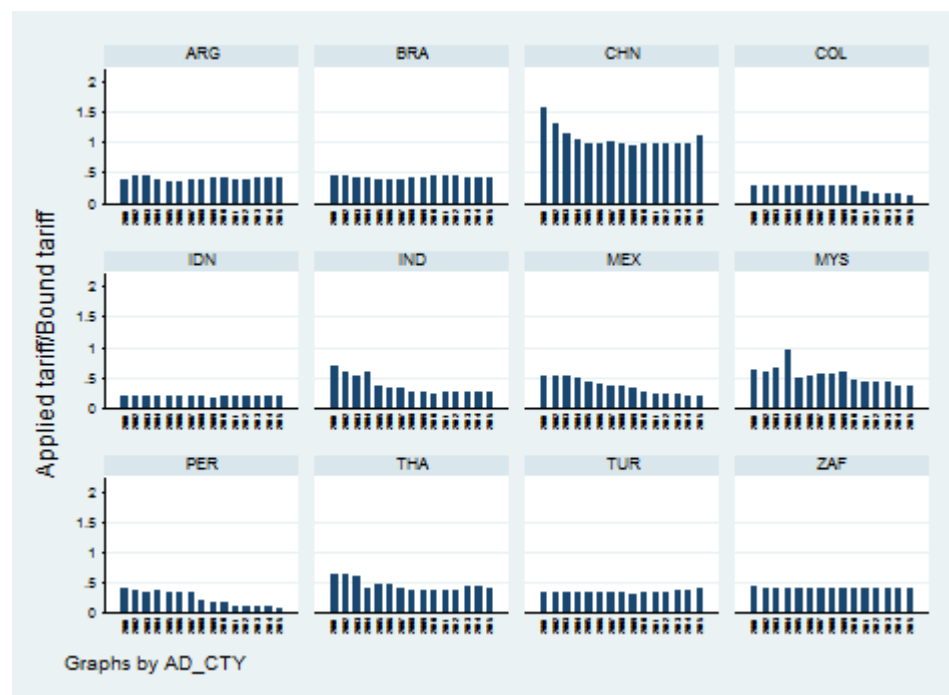
Source: TradeMap

Figure 8: Imports from main sources, Developed countries, 2001-2015



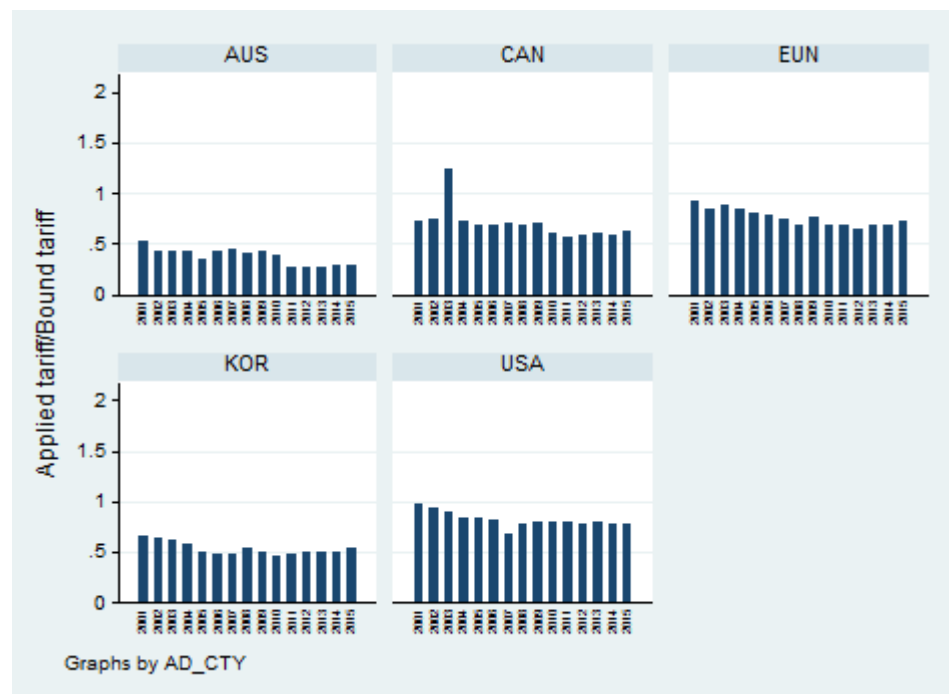
Source: TradeMap

Figure 9: MFN Weighted Applied Tariff/Weighted Bound Tariff, Emerging economies, 2001-2015



Source: WITS

Figure 10: MFN weighted applied tariff/Weighted bound tariff, Developed countries, 2001-2015



Source: WITS