**Non-Tariff Barriers, Enforcement, and Revenues:
The Use of Anti-Dumping as a Revenue Generating Trade Policy**

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The Use of Anti-Dumping as a Revenue Generating Trade Policy[1]

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Abstract: In contrast to developed countries, developing nations are especially reliant on trade taxes, particularly tariffs, as a source of government revenue. As such, tariff liberalization provides them with an incentive to switch towards other revenue generating trade barriers such as anti-dumping duties. The effectiveness of this is potentially limited due to the greater enforcement challenges with the exporter specific anti-dumping relative to broad-based tariffs. We examine this by estimating the impact of anti-dumping measures for 82 importing countries from 2008-2014. We find that anti-dumping's trade effects are larger for countries with greater policy enforcement, especially in low income countries. Although the results are somewhat sensitive to the measure of enforcement, our overall findings indicate that for countries with weak enforcement, tariff liberalization combined with a shift towards non-tariff barriers like anti-dumping is likely to lower government revenues and hamper their ability to provide the infrastructure and education needed for development.

JEL Codes: F13; F15; H27

Keywords: Non-tariff Barriers; Anti-dumping; Enforcement; Tax Revenues; Shadow Economy.

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1. Introduction

With a wealth of evidence indicating the economic benefits of integration with international markets, the past 60 years has seen a concerted push towards the reduction of trade barriers. From the GATT to the WTO to the proliferation of preferential trade agreements, great strides have been made in this direction (see Bagwell, Bown, and Staiger (2016) for a recent discussion). Nevertheless, it has proved especially difficult to achieve this integration in the developing world. One key policy-driven reason for this is that, unlike their developed country counterparts, developing nations are especially reliant on trade taxes (primarily tariffs) as a source of revenue.[3] As reported in Table 1, whereas in OECD regions like western Europe, tariff revenues are less than 1% of total government revenues, in developing regions such as Latin America and Asia, they are over 12%. African governments in particular are reliant on tariff revenues as they make up nearly one-third of total revenues. A major reason for this is that imports are relatively easy to track and therefore are a less-elastic tax base, especially when informal markets are a possibility (Emran and Stiglitz, 2005). Because of this, there have been difficulties in achieving policy reforms, such as a shift from tariffs towards relatively efficient VAT systems.[4]

With this in mind, as developing countries reduce tariffs, there is potentially increased pressure to find alternative revenue streams. One possible alternative is the use of revenue generating non-tariff barriers (NTBs) such as anti-dumping duties (ADDs); indeed Bown and Tovar (2011) find support for the notion that as India liberalized its tariffs it replaced this with ADDs. Comparable findings are found by Aggerwal (2004). Sudsawasd (2012) empirically estimates the relationship between trade policy and antidumping by applying a count model using a panel data set (1995-2007) of 56 developed and developing countries,

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[3] This is in addition to the various challenges developing nation exports face including the global demand shift towards high-skill intensive products (especially services), transportation barriers created by geography and poor infrastructure, and corruption and weak institutions (especially regarding intellectual property rights enforcement).

[4] See Davies and Paz (2011) for a discussion.

finding evidence of substitution, albeit mostly for the developed countries. Note that this replace has two facets: protection and revenue; while many NTBs can replace the protection aspect of tariffs, not all can substitute for its revenue generation capability.[5] For example NTBs such as sanitary and phytosanitary restrictions (SPS) or technical barriers to trade (TBTs) can reduce trade just as tariffs can, yet do not have the same revenue-raising potential.[6] Anti-dumping measures (ADMs) on the other hand can raise revenues especially when ADMs take the form of ADDs.[7]

However, if the goal is to raise government revenues via trade policy, an imposing government must also be cognizant of the effectiveness of the barrier. In contrast to many tariffs, which apply to all imports of a specific good (especially under the WTO's most favoured nation provision), ADMs are exporter-specific. Furthermore, ADMs can even be firm-specific within an exporter when an exporting firm has been granted a price undertaking (a commitment to maintain a minimum import price). As such, ADMs may raise less revenues than even their equivalent tariff due to substitution across importers. In addition, ADMs may be more difficult to enforce since they require accurate inspections to identify to which imports the ADM must be applied. Therefore, particularly in situations where enforcement capability is low, tariff reductions may have significant negative effects on government revenues and impede the ability to invest in the infrastructure and educational improvements needed for development.

One way to observe this in the data is to examine how the impact of ADMs and tariffs vary according to the enforcement capability of a country. In general, we would expect that

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[5] Aggerwal (2004) also suggests that anti-dumping measures adoption may result as a response to those by a trade partner.
[6] We acknowledge that SPSs and TBTs can raise revenues if they require firms to pay a fee for the inspection. However we contend that such effects are minimal when compared to tariffs or ADDs, particularly when inspection and verification costs are factored in. We also recognize that SPSs and TBTs can increase trade rather than reduce it. This can occur if, for example, a safety regulation increases consumer confidence in the imported good, increasing demand for it. Thus, there is a rationale for referring to these as non-tariff *measures* rather than non-tariff *barriers*.
[7] ADMs can take the form of duties, price undertakings, and other strategies.

when enforcement capability is low, imports will be less responsive to policy as they are brought in through shadow channels and/or policies are simply not applied. Furthermore, given the greater enforcement issues surrounding ADMs, we expect this effect to be more apparent there than in tariffs.

We test this idea using bilateral product trade data on 82 importing countries and 108 exporting countries across 4,292 products from 2008-2014, estimating how the effectiveness of tariffs and ADMs vary according to the enforcement capacity of the importing country. We find that the trade effect of ADMs is greater in countries with larger abilities to enforce their border policies (proxied by government size relative to the overall economy). This is particularly true for emerging economies and manufacturing imports. Conversely, we find no variation in the effect of a tariff across countries with different enforcement capabilities. This result is confirmed when we proxy enforcement capability by corruption but not by bureaucratic quality, where lower administrative burdens may offset increased enforcement, or the size of the shadow economy. This suggests that the differential effects are driven by failure to enforce policy rather than shifting the imports to the shadow economy.

The rationale for our focus on ADMs is two-fold. First, unlike TBTs and SPSs, where regulation can reduce trade by making exporting more costly even as it increases trade by reducing uncertainty about the quality of exports, ADMs should only reduce trade. Thus, focusing on this NTB gives us a cleaner anticipated effect for us to take to the data. Second, ADMs in the form of ADDs are by their nature revenue generating NTBs.

The rest of the paper is as follows. In Section 2 we discuss the literature on NTBs with a particular emphasis on the global use of ADMs. In Section 3, we discuss our estimation approach and data. Section 4 presents our results and Section 5 concludes.

Section 2: NTMs and Their Impact on Trade

In this section, we provide an overview of NTBs in general and then focus on ADMs specifically.

2.1 NTBs

NTBs, or more generally non-tariff measures (NTMs), are generally defined as policy measures other than ordinary customs tariffs that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both (UNCTAD, 2013). The distinction between the two terms is that whereas NTBs inhibit trade by definition, NTMs do not necessarily do so, e.g. safety regulations that improve confidence and enhance trade. NTMs comprise three separate but related groups of regulations and barriers. First, they can be barriers which impede entry of foreign goods, of Multinational Enterprises (MNEs), and/or workers into a country. Such are safety and environmental regulations on products, e.g., Sanitary and Phytosanitary Standards (SPS) for agricultural goods, local ownership requirements limiting the extent of foreign direct investment (FDI), and visa requirements that restrict entry by certain groups of foreign workers. Second, they can be exceptions granted by governments to firms that fulfill certain requirements. For example, the EU offers large tariff reductions on imported goods from preferred (often developing) countries.[8] For a firm to take advantage of these reductions it must meet rule of origin requirements whereby a sufficiently large share of the inputs are derived from the partner country. To do so, foreign firms must undertake costly verification of the origin of their inputs. Such verification is one type of NTM. Third, they may take the form of exports instead of imports related measures,

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[8] The EU runs a Generalized System of Preferences (GSP) for various developing countries and Western Balkan States, e.g., Federal Republic of Yugoslavia, Albania, Bosnia-Herzegovina. The GSP offers reduced duties on imports of specific products, e.g., textiles, clothing, footwear under very specific rules. In particular the rules of origin (RoO) are applied, thereby strictly requiring imported products to originate from countries with whom the EU holds GSP, and not from non-participating countries which redirect their products through free trade partners of the EU in order to avoid high EU customs duties.

e.g., incentives to domestic firms intended to support outward trade and investment.[9] Table 2 presents UNCTAD's (2015) commonly used taxonomy for the different types of NTMs.

Globally, the use of NTMs is on the rise. One way of measuring their use is to focus on WTO notifications. Notifying measures is a mechanism aiming at enhancing transparency of NTMs, by generating information on NTMs in the WTO system. The notification procedures contain three sections: (i) Members' commitment to their obligations regarding publication and notification, (ii) establishment of a central registry of notifications within the WTO Secretariat, and (iii) review of notification obligations and procedures by "the Council for Trade in Goods" under the Agreements in Annex 1A of the WTO Agreement. The Notification requirements cover the following subject areas: agriculture, anti-dumping, balance-of-payments, customs valuation, enabling clause, government procurement, import licensing, TRIPS, import restriction (Art. XVIII), TRIMS, maritime transport, reverse notifications, pre-shipment inspection, quantitative restrictions, PTAs, rules of origin, safeguards, SPS, state trading, tariffs, subsidies and countervailing duties, technical barriers to trade, textiles and clothing, services. Most Notification requirements cover NTMs that apply to specific products. Notification templates require Members to indicate which products are covered. Others relate to measures that can affect all products e.g. pre-shipment inspection, customs valuation. Note that usually the product code, more specifically the HS code, is not given with the notification. In our estimations, we will use ADM notifications.

While notification procedures encourage WTO-Members to provide information on their own policies, *reverse* notifications allow Members to identify measures imposed by other countries, e.g., Article 5.5 of the Agreement on Import Licensing Procedures, Article 12:8 of the Agreement on Safeguards. Reverse notifications are complemented by the *Decision on Reverse Notifications of NTMs*. It covers the whole spectrum of NTMs, and it

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[9] Examples include the US regulations whereby exporting firms are able to shield a share of their exports from US taxes. In 2002, the EU successfully challenged these under the WTO, charging that they amounted to an export subsidy (thus illustrating how NTMs can achieve the same effects as traditional trade instruments).

allows for the possibility that Members notify of non-tariff measures maintained by other Members, as long as such measures are neither subject to any existing WTO notification obligations, nor to any other reverse notification possibilities under the WTO Agreement.

WTO disciplines request "*necessity*" and "*proportionality*" tests of measures. Necessity ascertains whether a technical regulation is necessary to achieve the stated non-trade objective. Proportionality ensures that the least trade-distorting instrument to achieve the objective is chosen if necessary. In regards to these, (i) even if notifications are made, it is not always possible to establish whether all measures are notified, (ii) it is not clear whether Members who do not notify do not have any relevant NTMs for reporting or simply do not comply with the notification requirement, (iii) compliance is more pronounced with ad hoc notification requirements reporting new measures, (iv) tariff-rate quotas (TRQs) for agricultural products, anti-dumping and countervailing duties: Members are not obliged to notify if they do not have such measures in place. In all other cases Members are required to notify both when they introduce and when they do not have in place the measure concerned, and (v) in general, the lack of reporting reflects the non-application of measures. On the other hand, SPS, TBT and import-licensing measures, are most likely more widespread than what notifications show, e.g., see Bacchetta et al. (2012).

We present Figures 1 and 2, taken from Grübler et al. (2016), that evaluate the data of WTO notifications prepared within the PRONTO project.[10] The WTO data are presented according to the number of notifications, the types of different measures, specifically SPS and TBT measures as well as antidumping, and the sectors affected. As shown, notifications of SPS and TBT measure have increased and are the most common NTMs. Antidumping, reported under MAST chapter D as contingent trade-protective measures, have been reported

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[10] This can be found at http://www.prontonetwork.org.

less frequently. Note that the frequency of measures does not imply the effect of measures. For that, it is necessary to turn to the work estimating their impact.

Given the wide variety of NTMs in place, it is of little surprise that there is a large (and rapidly growing) set of studies examining their impact on trade. One strand of the literature on the NTM impact focuses on SPS and TBT measures. Alberini et al (2008), for example, examine the implementation of the FDA's seafood HACCP program using a dataset of plant inspections.[11] Among their findings they conclude that (i) there is scant evidence that the FDA, targeted inspections based on past compliance performance, (ii) with sanitation program, the threat of inspection increases the likelihood of firms' compliance. No evidence that inspector visits have a deterrent effect within the HACCP program, (iii) no significant association with past non-compliance either with HACCP or with sanitation standards. HACCP compliance does not improve compliance with sanitation standards, suggesting that the two are not complementary, and (iv) large plants find the transition to HACCP easier than smaller, less automated plants. But, with the exception of the very largest plants, larger plants are more likely to be out of compliance. This is particularly relevant to our analysis as it speaks to the role of enforcement in the NTB's effect.

Guimarães (2012), assess NTMs in intra-EU trade of agri-food products, and their incidence among EU countries (1961-2002). The study concludes that despite EU regulatory harmonization and the principle of mutual recognition, NTMs in intra-EU trade of agri-food products often violate EU accords on the free movement of goods.[12] Gourdon and Nicita (2012), in a statistical analysis indicate that the incidence of NTMs varies considerably across countries, industries and types of measures. Overall NTM coverage ratios vary across countries from less than 10% to more than 90%, with no overall pattern in terms of income

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[11]FDA: Food and Drugs Administration, HACCP: Hazard Analysis Critical Control Point.
[12]The pervasiveness of these measures signals the existence of restrictive practices in intra-EU agri-food products trade, adding to widespread accusations of EU protective legislation in the agri-food sector and lack of a level playing field in world trade.

levels. In particular, (i) TBTs are by far the most used regulatory measures with the average country imposing them on about 30% of products and trade, (ii) SPSs on average on about 15% of trade, (iii) The large incidence of SPS and TBT raises concerns for developing countries' exports, (iv) Non-technical measures: pre-shipment inspections affect, on average, almost 20% of trade and products, (v) Price control measures 8% of trade, and (vi) quantity controls on about 23% of trade. Concurrent with this variation is variation across countries in enforcement capability and the size of the shadow economy.

2.2 ADMs

Focusing specifically on ADMs, according to the MAST classification, antidumping measures as defined under chapter D comprise measures that counteract negative effects of imports in the importing country, unfair foreign trade practices contingent upon the fulfillment of certain procedural and substantive requirements. The detailed definition of antidumping measures is provided in the appendix.

The 1947 GATT agreement defines dumping as a process where a company exports a product at a price lower than its average cost of production, or lower than the one it normally charges on its own home market. It allowed duties, so called anti-dumping duties, in cases where such actions cause "material injury" to a domestic industry. Thus, an anti-dumping duty is a protectionist tariff that governments imposes, to protect local businesses and markets, on foreign imports on products which they believe are being dumped in their national markets.

While most other instruments of trade protection, such as tariffs, quotas, voluntary export restraints, etc., have been reduced or even eliminated under GATT/WTO rules, antidumping (AD) has emerged as a widespread impediment to trade, both by developed and developing economies. According to GATT/WTO rules, there must be a proof of economic injury for AD duties to be levied. Moreover, the AD cases require the filling of a petition by

the "injured" party, e.g., a domestic firm or industry group of firms. AD law requires that at least 50 percent of the injured industry must not oppose the petition. Once an AD duty is in place, a foreign firm can often alter its pricing strategy so as to avoid paying the duty. In such a case, a filling government may end up collecting no duties even if imports continue to enter the country. Furthermore, a foreign firm can "jump" the AD duties and relocate its production to either the domestic market or to a third country that is not subject to the duties. Thus, AD laws can affect strategically the behavior of domestic and foreign firms even if no AD duty is ever imposed.

With regards to the research specific to ADMs, the literature is quite diverse and deep, covering an extensive range of topics of interest. That said, the bulk of it relates to when ADMs are adopted by governments and/or imposed on imports. Blonigen and Prusa (2003) provide an exhaustibly detailed review of the earlier literature, presenting key studies investigating, e.g., US industry level determinants leading to the filling of AD petitions e.g., Herander and Schwartz (1984), Feinberg and Hirsch (1989), Hansen (1990), Krupp (1994), Furusawa and Prusa (1996), and Sabry (2000); studies examining the macro-economic determinants of AD petitions filling, e.g., Feinberg and Hirsch (1989), Knetter and Prusa (2000) who investigate how changes in the exchange rates and GDP can affect government agencies' decisions in AD cases across all industries in an economy. Other of the reviewed studies examine the strategic behaviour of imperfectly competitive exporting firms facing AD measures against their exports, e.g., Leidy and Hoekman (1990), Ethier and Fischer (1987), Fischer (1992) and Reitzes (1993). Studies reviewing AD injury include Prusa (1994) and Pauwels, Vandenbussche, and Weverbergh (2001), which raise this issue in the context of US and EU AD laws, respectively. The interaction between VERs and AD protection and its effect on incentives of firms and governments is first raised by Anderson (1992, 1993),

Vandenbussche and Wauthy (2001). Panagariya and Gupta (1998)(2000) present models with additional considerations, such as incomplete information and negotiation costs.

Antidumping has grown from a small number of developed economies, such as the EU, The US, Australia, Canada, N. Zealand, to a worldwide system of trade protectionist measures, where, today, developing economies are among the leading users. By and large, the literature on AD actions is from the perspective of developed/industrialized economies, while the literature on the implementation of AD measures by developing economies is still rather scarce. Zanardi (2004) provides evidence of the spread of ADM, as illustrated in Table 3.

The main conclusions using the data collected by Zanardi (2004) are as follows: first, there are many more countries implementing AD laws than the ones traditionally using them, e.g., the EU, the US, Australia and Canada using them in the past. Second, the number of new AD users is even more important than expected from past. Third, the widespread time profile of implementations suggests that several of these countries have had such laws for a long time but did not use them. According to his analysis, a possible explanation for this pattern is that the implementation and use of AD might have counterbalanced the tariff reductions accomplished by the various GATT rounds. He supports this hypothesis by noting that the number of countries with an AD law is strongly correlated with the number of countries which are members of the GATT/ WTO. In some other cases, however, the implementation and use of AD seem to have a retaliatory motive, as countries begun to use AD measures in retaliation to being targeted by similar actions from other trade partner-countries. Fourth, in terms of identifying the countries affected by AD laws, Zanardi (2004) concludes that the number of countries has been increasing over time: 68 in 1981–1987, 83 in 1988–1994 and 93 in 1995–2001. Over the period 1981–2001 roughly 113 countries have been the targets of AD investigations. In his overall sample, Asian countries dominate: China, South Korea, Japan, Taiwan and Thailand occupy some of the top places and together represent the target

of 30 per cent of all petitions. The United States, Brazil 420 and some European countries fill up the remaining positions in the top ten.

Bown (2008) examines empirically the determinants of industrial use of antidumping in developing countries. His results, reproduced here in Table 4, presents the most frequent new AD users based on the frequency of antidumping investigations and imposed measures. The table indicates that in the period 1985-1994, under GATT, the four "historical" developed-economy AD users, i.e., the US, the EU, Canada and Australia initiated almost 75% of all antidumping investigations. While they continue to be active AD users under the WTO period, nine developing countries, i.e., Argentina, Brazil, Colombia, India, Indonesia, Mexico, Peru, Turkey and Venezuela, make up 40% of all new investigations and 45% of all new measures imposed.[13]

In terms of which industries in these countries use antidumping to protect imports, Bown (2008: Table 4), constructs information on the basis of number of years during which 28 different 3-digit ISIC industry in each of these countries initiated at least one AD investigation and received import protection under at least one newly imposed measure. On the basis of this information, Bown (2008) reports that (i) most of these 28 3-digit ISIC industries, led by the steel and chemicals industries, pursued AD in at least one of these developing countries, (ii) all these are larger industries facing substantial import competition, rapidly declining industry output, and negative exchange rate and real GDP shocks, and (iii) there is substantial heterogeneity both across countries and industries within a country, as to whether particular industries pursued AD activity.

Although there is a large empirical literature on the determinants of ADMs, analysis of their effects on trade is rather limited. Vandenbussche and Zanardi (2010) provide a literature review on this, nevertheless, some key studies are worth discussion here. Coleman

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[13] Bown (2007) reports that other notable new users of AD measures such as China, South Africa, Egypt, Malaysia and Thailand are excluded from his sample because of lack of available production data.

et al. (2003) review four AD investigation against US agricultural products in Mexico and South Africa, and conclude that AD practices can be effective in blocking US exports. Messerlin (2004), comparing AD measures to the volume of imports, shows that in six of the major new users –Argentina, Brazil, India, Mexico, South Africa and Turkey – AD policy may have hindered liberalisation rather than help support it. Niels and ten Kate (2004) examine Mexico's 20 AD investigations against China, covering 44% of imports from that country during 1992–1993. Of these, 17 resulted in an AD measure, and by 1995 when these investigations were concluded and measured, the imports targeted had declined in absolute value and only represented 11% of total imports from China. In a follow-up study, Niels and ten Kate (2006) undertake a more detailed examination of the trade effects of Mexican AD actions, by covering 70 Mexican AD investigations that were initiated in the period 1992–1997. They address two major questions: First, do AD measures indeed raise prices and reduce imports from the named countries? This is referred to as the (direct) trade destruction effect of AD. Second, do domestic firms benefit from AD, or are imports from named countries replaced by imports from non-named countries, i.e. countries not subject to the AD activity? This is referred to as the trade diversion effect of AD. The study results are rather inconclusive. More specifically, the average index of import values for both named and non-named countries is split between cases with affirmative and negative outcomes. Imports from the named countries grew faster than imports from non-named countries in the two years before the AD investigation and subsequently fell from the named countries and increased from the non-named countries, following the investigation. This suggested, at least to some extent, an import diversion from named to non-named countries, despite the fact that in the third year after the investigation these changes in trade were dampened.

Vandenbussche and Zanardi (2010) apply a gravity model of trade flows in the time period 1980 and 2000 in order to estimate the trade effect of AD activities. They specifically

differentiate between countries that have traditionally been engaged in antidumping, and those countries only recently but frequently using antidumping measures. The latter are Brazil, India, Mexico, Taiwan and Turkey. The estimation results show a strong negative trade effect, with the largest being reported for Mexico and India. For example, Mexico's imports decreased by 7.2% of its annual imports (equalling about 6.5 billion US$ at 1995 real prices). The trade loss for India was estimated as being a 6.8% decrease, which counteracted the considerable annual growth of about 17% of imports due to India's trade liberalization. For all new users of AD, imports are estimated to decrease by 5.9% of their annual imports (equalling about 14 billion US$). Trade diversion is not observed or cannot offset the overall negative trade effect of AD. Instead, AD is found to offset trade liberalisation of countries that are WTO members and intensively use AD.

3. Regression Specification and Data

For our estimation, we use a gravity-style approach and employ fixed effects to absorb country, sector, and time control variables. Specifically, we use importer-exporter-product, importer-exporter-year, and product-year fixed effects. Thus, traditional trade determinants such as GDP, population, or distance between countries are captured by these. Further, this controls for the multilateral resistance term (Anderson and van Wincoop, 2003). We therefore estimate exports (measured as free-on-board values) between importer i and exporter j for 6 digit product p in year t as:

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\begin{aligned}
\ln Exports_{ijpt} = {} & ADD_{ijpt} + ADD_{ijpt} * Enforcement_{it} \\
& + \ln Tariff_{ijpt} + \ln Tariff_{ijpt} * Enforcement_{it} \\
& + NoTariff_{ijpt} + NoTariff_{ijpt} * Enforcement_{it} + \varepsilon_{ijpt}.
\end{aligned} \quad (1)
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In this, *Exports* is obtained from BACI which is based on the COMTRADE data.[14] Note that BACI does not report zero trade flows, therefore we lose no data from our use of logs.[15] While we admit that this has its shortcomings and alternative methods such as PPML are available, given the large number of fixed effects, these alternatives were not feasible for our sample.[16] *ADM* is a dummy variable equal to one if the WTO has been notified of an ADM by *i* on *j*'s *p* exports imposed in year *t*. This comes from the WTO notifications database constructed by Ghodsi, Reiter, and Stehrer (2015).[17] While it would be preferable to use the applied ADM rate rather than a dummy variable, such data are limited in country coverage and are primarily found for developed countries where there may be little variation in enforcement capability. *Tariff* is one plus the applied rate as reported by WITS (World Bank, 2016) for the country pair-product-year combination. *NoTariff* is a dummy variable equal to one if the tariff is zero, something we use since we are forced to add one to the tariff rate before logging.[18]

Our main variables of interest, however, are the interaction of the three protection measures with *Enforcement*, a proxy for the ability of an importer to enforce its policies. We proxy for this in three ways. First, we use logged government expenditures relative to GDP, obtained from the World Development Indicators.[19] The idea here is that a country with a large public sector compared to its overall economy may be well-staffed and able to police its policies. An alternative explanation would be that if such governments pay their officials well, there may be less corruption that could lead to smuggling or other efforts to avoid trade

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[14] These can be found at http://www.cepii.fr.

[15] Specifically, in our data on 108 exporters and 82 importers and products over the seven years, there would have been an additional 370,543 observations with zero trade.

[16] See Santos Silva and Tenreyro (2006) for a discussion of this issue.

[17] See Ghodsi, Gruebler, and Stehrer (2016a) and Ghodsi, Gruebler, and Stehrer (2016b) for examples working with such data.

[18] Which happens in 24% of the observations where we observe positive trade.

[19] These are at http://data.worldbank.org/data-catalog/world-development-indicators.

burdens. Both of these should lead to greater enforcement and thus greater impacts of ADMs and tariffs, with the first effect larger.[20]

Note that this is not the only way in which government size might be related to trade. Benarroch and Pandey (2008) conclude that larger government size leads to lower openness. The intuition of this result is that larger governments tend to be more interventionist. Higher level of intervention may apply to the foreign market so that countries with larger governments may be more protectionists and thus, less open. Benarroch and Pandey (2012), find a causal relationship between trade openness and government size using both aggregate and disaggregated government expenditure data, and differences in incomes across countries. Little or no support is found for a causal relationship between openness and aggregate or disaggregated government expenditure. Similar results are obtained when they split their sample into low vs. high income countries. Birinci (2013) uses panel data for 12 advanced economies,1964:1- 2010:4, and concludes that (i) there is positive bi-directional relationship between GDP growth and openness, (ii) the size of the informal economy has a greater impact on GDP growth than openness does, and the causality from openness to GDP growth is slightly stronger than the causality from GDP growth to openness, and (iii) there is no conclusive, robust evidence regarding the interaction between the size of the informal economy and trade openness. Note that in our case, these effects would be subsumed into the country fixed effects.

Our second proxy is the corruption index taken from he International Country Risk Guide (ICRG) produced by the PRS Group where higher numbers imply more corruption and therefore less enforcement. Third, we use bureaucratic quality which is also from the ICRG. this measure is such that higher numbers mean a more efficient government (i.e. a greater

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[20] Of course, large government shares in GDP can be the result of weak private sectors, such as in a poorly performing developing country.

enforcement capability).[21] It should be noted that this can also capture lower administrative burdens of complying with trade policy (i.e. it is easier to have shipments assessed and the necessary payments made). Finally, one might suspect that a government unable to enforce its trade policies may be unable to stop the overall shadow economy. In addition, if the trade barriers drive imports into illicit trade, then large values of the shadow economy might make this simpler. With this in mind, our last proxy for enforcement is the size of the informal economy from Schneider, Buehn and Montenegro (2010). Specifically, we employ the country-average over the period 1999-2007, as compared to our trade data which cover the period 2008-2014. This then mitigates concerns over endogeneity of the shadow economy measure.

As discussed above, our expectation is that ADMs reduce exports, but less so in countries with weak enforcement capabilities, i.e. those with low government expenditures to GDP, high corruption, and large shadow economies. Tariffs should also lower trade, however, given their relative ease of enforcement, we expect the interactions to be smaller, i.e. less variation across importers of high and low enforcement capability.

Table 5 presents the importing countries in our sample, including the number of ADMs against them and the number they have imposed against others.[22] It also provides information on our enforcement proxies by country. Table 6 breaks down the ADMs across sectors. Table 7 reports our summary statistics.

4. Results

Table 8 presents our baseline results. Column (1) begins with the full sample and only controls for ADM. As expected, when an importer has an ADM imposed on an exporter's products, trade falls. This effect would imply that, relative to the no ADM case, an ADM

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[21] See https://www.prsgroup.com/about-us/our-two-methodologies/icrg for details.
[22] Note that our number of ADMs differs from Bown (2008) because he reports ADM cases whereas we report the number of product-year-exporters under those cases.

results in 14.8% lower trade.[23] Column (2) introduces the interaction between the ADM and enforcement capability which is proxied by government expenditures relative to GDP. Our hypothesis anticipates that not only do ADMs lower trade, but that this effect is larger in countries with greater enforcement capability. Indeed, we find that this is the case. Column (3) omits our enforcement interaction but introduces the two tariff variables.[24] As in column (1), we find that ADM lowers trade; tariffs meanwhile have no significant effect. This may result from the fact that tariffs do not vary as much over time as ADMs do, with the impact of tariffs then being captured by our fixed effects.[25] In column (4), we include all of our protection measures as well as their interactions with the enforcement measure. In this case, we do not find any significant results.

While this might suggest that protection and enforcement have little impact on trade, one must remember that there are several aspects of these baseline results which impose assumptions on the estimation. First, it includes the European countries, nations for which ADM are jointly imposed. With this in mind, columns (5) through (8) repeat (1) through (4) but exclude the European Union importers. When doing so, we find greater significance for our estimates. In particular, we now find significantly negative effects for ADM on trade in all specifications, with this effect even more negative for high enforcement capability countries (note that the minimum value of the enforcement capability proxy is 2.4, hence this dominates the positive, non-interacted coefficient). Thus, it seems that, particularly when including the other jointly-determined trade variables for the EU countries, that their influence was masking the ADM effects.

A second aspect of the data is that we include both high-income countries and medium-income economies. This matters because, even though there may be variation in government size across the developed countries, this might be a weaker proxy for

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[23] As the ADM variable is a dummy, this elasticity is calculated as $100(1-e^{-.16})$.

[24] In should be noted that due to missing tariff information, this lowers our sample size by 1.7%.

[25] Note that many of the tariff values are bound by the WTO agreement.

enforcement capability as compared to the developing countries. In addition, because of the importer fixed effects, the interaction relies on time series variation in government size. While developing nations may experience meaningful shifts in government size and enforcement capability in our sample period, this may be less true for the stable wealthy countries. With this in mind, in Table 9, we separate our sample into a high-income group (columns (1) through (4)) and an emerging economy group (columns (5) to (8)).[26] As can be seen, while ADM lowers trade in both groups, this effect varies with enforcement capability only in the developing countries. This then suggests that government size may be a weak proxy for enforcement capacity in the developed countries and/or less variation in government size in these nations results in an impact that is swamped by the fixed effects.

In Table 10, we further explore our results by splitting our sample into manufacturing and non-manufacturing imports.[27] This may be particularly important given that ADM is often targeted towards manufactures (and in our sample, 89% of ADMs are against manufacturing). When doing so, we only find ADM effects for manufactures where the results mimic those of the baseline full sample estimates. One potential reason for this is that we have roughly 25% as many non-manufacturing observations as we do for manufacturing. Thus, at least for manufactures, the enforcement capability of an importer appears to play a significant role in the effectiveness of its trade policy.

One feature of the data is that a large share of ADM cases involve China (see Table 5), a nation which is both the largest target of ADM, making up 33% of the cases, and the largest imposer of ADM, comprising 8.4% of ADM notifications. With this in mind, it is important that we consider the impact China has on our estimates, something we do in Table 11. In columns (1) through (4), we omit China as an exporter. Here, although we find that ADM has a negative effect on trade, there is no significant role of enforcement capability. In

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[26] Table 5 indicates which countries fall into which category.
[27] Specifically, manufacturing includes industry codes 25 and higher. Note that we do not use services trade in our estimation.

columns (5) through (8), we instead omit China as an importer, finding comparable results. This suggests a particular link between Chinese trade and enforcement capability. Given the notoriety of China with respect to other aspects of trade (such as intellectual property rights), this may not be surprising.[28]

4.1 Alternative Enforcement Capability Proxies

In Tables 12, 13, and 14, rather than using government size relative to GDP as our enforcement capability proxy, we use three alternatives. In Table 12, we use corruption as our measure of enforcement capability (where a higher number would mean more corruption and therefore less enforceability). In columns (1) and (2), we use the full sample. Columns (3) and (4) omit the EU importers, (5) and (6) omit Chinese exports, and (7) and (8) leave out Chinese importers. As can be seen, using this alternative proxy reduces the overall significance of our results. Nevertheless, in the majority of our specifications we again find that ADM lowers trade with this effect smaller in more corrupt importers where enforcement capability is low.

In Table 13, we use bureaucratic quality as our enforcement capability measure. In columns (1) and (2), we use the full sample, finding results quite different from the baseline. In particular, although we find that ADM lowers trade, this effect is smaller for countries with better bureaucratic quality. When excluding the EU importers in columns (3) and (4), we find comparable results. Similarly, we leaving out China as an exporter (columns (5) and (6)) or an importer (columns (7) and (8)), we obtain results which follow the whole sample estimates. This then paints a very different picture than our baseline estimates, suggesting that for importers where enforcement is higher trade policies have lower effects. Alternatively, better bureaucratic quality may lower the administrative burden of policy compliance, offsetting the greater enforcement capability of a country. Finally, Table 14 uses

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[28] See Wyzycka and Hasmath (2016) on EU efforts to improve Chinese intellectual property rights enforcement as a means of protecting EU trade interests.

the size of the shadow economy as the enforcement proxy. As can be seen, when doing so we find no significant effects. This then suggests that the differential effect of ADM across countries is a failure to enforce policies rather than firms deliberately shifting to illegal imports.

4.2 IV Estimates

One potential concern for our estimates is the possibility of endogeneity of ADM, i.e. that ADM is targeted towards an importer's major exporters in an effort to protect domestic industry. Further, if ADMs are imposed in developing countries in part to replace lost tariff revenues, this would exacerbate such an endogeneity effect. Unfortunately, particularly with our short time frame and large number of countries, it is difficult to find a suitable instrument. Nevertheless, in Tables 15 and 16, we present IV estimates where we instrument for ADM and its interaction with government size using the average for the same exporter-product-year for other importers. Note that we do not instrument for tariffs, in particular because they are generally limited by WTO regulations and may therefore be less subject to potential endogeneity. Note that, as reported at the bottom of these two tables, the test statistics indicate that our instruments are sound.

When doing so in the baseline (Table 15), we find little of significance. When using this approach for the other specifications in Tables 8-13, we again tended towards insignificance. One notable exception is for the manufacturing/non-manufacturing results, which we show in Table 16. These results tend to support the idea of the endogenous formation of trade policies. Here, especially for non-manufacturing, we now find significant results for ADM that match our expectations. For tariffs, on the other hand, while we find significant estimates, they argue for a smaller trade impact in countries with high enforcement capability.

5. Conclusion

While the evidence provides a number of reasons for countries to work towards liberalizing trade, the issue is more complex in developing countries because of their reliance on trade-generated taxes as a source of government revenue. While a revenue loss resulting from lower general tariffs can be at least partially offset by replacing them with other revenue generating non-tariff measures, including anti-dumping duties. However, the effectiveness of such a move depends on many factors, including the relative enforcement capability of ADM versus tariffs and the overall enforcement capability of the importer.

Using data product-level imports on 82 importing countries over 2008-2014, we find two primary results. First, we find that ADMs generally reduce trade. Somewhat surprisingly, we find less significant effects from tariffs, something that may be driven by the relatively smaller variation in an importer's tariffs both over exporters and over time. Second, and most importantly for our analysis, we tend to find that ADM effects on trade are smaller in countries with smaller enforcement capability. This effect is generally smaller for tariffs. This may reflect the idea that such importers face greater difficulties in enforcing targeted ADMs than broad-based tariffs. In addition, we find that this is particularly true for emerging economies, with Chinese trade especially contingent on enforcement. Further, this might suggest that such nations would have a more difficult time replacing lost tariff revenue when there is an overall trade policy reform. As a result, such nations may find themselves hamstrung in providing the necessary infrastructure, education, and other government-led improvements necessary to spur economic development. Although this result is somewhat sensitive to our measurement of enforcement capability, our estimates suggest that, as with the tariff-VAT reforms discussed by Emran and Stiglitz (2005), Keen (2008), and others, there may need to be a degree of caution when promoting trade liberalization in trade-tax reliant countries.

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Figures

Figure 1: Number of WTO notifications of NTMs, 1996-2015.
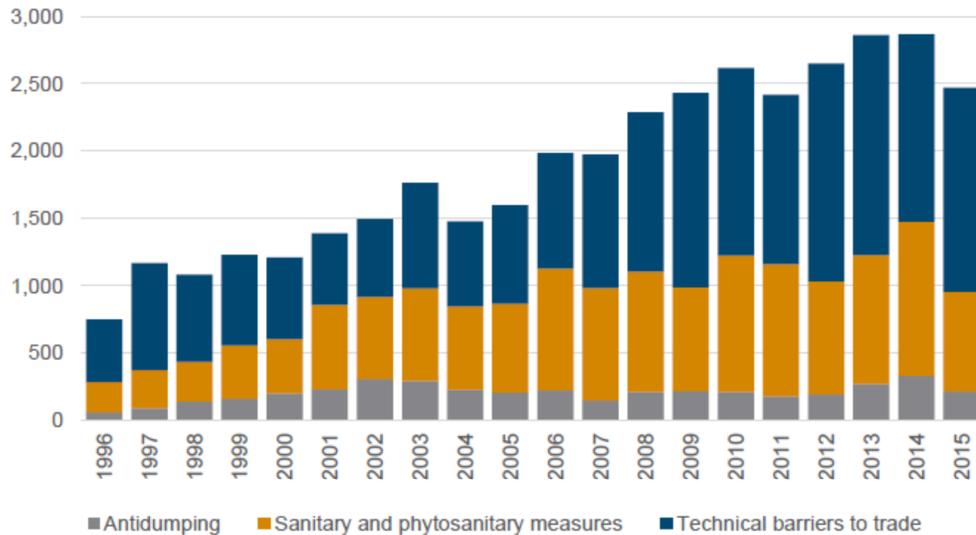
Source: Grübler et al. (2016), using data on WTO notifications amended.

Figure 2: Number of WTO notifications per sector.
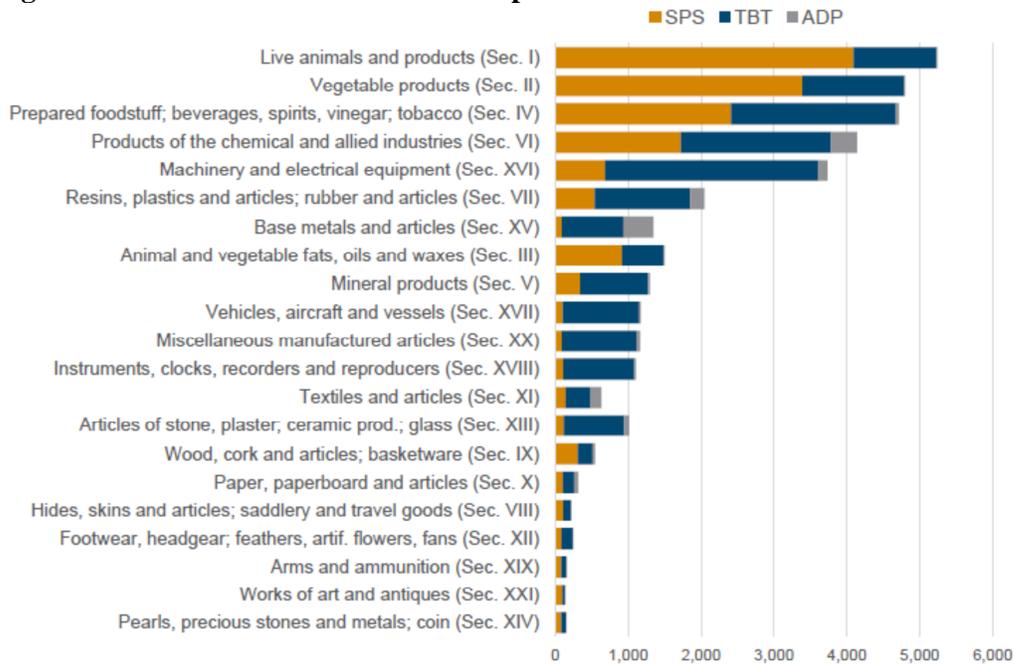
Source: Grübler et al. (2016), using data on WTO notifications amended.

Table 1: Trade Taxes as a Share of Total Revenues (1996-2002)

Region	Share
North America	1.8
Latin America	12.8
Western Europe	0.3
Asia	12.3
Africa	32
Central and Eastern Europe and Middle East	14.2

Source: Bird and Gendron (2007)

Table 2: MAST 2012 NTM Classification

Category		Classification Chapter
Imports	Technical measures	A Sanitary And Phytosanitary (SPS) Measures
		B Technical Barriers To Trade (TBT)
		C Pre-Shipment Inspection (PSI) And Other Formalities
	Non-technical measures	D Contingent Trade-Protective Measures
		E Non-Automatic Licensing, Quotas, Prohibitions and Quantity-Control Measures other than for SPS Or TBT reasons
		F Price-Control Measures, Including Additional Taxes and Charges
		G Finance Measures
		H Measures Affecting Competition
		I Trade-Related Investment Measures
		J Distribution Restrictions
		K Restrictions On Post-Sales Services
		L Subsidies (Excluding Export Subsidies Under P7)
		M Government Procurement Restrictions
		N Intellectual Property
		O Rules Of Origin
Exports		P Export-Related Measures

Source: UNCTAD (2015)

Table 3: Year of Implementation of AD Law by Country

Country	Year	Country	Year	Country	Year
Albania	1999	Grenada	1960	Philippines	1994
Antigua & Barbuda	1959	Guatemala	1996	Poland	1997
Argentina	1972	Honduras	1995	Portugal	1966
Armenia	2002	Hungary	1994	Romania	1992
Australia	1906	Iceland	1987	Russia	1998
Austria	1971	India	1985	Saint Lucia	1964
Barbados	1959	Indonesia	1995	Saudi Arabia	2000
Belarus	1999	Ireland	1968	Senegal	1994
Belgium	1968	Israel	1991	Singapore	1985
Bolivia	1992	Italy	1968	Slovak Rep.	1997
Brazil	1987	Jamaica	1959	Slovenia	1993
Bulgaria	1993	Japan	1920	South Africa	1914
Cameroon	1998	Kazakhstan	1998	South Korea	1963
Canada	1904	Kyrgyzstan	1998	Spain	1982
Chile	1986	Latvia	2000	Taiwan	1984
China	1997	Lithuania	1998	Thailand	1994
Colombia	1990	Luxembourg	1968	Trinidad & Tobago	1992
Costa Rica	1996	Malawi	1955	Tunisia	1994
Croatia	1999	Malaysia	1959	Turkey	1989
Cyprus	1956	Mexico	1986	Uganda	1959
Czech Rep.	1997	Moldova	2000	Ukraine	1999
Dominica	1960	Morocco	1997	United Kingodom	1921
Dominican Rep.	2001	Netherlands	1968	United States	1916
Ecuador	1991	New Zealand	1921	Uruguay	1980
Egypt	1998	Nicaragua	1995	Uzbekistan	1997
El Salvador	1995	Norway	1954	Venezuela	1992
Finland	1958	Pakistan	1983	Zambia	1955
France	1921	Panama	1996	Zimbabwe	1955
Germany	1951	Paraguay	1996		
Greece	1954	Peru	1991		

Source: Zanardi (2004).

Table 4: ADM Users During Recent GATT and WTO Periods

	ADM Investigations 1985-1995	ADM Investigations 1995-2004	ADMs Imposed 1995-2004
"New User" Developing Countries			
Argentina	44	192	139
Brazil	58	116	62
Colombia	11	23	11
India	9	400	302
Indonesia	0	60	23
Mexico	123	79	69
Peru	11	55	34
Turkey	74	89	77
Venezuela	6	31	25
…Subtotal	336	1045	742
(share of total)	-16.20%	-39.50%	-44.80%
"Historical" Users			
Australia	447	172	54
Canada	223	133	80
European Union	364	303	193
United States	475	354	219
…Subtotal	1509	962	546
(share of total)	-73.10%	-36.40%	-33.00%
Other WTO Members	220	639	368
(share of total)	-10.70%	-24.10%	-22.20%
Total	2065	2646	1656

Source: Bown (2008)

Table 5: List of Importing Countries in the Sample

Country	Number of ADMs		Gov't Size	Shadow Economy	Corruption	Bureaucracy Quality
	Imposing	Imposed				
Argentina	1019	182	15.72568	25.3	2.315525	3
Australia*	398	35	17.75901	13.95556	4.649189	4
Austria*	2072	187	19.8926	9.755556	4.772384	4
Bangladesh	0	12				
Belgium*	2396	430	23.84151	21.92222	4.778434	4
Belarus	0	136				
Bosnia & Herzegovina	0	69				
Brazil	1518	382	19.0242	39.04445	2.704142	2
Bulgaria	624	33	16.61085	35.3	2.006074	2
Canada*	655	61	21.02936	15.71111	5	4
Chile*	24	28	12.30769	19.27778	4.5	3
China	7002	27589	13.24106	12.68889	2.137135	2
Colombia	415	2	16.83466	37.33333	2.737757	2
Costa Rica	16	0	16.51865	25.74444	2.186502	2
Croatia	68	134	19.85466	32.14444	2.490273	3
Cyprus*	983	9	17.91672	27.96667	4	4
Czech Republic*	2060	121	20.00126	18.36667	2.506269	3
Denmark*	1804	155	26.7114	17.74444	5.5	4
Dominican Republic	13	3	9.897051	31.85556	1.834841	1
Ecuador	4	3	13.26724	32.4	2.65179	2
Egypt, Arab Rep.	251	99	11.37008	34.87778	2	2
El Salvador	0	36	11.00104	45.11111	2.284283	2
Estonia*	1282	29	19.27328		3.207791	2.5
Finland*	1904	203	23.88712	17.66667	5.803334	4
France*	2869	439	23.67611	15.02222	4.56187	3
Germany*	3396	729	18.92818	15.96667	5	4
Greece*	1785	47	21.52091	27.52222	2.005698	3
Guatemala	4	34	10.34605	50.46667	1.931327	2
Honduras	75	0	16.91635	48.32222	1.826923	2
Hong Kong SAR, China*	0	56	9.041476	16.03333	4.202158	3
Hungary*	1509	75	20.81531	24.41111	3	3
India	4790	2574	10.90241	22.17778	2.417678	3
Indonesia	381	928	9.20885	18.94444	3.142131	2
Iran	0	69				
Ireland*	1517	74	18.19373	15.78889	3.693437	4
Israel*	77	32	22.50502	22.01111	3.345238	4
Italy*	2839	631	19.80062	27.02222	2.5	2.5
Jamaica	30	0	15.80521	34.76667	1.859551	3
Japan*	24	3697	20.03562	10.95555	4.037123	4
Kazakhstan	0	83				

Country						
Kenya	0	7	14.49865	33.15556	1.368839	2
Korea, Rep.*	334	24316	14.8375	26.78889	3	3
Kyrgyz Republic	0	1				
Kuwait*	0	7	16.38993		2.753581	2
Latvia*	1033	18	18.28271	29.21111	2.203186	2.5
Lithuania*	1176	15	18.24101	32.04445	2.212856	2.5
Libya	0	3				
Macao Sar, China	0	120				
Macedonia, FYR	0	100				
Malaysia	104	4352	13.11305	30.92222	2.5	3
Malta*	681	15	19.67348	27.22222	3.5	3
Mexico	1251	1002	11.76502	30.01111	2.145697	2.975372
Moldova	0	35	21.87595		1.888231	1
Morocco	13	30	18.74967	34.93333	2.660736	2
Netherlands*	2820	353	25.87831	13.17778	5	4
New Zealand*	76	27	19.24198	12.35556	5.5	4
Norway*	0	324	20.82188	18.72222	5.183333	4
Oman*	0	80	20.36936		2.510417	2
Pakistan	411	351	10.35313	35.71111	2	2
Panama	36	0	11.12258		2	2
Paraguay	3	10	10.81075		1.306818	1
Peru	1009	17	11.12089	58.04445	2.302115	2
Philippines	3	132	10.09506	41.56667	2.120616	3
Poland*	2364	178	18.37643	27.2	2.700818	3
Portugal*	1504	93	19.71766	22.95555	3.817992	3
Qatar*	0	8	13.53747		2.764996	2
Russian Federation	337	1457	18.93646	43.8	1.802063	1
Saudi Arabia*	0	82	21.22916	18.06667	2.35909	2
Serbia	0	1				
Singapore*	0	113	9.885805	12.91111	4.5	4
Slovak Republic*	1720	64	18.81246	18.13333	2.506326	3
Slovenia*	1465	81	19.64559	26.23333	3.19528	3
South Africa	406	352	20.04126	27.31111	2.6204	2
Spain*	2551	358	19.85833	22.48889	3.994013	3
Sri Lanka	0	8				
Sweden*	1947	245	25.64939	18.75556	5.190025	4
Switzerland*	0	15	10.82768	8.544445	4.69535	4
Thailand	762	1540	16.03486	50.6	1.960201	2
Trinidad & Tobago*	22	5	12.44869	33.4	2	3
Turkey	2289	2386	14.42869	31.26667	2.435188	2
Ukraine	4919	1260	19.03607	49.72222	1.794226	1
United Arab Emir.*	0	99	10.00584		3.128116	3
United Kingdom*	3122	394	20.71203	12.5	4.195426	4
United States*	6362	2559	15.95986	8.633333	3.897651	4
Uruguay*	3	18	13.00798	50.64444	3.535714	2
Venezuela, RB	383	27	12.50866	33.84444	1	1
Vietnam	6	852	5.959539	15.13333	2.803571	2

Sample total	82916	82916				
Sample average			17.40322	22.01971	3.273661	2.998296

Notes: * indicates high income country.

Table 6: ADMs by Sector

Sector	Num. of ADMs	Sector	Num. of ADMs	Sector	Num. of ADMs	Sector	Num. of ADMs
1	6	25	37	49	204	73	8736
2	142	26	12	50	29	74	387
3	801	27	558	51	0	75	71
4	496	28	1517	52	321	76	956
5	23	29	5958	53	71	78	19
6	0	30	52	54	1669	79	34
7	778	31	393	55	1252	80	24
8	883	32	323	56	241	81	429
9	316	33	1161	57	6	82	180
10	33	34	1320	58	171	83	375
11	291	35	108	59	49	84	22634
12	145	36	130	60	52	85	1782
13	0	37	146	61	475	86	9
14	0	38	1517	62	326	87	1353
15	1352	39	2716	63	396	88	0
16	376	40	686	64	1720	89	0
17	225	41	0	65	0	90	577
18	218	42	0	66	0	91	0
19	281	43	0	67	0	92	17
20	1284	44	441	68	467	93	0
21	731	45	0	69	731	94	180
22	553	46	0	70	1418	95	155
23	203	47	7	71	0	96	286
24	0	48	1015	72	7880	97	0
						Total:	**82916**

Table 7: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Exports	1,380,665	5323.15	64361.48	1	15100000
ADM	1,380,665	0.055761	0.229459	0	1
Tariff	1,162,595	8.528433	16.44886	0	800.3
Gov. Exp (% GDP)	1,380,665	17.3975	4.818612	5.625084	28.06423
Corruption	1,380,551	3.274632	1.218588	0.5	6
Bureaucratic Quality	1,380,551	2.999452	0.794139	1	4
Shadow Economy	1,358,006	21.98004	9.672715	8.544445	66.06667

Table 8: Baseline Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Full Sample				Omitting EU importers		
ADM	-0.160***	0.135	-0.184***	0.00797	-0.144***	1.193***	-0.196***	1.308***
	(0.0139)	(0.162)	(0.0151)	(0.198)	(0.0247)	(0.285)	(0.0314)	(0.366)
*ADM*Enforcement*		-0.103*		-0.0663		-0.509***		-0.573***
		(0.0553)		(0.0670)		(0.106)		(0.134)
Tariff			0.000233	-0.00860			0.00293	-0.00375
			(0.00302)	(0.0315)			(0.00395)	(0.0444)
*Tariff*Enforcement*				0.00306				0.00269
				(0.0120)				(0.0174)
NoTariff			-0.00980	-0.0546			-0.00180	0.00794
			(0.00768)	(0.0787)			(0.0134)	(0.146)
*NoTariff*Enforcement*				0.0154				-0.00368
				(0.0277)				(0.0565)
Observations	1,380,665	1,380,665	1,149,751	1,149,751	721,495	721,495	567,390	567,390
Adjusted R-squared	0.849	0.849	0.852	0.852	0.854	0.854	0.858	0.858

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 9: Heterogeneous Effects: High Income versus Emerging Economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	High Income Countries				Emerging Economies			
ADM	-0.163***	-0.516*	-0.174***	-0.546*	-0.146***	1.740***	-0.208***	1.555***
	(0.0174)	(0.288)	(0.0180)	(0.289)	(0.0287)	(0.348)	(0.0367)	(0.404)
ADM*Enforcement		0.117		0.123		-0.731***		-0.680***
		(0.0951)		(0.0953)		(0.133)		(0.151)
Tariff			-0.00274	-0.0715			0.00366	-0.00538
			(0.00653)	(0.0808)			(0.00459)	(0.0565)
Tariff*Enforcement				0.0234				0.00342
				(0.0277)				(0.0227)
NoTariff			-0.0136	-0.247			0.00363	-0.128
			(0.0111)	(0.164)			(0.0159)	(0.208)
NoTariff*Enforcement				0.0778				0.0520
				(0.0551)				(0.0823)
Observations	794,015	794,015	686,019	686,019	582,609	582,609	459,327	459,327
Adjusted R-squared	0.854	0.854	0.856	0.856	0.845	0.845	0.847	0.847

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 10: Heterogeneous Effects: Manufacturing versus Non-manufacturing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Manufacturing				Non-manufacturing		
ADM	-0.188***	0.123	-0.209***	0.0298	0.0425	-0.362	0.0855	-0.390
	(0.0146)	(0.167)	(0.0160)	(0.204)	(0.0495)	(0.533)	(0.0572)	(0.662)
*ADM*Enforcement*		-0.108*		-0.0826		0.143		0.167
		(0.0575)		(0.0695)		(0.189)		(0.229)
Tariff			0.00111	0.00871			0.000765	-0.0929
			(0.00335)	(0.0413)			(0.00678)	(0.0575)
*Tariff*Enforcement*				-0.00313				0.0341
				(0.0161)				(0.0211)
NoTariff			-0.00782	-0.00619			0.000751	-0.370*
			(0.00841)	(0.0885)			(0.0183)	(0.189)
*NoTariff*Enforcement*				-0.00119				0.130**
				(0.0316)				(0.0657)
Observations	1,042,751	1,042,751	919,088	919,088	336,233	336,233	228,877	228,877
Adjusted R-squared	0.850	0.850	0.851	0.851	0.848	0.848	0.855	0.855

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 11: The Impact of China

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Omitting Chinese Exports				Omitting Chinese Imports			
ADM	-0.140***	-0.000372	-0.166***	-0.173	-0.171***	-0.0191	-0.186***	-0.0275
	(0.0164)	(0.175)	(0.0173)	(0.203)	(0.0153)	(0.196)	(0.0162)	(0.228)
*ADM*Enforcement*		-0.0487		0.00221		-0.0522		-0.0541
		(0.0599)		(0.0690)		(0.0660)		(0.0763)
Tariff			0.000654	0.000452			0.000549	-0.0114
			(0.00340)	(0.0342)			(0.00299)	(0.0315)
*Tariff*Enforcement*				0.000411				0.00414
				(0.0130)				(0.0120)
NoTariff			-0.00785	0.0234			-0.00753	-0.0665
			(0.00953)	(0.0864)			(0.00772)	(0.0796)
*NoTariff*Enforcement*				-0.0104				0.0203
				(0.0308)				(0.0280)
Observations	1,181,854	1,181,854	964,991	964,991	1,199,583	1,199,583	1,028,710	1,028,710
Adjusted R-squared	0.839	0.839	0.841	0.841	0.848	0.848	0.851	0.851

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 12: Using Corruption as a Measure of Enforcement Capability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample		Omit EU Importers		Omit Chinese Exports		Omit Chinese Imports	
ADM	-0.213***	-0.266***	-0.140*	-0.213**	-0.211***	-0.276***	-0.260***	-0.279***
	(0.0401)	(0.0446)	(0.0789)	(0.0925)	(0.0468)	(0.0513)	(0.0458)	(0.0488)
ADM*Enforcement	0.0157	0.0230**	-0.00168	0.00639	0.0207*	0.0306**	0.0249**	0.0258**
	(0.0104)	(0.0112)	(0.0276)	(0.0304)	(0.0119)	(0.0128)	(0.0114)	(0.0120)
Tariff		0.0124		0.0106		0.0148		0.00793
		(0.00990)		(0.0147)		(0.0111)		(0.00982)
Tariff*Enforcement		-0.00467		-0.00261		-0.00487		-0.00291
		(0.00347)		(0.00549)		(0.00389)		(0.00345)
NoTariff		0.00630		0.0489		0.0308		-0.000849
		(0.0232)		(0.0408)		(0.0275)		(0.0232)
NoTariff*Enforcement		-0.00595		-0.0183		-0.0118		-0.00285
		(0.00674)		(0.0140)		(0.00798)		(0.00671)
Observations	1,380,551	1,149,703	721,381	567,342	1,181,740	964,941	1,199,469	1,028,662
Adjusted R-squared	0.849	0.852	0.854	0.858	0.839	0.841	0.848	0.851

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 13: Using Bureaucratic Quality as a Measure of Enforcement Capability

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample		Omit EU Importers		Omit Chinese Exports		Omit Chinese Imports	
ADM	-0.222***	-0.299***	-0.129	-0.198**	-0.214***	-0.324***	-0.308***	-0.327***
	(0.0567)	(0.0629)	(0.0837)	(0.0944)	(0.0690)	(0.0792)	(0.0659)	(0.0691)
ADM*Enforcement	0.0202	0.0362*	-0.00581	0.000652	0.0240	0.0493**	0.0424**	0.0436**
	(0.0170)	(0.0185)	(0.0300)	(0.0322)	(0.0206)	(0.0231)	(0.0192)	(0.0199)
Tariff		-0.0299**		-0.0496***		-0.0303*		-0.0281*
		(0.0148)		(0.0182)		(0.0161)		(0.0148)
Tariff*Enforcement		0.0103**		0.0195***		0.0110**		0.00969*
		(0.00507)		(0.00652)		(0.00555)		(0.00505)
NoTariff		-0.0918***		-0.116**		-0.0566		-0.0906***
		(0.0339)		(0.0570)		(0.0415)		(0.0338)
NoTariff*Enforcement		0.0265**		0.0425**		0.0172		0.0266**
		(0.0106)		(0.0195)		(0.0131)		(0.0106)
Observations	1,380,551	1,149,703	721,381	567,342	1,181,740	964,941	1,199,469	1,028,662
Adjusted R-squared	0.849	0.852	0.854	0.858	0.839	0.841	0.848	0.851

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 14: Using the Shadow Economy relative to GDP as a Measure of Enforcement Capability

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample		Omit EU Importers		Omit Chinese Exports		Omit Chinese Imports	
ADM	0.00434	-0.0402	-0.0997	-0.248	-0.0586	-0.123	-0.0444	-0.0352
	(0.102)	(0.109)	(0.151)	(0.172)	(0.120)	(0.125)	(0.111)	(0.114)
ADM*Enforcement	-0.0552	-0.0482	-0.0152	0.0164	-0.0275	-0.0142	-0.0416	-0.0497
	(0.0347)	(0.0372)	(0.0495)	(0.0561)	(0.0405)	(0.0423)	(0.0375)	(0.0390)
Tariff		-0.0164		-0.0128		-0.0280		-0.000893
		(0.0305)		(0.0401)		(0.0337)		(0.0309)
Tariff*Enforcement		0.00556		0.00548		0.00955		0.000862
		(0.00929)		(0.0121)		(0.0102)		(0.00936)
NoTariff		-0.0678		-0.148		-0.131*		-0.0312
		(0.0611)		(0.115)		(0.0743)		(0.0613)
NoTariff*Enforcement		0.0201		0.0469		0.0415*		0.00916
		(0.0196)		(0.0350)		(0.0238)		(0.0196)
Observations	1,358,004	1,130,065	710,847	558,417	1,164,384	950,435	1,176,922	1,009,024
Adjusted R-squared	0.850	0.852	0.854	0.859	0.839	0.841	0.848	0.851

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 15: Baseline Results: IV Estimation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Full Sample				Omitting EU Importers	
ADM	-0.160***	0.315	-0.202***	0.0854	0.0470	-1.047	0.00183	-1.968
	(0.0214)	(0.403)	(0.0225)	(0.467)	(0.0853)	(1.016)	(0.148)	(1.679)
ADM*Enforcement		-0.159		-0.0955		0.411		0.757
		(0.132)		(0.152)		(0.371)		(0.635)
Tariff			0.000195	-0.00822			0.00292	-0.00318
			(0.00302)	(0.0315)			(0.00394)	(0.0444)
Tariff*Enforcement			-0.00990	-0.0542			-0.00198	0.0116
			(0.00768)	(0.0787)			(0.0134)	(0.146)
NoTariff				0.00290				0.00250
				(0.0120)				(0.0174)
NoTariff*Enforcement				0.0152				-0.00499
				(0.0277)				(0.0565)
KP test (p-value)	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Observations	1,380,665	1,380,665	1,149,751	1,149,751	721,495	721,495	567,390	567,390
Adjusted R-squared	0.849	0.849	0.852	0.852	0.854	0.854	0.858	0.858

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Table 16: Manufacturing versus Non-Manufacturing: IV Estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Manufacturing				Non-manufacturing		
ADM	-0.189***	0.290	-0.229***	0.110	0.256**	5.607**	0.240**	6.132***
	(0.0240)	(0.433)	(0.0253)	(0.505)	(0.101)	(2.369)	(0.0981)	(2.260)
ADM*Enforcement		-0.161		-0.113		-1.777**		-1.952***
		(0.142)		(0.165)		(0.770)		(0.738)
Tariff			0.00106	0.00952			0.000798	-0.0955*
			(0.00335)	(0.0414)			(0.00678)	(0.0578)
Tariff*Enforcement				-0.00347				0.0349*
				(0.0161)				(0.0212)
NoTariff			-0.00796	-0.00528			0.000657	-0.393**
			(0.00841)	(0.0885)			(0.0183)	(0.191)
NoTariff*Enforcement				-0.00158				0.138**
				(0.0316)				(0.0663)
KP Test (p-value)	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Observations	1,042,751	1,042,751	919,088	919,088	336,233	336,233	228,877	228,877
Adjusted R-squared	0.850	0.850	0.851	0.851	0.848	0.848	0.855	0.855

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered at the country-pair-year level. Fixed effects included in all columns: exporter-importer-product, exporter-importer-year, product-year.

Appendix

MAST Chapter D: Contingent Trade-Protective Measures as defined by UNCTAD (2015)

D1 Antidumping measure (often antidumping duties of the importing country or price undertakings by the exporting firms)
  D11 Antidumping investigation (investigation whether dumping of a product is occurring and injuring national producers (or a third country's exporters) of the like product.
  D12 Antidumping duty (duty levied on imports of a particular good originating from a specific country. The rates are generally enterprise-specific.
  D13 Price undertaking (undertaking by an exporter to increase its export price to avoid the imposition of antidumping duties.
D2 Countervailing measure
  D21 Countervailing investigation (investigation whether the imported goods are subsidized and are causing injury to national producers of the like product)
  D22 Countervailing duty (duty levied on imports of a particular product to offset the subsidies granted by the exporting country)
  D23 Undertaking (either an undertaking by an exporter to increase its export price or an undertaking by the authorities of the subsidizing country to eliminate or limit the subsidy or take other measures concerning its effects)
D3 Safeguard measures
  D31 General (multilateral) safeguard (temporary border measure imposed on imports of a product to prevent or remedy serious injury caused by increased imports of that product and to facilitate adjustment.)
    D311 Safeguard investigation (investigation conducted by the importing country authorities to determine whether the goods in question are being imported in such increased quantities and under such conditions as to cause or threaten to cause serious injury to national producers of like or directly competitive products.)
    D312 Safeguard duty (temporary duty levied on imports of a particular product to prevent or remedy serious injury from increased imports and/or to facilitate adjustment.)
    D313 Safeguard quantitative restriction (temporary quantitative restriction on imports of a particular product to prevent or remedy serious injury from increased imports and/or to facilitate adjustment.)
    D314 Safeguard measure, other form (safeguard measure in a form other than a duty or quantitative restriction to prevent or remedy serious injury from increased imports and to facilitate adjustment. Where the expected duration of the measure is more than one year, it must be progressively liberalized during the period of application.
  D32 Agricultural special safeguard (agricultural special safeguard allows the imposition of an additional tariff in response to a surge in imports (volume trigger) or a fall in import prices (price trigger))
    D321 Volume-based agricultural special safeguard: additional duty may be applied if the volume of imports of designated agricultural product exceeds a defined trigger quantity.
    D322 Price-based agricultural special safeguard: additional duty may be applied if the import price of a designated agricultural product falls below a defined trigger price.
  D39 Safeguard, n.e.s.

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