THE EMPIRICAL LANDSCAPE OF TRADE POLICY *

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1 Introduction

This chapter surveys the broad features of and developments in the use of trade policy across countries, within countries, and over time. Overall our goal is to describe and, whenever possible, quantify the extent of cross-sectional heterogeneity in commercial policy use and the resulting trade liberalization across countries, their trading partners, and economic sectors, over time.\footnote{This paper builds from a number of previous Handbook chapters describing various elements of how trade policy is used in practice, and notably Feenstra (1995), Rodrik (1995), Staiger (1995), and Maggi (2015).
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In our analysis of the empirical landscape of trade policy, three themes emerge. The first is that, within the context of a broad, 70 year trend toward a more liberal trading system, there exists tremendous variation in the form and restrictiveness of border policies. In the present day, governments use a wide variety of policy tools to restrict imports. The fundamental dichotomy in the lexicon of import policies has been between price-based measures known as import tariffs, and the quantity-based measures known as quotas. Within these broad classes, however, a variety of specialized categories have arisen. The development of trade agreements has played an important role in both constraining access to certain trade policies, and yet also making available other trade policies for use under certain types of legal-economic conditions. One result is an extensive variety of types of measures currently in use. Moreover, across countries and across sectors the trade regime in place at a specific point in time exhibits extensive heterogeneity in the level of restrictiveness.

A second emerging theme is that history tends to repeat itself. While the most popular forms of border barriers have changed over the decades since World War II, having been shaped by the constraints of the GATT/WTO system, many of the same industrial sectors and circumstances in which countries raise barriers to trade seem to have episodes of resurgence over time.

The third theme is that the success of the world trading system in reducing “traditional” border barriers and integrating economic activity has opened up new areas of policy conflict that are expected to only grow in importance. Bilateral frictions between trading partners have moved well beyond tariffs and quotas to the potential international externalities associated with how countries implement their traditionally “domestic” policies - i.e., domestic tax and subsidy regimes, health and safety standards for products, as well as labor and environmental regulations. In order to survey the empirical landscape of research of this increasingly important area, we are forced to rely primarily on theory and case studies to highlight important themes. While certainly the lack of tailor-made and readily-available policy data has been a limiting factor, the result is that rigorous empirical work in this area is still very thin.\footnote{The lack of sufficiently detailed data for analysis of commercial policy is not new; it is only recently that researchers have even had access to data on policies that are relatively straightforward to measure and assess, such as tariffs and more recently, temporary trade barriers. Bown (2011) presents a discussion of recent developments. Data collection on “behind the border” policies that affect trade lags even further. Nevertheless, the problem associated with the political economy of data production and dissemination and free-riding for the case of commercial policy has yet to be resolved.} As such, the literature is relatively unsettled as to the positive and normative understanding of the extent to which regulatory and standards policies unduly inhibit trade and cross-border economic activity and what, if anything, is the role of trade agreements to do something about it.
We begin our discussion of the contemporary state of trade policy in Section 2 with an analysis on the focal instrument of the international trading system - the ad valorem import tariff. A cross-country examination of the contemporaneous data reveals a number of interesting facts. While overall levels of import protection are relatively low across countries in historical terms, important heterogeneity remains - e.g., across countries, industries, and sometimes trading partners, as well as in terms of the enforceable legal commitments that have been made under the multilateral trading system. Second, because countries have taken on additional liberalization under preferential trade agreements, there is additional heterogeneity for certain policy-imposing countries in tariff height across foreign trading partners and sectors.

Section 3 extends the analysis of border instruments to look beyond ad valorem import tariffs. Even though the preferred policy tool in the WTO system is the ad valorem tariff, specific tariffs are surprisingly common in the tariff schedules of especially high-income WTO members. Further, although today’s institutional environment of trade rules has delivered low applied ad valorem import tariffs, contemporary use of temporary trade barriers - such as antidumping duties, safeguards, and countervailing duties - by some countries has been increasing and is also characterized by heterogeneity across economic sectors and foreign trading partners. Potentially WTO-consistent use of temporary trade barriers can substitute for ad valorem import tariffs and other popular border policies (e.g., quantitative restrictions), whose use has otherwise been restricted by rules embodied in WTO or PTA membership. We then proceed through our lexicon of non-tariff import restrictions by documenting the use of quotas and price undertakings within the WTO. Even though the WTO’s special policy tools have legal definitions that imply use should be limited to specific circumstances or to achieve a specific policy objective, there is evidence that these tools follow the same policy function as traditional border barriers. Section 3 concludes with a brief history of the use of special import restrictions over an even longer time horizon in which we emphasize our second theme on history repeating itself, albeit potentially through different policy tools, by different countries, or against different trading partners.

Section 4 offers a brief overview of “behind the border” policies that have the ability to substantially impact international commerce. These include domestic subsidies and taxes, as well as standards and regulations. A comprehensive characterization of such data is notoriously difficult and fraught with measurement concerns empirically; thus we present case studies and examples from recent policy conflicts to identify potentially important areas in which the world trading system confronts the trilemma of how to simultaneously respect local preferences in domestic policy, internalize cross-border policy spillovers that operate through trade flows, and facilitate greater trade integration to sustainably maximize the value of the world’s productive resources. This section touches on the question of whether there is potential substitutability of domestic policies and border barriers and the role of the WTO as a forum for managing tensions that arise when domestic policies, which could serve a legitimate domestic objective or be intentionally protectionist, have trade-restricting or distorting impacts.
2 Ad valorem Import Tariffs

The natural place to begin an empirical analysis of contemporary trade policy is with the *ad valorem* import tariff, the most prevalently applied trade tax in existence, whether under a multilateral trade agreement such as the GATT/WTO or preferential trade agreements. We begin by describing the role of ad valorem import tariffs under the WTO before turning to preferential trade agreements (PTAs).

Some of the analysis below relies on cross-country data comparisons where, for reasons of data quality, we do not attempt to be comprehensive. Instead, we focus to begin on a sample of the 31 ‘economies’ listed in Table 1. These major economies were not chosen randomly - they include the Group of 20 (G20) economies plus an additional set of developing countries each with 2013 populations of over 40 million. Collectively in 2013, these 31 economies represented 83 percent of the world’s population, 91 percent of GDP, 80 percent of imports, and 79 percent of exports. Figure 1 illustrates their geographic diversity.

2.1 The WTO

The WTO had 161 members as of 2015. This means that the WTO rules governing import restrictions apply to almost all countries that are engaged in international trade; indeed, 29 out of the 31 economies of Table 1 are WTO members. The tariff rate that a WTO member applies to imports from all other WTO members is known as the most-favored-nation (MFN) applied tariff rate or MFN rate. Each WTO member negotiates its own tariff schedule over importable products; the WTO’s principle of non-discrimination requires that the tariff rate for each product be identically applied across WTO trading partners. Second, the vast majority of MFN tariffs are applied in ad valorem form, as opposed to a rate defined as a specific, or per unit, duty. Third, as we further discover below in our introduction of tariffs arising under PTAs, the MFN applied ad valorem import tariff is the tariff rate that applies to the majority of global trade.

2.1.1 MFN applied rates, tariff bindings/caps, and binding commitments

Membership in the WTO requires that countries take on a number of commitments with respect to their tariffs. First is the commitment that the applied tariff will be imposed at the same rate against imports from all other WTO members through the most-favored-nation (MFN) principle of nondiscrimination. Second, WTO members establish the set of tariff lines over which they agree to take on some legally binding commitments on the upper limit above which they promise not to raise their applied tariff. Third, for each of those tariff lines (or products) over which the WTO member

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3Here and throughout we refer to economies and countries interchangeably even though we will generally rely on information about the European Union collectively as opposed to its member states individually. Since these countries have a common trade policy set by the European Commission, we treat them as one economy. The 27 member countries of the EU as of 2013 included Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the UK.
agrees to take on some legally binding upper limit commitment, the member also established an
exact upper limit above which it promises not to raise its applied MFN tariff. This upper limit
is referred to as the ‘tariff cap’ or ‘tariff binding’. MFN applied rates must therefore be less than
or equal to the tariff binding in order to be legal under the WTO. The difference between the
tariff binding rate and the MFN applied rate is frequently referred to as the ‘water’ in the tariff
binding or alternatively, ‘binding overhang.’ Finally, whereas the first commitment of MFN is
a principle to which all WTO members must abide (subject to well-defined exceptions, some of
which are described below), WTO members have established individually their second and third
commitments, sometimes resulting from decades of interaction with other WTO members under
GATT negotiating rounds. More on this also below.

The data for these commitments reveal substantial heterogeneity for even ad valorem import
tariffs across countries. The first column of Table 1 presents the simple average of the MFN applied
ad valorem import tariff rate for our sample of major economies in 2013, only two of which were
not members of the WTO.4 The United States, for example, applied an MFN tariff to imports
from other WTO members at a simple average rate across the roughly 5200 6-digit Harmonized
System (HS06) products of 3.4 percent in 2013. Among the high-income G20 members, Australia
had the lowest average MFN applied tariff (2.7 percent) and South Korea had the highest (13.3
percent). The emerging economy members of the G20 tend to have slightly higher MFN applied
import tariffs, ranging from Indonesia (6.9 percent) to India (13.5 percent). The other developing
countries in the sample that were WTO members by 2013 had applied MFN tariffs that were even
slightly higher than the typical G20 rates, ranging from an average of 5.6 percent (Burma) to 16.8
percent (Egypt). Finally, the WTO non-member countries, such as Ethiopia and Iran, had average
MFN applied rates that were substantially higher.5

The MFN tariff rates that countries apply are not, however, their legal commitments under the
WTO. The second column in Table 1 lists the average WTO tariff binding commitment (or tariff
cap) that the country has taken on, and the third column lists the share of imported products
over which it has agreed to take on some upper limit binding commitment. Economies such as
the US, the EU, Saudi Arabia, Argentina, Brazil, China, Mexico, Russia, Democratic Republic of
Congo, and Vietnam have agreed to bind 100 percent of their tariff lines. For countries that have
not agreed to bind all of their products at some upper limit, the remaining products have tariff
upper limits that are ‘unbound.’ As examples, India has not agreed to a binding upper limit to its
applied MFN tariff for more than 25 percent of its imported products. Turkey has not made legally
binding MFN commitments for nearly 50 percent of its products, though because most of Turkey’s

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4The calculations in Table 1 derive from data that includes consideration of ad valorem equivalent estimates for
products over which the import tariff that the country applies is a specific duty. We describe data on the prevalence
of import tariffs applied as specific duties in Section 3.1.1 below.

5We note that an MFN tariff is legally a meaningless concept for countries such as Ethiopia and Iran as they are
not WTO members and are thus not legally bound by a multilateral trade agreement to impose a nondiscriminatory
import tariff. This similarly holds for the “MFN” tariffs (reported below) applied prior to GATT/WTO membership
for countries that ultimately become members. Furthermore, our use of the word “legal” to describe WTO tariff
commitments refers to treaty obligations that countries voluntarily assume, as enforcement of WTO “law” is by the
mutual agreement of all parties, as is described in greater detail elsewhere in this volume.
applied MFN tariffs are tied to those imposed by the European Union through its customs union arrangement, the fact that the EU has bound 100 percent of its tariffs may serve as a de facto anchor (in lieu of a binding legal commitment) for Turkey as well.\footnote{Turkey and the European Union do not have a ‘complete’ customs union as agriculture is excluded entirely, and there are special provisions for steel, textile, and apparel products. Furthermore, as we describe in more detail below, the countries also independently negotiate their own free trade agreements and they administer their own temporary trade barrier policies independently; thus the external trade policy toward third parties in practice is not perfectly ‘common’ in a number of important ways. Bown (2014a) presents a discussion, but the legal-economic sources of these types of divergences under a customs union are an important and under-studied area of research. See also Limão and Tovar (2011).}

The second column in Table 1 reveals that even for the economies that have agreed to bind the vast majority of their tariffs under the WTO, there is wide variation in the average upper limit. While the first column identifies 14 different economies, for example, as applying MFN tariffs that average less than 10 percent, only Canada, China, the EU, Japan, Russia, and the US have undertaken WTO legal commitments to keep those tariffs at an average of 10 percent or less. And while average applied and WTO binding rates are almost identical within China, the EU, Japan, Russia, and the US, most emerging economies and developing countries have average WTO binding rates that are significantly higher than their average applied MFN rates.\footnote{Average applied rates are higher than average binding rates for an economy like the European Union in Table 1 because of a combination of the procedure of averaging from product-level data and of the computation of ad valorem equivalents for products’ rates applied as specific duties (in a given year, reflecting current prices) versus binding rates. For Russia, an additional contributor to the fact that its applied MFN rates were higher than its binding rates is likely due to its relatively recent WTO accession and it has not yet fully phased in all of its associated applied MFN tariff reductions.} Within the G20 emerging economies, the existence of this ‘water’ in the tariffs or ‘binding overhang’ is particularly prominent, as average bindings may be 2 to 5 times higher than applied rates. For other developing countries listed in Table 1 such as Bangladesh and Nigeria, the average binding commitment is more than 100 percentage points higher than the MFN applied rate in 2013.

The last three columns in Table 1 present information on the potential existence of “tariff peaks” defined here as products with applied MFN tariffs that are over 15 percent. For example, even though the United States has an applied MFN tariff that averages 3.4 percent, 2.7 percent of its imported products in 2013 faced MFN applied tariffs of 15 percent or more. The peak US tariff was 350 percent. For Canada, another country with low average applied tariffs, nearly 7 percent of its imported products in 2013 faced tariffs of over 15 percent, with a peak rate of 484 percent. For emerging and developing countries, even larger shares of imported products are subject to these ‘tariff peaks,’ though interestingly the maximum rate that a number of these countries (e.g., Argentina, Brazil, China, Bangladesh, Burma, Ethiopia, Nigeria, Philippines) apply against any imported product is significantly lower than the maximum rate imposed by each of the G20 high income economies. As such, the coefficient of variation for the tariff lines for these particular countries is also significantly lower.

As we detail below, research seeking to understand the variation in MFN applied tariffs has been an important topic for a number of different areas of recent empirical work. Bagwell and Staiger (2011) and Ludema and Mayda (2013), use the MFN applied rates of WTO members to empirically...
investigate implications of the terms-of-trade theory of trade agreements under a modeling framework in which these tariffs may represent ‘cooperative’ levels.\textsuperscript{8} Broda, Limão and Weinstein (2008), on the other hand, use the MFN applied rates to examine two different empirical contexts. First, they examine variation in applied MFN tariffs for a number of WTO non-member countries in order to assess the relevance of the terms-of-trade theory for tariff formulation for countries unconstrained by trade agreements that may attempt to exploit market power and implement ‘noncooperative’ or Nash tariffs. Second, they also show how the MFN applied rate of a particularly prominent WTO member - the United States - does not appear influenced by terms-of-trade considerations, which is consistent with it being viewed as the cooperative tariff policy under the WTO.

\subsection*{2.1.2 MFN applied tariffs across sectors, and within-sectors by end-use}

In addition to significant heterogeneity in average applied MFN tariffs across countries, next consider potential heterogeneity across sectors within countries. Figure 2 begins by providing additional detail on average applied MFN rates (blue bars) and legal bindings (grey bars) for three groups of policy-imposing countries - the G20 high-income, the G20 emerging, and the other developing countries as classified in Table 1 - and sixteen industries.\textsuperscript{9}

Figure 2 illustrates a number of relatively clear patterns. First, high-income countries have lower average applied MFN tariffs than emerging economies and developing countries almost universally across sectors. Second, across country groupings, the average applied MFN tariffs are also typically higher in sectors such as agriculture (animal products, vegetable products, and foodstuffs), textiles and apparel, and footwear. Third, while the high-income economies have relatively little binding overhang in any sector, there is evidence of significant water being in existence for emerging and developing countries across all sectors; the flexibility allowing for them to potentially make sizeable and legal upward changes to their MFN applied tariffs is also greatest in agriculture.\textsuperscript{10}

Figure 3 presents an alternative approach to the tariff data by examining the share of HS06 imported products within a sector for which the MFN applied rate is defined as being a tariff peak, or a tariff applied at or above the threshold level of 15 percent. For high-income economies, nearly 30 percent of products in the foodstuffs sector had an applied MFN tariff in 2013 of 15 percent or more. Similar peak tariffs can be found for high-income economies in 18 percent of products in the animal sector, 15 percent in footwear, 13 percent in vegetables, and 6 percent in textiles and apparel. The distribution of peak tariffs across sectors is quite similar for emerging and developing countries, it is simply that in emerging and developing countries the share of products within each

\textsuperscript{8}See also Nicita, Olarreaga, and Silva (2014) and Beshkar, Bond and Rho (forthcoming) that pursue different implications of the terms-of-trade theory of trade agreements by exploiting variation in the difference between MFN applied rates and WTO tariff bindings.

\textsuperscript{9}Industry classification is given in Table Appendix A.

\textsuperscript{10}Some countries have used this flexibility to make relatively high frequency - e.g., weekly, monthly, etc. - changes within years (and thus potentially not captured in the annual data) to applied MFN tariffs on agricultural products, perhaps in light of both political economy concerns and the uncertainty of yields due to weather-related shocks and growing seasons. Recent WTO disputes challenging such policies imposed by Chile and Peru are described in Bagwell and Sykes (2005) and Saggi and Wu (forthcoming), respectively.
sector that has such high tariffs is significantly larger. Nearly 70 percent of footwear products in
developing countries had applied MFN tariffs at rates that are higher than 15 percent in 2013.

Our next diagnostic considers potential differences in applied MFN tariff rates depending on
the end-use of the product; here we rely on the Broad Economic Categories (BEC) characterization
that maps the underlying HS06 products into two categories: final goods (for consumption) and
intermediate inputs. The data in Figure 4 provide evidence of “tariff escalation” – i.e., that
countries tend to apply higher import tariffs on final goods than they apply on intermediate inputs
- perhaps out due to motives associated with increasing domestic value-added into production (and
exports) or to affect potential inclusion in international supply chains. Overall, MFN applied tariffs
on final goods average 70-75 percent higher for the G20 high income and emerging economies and
more than 90 percent higher for other developing countries than the average MFN tariffs that
those same groupings apply to products classified as intermediate inputs. Within sectors, the
Figure 4 evidence of “tariff escalation” is fairly strong across almost all sectors and country groups
as average applied MFN tariffs on final goods are significantly higher than on intermediate goods.
The evidence is strongest across sectors for the G20 emerging economies and other developing
countries, the evidence of potential tariff escalation is weakest in high-income economies in sectors
such as vegetables, chemicals, wood and wood products, and other miscellaneous products.

Finally, we note that an additional potential source of variation can occur even within HS06
products that are intermediate inputs if a country uses a “dual import” or “duty drawback” tariff
regime; such regimes can result in a country applying different MFN tariff rates depending on
whether the ultimate consumer of the final processed good (that utilizes the potentially taxed
imported intermediate as an input) is domestic or foreign. Under such regimes, imported inputs
into a final product designated for export are allowed to enter the economy duty-free (or with the
applied MFN tariff being refunded), whereas the same inputs face the normal MFN applied tariff
if the input is used to produce a good that could be consumed domestically. Sometimes these
systems are established whereby a geographic area is designated as an export processing zone; in
other instances, the regimes may not be constrained by geography but only by the willingness and
ability of firms to comply with national government legal requirements such as customs declarations.
While we do not provide data characterizing such schemes, research increasingly investigates their
potential impact on a variety of economic activities, especially in light of China being such a
prominent example of an export-led major economy that utilizes a special import tariff system in
which firms are designated as processing firms or ordinary exporters.

\[^{11}\] For ease of exposition, we strip out BEC categories of “mixed use.”
\[^{12}\] Note that in the minerals and fuel industries, no HS06 products are classified as final goods.
\[^{13}\] See Madani (1999) for an overview of export processing zones. Processing firms are not allowed to sell the goods
they produce domestically; they pay zero or low tariff rates on their imported inputs. An ordinary exporting firm
producing the same good must pay the applied import tariff rate but faces no constraints on selling goods domestically
and abroad. Recent papers have analyzed the productivity implications of these dual tariff structures (Yu, 2013) or
the implications for domestic factor demands (Brandt and Morrow, 2015).
2.1.3 MFN applied tariffs over recent history

Next consider the data on changes to applied MFN tariffs over the recent period covering the tail end of the GATT era and the first decades of the WTO. Table 2 presents a cross section of data across our sample of countries for three key years chosen to potentially reveal the impacts of important institutional milestones arising across three decades: 1993, 2003, and 2013. The table also provides information on when (if ever) the country became a member of (“Contracting Party to”) the General Agreement on Tariffs and Trade (GATT), as well as when (if ever) the country became a member of the WTO.

For example, for countries that were members of the GATT, the 1993 data in Table 2 reflects their applied MFN ‘GATT’ tariffs before they would implement any changes resulting from the Uruguay Round of negotiations that ushered in the WTO. By 2003, the countries that joined the WTO at its 1995 inception had phased in most of their Uruguay Round tariff liberalization commitments; thus a comparison of 1993 and 2003 data for such countries may provide a first-order assessment of the impact of the Uruguay Round on average applied MFN tariffs. For China, which joined the WTO through an accession process that concluded in 2001, 1993 and 2003 present data on pre-WTO and post-WTO accession applied MFN tariffs. Similarly, the comparison of 2003 versus 2013 data reveals information on pre-WTO versus post-WTO accession applied MFN tariffs for more recently acceding countries such as Russia (2012), Saudi Arabia (2005), Ukraine (2007) and Vietnam (2008). Finally, given that there has not been any newly concluded multilateral negotiating rounds between 2003 and 2013, any differences in applied MFN tariffs between those two years for the long-standing GATT/WTO members must reflect the impact of ‘something else.’

The Table 2 evidence on changes to applied MFN tariffs for the G20 high-income economies over this extended period is somewhat mixed. Long-standing GATT/WTO members such as the European Union, Japan and the United States already had relatively low MFN applied rates at the end of the GATT period in 1993 at 7.0, 4.4, and 5.6 percent, respectively. These economies cut their average applied tariffs by another 1 to 3 percentage points as a result of the Uruguay Round; nevertheless, given their low initial applied levels, low tariff bindings and resulting lack of ‘water’ (see again Table 1) and the failure of the Doha Round negotiations, applied MFN tariffs for these economies were virtually unchanged between 2003 and 2013. For other high income countries such as Australia and Canada, average applied MFN tariff cuts over the 20 year period have been larger.

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14 We examine this particular period for two reasons. First, we are interested in the highest quality (across country) data on MFN applied tariffs for a consistent classification scheme, and the Harmonized System went into effect in 1988. Thus any attempts to assess changes in tariffs for a period before and after the 1988 threshold will have to confront serious concordance issues that will differ country-by-country, but which will make averaging or examining product level changes nontrivial. Second, despite the HS system beginning in 1988, data for many countries in our sample does not become routinely available until the early 1990s. Nevertheless, as we describe in further detail below, picking 1993 as a common starting point does miss out on some countries’ substantial tariff liberalization periods that may have already begun in the early 1990s (India), 1980s (Argentina, Brazil, Colombia, Mexico), or even earlier. We return to a discussion of changes of MFN tariffs over the 1947-1994 period, where we are forced to rely on alternative data and measures for tariffs, and we discuss the associated caveats of utilization of such data, in a later section.

15 Note finally that the data for 2013 in particular in Table 2 may differ from Table 1 as we are now limiting our consideration of products to which the tariff is applied on an ad valorem advice, so as to focus on policy changes and not changes in ad valorem equivalent rates that may arise due to changes in underlying prices.
On the other hand, South Korea’s average applied MFN import tariff is actually higher in 2013 than it was in 1993. Saudi Arabia’s tariff by 2013 is roughly one third of its 1993 level; this largely reflects the commitments it undertook as part of its 2005 WTO accession.

Table 2 reveals similarly mixed evidence on changes in average MFN applied tariffs across the G20 emerging economies over this period. China and India began the early 1990s with extremely high applied tariffs that still averaged 56.3 and 39.1 percent, respectively; these countries subsequently underwent a large scale tariff liberalization and the result is that by 2013 their MFN applied rates averaged only 9.6 and 13.3 percent. Other countries such as Indonesia, Mexico, and South Africa also had much lower applied MFN tariffs in 2013 relative to 1993. However, countries like Argentina, Brazil, and Turkey began the early 1990s with relatively low applied MFN tariffs and the average levels of their applied MFN import tariffs in 2013 are not much different than they were in 2003 or even 1993, and in some instances, they are even a bit higher. Finally, while Russia’s applied MFN import tariffs did not change much on average over these decades; nevertheless, Russia did enter the WTO in 2012 and took on legally binding commitments over 100 percent of those tariffs at relatively low rates (see again Table 1, column 2), some of which Russia is still phasing in.

Finally, the lower third of Table 2 indicates that the sample of other developing countries has, for the most part, engaged in a general period of tariff liberalization over these twenty years. For all of the countries with available data, applied MFN tariffs in 2013 were significantly lower than they were in 1993. A number of these developing countries cut their average applied MFN tariffs by 20 percentage points or more from their levels in the early 1990s, where the initial average applied MFN tariff for Nigeria was 34.4 percent, for Kenya was 35.2 percent, for Thailand was 45.7 percent, for Pakistan was 50.8 percent, and for Bangladesh was 82.8 percent.

While the data in Table 2 suggest that tariffs were generally lower (or at least not much higher) in 2013 relative to 1993 for most of these 31 economies, the next question concerns the inter-temporal path of this liberalization. Did liberalization over this period take place gradually, or were tariff cuts implemented in large increments? Whether continuous or discrete, was the liberalization a continual downward process or were there significant fluctuations so that tariffs fell initially, then increased (as policies were reversed), before falling again?

Figure 5 begins to address these questions by providing additional information on the year-to-year changes in levels of average applied MFN tariff rates across the three country groups over the WTO period of 1996-2013.\(^{16}\) For the United States, which began the period with extremely low applied MFN tariffs on average, applied MFN tariffs declined by an average of 0.3 percentage points each in 1996, 1997, 1998, and 1999 as it implemented its Uruguay Round commitments. After 2000, however, there is little annual change to the US average applied MFN tariff. The same basic pattern holds for Australia and Japan; for Canada and the EU, applied MFN tariff cuts were larger on average in 1996 and 1998 than 1997 and 1999; nevertheless, after 2000 applied MFN

\(^{16}\) In our survey of some of the research on this topic below, we present some potential contributing explanations behind this phenomenon, including the existence of tariff bindings as well as the WTO-provided access to other policy instruments.
tariffs for these economies were also mostly unchanged. The main exception during this period among the high-income G20 economies was Korea, whose average applied MFN tariff increased by 5.2 percentage points in 1996 immediately preceding the Asian Financial Crisis, declined by 3.9 percentage points in 1999, increased by 3.5 percentage points in 2000, and only since has remained relatively stable, albeit at a high (relative to the other high-income G20 economies) average level.

For G20 emerging and other developing economies, the data on annual changes in average applied MFN tariffs illustrated in Figure 5 suggests a bit more variation. For example, the average applied MFN tariffs in Argentina and Brazil increased by 2.4 and 2.8 percentage points, respectively, in 1998, in part to address a recession associated with the contagion of the Asian Financial Crisis that had spread to Brazil. They cut those tariffs by an average of 2.3 and 1.4 percentage points, respectively, in 2001, in the lead-up to Argentina's abandonment of its fixed exchange rate regime and default in 2002. Turkey similarly had fluctuations in its average applied MFN tariff that were greater than 1 percentage point per year for four out of five years during 1999-2003 in the face of its own financial crisis. India, however, had the greatest year-to-year fluctuations among the G20 emerging economies during this period. In 10 out of the 11 years between 2000 and 2010 India's average applied MFN tariffs changed by at least 1 percentage point: in three of those years (2000, 2004, 2009), India's average tariffs increased considerably, and in six of those years, the tariffs decreased considerably. Finally, for the other developing countries presented in the lower panel of Figure 5, there is evidence of even more annual variation in applied tariffs; nevertheless, the largest annual changes are primarily episodes of tariff cuts, some of which associated with WTO accession (e.g., Vietnam in 2008).

To what extent are the data on annual changes in average applied MFN tariffs capturing the underlying changes taking place at the product level? To investigate the possibility that changes in average tariffs may not fully capture the churning taking place at the product level - i.e., sizeable tariff increases for some products being offset by tariff decreases for others - Figure 6 plots the share of HS06 products for each country for which the applied MFN changed from the previous year by a ‘sizeable’ threshold level of 5 percentage points or more. For the G20 high incomes economies, there are relatively few HS06 products during this period for which applied MFN tariffs changed by such a large amount; their incidence is largely concentrated into downward movements associated with implementation of Uruguay Round commitments (e.g., Canada in 1996 and 1998) or WTO accession (e.g., Saudi Arabia in 2005).\footnote{While not shown in the Figure because it is an outlier, in 2002 during its WTO accession negotiations, Saudi Arabia also changed 86 percent of its tariff lines by 5 percentage points or more.}

For the G20 emerging economies and other developing countries in Figure 6, however, there is some additional evidence of product-level fluctuations and year-to-year change in the applied MFN tariff. Argentina, for example, adjusted the MFN applied tariff on more than 12 percent of its products by 5 percentage points or more each year between 2001 and 2004 in the period around its economic crisis. Turkey adjusted the MFN applied tariff on more than 5 percent of its products by 5 percentage points in five different years between 1996 and 2003. Even larger year-to-year...
fluctuations have taken place for a number of the other developing countries shown in the lowest panel of Figure 6, including a few that we have omitted from the Figure (but included in the Notes) for ease of exposition and scaling.

One potentially surprising outcome arising from Figures 5 and 6, however, involves the Great Recession period of 2008-2009. The evidence from these figures is that for these 31 countries there was not a significant increase in average tariffs or share of product lines with sizeable changes in applied tariffs during this most recent crisis. We review the research-to-date on potential explanations in the next section.\textsuperscript{18}

\subsection*{2.1.4 Research on MFN tariffs}

Researchers have carried out a number of important studies that rely heavily on cross-sectional, cross-country, and panel data on MFN tariffs.\textsuperscript{19} The snapshot of the data characterized by Figures 5 and Figure 6 and our discussion in the last section already point to complications likely to arise from research using such data to understand the determinants of applied MFN tariffs or tariff bindings either across countries or within countries over time. Seeking to explain cross-sectional differences within a country (e.g., see again Figures 2, 3, and 4) based on any underlying, micro-founded theoretical determinants such as product-level elasticities, import penetration, economic shocks, or redistributive elements tied to political-economy, must also confront the environmental reality that the data generation process is also significantly influenced by (a) country-specific features, some of which are institutional (e.g., timing of GATT/WTO accession and taking on of commitments), others of which may be tied to aggregate-level (unemployment, growth) shocks and (exchange rate regime) flexibilities on non-trade-related policy instruments; (b) legal constraints arising under the GATT/WTO multilateral system, such as the ‘bindingness’ (or fluctuations in water) stemming from tariff caps; (c) legal flexibilities arising under the GATT/WTO multilateral system, such as access to alternative (substitutable) trade policies, including the temporary trade barriers of antidumping, safeguards, and countervailing duties, and (d) other non-MFN trade policy changes arising through preference regimes, free trade areas, and customs unions. This section describes a number of recent research contributions that have begun to tackle these issues.

The impact of multilateral negotiations (or the lack thereof) on MFN tariffs  What determines the tariffs set by the countries not involved in the multilateral, GATT/WTO trade agreements? Broda, Limão and Weinstein (2008) use the MFN applied tariff rates for a cross-country sample of non-GATT/WTO member countries and present evidence consistent with the

\textsuperscript{18}To foreshadow the second theme of our paper, the issue in examining trade policy’s responsiveness to macroeconomic shocks, we know that there is sometimes a shift in the form of the policy instrument being used. Although we do not necessarily observe increases in average ad valorem tariff rates to macro shocks, Bown and Crowley (2013b, 2014) have documented the countercyclical use of other trade policy tools, specifically temporary trade barriers, in recent decades.

\textsuperscript{19}Applied tariffs that are imposed not as ad valorem duties but as specific duties may also have the ad valorem equivalent of the rate change over time alongside changes in prices. We will largely abstract from that issue in this section so as to focus on policy changes, referring again to this when we introduce the data on specific duties more formally in Section 3 below.
terms-of-trade (or market power) theory for tariff formulation that countries unconstrained by trade agreements may attempt to shift some of the costs of those tariffs (through lower exporter-received prices) onto trading partners. In our 31 economy sample, the 1993 applied tariff data for countries such as China, Russia, Saudi Arabia, and Ukraine are in the Broda-Limão-Weinstein sample and study of unconstrained/optimal tariff formulation.

For countries that undergo an accession to the WTO, Bagwell and Staiger (2011) empirically investigate implications of the terms-of-trade theory of trade agreements under a framework in which ‘noncooperative’ (Nash) level policies are represented by pre-WTO MFN tariffs and ‘cooperative’ (politically optimal) level policies are represented by post-WTO accession MFN applied tariffs. Their evidence is consistent with the theory and thus the resulting interpretation is that post-WTO accession policies may reflect the ‘politically optimal’ tariffs and that negotiated entry into the WTO may neutralize terms-of-trade externality concerns associated with the exertion of market power. While the only major economy that acceded to the WTO during the Bagwell-Staiger sample period of 1995-2006 which overlaps with our data is China (2001), nevertheless, other major economies in our sample that have subsequently acceded to the WTO are Democratic Republic of Congo (1997), Vietnam (2007), Ukraine (2008), and Russia (2012).

For a number of other countries, the MFN tariffs in effect during the post-1995 WTO period reflect not only the latest results of negotiations that took place under the Uruguay Round, but they also reflect a legacy of relatively low tariffs at the start of the Round resulting from seven earlier GATT rounds of multilateral negotiations occurring since 1947. To examine the implications of the terms-of-trade theory for such long-term members of the GATT/WTO, Ludema and Mayda (2013) develop a theory and an empirical investigation that explores the role of endogenous participation of exporting countries.20 One of their key contributions is to provide a potential explanation for where the GATT/WTO has failed to achieve success in lowering tariffs (and internalizing terms of trade externalities). Indeed, their results concerning the relatively high remaining applied MFN tariffs across countries in sectors such as agriculture, textiles and apparel, and footwear (see again Figure 2, especially for the G20 high-income economies), can be linked to diffuse exporting interests, and the lack of concentration across countries. Thus terms-of-trade effects may not get internalized in these sectors due to the standard free-rider problem that exporting countries are unable to organize sufficiently to get the importing country to come to the negotiating table in order to engage in reciprocal tariff liberalization. The Ludema-Mayda sample includes 13 economies that overlap with our set, including Argentina, Australia, Brazil, Canada, Colombia, European Union, India, Indonesia, Japan, South Korea, Mexico, Thailand and the United States.

The impact of preferential tariff liberalization on MFN tariffs  What is the effect on MFN tariffs when only subsets of countries lower their tariffs toward one another, under one of the GATT/WTO-permitted “exceptions” to MFN that we describe below in Section 2.2? Do such preferences serve as a ‘stumbling block’ to additional MFN liberalization, or a ‘building block’ to

20See also Ludema and Mayda (2009).
future MFN applied tariff cuts (Bhagwati, 1991)? The literature to date for the impact on MFN tariffs suggests that the evidence is mixed.

In two country-specific studies, Limão (2006) for the United States and Karacaövali and Limão (2008) for the European Union, there is evidence that the free trade agreements that these economies had in place prior to the conclusion of the Uruguay Round significantly limited the cross-sectional pattern to MFN tariff cutting arising as a result of the Round. In particular, MFN tariffs were cut less as a result of the Uruguay Round for products with positive imports from PTA partners relative to similar products from which imports from PTA partners were zero.

On the other hand, Estevadeordal, Freund and Ornelas (2008) present a cross-country study for a group of 10 Latin American economies over 1990-2001 and show that preferential tariff liberalization in the region early in the period was subsequently followed by applied MFN tariff liberalization. One potential explanation for the differences with the Limão (2006) and Karacaövali and Limão (2008) results is that these Latin American countries were granting much larger preference margins (the difference between the applied MFN tariff and the applied preferential tariff) than in the US and EU cases. As such, Latin American governments may have cut MFN tariffs as well so as to avoid the potentially harmful economic distortions that may arise through trade diversion (Viner, 1950). A second potential explanation behind the EU and US results described earlier as their FTAs may also be “special,” in the sense that the preferences were granted, frequently to small countries, and with the intention of the preference margin serving as a form of compensation for non-trade related objectives in cooperation between the countries.\(^{21}\) One final note about the cross-country results of Estevadeordal-Freund-Ornelas is that the many-country source allows them to identify also where the results tend to break down. In particular, the “building block” results only hold for the FTA countries in their sample (e.g., in our 31 economies sample, these include Colombia and Mexico) and they do not hold for the economically important economies of Argentina and Brazil that have a customs unions that includes a supposedly common external MFN applied tariff policy.\(^{22}\)

**The impact of real exchange rates, business cycles, and other aggregate-level shocks on MFN tariffs** Dating back to the experience of the Great Depression in the 1930s, there is a presumption that macroeconomic shocks can also have significant effects on trade policy.\(^{23}\) Indeed, Irwin (2012) attributes much of the protectionism arising after the onset of the Great Depression to the inflexibility of exchange rates due to the gold standard; sharp real exchange rate appreciations

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\(^{21}\) For a theory behind this result associated with the countries like the US seeking to retain preference margins for certain FTA partners in order to compensate them for non-trade objectives, such as higher environmental or labor standards, intellectual property rights protection, or cooperation in fighting the ‘war on drugs’, see Limão (2007).

\(^{22}\) Calvo-Pardo, Freund and Ornelas (2011) also provide evidence of the building block effect for the ASEAN Free Trade Agreement. In a more recent study of the Central American Free Trade Agreement-Dominican Republic (CAFTA-DR) that involves five central American countries signing an FTA with the United States in 2004, Tovar (2012) finds evidence first of an initial stumbling block effect of preferential tariff reductions on subsequent applied MFN tariffs that is then followed by a (weaker) subsequent building block effect.

\(^{23}\) On the other hand, there is not a robust theoretical literature linking business cycles and import protection. An exception is Bagwell and Staiger (2003).
that decrease the relative price of imports across the board may intensify import competition facing domestic producers and increase demands for applied tariffs. There is also an historical literature, likely also motivated by the 1929 stock-market crash facilitating the US imposition of the Smoot-Hawley tariffs in 1930 (see also Irwin, 2011), that US tariffs are countercyclical (Bohara and Kaempfer 1991; Cassing, McKeown and Ochs 1986) and rise following periods of recession (negative or weak real GDP growth, increases in unemployment), high inflation, etc.\textsuperscript{24}

As we have already inferred from our analysis of the cross-country data presented in Figures 5 and 6, despite the massive and simultaneous macroeconomic contraction that took place globally during the Great Recession of 2008-2009, most countries did not substantially increase their applied MFN tariff protection. Research that examines changes in applied MFN tariffs during the crisis include Kee, Neagu and Nicita (2013), Rose (2013), Gawande, Hoekman and Cui (2015), and Foletti, Fugazza, Nicita and Olarreaga (2011). Nevertheless, as we further investigate in more detail below, the fact that applied MFN tariffs did not increase universally during the Great Recession does not necessarily imply that import protection overall is no longer sensitive to macroeconomic fluctuations. It could have been that countries did not respond with applied MFN tariff increases because of the success of WTO disciplines on tariff caps/bindings in particular, but then any domestic demands for new import protection were pushed toward other potentially WTO-consistent trade policy instruments, including those that we introduce below in section 3.1.2.\textsuperscript{25}

**Exogenous unilateral liberalization of MFN tariffs** The environment created by a country that has changed its applied MFN tariffs has been used in a number of research settings; the environment, however, frequently depends on institutional or even country-time-specific factors. One particular experience worth highlighting is India’s unilateral liberalization of the 1990s, as it is another environment that has turned out to be a useful laboratory for conducting economic research.

Topalova and Khandelwal (2010), for example, find that India’s MFN tariffs applied during the late 1990s were unrelated to standard political-economy determinants of trade policy. This is an important empirical result in that it establishes India’s IMF-mandated tariff cuts associated with its 1991-92 macroeconomic crisis and stand-alone agreement as a plausibly “exogenous” shock and environment suited to assess a number of important research questions related to the impact of globalization on incentives and micro-level economic activity.\textsuperscript{26} Bown and Tovar (2011) find supporting evidence of this result by showing how India’s applied MFN tariffs set in 1990 are

\textsuperscript{24}Nevertheless, questions arise from papers in this literature which rely on estimates for tariffs based on collections of duties as a share of dutiable imports. We return to this and other aggregation and measurement issues below.

\textsuperscript{25}As we discuss more formally below, Bown and Crowley (2013a, 2014) consider the time-varying constraints on a country’s applied MFN tariffs imposed by WTO tariff binding commitments as a contributing factor behind the potential substitution toward use of other trade policies in response to aggregate-level fluctuations.

\textsuperscript{26}The Indian empirical environment in the 1990s and this arguably exogenous import tariff shock has been used to study the impact of globalization on schooling and human capital acquisition (Edmonds, Pavcnik and Topalova, 2010), firm productivity (Krishna and Mitra 1998; Topalova and Khandelwal, 2011), use of intermediate inputs (Goldberg, Khandelwal, Pavcnik and Topalova, 2010) and product switching (Goldberg, Khandelwal, Pavcnik and Topalova, 2010), customs evasion (Mishra, Subramanian, and Topalova, 2008) amongst others.
consistent with the structural framework of the Grossman and Helpman (1994) model, but that they then become inconsistent with the model for the MFN tariffs applied in 2000-2002.\footnote{Bown and Tovar (2011) then go on to show how, when the measures of import protection in 2000-2002 include not only applied MFN tariffs but also the temporary trade barrier policies of antidumping and safeguards, the empirical consistency with the Grossman and Helpman (1994) framework is restored.}

**ADDITIONAL EMPIRICAL RESEARCH ON MFN TARIFFS (TO BE WRITTEN)**

- Quantification: Ossa (2014)

**Other open research questions motivated by patterns in MFN tariffs** There are a number of other empirical puzzles arising from the data on the cross-sectional data on MFN tariffs, much of which we have not been able to get into here. For example, what explains the tariffs for the more than three dozen countries and more than 500 million people that remain outside of the WTO? Even within the WTO, what explains the tariff-setting behavior of the countries that are only marginal participants - i.e., they are members, but their import tariff lines are not legally bound, or which may be bound but at excessively high levels? What explains the behavior of countries that are in the WTO and that apply low tariffs, and that have made legally binding commitments on their tariffs, but for which there exists substantial binding overhang or water in the bindings? What explains countries with low applied and bound tariffs overall, and yet which still have significant incidence of tariff peaks?

### 2.2 Preferential Trading Arrangements

[TO BE WRITTEN, WHAT FOLLOWS ARE NOTES]

By definition, MFN import tariffs are applied on a nondiscriminatory basis against all other WTO members, unless there is an exception. Thus if a country seeks to discriminate by applying a less-than-MFN import tariff toward imports of a specific trading partner, it must use one of the WTO permitted exceptions.

**Various forms of preferential trading arrangements in existence**

- Reciprocal Preferential Trade Agreements (PTAs) - free trade agreements, customs unions and the Enabling Clause
- Unilateral preferences (GSP, AGOA, EBA, etc.)
- Other forms of preferential arrangements (plurilaterals, critical mass agreements, etc.)
Existence, size, and utilization of preferential rates  Then we provide a characterization of the totality of these preferences and their implications for applied tariffs and attempt to put some “numbers” on the amount/frequency of each type of bilateral preferential relationship showing up in the data. We will attempt to provide empirical information for as many of our 31 economy sample as possible for items such as:

- Share of MFN applied and bound tariff lines with zero tariffs (so preferences “meaningless”)
- Share of lines with MFN tariffs > 0 but with zero PTA tariffs (so no preferences given)
- Share of lines with MFN and PTA tariffs > 0
- Share of lines with tariff peaks remaining (i.e., are tariff peaks addressed by PTAs? Or are these the politically sensitive sectors also carved out from PTAs?)
- Data on preference utilization rates
- Data on how much trade occurs under MFN rates versus PTA rates even between PTA partners

Stylized facts from WTO (2011) study on PTAs

- Share of intra-PTA trade in world trade has nearly doubled from 18 percent in 1990 to 35 percent in 2008 (including intra-EU trade raises this: from 28 percent in 1990 to 51 percent in 2008)
- However, in a study of PTAs involving 85 countries and 90 percent of world trade in 2007, 66 percent of tariff lines with MFN tariff peaks (MFN rates > 15 percent) have not been reduced at all through PTAs
- Between 49 percent (including intra-EU trade) and 65 percent (excluding intra-EU trade) of world trade takes place between countries that are not part of a common PTA.
- Excluding (including) intra-EU flows, only 16 percent (30 percent) of global trade is eligible for any preferential tariffs; less than 2 percent (4 percent) of global trade is eligible to receive preferences with margins above 10 percentage points.
- Excluding (including) intra-EU trade, 84 percent (70 percent) of world merchandise trade still takes place on an MFN basis.

Research on preferential tariffs and PTAs


Quantification: Caliendo and Parro (2015), trade creation/trade diversion literature

Empirical puzzles and open questions arising out of the current data on PTA tariffs:
Overall, the literature is inconclusive as to how much trade comes in under preferences, and yet the gravity literature tends to find evidence that PTAs have big impacts on trade flows. And the PTAs under negotiation today seem to be about something else beyond tariffs but toward “deeper” integration - i.e., some of which we may attempt to characterize more precisely (with data) in Section 4 below.

What explains countries forming PTAs where MFN tariffs are already zero? (Why bother?)

What explains countries forming PTAs where MFN tariffs are positive and PTAs are cut to zero? (trade creation > trade diversion?)

What explains countries forming PTAs where MFN tariffs are positive and the PTAs do not cut those tariffs? (tariff peaks remain)

2.3 Other Contemporaneous Application of Ad Valorem Tariffs
[TO BE WRITTEN, WHAT FOLLOWS ARE NOTES]
Here we will briefly describe a number of other tariffs that are currently applied

- Non-WTO members who do not receive MFN tariffs and who also do not receive preferences - e.g., for the United States, the trading partners on the list for “column 2” tariffs

- At the conclusion of a WTO dispute, the permissible bilateral retaliatory tariffs imposed by the complainant - e.g., see Bown and Ruta (2010)

- At the conclusion of a PTA dispute, the permissible bilateral retaliatory tariffs imposed by the complainant - e.g., Mexico’s imposed tariffs against the US over $1 billion after the US - Trucks dispute

2.4 Historical evolution of ad valorem tariffs
[TO BE WRITTEN, WHAT FOLLOWS ARE NOTES]
Much of the remaining chapters of this volume examine additional theoretical and empirical work explaining the design of trade agreements and much of the status quo. Much less will be said about how we arrived at the status quo, and the historical evolution of the instruments of trade policy. Thus far we have focused on contemporary trade policy (as of 2013), and product-level data on tariff changes between the end of the GATT period (1993) and the present (2013).
This section will provide more information on the evolution of tariffs over early 1930s (post-Smoot Hawley and international retaliatory response) and 1994. The experiences during that period are, of course, heterogenous:

**Industrialized countries and the classic GATT/WTO Story**  First set of countries - currently “industrialized” countries - the “classic” story of how we arrived at low and bound tariffs and the status quo

- Starting point - high protection of 1930s led to GATT 1947
- Border barriers tariffed and dismantled in GATT negotiating rounds between principle suppliers (e.g., Bagwell, Staiger and Yurukoglu 2015)

**Emerging Economies and Developing countries**  Next from the “current” set of emerging economies and developing countries

- 1950s and 1960s - many sought and were granted special and differential treatment, trade-restrictive regimes of the 1960s (import substitution) led to low growth
- some adopted different strategy - export led growth of Hong Kong, Korea, Taiwan, Singapore, etc
- wave of trade liberalizations beginning in the 1990s for many other emerging economies (China, Brazil, India, etc.) - however, many were not the GATT model but were unilateral (India) or alongside preferential (Brazil) liberalizations
- the fall of communism, the transition economies (many integrated into EU), disintegration of Russia
- Other developing countries that remain at the margins of participation in the international trading system

### 3 Border Instruments Beyond Ad valorem Import Tariffs

This section introduces other government “commercial” policies that affect imports at the border beyond ad valorem duties. These include specific duties; the temporary trade barrier policies of antidumping, countervailing duties and safeguards; quantitative restrictions, quotas, tariff-rate quotas, and then negotiated arrangements with exporters such as price undertakings and voluntary export restraints (VERs).28 We describe the empirical landscape of each individual policy instrument in isolation and we also present data on the historical evolution of these policies during the

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28 The empirical relevance of the distinction between tariffs and quotas depends on the production technology in an industry and its market structure. Since Bhagwati (1965) economists have understood the general equivalence of tariffs and quotas in perfectly competitive markets with a competitive allocation of quota rights. Interestingly, since its inception in 1947, the GATT/WTO system has always insisted on its members adopting tariffs rather than
period since World War II. Our general conclusion is that while each of these policy instruments has had important episodes of historical use, some also fall out of favor, and that this is frequently the explicit result of trade agreements seeking to discourage the particular use of one instrument, with or without recognition that this may result in governments then facing incentives to turn to something else. Nevertheless, given the relative substitutability of many of these policy instruments, and perhaps due to the fact that many of the ‘problems’ that trade policy instruments are seen to solve remain the same (e.g., competitive adjustment due to new market entrants, macroeconomic shocks, etc.), it also turns out that the historical narrative of trade policy also tends to repeat itself. Frequently the story-line stays the same, it is simply the countries, sectors, and governments seeking use of the instruments that changes.

In general, the empirical studies relying on government use of import policies outside of ad valorem import tariffs have arguably been as if not more important for the empirical literature on trade policy than that described in Section 2.1.4. Indeed, much of the initial progress in the modern literature on endogenous import protection focused on these alternative policies, under the interpretation that the ad valorem import tariffs applied by the major GATT/WTO members were inappropriate for studies of optimal, unconstrained policymaking behavior given that they had already been subjected to decades of international negotiations even by the 1970s. As such, many of the policy instruments described in Section 3 and Section 4 are important components to the measures of “trade policy” (frequently sector-level coverage ratios of imports affected by non-tariff barriers) that theoretical determinants are seeking to explain in the seminal studies of endogenous import protection such as Trefler (1993), Goldberg and Maggi (1999), and Gawande and Bandyopadhyay (2000).

In addition, these policies have also served as important robustness checks for papers with a primary focus on testing a relationship in the ad valorem import tariff setting, such as Broda, Limão and Weinstein (2008), and Blanchard, Bown and Johnson (2015). Furthermore, research has also begun to look into the theoretical implications of trade agreements that constrain ad valorem import tariffs (through binding caps) may result in these alternative, substitutable trade policies being used to respond to shocks, including shocks related to political-economic adjustment associated with the tariff-cutting process (Limão and Tovar 2011; Bown and Tovar 2011), the terms-of-trade motive and import volume shocks (Bown and Crowley, 2013b), or aggregate-level macroeconomic fluctuations (Knetter and Prusa 2003; Irwin 2005; Bown and Crowley 2013a, 2014).

29 quotas. Important theoretical differences between tariffs and quotas have focused on deviations from the assumption of perfect competition (Panagariya, 1981, 1982; Eaton and Grossman, 1986) or wasteful resources devoted to gaining import licenses (Krueger, 1974). Much of the modern work in trade theory today (Melitz, 2003; Eaton and Kortum, 2003 and articles deriving from these models) is based on an analysis of an ad valorem trade cost, embodying both transportation costs and border taxes, which is often assumed to be the same across all goods or across all trading partners or both. As we proceed through our lexicon of trade restrictions, we will suggest where important sources of policy heterogeneity might be exploited to investigate important puzzles in our understanding of international trade.

29 See also Lee and Swagel (2000).
3.1 The instruments

In this section we introduce the main border instruments of trade policy aside from ad valorem import tariffs one by one.

3.1.1 Specific duties

While the vast majority of import tariffs are applied as ad valorem duties, there are a number of important instances in which countries apply trade policy through specific, or per-unit duties. We first consider the data on where such duties arise before turning to research on areas of its potential relevance.

First consider countries’ applied MFN tariffs. While the WTO (2014c) reports that in most countries the share of product lines with non-ad valorem tariffs is zero, a number of major economies constitute sizeable exceptions. Figure 7 reveals that specific duties remain a significant part of the applied MFN tariff policy arsenal in 2013 for a number of the 31 major economies in our sample. Indeed, Russia had more than 11 percent of its product lines subject to specific duties in 2013; Thailand, the United States, European Union, and India each also applies specific duties to 5 percent or more of its imported HS06 products.\textsuperscript{30}

Figure 8 identifies for 2013 the industrial location of where MFN tariffs are applied as specific duties across our three country groupings. For the high-income economies, the overwhelming incidence of specific duties is found in agriculture - more than 10 percent of animal products, more than 15 percent of vegetables, and nearly 25 percent of foodstuffs report MFN tariffs being applied as specific duties. A smaller, though still nontrivial, incidence of specific duties are found in sectors such as footwear, textiles and clothing, and fuel. For the United States in particular, MFN tariffs are applied as specific duties for nearly 50 percent of vegetables and foodstuffs, 27 percent of animal products, 10 percent of minerals, 16 percent of fuels, 9 percent of textiles and apparel, 21 percent of footwear, and 18 percent of miscellaneous products.

As we describe in more detail below, MFN applied tariffs are not the only instrument of trade policy in which specific duties are found to arise; they are also a somewhat common outcome of the temporary trade barrier investigations.\textsuperscript{31} In some instances, a newly imposed antidumping or safeguard restriction may result in a new and additional specific duty, even though the benchmark trade policy had been applied as an ad valorem import duty.

An open research question is what explains the cross country and sectoral variation in MFN tariffs applied as specific duties, and in particular, relatively high incidence of such specific duties being applied in agriculture, footwear, textiles and clothing in high-income economies especially. One contributing explanation likely relates to the results of Ludema and Mayda (2013) on the

\textsuperscript{30} Switzerland is the only country with a higher share of imported products subject to specific duties than Russia in 2013, at 78.3 percent. Belarus and Kazakhstan have a customs union with Russia and thus roughly the same share of products subject to specific duties. Other countries with shares larger than 5 percent of imported products not shown in Figure 7 include Norway (7.8), Zimbabwe (6.4) Uzbekistan (5.8) and Israel (5.0).

\textsuperscript{31} Indeed for the G20 economies over the period 1995–2013, [COMPUTE NUMBER] percent of the investigations that resulted in new trade restrictions were imposed as specific duties.
constraints imposed by voluntary participation, exporter concentration, and the historical legacy of the reciprocity-based negotiations framework of the GATT period. Such an interpretation is consistent with their results, given the sectoral correspondence between the incidence of specific duties, relatively high ad valorem equivalents for applied MFN tariffs (recall Figure 2), and the incidence of tariff peaks (recall Figure 3). Furthermore, for decades beginning in the 1960s, the GATT Contracting Parties largely pulled agriculture, textiles and apparel outside of GATT disciplines. In the latter case, global trade in textile and apparel products was governed by a separate system of quotas, voluntary export restraints, and other orderly marketing arrangements - beginning with the Short Term and then the Long Term and then the Multi-Fibre Arrangement before this was finally terminated in 2005 after a 10 year phase-out period at the conclusion of the Uruguay Round of negotiations and establishment of the WTO.

We conclude this section with insights from research identifying at least three other reasons why the existence of specific duties being applied in practice is potentially important.

The first issue involves the question of the trade-restrictiveness of the different forms of these applied tariffs, and the role of prices. It has become clear from the US experience of the Great Depression era that the trade-restrictiveness of the Smoot-Hawley tariffs of 1930, much of which were applied as specific duties, increased over the subsequent decade in the face of the deflation of falling domestic prices. On the other hand, the subsequently high ad valorem equivalent rate of these specific duties in the early 1940s, implies that much of the subsequent tariff “liberalization” of US import markets during the 1940s arose not specifically because of policy decisions to cut tariffs, but simply because inflation increased, thereby reducing the ad valorem equivalent of the imposed specific duty (Crucini 1994; Irwin 1998). Given especially the data presented for high-income countries in Figure 8, the trade restrictiveness of tariffs imposed as specific duties in agricultural markets may fluctuate substantially due to changes in world prices for commodities.\(^{32}\)

Second, specific duties are also potentially economically important as they can be an implicit means by which to effectively apply a tariff that discriminates between trading partners (or even firms within the same trading partner) without violating the MFN rule when there are heterogenous varieties of differentiated products included in the same tariff code at which the policy is applied. Consider, for example, two varieties of shoes that fall within the same HS06 product code - and thus which must therefore face the same applied MFN tariff rate across different sources - and yet those two varieties of shoes have different prices because of quality differences (Schott, 2004). The ad valorem equivalent of a $2 specific duty on a $10 pair of shoes (say, from China, Indonesia, or Vietnam) is 20 percent, whereas the ad valorem equivalent on a $100 pair of shoes (say, from Italy) is only 2 percent. While the ad valorem equivalent of an MFN-consistent specific duty is clearly discriminatory across trading partners, it is permissible under the WTO.\(^{33}\) Such an approach

\(^{32}\)While the fact that many high-income countries apply specific duties over such commodities implies they have a natural buffer (ad valorem equivalent import protection levels fluctuating due to world price shocks), this likely partially explains why emerging and developing countries that apply their agricultural tariffs as ad valorem duties have such large amounts of water (see again Figure 2) in those sectors.

\(^{33}\)See, for example, from Turkey’s safeguards on imports of footwear described in Bown, Karacaoglu and Tovar (2015).
to TTB outcomes such as an applied safeguard, which is designed by the WTO Agreements to be applied on a more MFN-consistent basis than a comparable policy such as antidumping, is frequently a politically useful way for governments to discriminate between foreign suppliers, such as against varieties from the low-priced trading partner while minimizing the impact on the high-priced trading partner.

The third area is simply on the efficiency properties of specific duties as compared to ad valorem duties as a form of taxation, in particular as arising under different market structures. For example, there is a distinct literature in public finance studying such questions (Delipalla and Keen 1992; Keen 1998).

### 3.1.2 Temporary trade barriers of antidumping, countervailing duties, safeguards

The next set of trade policy instruments that we consider are antidumping, countervailing duties, and safeguards, collectively referred to here as temporary trade barriers (TTBs) based on the common property that are each legally has a temporary life span. In some of the analysis below we assess their collective use - as motivated by evidence in how they have been used as substitute policy instruments - and in other areas we disentangle their use in order to show their relative importance. Overall, when measured by metrics such as frequency of use and import coverage, the most empirically important of the policies is antidumping. Nevertheless, safeguards use has been important for certain countries and especially during certain periods, and there is also some evidence that countervailing duty use may be becoming increasingly important across countries over time.

Table 3 summarizes the use of TTBs by those of our 31 economies that employed the instruments during the 1995-2013 period and includes information on when the economy implemented its antidumping law, and when it initiated its first antidumping investigation. We choose this 1995-2013 period for a number of reasons. First, it is a period that our data most accurately captures the ‘stock’ of TTB policies in effect. Second, 1995 begins the WTO period for which rules governing TTB use (for WTO members) were common across countries. Under the GATT, the rules for certain TTBs were different depending on whether a GATT contracting party was a signatory to plurilateral Antidumping Code and Code on Subsidies and Countervailing Measures. Third, we also want to make comparisons of TTB use for pairs of countries that share other trade policies in common - e.g., customs union arrangements, some of which (e.g., EU-Turkey, Argentina-Brazil) may not have been fully in effect until the mid-1990s.

For interpretive purposes, consider first the US data on the import coverage of the TTBs that it had in effect over 1995-2013. The first four columns reveal information on the cumulative share of imported products over which the United States imposed some sort of TTB policy during the period. The US imposed some TTB policy on 10.6 percent of all HS06 imported products at some point during 1995-2013. Among the four different TTB policies in use by the United States during

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34 For the US and EU especially, the early 1990s featured AD still in effect from the 1980s but for which we do not have the HS codes because they were imposed under a different product classification scheme.
this period, antidumping has been most prevalently applied (covering 9.0 percent of all products), followed by countervailing duties (5.1 percent), the global safeguard (2.8 percent), and the China-specific transitional safeguard (less than 0.1 percent). The fact that individual TTB policies for the US cumulate to more than 10.6 percent of total imports reflects both the substitutability of these policy instruments - e.g., the United States has applied different TTB policies to the same products at different points in time - as well as the redundancy of these policy instruments - e.g., the United States frequently applies two different TTB policies, such as an antidumping duty and a countervailing duty, to the same product and trading partner at the same moment in time.

Consider the next set of columns in Table 3 for the United States. On average over 1995-2013, the US had 4.9 percent of imported products covered by an imposed TTB in any one year, and the maximum coverage was at 6.8 percent in 2012. Finally, the mean share of imported products in a year that were subject to a new US TTB investigation - and that could potentially lead to new import restrictions - was 0.9 percent over 1995-2013. The maximum share of imports subject to new TTB investigations was 3.9 percent of products in 2001, when the US initiated a wide-ranging safeguard investigation over imported steel products.

While the United States is the most highly-researched user of TTBs historically, when measured by the share of products collectively impacted by TTBs, it was only the second largest user of these policies over 1995-2013. Mexico had nearly 23 percent of its imported products subject to a TTB policy imposed at some point during 1995-2013; the majority of this was due to a set of antidumping import restrictions that Mexico imposed on China beginning in 1992-1993 (over 20 percent of its product lines) and which remained in effect until 2008. India only began using antidumping in 1992, nevertheless, between 1995-2013, 8.0 percent of its imported products became subject to some newly imposed import-restricting TTB policy. Other economies with sizeable shares of their products covered by TTBs during this period include the European Union at 8.1 percent, Argentina at 4.8 percent, Turkey at 4.2 percent, Canada at 3.4 percent, China at 3.1 percent, and Brazil at 2.8 percent. One interesting item to note from this list is that customs union partner pairs that otherwise share a common external MFN tariff - e.g., EU-Turkey, Argentina-Brazil - not only retain the legal authority to implement their own TTB policies independently, but the evidence from the share of product lines affected by their imposed TTBs indicates that they clearly do.

Furthermore, the composition of TTB policies employed by the United States is not systematic of each and ever TTB user. While the United States has implemented each of the three major TTB policies with a significant share of import coverage during this period, most of the TTB users tend to rely primarily on antidumping. Other significant users of safeguards in our sample of economies, for example, include Argentina, Brazil, Egypt, the EU, China, India, Indonesia, and Turkey - though for the US, EU, and China, the significant safeguards use during this period was dominated by 2001-2003 and almost simultaneous safeguards imposed over an overlapping set of

\[35\] Robertson (2011) presents a discussion of Mexico’s use of TTBs during this period. Note the maximum share (23.7 percent) in any one year is higher than the cumulative share over the entire sample given the changes in the Harmonized System which added new HS06 codes that were never subject to any TTB.
steel products. Countervailing duty laws, on the other hand, have only recently been adopted by a number of economies and are only starting to be implemented; as such, their import coverage has been fairly limited to high-income economies such the US, EU and Canada. The China-specific transitional safeguard mechanism that was introduced as part of China’s WTO Accession Protocol in 2001 has not been frequently utilized - notwithstanding the somewhat infamous use by the US on imports of tires in 2009 during the global economic crisis - the peak use was by Colombia, briefly, over a set of textile and apparel products in 2005.\textsuperscript{37}

Next consider Figure 9, which illustrates a measure of the time path of TTB use for the EU, US, China and India over a slightly longer time period of 1990-2013. The figure presents four series of data - for all TTB policies (and antidumping only), a ‘flow’ measure of the share of HS06 import products each year subject to a newly-initiated TTB investigation that could result in a new import restriction; and for all TTB policies (and antidumping only), a ‘stock’ measure of the share of HS06 import products each year subject to an imposed import restriction.

Figure 9 reveals a number of interesting features on the use of these TTBs over time. First, India began using TTBs in 1992 and China only in 1997; the US and EU use of these TTBs pre-dates the introduction of the Harmonized System in 1988, thus these data understate the TTBs that these economies had in effect in the early 1990s especially that had been imposed in the 1980s (or early) and which had not yet been removed. Second, there are spikes for the United States in 1992 and 2001 and for the EU in 2001; empirical evidence described in more detail links significant increases in TTB use to recessionary periods (especially unemployment rate increases) as well as real exchange rate appreciations. Third, for China, the EU, and US - the significant deviation between the all TTB and antidumping only measures in 2001-2003 reflects the previously discussed global safeguards imposed over steel products. Fourth, there is a slight increase for these economies in the ‘flow’ of products subject to new TTB investigations during the Great Recession period, but it is not nearly as sizeable as in other periods of macroeconomic downturn. Finally, turning back to Table 3 (and Figure 9), it turns out that not only the US, but also the EU and India, have a significant share of products subject to new TTB investigations each year; each averaged between 0.6 and 0.9 percent of products.

Figure 10 illustrates the sectoral breakdown - whereby we limit it to the major users of TTBs; i.e., the countries for which 2.8 percent or more of their HS06 lines were subject to a TTB during this period. We also group countries somewhat differently so as to make more direct comparisons (where relevant) between certain major trading partners.

First compare Figure 10 with the data on MFN applied tariffs in Figures 2, 3, and 8. Many of the sectors that in 2013 were still subject to high average tariffs, high incidence of tariff peaks,

\textsuperscript{36} For a discussion of the US safeguard on steel, and a comparison to the similarities on prior US use of antidumping and countervailing duties products during the 1990-2003 period, see Bown (2013).

\textsuperscript{37} For a discussion of the US safeguard on tires, see Charnovitz and Hoekman (2013). For the China safeguard more broadly, see Bown and Crowley (2010). Note that in response to end of the MFA in 2005 and the concern for a surge in textile and apparel imports from China, the US and EU did not initiate formal investigations under the China-specific transitional safeguard but instead negotiated bilateral voluntary export restraints. For a discussion, see Bown (2010, pp. 307-311)
or high frequency of specific duties are not necessarily the same as where TTBs are prevalent. Specifically, agriculture during 1995-2013 was not a frequent target of TTBs across using countries. For other sectors, such as textiles and apparel and footwear, there is variation across countries; e.g., the US has relatively high MFN applied tariffs in those sectors, but has not used TTBs in those sectors. On the other hand, despite textiles and apparel and footwear also being protected by relatively high MFN applied tariffs in countries such as Argentina, Brazil, India, Mexico and Turkey, there is also relatively high import coverage by TTBs. The rationale for these countries, as we describe next, is frequently to address increased import competition of products in these sectors from other emerging economies and developing country exporters and in particular, China. Third, chemicals and metals continue to be industries where TTB use is frequent during 1995-2013, especially in high-income economies, which is consistent with use in earlier decades as we further detail below. Contributing explanations include that these are relatively high fixed cost industries but also relatively concentrated industries, which may affect the industry’s ability to organize politically and file petitions for TTB protection under these laws. Table 4 shows another dimension of TTBs, and their ability to discriminate against certain trading partners may imply that the incidence of such use has the potential to be non-uniform across exporting countries. While there are different ways of measuring and examining this, here we present two measures - the trade-weighted share of the exporting country’s total exports to the G20 economies over which the G20 economy had a TTB imposed, and the estimated value of those TTB-impacted exports to the G20 economy.\footnote{These data are derived from dynamic import coverage ratios following the methodology described in Bown (2011, 2013). The main requirement is an assumption on counterfactual import growth for products from trading partners subject to an imposed TTB during the period that the TTB was in effect. The current data relies on the relatively conservative assumption that TTB-impacted products would have grown at the same rate as the average rate of non-TTB impacted product import growth.} We compute these two measures both in 2013 for the G20 economies and then, for rough comparison purposes, also in 1995 for the ‘G4’ economies of Australia, Canada, the European Union and the United States - the major TTB users at the time. For interpretation purposes, consider an exporter like China. In 2013, 7.1 percent of China’s exports to the G20 economies were subject to a TTB, and this is estimated to cover roughly $100 billion of its exports to those economies. In 1995, 2.9 percent of China’s exports to the G4 economies were subject to a TTB, and this is estimated to cover $3.3 billion (in constant 2013 dollars) of its exports to those four economies. Table 4 reveals a number of interesting pieces of information. First is the sheer scale with which the value of China’s exports are subject to G20 TTBs relative to all other exporting countries - e.g., in value terms, China has almost ten times more TTB-affected exports than the second most-impacted exporter of South Korea at roughly $14 billion, and the United States is third at $12.6 billion.\footnote{While Latvia had a larger share of its exports subject to G20-imposed TTBs than China in 2013, because it is such a small exporting country, when measured in dollar terms it was not in the top 20 most affected exporters.} Furthermore, the list includes are a number of other emerging, developing, and ‘transition’ economies - i.e., the share of these countries’ exports that are affected by foreign-imposed TTBs is high. While not shown here, tying this to the fact noted earlier that some of the major new users

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39 While Latvia had a larger share of its exports subject to G20-imposed TTBs than China in 2013, because it is such a small exporting country, when measured in dollar terms it was not in the top 20 most affected exporters.
of these TTB policies are other emerging economies has given increasing prevalence via TTBs as “South-South” protectionism (Bown, 2013). Third, countries like China, Ukraine, Moldova, Russia and Macedonia are all former “non-market” economies (NMEs); there are special rules available for countries to impose antidumping in particular against NMEs during this period which may make it arguably easier legally to apply such import restrictions to them.

Next compare the first two columns of 2013 data to the 1995 data; in 1995 the main TTB policy in use (antidumping) was primarily targeting the newly industrializing Asian economies of Japan and South Korea. Indeed, Japan went from having $7.7 billion of exports to the G4 in 1995 being subject to TTBs (roughly 2.6 percent of its total exports to those economies), to only $4.4 billion in 2013, and it is not even among the top 20 targeted countries as a share of the country’s total exports. And while Korea was still the second largest exporter in 2013 when calculated in value terms, the share of its exports subject to TTBs in these two sets of important markets is only roughly half as large in 2013 as it was in 1995. The anecdotal evidence for Japan and Korea is at least suggestive of the idea that it may be possible for once highly-impacted exporters to “graduate” from being targets of foreign TTB use over time.

A final point worth making before concluding this section is revealed by returning to Table 3. I.e., it should certainly not be overlooked that not all countries and not even all WTO member economies are users of TTBs. Indeed, the table lists the data for the users of the policies that are “known” users due to WTO reporting requirements. Most of the developing countries in our sample, for example, are not users of TTBs at all, and thus are not even listed. Nevertheless, there are even some high-income G20 economies - such as Japan - that have long had access to TTB policies (e.g., its antidumping law dates to 1920). Furthermore, there are some historical TTB users - e.g., Australia, Canada, and even South Africa - whose relative use of TTBs during this period has declined relative to earlier decades.

There are a number of other heterogeneous aspects arising from TTB use that we will comment on here but over which we will not present summary data. The first concerns the heterogeneity in the application of different policies - e.g., these policies are applied as ad valorem duties, specific duties, price undertakings, quotas, tariff rate quotas, etc. The second concerns the restrictiveness of the policies - e.g., even when these policies are imposed as ad valorem import duties, often times they are set at what are designed to be prohibitive levels of greater than 100 percent, 500 percent, or 800 percent. The third concerns the duration of these imposed import restrictions - e.g., while the WTO rules for each of them are that they are supposed to be “temporary”, there are some antidumping measures that have been imposed for 20 - 30 years or longer and are thus, arguably quasi-permanent.

Similar to TTB use increasing across countries, the research examining this use within countries, and across countries has also been developing substantially over time. Because it is too voluminous...
to cover in its entirety, here we restrict ourselves to a set of research focused on examining TTB use in light of the constraints that trade agreements in particular impose on access to other policy instruments, such as MFN (or PTA) tariffs.

Two examples illustrate research on country-specific use of TTBs that assesses theoretical models of trade agreements and questions of trade policy substitution. First, Bown and Crowley (2013b) treats TTBs such as antidumping and safeguards as potentially responding to terms-of-trade pressure to raise levels of import protection in the spirit of the repeated game model of self-enforcing trade agreements of Bagwell and Staiger (1990). Because US applied MFN tariffs are constrained due to WTO commitments and tariff bindings, the Bown-Crowley approach relies on data from United States TTB use at the industry-trading partner level over 1997-2006 and provide evidence consistent with the terms-of-trade theory that levels of import protection increase in the face of trade volume surges, especially when those surges take place in sectors with import demand and export supply that are relatively more inelastic. Second, Bown and Tovar (2011) use product-level information on India’s TTBs and the canonical Grossman and Helpman (1994) model of endogenous trade policy formation to examine the impact of the “exogenous” shock to applied MFN tariffs that took place in India beginning in the early 1990s. They show empirical results consistent with the Grossman-Helpman theory when using India’s applied MFN tariffs in 1990, inconsistent with the theory when using India’s applied MFN tariffs only in 2000-2002, but consistent again with the theory when using India’s stock of antidumping and safeguard import restrictions in place in addition to India’s applied MFN tariffs in 2000-2002. They interpret this as evidence that, over time, India unwound some of its commitment to reduce tariffs by substituting policy use toward antidumping and safeguard protection.

Another method to address these questions is to investigate whether TTB policy use responds to macroeconomic shocks - in particular, real exchange rate appreciations and increases in the unemployment rate - and whether this might partially explain why there is increasingly less evidence that applied MFN shocks are responsive to such fluctuations, as discussed in Section 2.1.4. Knetter and Prusa (2003) provide evidence consistent with such an interpretation for high-income G4 economies (Australia, Canada, EU, US) over the 1980-1998 period, as does Irwin (2005) for the United States over earlier decades. More recently, Bown and Crowley (2013b, 2014) expand upon this work in cross-country samples of five high-income economies and 13 emerging economies, respectively, covering the period of 1988-2010 and find evidence consistent with import protection through TTBs still being responsive to such aggregate level fluctuations. They also provide additional evidence of particular relevance for the discussion here. First, for the high-income economies of the EU and the US, the flexibility of the real exchange rate, and in particular the sharp depreciations that subsequently took place (after initial sharp appreciations in 2009) likely contributed to the dampening pressure on demands for import protection during the Great Recession. Second, over time, the emerging markets’ collective TTB responsiveness to such macroeconomic shocks has economic shocks. In one of the first papers assessing industry-level use of antidumping by the major new-user emerging economies during 1995-2002, Bown (2008) finds evidence for industry-level, aggregate-level, and political explanations for the responsiveness of antidumping across countries, industries, and time.
been increasing, thus increasingly mimicking the TTB responsiveness of high-income economies along this dimension. Third, there is also evidence that as the ‘water’ available to governments disappears over time - i.e., the difference between a country’s tariff binding cap and its MFN applied tariff shrinks - countries are forced to resort less to adjusting their other (e.g., MFN applied tariffs) trade policies and they substitute more toward TTBs.

Finally, another important research area examines the intersection of discriminatory trade policies, such as preferential trade agreements and the use of antidumping. Prusa and Teh (2010) present a cross-country study examining the relationship between PTAs and antidumping and conclude that antidumping actions against PTA partners tends to fall by sizeable amounts after PTA implementation, and it tends to increase by sizeable amounts against PTA non-partners after implementation.\textsuperscript{43}

\subsection{3.1.3 Quantitative restrictions, import quotas, tariff rate quotas}

While generally forbidden under GATT Article XI, quotas are still very much in use contemporaneously. They are an especially prevalent outcome in safeguard investigations; 30 percent of the import restrictions that WTO members imposed under the Agreement on Safeguards between 1995-2014 were in the form of a quantitative restriction or tariff rate quota.\textsuperscript{44} The allocation of welfare and the costs imposed on different societal groups will vary with the precise way in which a quota is administered. In theory, a quota sets a limit on the number of units of an item that may enter a country. If a domestic government auctions off licenses to import the good, then the difference between the item’s price under free trade and the domestic price of the good under the quota is a quota-rent which is collected by the importing country’s government. If the government gives away licenses to import under the quota, it transfers the value of this potential tax revenue to whomever receives the licenses - a foreign government, a foreign export licensing board, or foreign producers. In this process, there is great scope for corruption. This is one of the reasons why multilateral development banks have long encouraged the use of more transparent ad valorem tariff policies whenever possible.

In the example described above, we inherently assumed that for the commodity in question, the world market price was below the domestic price so that the entire quota was filled. In practice, non-binding quotas whose allotments are not filled are not uncommon. In these cases, the quota fill rate, the ratio of actual imports to quota-allowed imports, can serve as a measure of how restrictive the import policy is, due to the administrative costs and uncertainty of market access associated with the quota.

The administration of some quotas, especially those used in safeguard cases, allocates the import licenses to historical exporters. For example, a quota might allocate a value-based measure of

\textsuperscript{43}See also Blonigen (2005) for an earlier study of antidumping and countervailing duty use under NAFTA. See also the discussion and case studies presented in Bown, Karacaovali, and Tovar (2014).

\textsuperscript{44}Bown and McCulloch (2003) examine the WTO safeguards imposed over 1995-2000 and highlight the discriminatory nature of such applications, including for quantitative restrictions which base within-quota shares on historical market presence, thus discriminating against new entrants.
domestic market share to all foreign producers, for example 50 percent, and then further divide
the aggregate quota to historical exporters based on historical market shares. This system has the
advantage of dramatically reducing competitive pressure on domestic producers, partially placating
major foreign producers, while facing minimal resistance from the major losers, i.e., disorganized
consumers and potential new entrants from foreign countries. This system nominally satisfies non-
discrimination by providing market access to historical exporters, but prevents new market entrants
that have the potential to lower consumer prices.

More commonly, governments establish tariff rate quotas which allow a specified quantity to
enter duty free subject to an import license, an additional quantity to enter at a moderate tariff
subject to import licenses, and a further quantity to enter at a very high or prohibitive tariff. These
tools are primarily used today by middle and low per capital GDP countries.

The empirically most significant quota system of the last half-century, the Multifibre Agreement,
originated as a US-initiated set of short term quotas on cotton textiles in 1961, gradually expanded
to include more textiles products and apparel, and was finally dismantled in 2004. A number of
studies have focused on different aspects of the MFA (Brambilla, Khandelwal and Schott, 2010;
Barrows and Harrigan, 2009; Dean, 1995; Khandelwal, Schott, Wei, 2013).

### 3.1.4 Price undertakings and voluntary export restraints

While high income countries do not readily admit to the use of quotas, policy tools such as the price
undertakings regularly negotiated between the European Commission and foreign exporters and the
voluntary export restraints regularly used by the United States in the 1980s are essentially import
quotas. In the EU, approximately 13 percent of antidumping investigations that found evidence
of dumping by foreign exporters over 1989-2011 resulted in a negotiated price undertaking. These
arrangements typically consist of a minimum import price (MIP) and a market share allotment.
However, these are non-transparent in that official EU publications do not report the negotiated
prices or market shares. Rather, official Decisions and Regulations report the names of the lead
foreign negotiating authority (for example, a foreign Chamber of Commerce or industry association)
and all firms that are participating in the undertaking. This set-up leaves the Commission with
flexibility to adjust minimum import prices and market shares as the situation warrants. Thus,
the impact of an undertaking, like that of a quota, will depend on the competitive structure of the
industry with considerable scope for losses to consumers if the market is imperfectly competitive.

Table 5 summarizes the usage of different forms of import barriers used by the EU to address
dumping over 1989-2011. In table 5 we present the shares, in percentage of different forms of import
restrictions by the type of export origin. Broadly, the EU tends to favor ad valorem import tariffs
to restrict imports from high income countries and price undertakings (quotas with price floors) if
the origin is a smaller developing country. During this period, a total of 492 antidumping measures
were implemented by HS06 product and export origin. Across all export origins, 74.6 percent of
antidumping restrictions were implemented with some form of a tariff, while 20.3 percent were
imposed in some form of price undertaking. (The balance had unknown outcomes). Within tariffs,
although the overwhelming share were ad valorem tariffs, almost 10 percent of antidumping actions were implemented as specific duties. As noted above, these specific duties tend to discriminate against lower quality goods.

Moving across the top row (ad valorem duties), there is a steep decline in the share of this instrument as per capita income falls. While 75 percent of antidumping measures against high income countries were ad valorem duties, for G20 emerging economies, this share falls to 68 percent. Only slightly more than half (56 percent) of antidumping restrictions against developing countries took the form of an ad valorem duty.

The use of specific duties (row 2) is less common, but perhaps surprising as it is not entirely clear how specific duties can address anti-competitive practices on the part of an exporter. One suspects that the primary objective is to reduce EU firms’ competition with lower cost and lower quality substitutable products. The subsequent row highlights the quantitative importance of price undertakings in EU antidumping policy. A significant share, 13 percent of all antidumping measures are explicitly price undertakings. The disturbing feature of is that a full 25 percent of antidumping measures against developing countries are price undertakings, compared to only 6.8 percent for G20 high income and 6.6 percent for G20 emerging economies. This lends credence to the argument of a pernicious bias against developing countries. The use of a quota-style measure inhibits future export growth to the EU by the countries with the most to gain domestically.

Proceeding to the next row, we observe that hybrid measures, in which some exporting firms are invited to participate in a price undertaking while the remainder face an ad valorem duty is also notably higher for developing countries than for other groups at 9.6 percent. The final row summarizes the relative infrequency of special undertakings that revert to import duties if the export price falls below the undertaking’s minimum import price.

In contrast to EU price undertakings which remain common, there is little evidence to suggest VERs are widely used today.\(^{45}\) The VERs previously favored by the US are perhaps best exemplified as a quantitative restriction on the number of differentiated goods allowed entry within a generally defined product category. This system allows foreign producers freedom to set prices and product attributes in order to maximize profits given the existence of the quota.

Two briefly presented case studies demonstrate the welfare concerns raised by the use of these policies. First, consider the price undertaking imposed by the EU on imports of solar panels from China in 2012. From the perspective of the Chinese, this was an important trade policy event as solar panels comprised 7 percent of all Chinese exports to the EU in 2012. Solar panels are homogeneous goods whose physical quantity is reported in EU import statistics as kilowatt hours of power-generating capacity under ideal circumstances. The power generating capacity of photo voltaic cells per euro improved rapidly over 2000-2011, suggestive of dramatic technological improvement, learning by doing in manufacturing, or both. At the time the antidumping investigation began, the European market was served by 220 domestic producers and 135 Chinese exporting

\(^{45}\) As these measures are not permitted under the WTO, it is possible that they are used surreptitiously, but we are unaware of media reports of these types of actions among major economies.
producers. So, the market was probably best described as monopolistically competitive rather than oligopolistic. Of the 135 Chinese exporting producers involved in the solar panel case, XX were subsidiaries of or were themselves publicly listed on stock markets in the US, Hong Kong, or China. Interestingly, the cumulative abnormal return of Chinese solar panel producers to the European Commission’s decision to institute a price undertaking was, on average, negative (Crowley and Song, 2015). Although a quota could, in theory, improve profitability of exporters by facilitating collusive price increases, it seems that for Chinese solar panel producers, the loss of future sales growth in Europe more than offset an gains associated with the elimination of aggressive price competition insured by the undertaking’s minimum import price.

The solar panel case stands in sharp contrast to the investor response to the announcement of the 1981 US automobile voluntary export restraint. At the time, the US automobile industry was oligopolistic, consisting of three major producers facing a few Japanese exporting competitors. The announcement of the VER, which gave the right to issue export licenses to the US to Japanese authorities, sent the stock prices of Japanese automobile producers up (Ries, 1993), a phenomenon that demonstrated how import quotas facilitate collusive behavior in an oligopolistic market (Harris, 1985; Krishna, 1989). By establishing the restriction as a count of units rather than as a market share, the US government provided an incentive for Japanese exporters to improve quality and increase price-cost markups (Levinsohn, Berry, and Pakes, 1999; Goldberg, 1995; Feenstra, 1988).

3.1.5 Import licensing

We are unaware of the existence of comprehensive catalogues of import licensing requirements. Thus, it is difficult to assess the role they currently play in world trade. Anecdotally, they appear to be more common in countries that are less engaged in world trade.

One prominent recent example of the use of import licenses has been Argentina’s institution of import licensing requirements for hundreds of products in 2012. The use of these licenses and related aspects of Argentina’s import regime were challenged by the European Union at the WTO with Australia; Canada; China; Ecuador; European Union; Guatemala; India; Israel; Japan; Korea, Republic of; Norway; Saudi Arabia, Kingdom of; Switzerland; Chinese Taipei; Thailand; Turkey; and the United States participating in the dispute as third parties. In February 2015, Argentina notified the WTO that it intended to modify its program in order to bring it into compliance with the WTO.

3.1.6 Customs valuation and trade facilitation

The Doing Business reports of the World Bank are the best known source of comprehensive data about time delays and related problems associated with moving goods across a border. Djankov, Freund and Pham (2010) use this data to estimate a gravity model of trade and find that each additional day of delay before shipment reduces trade by more than 1 percent. A more recent
contribution by Volpe Martincus, Carballo and Graziano (2015) utilizes detailed export transaction data from Uruguay to precisely estimate the impact of customs delays on firm exports.

To the best of our knowledge, little systematic data is available about the extent to which customs valuation disputes between parties arise in international trade. Horn and Mavroidis (2008) compiled a systematic database of all WTO disputes and the legal issues raised. Of the 426 requests for WTO consultations through 2011, 5 involved a complaint over customs valuation. These cases primarily involve a complaint about the customs valuation procedures in a middle income or developing country. Dispute settlement (DS) case 53 involved a complaint by the European Union against Mexican customs procedures; DS 197 and 198 were complaints by the United States against Brazil and Romania, respectively, over the use of minimum import prices; DS 298 consisted of a complaint by Guatemala over Mexico’s procedures and DS370 was filed by the European Union over Thailand’s valuation of alcoholic beverages.

A growing literature has used data on customs valuation to examine bureaucratic corruption. For example, Javorcik and Narcisco (2008) study tariff evasion practices in Eastern European economies while Mishra, Subramaian, and Topalova (2008) study tariff evasion in India.

### 3.2 Historical evolution of other border barriers under the GATT/WTO

Throughout its history, the GATT/WTO system has trended in the broad direction of trade liberalization and greater policy transparency. As discussed in section 2, from the earliest days, the GATT encouraged countries to use tariffs, especially ad valorem tariffs, rather than quotas. Members of the GATT also committed to lowering tariffs as successive negotiating rounds. However, the history of the GATT has been punctuated by rising trade barriers for different members, for different products, and at different points in time. These retrenchments away from a liberal trade policy were either made under one of several GATT articles that enabled temporary, contingent import restrictions (Article XII Balance of Payments, Article VII Antidumping, or Article XIX Safeguards), permanent renegotiation toward greater restrictiveness (Article XXVIII Renegotiation), or special side agreements that were often notified to the GATT Secretariat even as they undermined fundamental GATT principles (for example, the Multi-Fibre Agreement or the Agreement on Agriculture).

Our analysis proceeds with an emphasis on the cross-sectoral usage of the different tools of protection over time. The most important point to be made is that across decades, there are shifts within a sector away from one policy tool and toward another. For example, we observe both temporary Article XIX and permanent Article XXVIII actions by today’s high income countries used to restrict imports of textiles and apparel in the 1950s. However, with a establishment of the Short Term Arrangement on cotton textiles in 1961, followed by the Long Term Arrangement in 1962 and the Multifibre Agreement in 1974, there is a notable absence of import restrictions for this sector by the United States under either the Antidumping or Safeguard agreements in the 1970s, 1990s or 2000s.

An additional important observation is that while different tools were used to address different
problems, within a class of “problems” the choice of the policy tool also varied over time. For example, Article XII allowed countries broad latitude to impose comprehensive import licensing schemes to respond to macroeconomic shocks in an era of rigidly fixed exchange rates. In the current era, in which most currencies float and BOP difficulties are rare, high and middle income countries have switched to temporary trade barriers (antidumping and safeguards) to restrict imports in response to macroeconomic shocks (Bown and Crowley 2013b, 2014). Another example of switching the instrument over time to address the same problem arises with the creation of special policy instruments to smoothly facilitate “adjustment” or entry of new countries into the multilateral trading system. At the time of Japan’s GATT accession in 1955, more than 50 countries invoked Article XXXV in order to refuse Japan MFN tariff treatment. That is, this tool was used to set higher tariffs on Japanese imports. The disruption that Japan’s rapid industrialization caused to the world trading system was one of the precipitating factors behind the establishment of the extra-GATT system of textile and apparel quotas (STA, LTA, and MFA) mentioned above. Today, this historical pattern of new tools to facilitate gradual entry of new members repeats itself with the creation of modern instruments like China’s accession safeguard.

The broad story that emerges is that countries used a variety of import restrictions during the GATT era. While different sets of countries tended to favor one type of import restriction over another in different time periods, the process of cataloging the use of different policy tools is ongoing and incomplete, making it difficult to draw definitive conclusions about trends for each policy tool.46

In this section we will present historical data on contingent policy tools that have particular relevance for the current period, Article XIX (Safeguards), Article XII (Balance of Payments) and Article VII (Antidumping). We begin with Article XIX actions from 1950-1959 and compare them to actions under the Agreement on Safeguards from 2000-2010. Next, we summarize data on Article XII BOP actions over 1950-1959. While balance of payments problems arising from an overvalued currency are relatively rare today, there is considerable policy concern about the trade surpluses that derive from undervalued currencies. Among the issues raised by US lawmakers who oppose greater trade liberalization is the Chinese government’s historic management of the renminbi relative to the US dollar. Finally, we then turn to antidumping investigations reported to the GATT from 1970-1979 and compare them to antidumping investigations over 1990-2009.

### 3.2.1 Raising tariffs under the GATT/WTO

Two distinct GATT articles, XIX and XXVIII, allowed for the re-institution of higher, more restrictive tariffs that gave the overall agreement a limited degree of flexibility to aid domestic policymakers in coping with an uncertain world. Article XIX enabled countries to temporarily institute import

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46 A case study of US import policy in the 20th century by Robert Baldwin (1983) suggests that the use of Article XIX action by the US cycled with changes in US trade law. The US law regarding safeguards varied in the stringency of qualifying criteria over decades with the result that safeguards were never used under the 1962 US Trade Act, but were far more common after reforms to the law in 1974.
restrictions on narrowly defined products\textsuperscript{47} if there was evidence that 1) imports of the product had increased, absolutely or relative to a historical growth trend, and 2) the domestic import-competing industry was performing poorly. Article XXVIII outlined a process for permanent increases in the restrictiveness of the import regime with respect to narrowly defined products.

Actions to raise tariffs permanently under Article XXVIII (Renegotiation) were relatively rare in the first decade of the GATT. We briefly discuss their use as part of a comprehensive examination of the way in which trade policy was changed under the GATT system. Figure 11 presents, by sector, the number of Article XXVIII renegotiations undertaken by high income and developing countries between 1950 and 1959.

Figure 12 displays the sectoral distribution of Article XIX and Agreement on Safeguards Actions. Data on Article XIX investigations between 1950-1959 was collected from the GATT digital archive at Stanford University and each verbal description of a product was matched to the modern HS06 product classification. The northwest panel presents the US sectoral distribution of SG actions over time while the northeast panel presents the same graph for the core European countries that became the central members of the European Economic Community.\textsuperscript{48} In the bottom left panel we display the sectoral distribution for the G20 high income countries. Finally, the sectoral distribution for G20 emerging economies is presented in the lower right panel.

In terms of research, Bown (2004) examines invocations of Article XIX and XXVIII over the 1973-1994 period in one of the relatively few empirical pieces seeking to explain why countries used these provisions to implement additional import protection. The evidence there is consistent with a theory that countries invoked these exceptions when they needed to make changes to their trade policies between negotiating rounds and wanted to do so in accordance with GATT rules so as to avoid a dispute and potentially more severe retaliation by affected trading partners.\textsuperscript{49}

\subsection*{3.2.2 Import restrictions to address Balance of Payments problems}

[TO BE WRITTEN] See Figure 13.

\subsection*{3.2.3 Antidumping duties over time}

As discussed in section 3.1.2, antidumping policies, restrictions that target products sold at “unfair” prices, are widely used by high, middle and low income countries today. In this section, we present statistics on the use of antidumping by the GATT’s high income economies over 1970-1979. For ease of comparison, we present figures on the use of antidumping from 1970-1979 alongside figures for the same economies over 1990-1999 and 2000-2009. Figure 14 depicts for three different decades the

\textsuperscript{47}For example, an Article XIX action typically involved a tariff line item or group of line items like “hatter’s fur” (USA, 1951), “strawberries” (Canada, 1957) or “hard coal” (Federal Republic of Germany, 1957) rather than a broad industrial classification like “chemicals” or “machinery.”

\textsuperscript{48}The definition of core European countries we use includes: the Federal Republic of Germany, France, the Netherlands, Belgium, the United Kingdom, and Italy.

\textsuperscript{49}For a theoretical exploration of the different GATT rules on compensation under Article XIX and XXVIII versus under dispute settlement (GATT Article XXIII), see Bown (2002).
share of antidumping investigations in 16 industrial sectors. Data used to construct these figures for 1970-1979 come from the GATT digital archive series COM.AD, and for 1990-2000 from the World Bank’s Temporary Trade Barriers database. For the 1970s, we mapped the verbal descriptions of products involved into HS06 product categories. We then concorded HS06 product descriptions to 16 broad industrial categories. The decadal breakdown is interesting because these decades correspond to 3 different policy regimes. The 1970s antidumping investigations took place prior to the Tokyo Round Antidumping code. The 1990s investigations took place under the Tokyo Round rules and the WTO’s Agreement on Antidumping, while the last decade presented, 2000-2009, corresponds to the modern WTO AD code.

Beginning with the panel in the upper left of figure 14, the first glaring point is that, in the contemporary period, antidumping policy in the US is used to restrict imports in metals sectors. The second point is that, this was not always the case. While 88 percent of US antidumping cases in the 1990s and 68 percent of these cases in the 2000s involved metal products, the share was a mere 24 percent in the 1970s. In this earlier era, the cross-sectoral distribution of antidumping investigations was considerably less skewed, with 12 percent of investigations in chemicals, 21 percent in machinery, 10 percent in plastics, 8 percent in stone, 6 percent in textiles, and 7 percent in transportation equipment. Turning to the upper right panel, the graph of antidumping investigations by the European Economic Community (1970s)/European Union (1990-2000), we see that Europe’s use of antidumping was skewed toward metals in the 1970s, textiles in the 1990s and metals again in the 2000s. Like the US, Europe’s use of antidumping actions in the 1970s seems to have been dispersed across many industries, with large shares of activity in chemicals (12 percent), machinery (12 percent), metals (39 percent), plastics (5 percent), stone (5 percent), textiles (11 percent) and wood (14 percent).

The next two panels aggregate antidumping investigations across two sets of countries. In the lower left, we present the share of antidumping actions in 16 industrial sectors for Australia, Canada, the EEC/EU, Japan, Korea, and the United States. Overall, antidumping actions in the steel industry dominate this policy tool for high income economies. Perhaps unsurprisingly, the wider sectoral breadth of the policy tool in the 1970s is observed in this aggregated data; significant shares of investigations are found in chemicals, plastics, wood, textiles, metals, and machinery. There is a sharp contract between the lower left panel for high income economies and the lower right panel which shows the sectoral distribution of antidumping investigations for a group of countries that are today known as the emerging economies: Argentina, Brazil, China, Indonesia, India, Mexico, Turkey and South Africa. Firstly, we see that none of these countries formally utilized antidumping policy under the GATT in the 1970s. However, as these countries joined the GATT/WTO system, they used this popular import restriction. However, the most notable thing is that the antidumping actions of emerging economies were dispersed across several industries. In the 1990s, chemicals (21 percent), plastics (14 percent), textiles (20 percent), metals (29 percent) and machinery (4 percent) commanded sizeable shares of antidumping activity. A similar cross-sectoral pattern is observed in the 2000s with industry shares for chemicals (23 percent), plastics
(15 percent), textiles (20 percent), metals (19 percent) and machinery (9 percent).

4 Behind the Border Policies

Next we move to a discussion of behind-the-border policies and their impact on trade. Historically, economists have approached the issue of behind the border policies that influence trade flows by emphasizing policy substitution and the efficiency of different tax or regulatory instruments. For example, an import tariff can be replaced with the appropriately tailored combination of a consumption tax and a production subsidy. The basic concern with policy substitution has ultimately been reflected in trade agreement rules designed to prevent countries from replicating dismantled tariff barriers using “domestic” policy instruments.

However, in reviewing the types of problems that have been raised at the WTO’s dispute settlement body since 1995, it appears that many of the problems confronting the world trading system today require a paradigm shift in which we try to develop a better understanding of the complex spillovers of domestic and border policies and the value, if any, of international policy coordination.

The world has taken two very different sets of approaches to dealing with behind the border policies in trade agreements. The “shallow” integration approach of the GATT/WTO has emphasized the removal of barriers to imports and an equal treatment of all goods within a nation’s borders and places little restriction on national sovereignty in domestic policy-setting. The “deep” integration approach of PTAs works toward dismantling many national economic borders and potentially harmonizing national policies or creating mutual recognition agreements. Interestingly, while the deep approach has great potential for internalizing cross-border policy spillovers, the infringement or perceived infringement on sovereignty is creating a backlash against integration within the deepest PTA, the European Union.

The categories of behind-the-border policies that we introduce includes domestic subsidies; supply side policies like product standards, local content rules, technology transfer, environmental regulation, labor policy, etc.; and consumer policies like product labeling, geographic indicators and health and safety rules.

[MORE TO BE WRITTEN, WHAT FOLLOWS ARE NOTES]

   Domestic tax and subsidy policies - those that mainly affect competition with imports

   • Other policies that affect the supply side - e.g., product standards, local content rules, tax laws, technology transfer, environmental policy, labor policy, competition policy, IP protection, investment policy, services (after-market), ...

   – Examples of WTO disputes and specific trade concerns, WTO (TBT/SPS) committees raising these issues
   – Examples of PTA disputes - e.g., CAFTA - US vs Guatemala on labor standards; NAFTA - Mexico vs US on truck safety standards
• Standards and regulations that impact consumer demand (e.g. consumer labeling, geographic indicators, marketing regulations, health and safety, etc.)


  – Specific trade concerns: Fontagné, Orefice, Piermartini, and Rocha (forthcoming)

4.1 Domestic subsidies: from semiconductors to solar panels

The study of domestic subsidies in international trade has traditionally focused on the substitutability of domestic consumption and industrial subsidies as imperfect substitutes for import tariffs (Copeland, 1990; Ederington, 2001, 2002). However, it appears that the role that subsidies play in international trade is less transparent, more subtle and more complex. We briefly describe two cases of subsidies in international trade for two industries: semiconductors produced in Korea circa 2001 (Francois and Palmeter, 2008; Prusa, 2008; Crowley and Palmeter, 2009) and solar panels produced in China circa 2012 (Crowley and Song, 2015). The two cases have interesting parallels; in both cases the production technology involved high fixed costs and rapidly declining marginal costs. The problems in both industries erupted after technological efficiency in the industry had gone through a period of dramatic growth that led to a worldwide supply glut.

Beginning with semiconductors, in 2001, a leading Korean producer, Hynix, which accounted for 4 percent of total Korean exports, was financially insolvent. Hynix’s creditors organized two financial bail-outs, in October 2001 and again in December 2002, in order to save the company. The US, EU and Japan, major importers and producers of semiconductors at the time, each asserted that the Korean government had subsidized the industry by orchestrating the bailouts in a covert way. They responded by imposing tariffs on Korean semiconductors through a countervailing duty.\footnote{These tariffs were eventually challenged at the WTO in two separate disputes, US-DRAMs and Japan-DRAMS (See Francois and Palmeter, 2008; Prusa, 2008; Crowley and Palmeter, 2009). The Japan-DRAMS case focused on both big questions like “if a government pressures or coerces a private entity to support a firm, is that a subsidy?” and smaller technical questions like “how does one assess the value of a financial restructuring?”}

This case typifies a classic subsidy problem in international trade - an exporter’s production subsidy harms import-competing firms in an importer’s home market and also harms the sales of the importer’s firms in third country markets. Notably, the WTO has a clear policy, the countervailing duty, to address harm to domestic sales of import-competing firms arising from (indirectly or directly subsidized) imports, but has no clear ways of addressing the losses arising from the subsidy to these same firms in third country markets.

The story of solar panels is similar in many respects, but adds interesting twists regarding the beneficiaries of a government policy. Firstly, like semiconductors, solar panels are produced with a high fixed cost declining marginal cost technology. Secondly, because the use of solar panels in lieu of fossil fuels to create electricity was and is seen as a highly desirable social outcome, governments
in Europe undertook serious commitments to stimulate consumer demand through the use of a variety of consumption subsidies beginning in 1999 (see Crowley and Song, 2015). The ultimate result has been a massive increase of the quantity in kW hours of solar generating capacity in Europe. For example, in Germany in 2014, installed solar capacity was 38GW compared to 28 GW in gas, 28 GW in hard coal, and 21 GW in brown coal (Burger, 2014).

Although the consumption subsidy was partially intended to benefit the German firms that were instrumental in the technological development of solar panels, by 2012, solar panel producers located in China has captured 80 percent of the European market. As was the case with semiconductors, rapid technological progress (facilitated by the EU’s consumption subsidies) created a glut in global supply. This prompted EU import restriction of solar panels from China (instituted under antidumping law) which are still in place today. The interesting twist here, relative to Korean semiconductors, is that after Chinese access to the subsidized European market was curtailed, the Chinese government responded to the European import restrictions with their own domestic policy initiatives. China introduced regulations to force industry consolidation in July 2013 and a program of consumption subsidies in August 2013. That is, European domestic policy created a huge market open to international competition, but in the face of intense competition, Europe turned to trade policy to reclaim part of this market for its own producers. China responded to European trade restrictions with policies to stimulate demand in its own potentially massive market. Contemporaneously, a policy fight erupted in a smaller third market, the US. In the US, a subsidiary of a German firm, Solar World AG, filed a successful antidumping case against Chinese and Taiwanese producers that concluded in 2015 with steep import tariffs against these countries (but none against German producers).

Thus, relative to the earlier problems in semiconductors trade, trade in solar panels appears to be an ever-growing battlefield in which governments are assisting firms through a combination of consumption subsidies and import tariffs. Weirdly, governments are pursuing policies even though they cannot fully direct the benefit of these policies toward their own national firms and, in some cases, seem to be aiding foreign producers.

This raises a host of questions for how a multilateral trade adjudication body like the WTO should approach problems - like the co-appearance of subsidies and import tariffs to influence the organization of production and trade in a socially-important industry like clean energy generation in which rapidly advancing technology creates a high degree of firm failure and government expenditures directed toward technological improvement can end up financing activities of firms in other countries.

4.2 Other supply side policies

[TO BE WRITTEN]
4.3 Consumer demand-related policies

Much of the policy discussion surrounding the trade-impact of consumer demand related policy embraces skepticism of the policy’s objective. Citizens and pundits in one country often view a consumer policy in a second country as “trade policy in disguise” or a non-transparent border barrier. For someone trained in the policy substitution framework, this skepticism is natural, yet also disrespectful of social norms or customs that might be highly important in a foreign country. Given the WTO dispute settlement body’s caseload on consumer policies, it is not obvious how the world trading system can at the same time respect location-specific preferences, facilitate greater trade integration and internalize cross-border policy spillovers. Perhaps the solution to consumer policy spillovers should be increased policy coordination, but it is not clear under which circumstances this is socially optimal.

In a dispute before the WTO in 2011, Mexico challenged a US law which enforced the use of a private voluntary labeling scheme for a consumer product, canned tuna (Crowley and Howse, 2014). The “dolphin-safe” label on the can provided information to consumers about the production technique used by tuna fisherman. From Mexico’s perspective, this labeling regime was a discriminatory barrier to US market access for Mexican tuna, the production of which sometimes involved encircling dolphins, a practice that US dolphin lovers objected to on moral grounds as harmful to dolphins. From the perspective of US dolphin lovers, the label served a legitimate social policy objective - discouraging the use of an unethical production process and protecting the well-being of a highly intelligent animal.

This case typifies the types of concerns raised in cases of production process labeling (organic, GMO free, no animal testing, safe factory conditions, etc.), geographic identifiers (Champagne, Parmigiana), and taxes or regulations for cultural goods (French movies, Korean shochu alcohol, etc.). It is difficult for an individual located outside of the society where the regulation is adopted to determine if the policy truly reflects local preferences or if it is just a smokescreen for protection. In the tuna dolphin case, it is clear that in both countries there is a distribution of individual preferences across the importance of safeguarding animal well-being. The coordination of a transnational labeling system might benefit the population of dolphin-loving consumers in multiple countries; but whether any system should be a private or public regulation and how this type of domestic policy can be implemented and enforced in multiple jurisdictions are difficult questions. Moreover, the solution to these types of consumer-protection policies are likely to vary product by product and across groups of countries according to region or stage of development.

5 Conclusion and the future empirical landscape of trade policy

Having characterized the data on trade policy, we conclude by noting that a number of critical, first-order questions related to the empirical landscape of trade policy have yet to be answered. These include, Why is there cross-country heterogeneity in commercial policy (both in the set of available policy tools and in the trade-restrictiveness of policy) across three groups - industrialized,
middle-income, and least-developed countries? What has led to any convergence in commercial policy across countries over time? Why have most of the major trading countries largely chosen to liberalize commercial policy since the mid 1980s?

We also point to increasingly important (but under-researched) issues for empirical trade policy, including - the role of supply chains, the rise of the BRICS, and the “deeper” integration FTAs currently under negotiation though go well beyond preferential tariffs.

We also identify areas of future research, including the need for new data on “commercial” policy related to trade.

[MORE]
References


Figure 1: Geographic Coverage of the 31 Economies in the Empirical Exercise

Source: Constructed by the authors.

Figure 2: Average Applied MFN Tariffs in 2013 and Tariff Bindings, by Industry and Country Group

Source: Constructed by the authors from tariff data at the HS-06 level from the WTO and UNCTAD/TRAINS. ‘Water’ defined as the difference between the country’s tariff binding legal commitment and its applied MFN rate. Country groupings based on Table 1.
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Source: Constructed by the authors from tariff data at the HS-06 level from the WTO and UNCTAD/TRAINS. A tariff peak is defined as an HS-06 product with an applied MFN tariff greater than 15 percent. Country groupings based on Table 1.
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Source: Constructed by the authors as the share of HS06 products for which the absolute value of the annual difference in MFN applied tariffs from the prior year was larger than 5 percentage points, with tariff data taken from WTO and UNCTAD/TRAINS. For scaling purposes, the following outliers are omitted from the figure: Saudi Arabia 86 percent of products (2002), India 77 percent of products (2005), Philippines 60 percent of products (1996), Pakistan 81 percent of products (1999), and Egypt 51 percent of products (2004).
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Source: Constructed by the authors from WTO (2014c). Includes 31 economies from sample of Table 1; the remaining 9 countries from Table 1 each had zero HS06 products with MFN tariffs applied as specific duties in 2013.

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Source: Constructed by the authors from tariff data at the HS-06 level from the WTO and UNCTAD/TRAINS. Country groupings based on Table 1 and includes all countries, even those revealed in Figure 7 as having zero MFN tariffs applied as specific duties.
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Source: Constructed by the authors from temporary trade barrier (TTB) data at the HS-06 level from Bown (2014b); TTBs include antidumping, countervailing duties, global safeguards and China-specific transitional safeguards.

Notes: during this period Canada, Mexico and the US had a common FTA (NAFTA), European Union and Turkey had a customs union (common external applied MFN tariff), and Argentina and Brazil had a customs union (common external applied MFN tariff).
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Source: Constructed by the authors from Bown (2014b) and L: series reports from 1950-1959 in the GATT digital archive. The share reported for each decade is the count of safeguards investigations by HS06 product and export origin within one of 16 industrial sectors divided by the count of safeguards investigations by HS06 and export origin summed over all industrial sectors.
Figure 13: Article XII (BOP Actions), 1950-1959

Source: Constructed by the authors from the L: reports from 1950-59 in the GATT digital archive.
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Source: Constructed by the authors from Bown (2014b) and COM.AD reports from 1970-1979 in the GATT digital archive. The share reported for each decade is the count of antidumping investigations by HS06 product and export origin within one of 16 industrial sectors divided by the count of antidumping investigations by HS06 and export origin summed over all industrial sectors.
Table 1: MFN Ad Valorem Import Tariffs for Selected Economies, 2013

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<td>27.7</td>
<td>135.0</td>
<td>120</td>
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</table>

Source: tariff data taken from WTO (2014c). Notes: parentheses indicate data availability for year other than 2013. *selected other developing countries chosen as those with 2013 populations greater than 40 million. G20=Group of 20. † indicates WTO non-member. **indicates legal bindings not relevant for WTO non-members. Columns (1), (2), and (6) are ad valorem rates, and columns (3), (4), and (5) are shares of import products. Coefficient of variation in column (7) defined as standard deviation of tariff line duty rates divided by the simple tariff line level average of all duty rates.
Table 2: Average Applied MFN Ad Valorem Import Tariffs for Selected Economies: 1993, 2003 and 2013

<table>
<thead>
<tr>
<th></th>
<th>GATT membership year</th>
<th>WTO membership year</th>
<th>Simple average applied MFN tariff for 1993</th>
<th>2003</th>
<th>2013</th>
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<td>11.6</td>
<td>12.2</td>
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<td>1995</td>
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</tr>
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</tr>
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<td>10.7*</td>
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<td>1995</td>
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<td>10.0</td>
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<td><strong>Developing, other</strong>*</td>
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<td></td>
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</tr>
<tr>
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<td>1995</td>
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<td>14.0</td>
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<td>1995</td>
<td>–</td>
<td>5.5</td>
<td>5.6*</td>
</tr>
<tr>
<td>Colombia</td>
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<td>1995</td>
<td>12.3*</td>
<td>12.3</td>
<td>6.8</td>
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<td>DR of the Congo</td>
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<td>1997</td>
<td>–</td>
<td>12.0</td>
<td>11.0*</td>
</tr>
<tr>
<td>Egypt</td>
<td>1970</td>
<td>1995</td>
<td>34.6*</td>
<td>26.9</td>
<td>16.8*</td>
</tr>
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<td>Ethiopia</td>
<td>NM</td>
<td>NM</td>
<td>28.9*</td>
<td>18.8*</td>
<td>17.3*</td>
</tr>
<tr>
<td>Iran</td>
<td>NM</td>
<td>NM</td>
<td>–</td>
<td>27.3</td>
<td>26.6*</td>
</tr>
<tr>
<td>Kenya</td>
<td>1964</td>
<td>1995</td>
<td>35.2*</td>
<td>15.2*</td>
<td>12.8</td>
</tr>
<tr>
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<td>1960</td>
<td>1995</td>
<td>34.4*</td>
<td>28.6</td>
<td>11.7</td>
</tr>
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<td>1995</td>
<td>50.8*</td>
<td>17.1</td>
<td>13.5</td>
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<tr>
<td>Philippines</td>
<td>1979</td>
<td>1995</td>
<td>22.9</td>
<td>4.7</td>
<td>6.3</td>
</tr>
<tr>
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<td>1961</td>
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<td>20.3</td>
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<td>12.8</td>
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<tr>
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<td>1995</td>
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<td>10.4</td>
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<td>2008</td>
<td>7.0*</td>
<td>7.0*</td>
<td>4.5</td>
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<td>Vietnam</td>
<td>NM</td>
<td>2007</td>
<td>14.1*</td>
<td>16.8</td>
<td>9.4</td>
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</table>

Source: constructed by the authors with applied ad valorem duties data at the HS06 level taken from WTO and UNCTAD/TRAINS. Notes: *data for that year not available and so chosen as the closest available year. G20=Group of 20. NM indicates GATT or WTO non-member. **Different European Union member states became GATT Contracting Parties in different years. For the purposes of this table, ad valorem equivalent rates of tariffs applied as specific duties are omitted from the calculations.
Table 3: Import Product Coverage by Temporary Trade Barriers over 1995-2013, by Country and Policy

<table>
<thead>
<tr>
<th>G20 High-income</th>
<th>Cumulative coverage by TTB ever in effect during 1995-2013</th>
<th>Annual coverage by TTB in effect 1995-2013</th>
<th>Annual coverage by new TTB investigation 1995-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AD law/ initiation</td>
<td>All TTBs</td>
<td>AD only</td>
</tr>
<tr>
<td>Australia</td>
<td>1906/na</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Canada</td>
<td>1904/na</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>European Union</td>
<td>1968/1968-69</td>
<td>8.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Japan</td>
<td>1920/1982</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>na/na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>South Korea</td>
<td>1963/1986</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>United States</td>
<td>1916/1922</td>
<td>10.3</td>
<td>9.0</td>
</tr>
</tbody>
</table>

G20 Emerging

| Argentina       | 1972/na            | 4.8      | 4.6     | 0.1      | 0.5     | 0.0      | 2.2  | 0.6  | 1.2  | 3.2  | 0.5  | 0.4  | 0.0  | 1.3  |
| Brazil          | 1987/1988          | 2.8      | 2.4     | 0.2      | 0.3     | 0.0      | 1.2  | 0.4  | 0.4  | 1.9  | 0.3  | 0.2  | 0.0  | 0.6  |
| China           | 1997/1997          | 3.1      | 2.1     | 0.2      | 1.3     | 0.0      | 1.1  | 0.7  | 0.0  | 2.0  | 0.2  | 0.4  | 0.0  | 1.8  |
| India           | 1985/1992          | 8.0      | 7.6     | 0.0      | 0.9     | 0.3      | 3.4  | 2.2  | 0.2  | 6.6  | 0.9  | 0.7  | 0.1  | 2.4  |
| Indonesia       | 1995/1996          | 2.1      | 1.1     | 0.0      | 1.1     | 0.0      | 0.6  | 0.6  | 0.0  | 1.8  | 0.2  | 0.3  | 0.0  | 1.2  |
| Mexico          | 1986/1987          | 22.9     | 22.8    | 0.6      | 0.0     | 0.0      | 17.5 | 10.0 | 1.0  | 23.7 | 0.2  | 0.1  | 0.0  | 0.4  |
| Russia          | na/na              | na      | na      | na      | na      | na      | na   | na   | na   | na   | na   | na   | na   | na   |
| South Africa    | 1914/1921          | 2.1      | 2.1     | 0.1      | 0.0     | 0.0      | 1.0  | 0.4  | 0.3  | 1.7  | 0.1  | 0.1  | 0.0  | 0.6  |
| Turkey          | 1989/1989          | 4.2      | 2.5     | 0.0      | 1.6     | 0.1      | 2.9  | 2.0  | 0.6  | 5.9  | 0.4  | 0.5  | 0.0  | 1.8  |

Developing, other

| Colombia        | 1990/1991          | 2.3      | 1.2     | 0.0      | 0.1     | 1.5      | 0.6  | 0.5  | 0.1  | 1.9  | 0.2  | 0.4  | 0.0  | 1.8  |
| Egypt           | na/na              | na      | na      | na      | na      | 3.6      | na   | na   | na   | na   | na   | na   | na   | na   |
| Pakistan        | 1983/2002          | 0.4      | 0.4     | 0.0      | 0.0     | 0.0      | 0.2  | 0.1  | 0.0  | 0.3  | 0.1  | 0.1  | 0.0  | 0.3  |
| Philippines     | 1994/1994          | 0.5      | 0.3     | 0.0      | 0.2     | 0.0      | 0.2  | 0.1  | 0.1  | 0.7  | 0.1  | 0.1  | 0.0  | 0.4  |
| Thailand        | 1994/1994          | 0.6      | 0.6     | 0.0      | 0.1     | 0.0      | 0.3  | 0.2  | 0.0  | 0.7  | 0.4  | 0.5  | 0.0  | 1.0  |
| Ukraine         | na/na              | na      | na      | na      | na      | 0.1      | na   | na   | na   | na   | na   | na   | na   | na   |

Source: coverage indicates share of a country’s HS06 import product lines, constructed by the authors with data from Bown (2014b).

Notes: na indicates policy data not available, TTB = temporary trade barrier, AD = antidumping, CVD = countervailing duty, SG = global safeguard, CSG = China-specific transitional safeguard, and G20=Group of 20. AD law is year of implementation of the country’s antidumping regime, and initiation refers to the year of initiation of the country’s first antidumping investigation. Data for Bangladesh, Burma, DR of the Congo, Ethiopia, Iran, Kenya, Nigeria, Tanzania and Vietnam omitted.
Table 4: Exporting Countries Most Exposed to Foreign-Imposed TTBs, 2013 and 1995

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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<td>1. China</td>
<td>100.3</td>
<td>1. South Korea</td>
<td>7.6</td>
<td>1. Japan</td>
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<td>2. South Korea</td>
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<td>5. Thailand</td>
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<td>6. Thailand</td>
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<td>6. Thailand</td>
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<td>6. Brazil</td>
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<td>7. Indonesia</td>
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<td>7. Japan</td>
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<td>7. Malaysia</td>
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<td>8. Brazil</td>
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<td>9. Mexico</td>
<td>2.5</td>
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<td>9. Hong Kong</td>
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</tr>
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<td>12. Turkey</td>
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<td>0.5</td>
<td>20. Ukraine</td>
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</table>

Source: Trade-weighted shares of imports subject to foreign-imposed TTBs, constructed by the authors using HS-06 level data from Bown (2014b) matched to UN Comtrade import data and using the methodological approach of Bown (2011, 2013). G20 = Group of 20 economies listed in Table 1. G4 = Australia, Canada, European Union, and United States only.
Table 5: Implementation of EU Antidumping Measures: Form of the Import Restriction (percentage)

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<th>Export Origin</th>
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<td>All countries</td>
<td>G20 High income</td>
<td>G20 Emerging</td>
<td>Developing</td>
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<td><strong>Tariffs</strong></td>
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<td>6.6</td>
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<tr>
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<td>9.6</td>
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<td>Duty if min. price breached</td>
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<td>4.1</td>
<td>2.5</td>
<td>6.2</td>
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Source: constructed by the authors from Bown (2014b).
Table Appendix A: Industry Classification Used in the Analysis

<table>
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<th>Acronym</th>
<th>Industry</th>
<th>Harmonized System 2-digit (HS02) Sections</th>
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<tbody>
<tr>
<td>ANIM</td>
<td>Animal products, live animals</td>
<td>01-05</td>
</tr>
<tr>
<td>VEGE</td>
<td>Vegetable products</td>
<td>06-15</td>
</tr>
<tr>
<td>FOOD</td>
<td>Prepared foodstuffs, beverages, spirits, vinegar, tobacco products, edible fats</td>
<td>16-24</td>
</tr>
<tr>
<td>MINE</td>
<td>Mineral products</td>
<td>25-26</td>
</tr>
<tr>
<td>FUEL</td>
<td>Mineral fuels</td>
<td>27</td>
</tr>
<tr>
<td>CHEM</td>
<td>Chemicals</td>
<td>28-38</td>
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<tr>
<td>PLAS</td>
<td>Plastics and rubber</td>
<td>39-40</td>
</tr>
<tr>
<td>HIDE</td>
<td>Hides, skins, leather, etc</td>
<td>41-43</td>
</tr>
<tr>
<td>WOOD</td>
<td>Wood and articles of wood, pulp and paper</td>
<td>44-49</td>
</tr>
<tr>
<td>TEXT</td>
<td>Textiles, fibres, apparel, etc</td>
<td>50-63</td>
</tr>
<tr>
<td>FOOT</td>
<td>Footwear, headgear, umbrellas, feathers, etc</td>
<td>64-67</td>
</tr>
<tr>
<td>STON</td>
<td>Stone, cement, plaster, ceramics, glassware, pearls, etc</td>
<td>68-71</td>
</tr>
<tr>
<td>META</td>
<td>Base metals and articles of base metal</td>
<td>72-83</td>
</tr>
<tr>
<td>MACH</td>
<td>Machinery, mechanical appliances, electrical equipment</td>
<td>84-85</td>
</tr>
<tr>
<td>TRAN</td>
<td>Transportation: vehicles, aircraft, vessels</td>
<td>86-89</td>
</tr>
<tr>
<td>MISC</td>
<td>Miscellaneous</td>
<td>90-97</td>
</tr>
</tbody>
</table>