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Taking Stock of Antidumping, Safeguards and Countervailing Duties, 1990–2009

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1. INTRODUCTION

THE major economies of the world trading system undertook a variety of approaches to liberalise trade during 1985–2009. *Multilateral* negotiations resulted in the initiation and completion of one round (Uruguay Round, 1986–94) which transformed the GATT to the WTO, and WTO members subsequently initiated further liberalisation negotiations in 2001 under the (still ongoing) Doha Round. A number of countries liberalised by negotiating and/or expanding access to partners through major *preferential* trade agreement initiatives: examples include the Canada–US Free Trade Agreement (CUSFTA) that was signed in 1987 and then extended to include Mexico in 1994 to create NAFTA, and Argentina and Brazil negotiated with other South American countries to form Mercosur in 1991. The European Community expanded from 10 countries to 12 in 1986 to 15 in 1995 to 25 in 2004 to 27 members of the European Union by 2007, and it also formed a customs union with Turkey that went into effect in the mid-1990s. India responded to its balance of payments crisis of 1991–92 by cutting its applied tariffs through a *unilateral* liberalisation. Finally, China underwent 15 years of *accession* negotiations to realise

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WTO membership in 2001, and this locked in a number of its major tariff reductions. Regardless of the trade liberalisation path undertaken, a common result is that many of these economies currently have historically low applied import tariffs in place.

While WTO economies pursued different liberalisation routes to reduce and sustain lower applied tariffs over these 25 years, a second theme common to this period is that many increasingly adopted 'contingent' or 'administered' import protection under policies such as antidumping, safeguards and countervailing duties – what I refer to jointly as temporary trade barrier (TTB) policies. The combined result of these two phenomena is a new framework for the international trading system: exporters are simultaneously subject to low (on average) applied import tariffs, but they also face the threat of frequently changing – i.e., newly imposed or removed – TTBs. Such an institutional framework ultimately poses many research questions on transmission mechanisms through which government access to and use of TTB policies are economically important.

This paper characterises the institutional framework by providing an empirically based set of facts on the cross-country use of TTB policies over 1990–2009, taking stock of newly available, product-level data organised into the World Bank's Temporary Trade Barriers Database (Bown, 2010a). I begin by using the data to address a number of basic questions. For which countries and in what episodes are such TTB policies revealed through their use as being quantitatively important?[1] How were these TTB policies used and not used during the global economic crisis of 2008–09? What is the exporter incidence of such imposed policies, and how has this changed over time?

I begin Section 2 by constructing two new measures of annual, product-level 'stocks' and 'flows' of imported products *subject to* these TTBs. These measures are defined to address some of the main shortcomings of previous research. First, prior research has not constructed comprehensive estimates for how much of a country's imports were subject to TTBs at any point in time. Examining the 'stock' of such trade barriers in place was previously difficult because of the lack of data on both the timing of policy removals and the details of which harmonised system (HS) import products that TTBs covered. As such, previous work focused almost exclusively on industry-defined data covering annual counts of the initiation of *new* investigations and the imposition of *newly imposed* barriers – more limited 'flow' variables

[1] Such policies could be important despite nonuse (or under-utilisation) – for example, as an outside option or off-the-equilibrium path behaviour – if they help facilitate efficiency-enhancing outcomes. For example, access to such policies may serve as insurance for uncertain trade policy negotiators which allow them to take on deeper commitments in a trade agreement (Fischer and Prusa, 2003; Hoekman and Kostecki, 2009).

that also lacked economically satisfying definitions for a product. I overcome some of these difficulties by applying my measures to new and detailed data drawn from the World Bank's Temporary Trade Barriers Database. As such, this research builds upon prior work documenting the global proliferation of antidumping (AD) use in particular (Prusa, 2001; Zanardi, 2004; Bown, 2009).

My first estimates compare developed versus developing economy use of TTBs and show how such policies are likely to have heterogeneous economic impacts on these two types of economies' own trade flows.[2] Most striking is how the divergence between these two groups of policy-imposing economies has taken place over time. Even before the global economic shock of 2008–09, the annual stock of imported products subject to such trade barriers imposed by major emerging economies such as Argentina, Brazil, China, India and Turkey had grown substantially; from a starting point in the mid-to-late 1990s at or close to zero, to coverage of up to 4 per cent of each economy's imported products by 2007. On the other hand, more developed economies with a longer history of using such policies, like the United States and EU, have experienced a declining share of their imports subject to such policies over time. One of my measures indicates that while 3.5–5 per cent of these economies' imports may have been affected during 1997–2005, TTB policy coverage had fallen by roughly 50 per cent to only 1.5–3 per cent of their annual imports by 2007.[3]

After providing a broad characterisation of the use of these policies across countries over time, I use the methodological framework to assess the use of TTBs during the global economic shock of the 2008–09 crisis. Especially early in the crisis, and perhaps because of the sharp and unexpected decline in global trade flows in the fourth quarter 2008 through the first quarter 2009, there was substantial concern of a protectionist retreat on the scale of the 1930s Great

[2] These results relate to recent research (Vandenbussche and Zanardi, 2010; Egger and Nelson, forthcoming) that uses more historical, albeit less-detailed, data to estimate the aggregate impact of antidumping – the most common of these TTB policies – on trade flows. These two papers use similar gravity model regression approaches and present distinct results: while both find the effect of antidumping on trade flows to be negative, Egger and Nelson conclude that the effect is modest while Vandenbussche and Zanardi interpret the effect as more sizable. A separate approach to estimating the impact of these policies is Gallaway et al. (1999), which develop a computable general equilibrium-based approach to estimate the economic welfare impact of the US use of antidumping and countervailing duties on data for 1993.

[3] As I explain in substantial detail in the methodological section of the Appendix A, despite innovations that improve measurement of the economic importance of such TTBs, remaining data constraints leave some measurement error, especially when it comes to the construction of the *level* of any policy-imposing economy's imports subject to TTBs. Nevertheless, because I define the measures consistently over time and across trading partners, measurement error is much *less* of a concern for two of our main questions of interest: intertemporal changes (i.e. whether the scope of imported products subject to a country's use of TTBs is increasing or decreasing over time) and the relative exporter incidence (i.e. whether certain exporters are relatively more or less frequently targeted than others by imposed TTBs).

Depression era.[4] Nevertheless, in Section 3, I detail the somewhat surprising evidence that the 2008–09 shock basically continued precrisis trends in how both developed and developing economies apply new import protection via TTBs. While the major G20 users have combined to increase the stock of product lines subject to TTBs by 25 per cent during the crisis, and despite the massive recessions in many high-income economies, on average, the *developed* G20 economies increased the stock of products covered by TTBs by only 5 per cent in 2009 relative to the precrisis level.[5] On the other hand, developing economies have increased their stock of product coverage by TTBs during the crisis by 40 per cent, though there is substantial heterogeneity within the set of developing economies. Nevertheless, my results suggest it would be wrong to interpret this increase as *caused by* the crisis, given that the measured increase is consistent with precrisis trends and is not far from forecasts of what may have taken in place even in the absence of the crisis.[6]

The other major empirical exercise of the paper is to measure the exporter incidence of the growing use of antidumping so as to determine implications for discriminatory patterns of import protection across the trading system. The results are detailed in Section 4; not surprisingly, there is also evidence of substantial heterogeneity of impact across affected exporting economies. Over time, the main impact of the foreign use of antidumping is increasingly on developing economy exporters. First, China's exported products face the largest stocks of foreign-imposed antidumping barriers by 2009, at nearly four times the amount of the next most targeted economies – South Korea; EU; and Taiwan, China. Overall, by 2009, 2.6 per cent of China's exported products to developing economies were subject to antidumping, and 1.6 per cent of its products to developed economies were subject to antidumping, percentages that

[4] For a comprehensive account and decomposition of the various protectionist forces at work during the Great Depression, as well as other, nontrade policy-related factors that contributed to the curtailment of global trade, see Irwin (2011). For an early assessment of potential causes of the trade collapse of 2008–09, of which the consensus is that it had little to do with changes in trade policy but instead more fundamental demand (income) and supply (credit) factors, see Baldwin (2009). Baldwin and Evenett (2009) provide a collection of research from early in the crisis that highlights the fears of an impending protectionist backlash.

[5] Russia (not a WTO member) and Saudi Arabia (previously not a TTB user) are the only G20 economies not represented in the empirical analysis of the use of TTBs.

[6] It is not too early to begin to assess the stock of products subject to TTBs resulting from the crisis period given that increased flows of new investigations had shown signs of levelling off by the end of 2009. Furthermore, my measurement of TTBs 'times' the contribution to the stock of newly imposed TTBs as the year the first (even a preliminary) barrier is imposed. While terminating coverage for policies imposed as of the end of 2009 is likely to miss some late-imposed barriers, as of the July 2010 Temporary Trade Barriers Database release (covering data through second quarter (2Q) 2010), there had been a substantial moderation in the count of newly initiated TTB investigations relative to the run-up that took place in 2008–09. The count of new investigations began to taper off in 4Q 2009, and this has continued into 1Q and 2Q 2010. For a discussion, see, for example, Bown (2010b).

had accelerated since its 2001 WTO accession (Messerlin, 2004; Bown, 2010c). I illustrate additional data that show how this 'South–South' feature of antidumping is also not unique to China's exports. A number of other developing countries face trends similar to China in that the share of their products exported to other emerging economies that is targeted by foreign antidumping is higher than the share of their products exported to high-income economies.

In addition to these two main empirical contributions, I use my approach to address a number of other research questions. For example, while focusing on annual stock measures of TTBs is an important and previously underemphasised area for research, my methodology also allows for construction of other measures of TTB policy activity, including more precise 'flow' measures based on product coverage. Capturing more information on the rate of new application of such barriers over time illustrates the volatility of trade policy and raises additional questions regarding policy uncertainty that have emerged elsewhere in the literature (e.g. Limão and Handley, 2010). While there is substantial variation in flows both across countries and over time, in Section 2, I also find that some major economies average up to 1 per cent of imported products becoming subject to new TTB investigations annually. Furthermore, there is also evidence that the flows relate to the *cumulative* stocks of 6-digit HS products affected by at least one TTB over 1990–2009. My examination of the data suggests that for the major G20 economies, the cumulative stock of affected products ranges from a low of 0.09 per cent (Japan) to a high of 21.79 per cent (Mexico), with India (8.62 per cent), European Union (9.62 per cent) and United States (13.37 per cent) in the middle. The uncertainty created by the volatility in some economies' use of TTBs is a policy feature quite distinct from how most of these economies use their applied tariffs, at least during the 2000s, which have remained relatively unchanged given their multilateral (WTO) and preferential trade agreement commitments.

Next, I also investigate the potential for substitutability across antidumping, countervailing duty (CVD) and safeguard barriers within these policy-using economies; as such, I attempt to disentangle the relative importance of each policy across countries and time.[7] For example, in addition to the global safeguard (SG), I include data on post-2001 use of the 'China-safeguard' (CSG) – a policy that the existing WTO membership insisted upon as part of China's accession to the WTO and that may be imposed until 2014.[8] The most prominent use of this policy was the high-profile US-imposed safeguard on imports

[7] Examples of recent research examining use and other impacts of antidumping across (including developing) countries include Niels and Francois (2006), Bown (2008), Reynolds (2009), Moore and Zanardi (2009) and Bown and Tovar (2011).

[8] Bown and Crowley (2010) examine whether there is empirical evidence that might motivate inclusion of a 'trade deflection' provision in the terms triggering use of the CSG under its 2001 WTO accession agreement.

of Chinese tires in the midst of the global crisis in September 2009. Overall, evidence from Section 2 allows me to conclude that while antidumping is still the dominant TTB policy instrument, an exclusive focus on antidumping could miss up to 40 per cent (depending on policy-imposing economy) of the cumulative stock of products affected by TTBs during this period; though most of this is with respect to the *global* safeguard policy instrument.

Third, in Section 5, I provide a final examination of the more recent potential shift towards governments relying on the countervailing duty (anti-subsidy) policy. Such a change in the policymaking environment stems from at least two separate events: the rules and commitments accompanying China's WTO accession in the face of its continued export expansion; and the global policy response to the economic crisis of 2008–09 which led to a number of government-financed industry bailouts which trading partners may ultimately choose to address through CVDs. I decompose the data and illustrate that CVD use is still largely dominated by the United States, though I point out signs identifying how this may change over time. I also illustrate how assessing the impact of CVDs is complicated by the fact that almost all applications in recent history have been made simultaneously with antidumping duties (against the same products, from the same foreign sources). The evolving nature of antidumping, countervailing duty and safeguard protection has obvious political economy implications for which countries are interested in negotiating potential reform to the WTO Agreement on Antidumping, Agreement on Subsidies and Countervailing Measures and Agreement on Safeguards.

I conclude the final section by using the facts that the data reveal to raise new and pressing questions for further economic research on TTB use and the evolving rules, changing nature of the WTO membership, shifting global trade patterns, interaction with preferential trade arrangements and even the fragmentation of global production.

2. THE STOCK OF TEMPORARY TRADE BARRIERS – FROM THE IMPORTING ECONOMY PERSPECTIVE

My first task is to construct measures for the use and potential impact of the TTBs over time and across policy-using countries. My attempt is to improve upon earlier efforts (Prusa, 2001; Zanardi, 2004; Bown, 2009) to characterise the use of such trade barriers across countries over time. Previous work generally suffers from two data-induced shortcomings. First, it typically relies on the country's own, self-reported characterisation of a 'product' subject to a newly initiated investigation or imposed barrier, and this definition of a product results from the petition filed by the domestic industry. There is no uniform standard for such definitions, as such using this unit of account may not

accurately reflect the economic importance or unimportance of TTBs if there is substantial heterogeneity in the amount of product coverage across TTB investigations, countries or time. Second, previous work also focused almost exclusively on data covering annual counts of the initiation of *new* investigations and the imposition of *newly imposed* barriers – i.e., 'flow' variables. Such research has typically not had access to sufficiently informative data so as to construct and examine the 'stock' build-up of such trade barriers in place over time because it lacked information on policy removals.[9] Constructing and examining stock measures also allows me to better assess the incidence of TTBs in the face of heterogeneity in the timing of newly imposed barriers and the length of time that such barriers stay imposed.

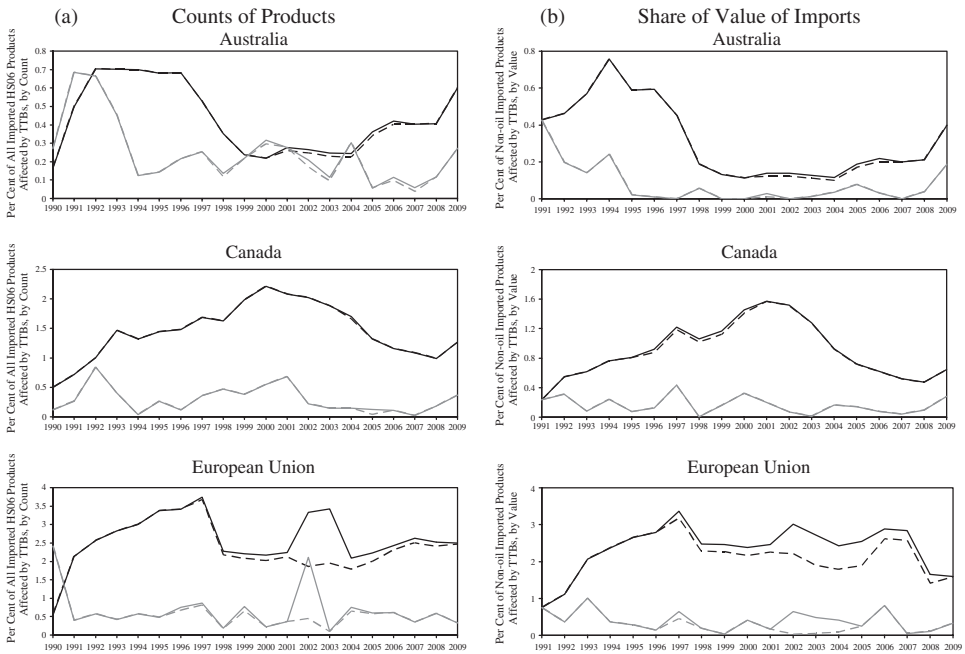
While I leave to the Appendix A an equation-based description of my explicit methodology, here, I provide a brief discussion to lend intuition to the approach.

My first methodological approach constructs 'count' measures of the annual stock of HS-06 products subject to TTBs, and it takes an importing economy's set of HS-06 products as the unit of observation. I build from Bown and Tovar (2011, Figure 1) which focused on India's use of antidumping over 1992–2003; the count measures reflect information on newly imposed trade barriers, previously imposed trade barriers and the removal of previously imposed barriers. In addition to applying the Bown and Tovar approach to a new set of countries, I also adapt it along three important dimensions: (i) I examine not only cumulative stocks but also flows; (ii) I examine not only antidumping, but also HS-06 products subject to other TTB policies such as CVDs, global safeguards and China-specific safeguards; and (iii) I normalise the count of affected HS-06 products by the economy's stock of HS-06 products with nonzero imports in that year.

My second approach refines the counts measure by using import value data to *trade-weight* the importance of TTBs at the HS-06 product level. Creation of this complementary 'value' measure is one way to address the likelihood of substantial heterogeneity in the economic importance across HS-06 products and TTBs. For example, not all HS-06 products may be equally important contributors to the economy's overall level of imports; one product from one foreign source may cover billions of dollars of imports while another may only cover a few hundred thousand dollars. Furthermore, some TTBs are applied against multiple foreign sources and thus have the possibility of adversely affecting much more trade than one applied against a single foreign supplier of the HS-06 product. The values approach requires HS-06 import value data from the United Nations Comtrade database to construct year-by-year coverage ratios of imports subject to TTBs. I use nonoil imports only.

[9] Exceptions include recent research examining the question of antidumping policy removal and the Sunset Review process such as Moore (2006) and Cadot et al. (2007).

FIGURE 1
Developed (G20) Economy Use of Temporary Trade Barriers, 1990–2009.

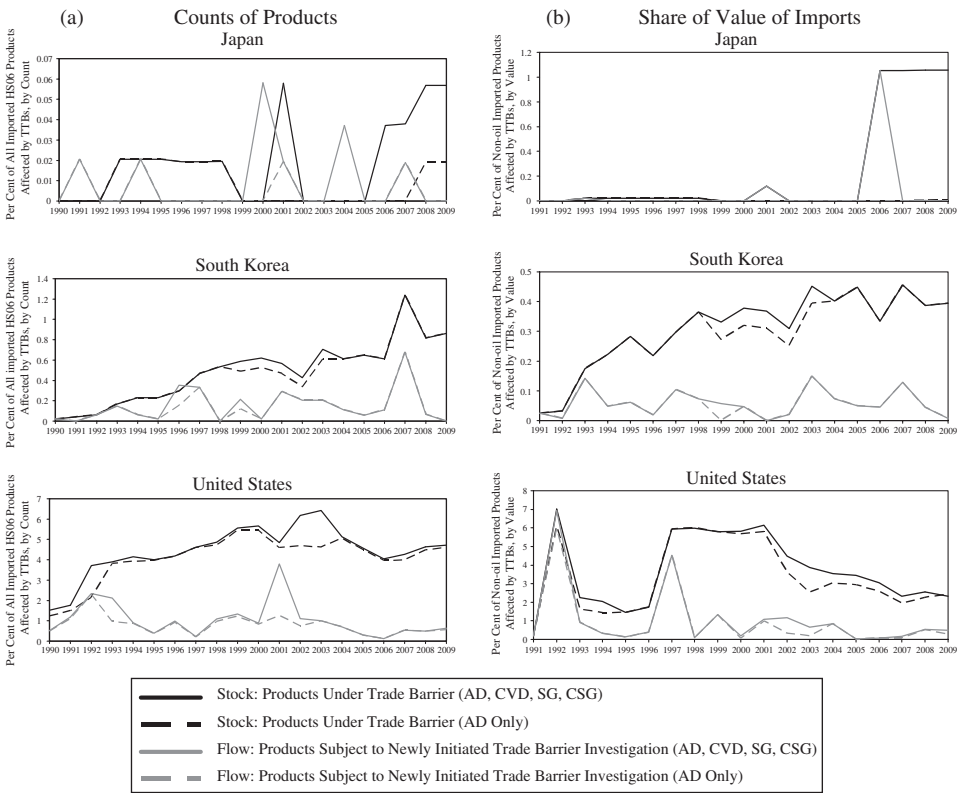


The Appendix provides an explicit account of the methodology for the 'count' and 'value' computations, as well as a more complete discussion of additional caveats. My empirical analysis relies on the extremely detailed TTB policy data from the World Bank's Temporary Trade Barriers Database (Bown, 2010a) to construct relatively comprehensive information on the 'stock' and 'flow' of such barriers at the 6-digit HS product level across countries and over time. More details on the data are available in Appendix B and are described comprehensively in Bown (2010a).

a. Potential Trade Impact From the Importing Economy Perspective

Before turning to the results, I describe how to interpret the data presented in Figures 1 and 2. Each row presents information for one policy-imposing economy. The panels in the left column (Figures 1a and 2a) present information based on the 'count' of HS-06 products and thus minimal assumptions tying product coverage to trade impacts. The panels in the right column (Figures 1b and 2b) rely on a trade-weighted measure of time-varying coverage ratios by matching HS-06 products to import 'value' data. The series in panel a begins in 1990. The series in panel b covers TTB activity beginning in 1991, since the

FIGURE 1 *Continued*



Source: Calculated using Appendix equation (A1) (panel a) and equation (A2) (panel b) from data in the Temporary Trade Barriers Database (Bown, 2010a).

'value' approach requires import value data for $t - 1$, and my first year of available import data for most economies is only 1990.[10]

Each of the panels in Figures 1 and 2 presents four different pieces of information. First, the *grey solid* line defines the TTB indicator based on imported products affected by newly initiated *investigations* under *any* TTB policy and thus is a broad measure of the potential annual 'flow' of new barriers.[11] Second, the *grey dashed* line defines the indicator similarly, but it captures the

[10] See Appendix equation (A1) (for 'count' approach) and equation (A2) (for 'value' approach). There are exceptions for countries for which HS-06 import data are not available back until 1990; these countries are listed in the Appendix B.

[11] This series represents the *potential* new product coverage because not all resulting investigations necessarily result in the imposition of a new trade barrier. I use this definition given the results of Staiger and Wolak (1994) which noted how even the mere investigation can have real economic effects. Thus, the 'flow' level can be higher than the incremental addition to the 'stock' given that not all investigations will result in imposed barriers. For an example of this, see the 'count' measures for Brazil in Figure 2a and the years 1993 (investigations = 'flow') and 1994 (new barriers = 'stock' imposed one year later).

flow of potential imported products affected by the *antidumping* policy alone. For countries that only used antidumping and did not have any CVD, SG or CSG investigations during this period, the grey solid line and the grey dashed line overlap. Any divergence between these two lines represents the products subject to investigations under the countries' other (nonantidumping) TTB policies. Third, the *black solid* line defines the TTB indicator as taking on a value of 1 whenever the product (panel a) or product-trading partner combination (panel b) was subject to some TTB that had been imposed in that year or a prior year (and had not yet been removed); as such this measures the 'stock' of products subject to TTBs. Fourth, the *black dashed* line represents the stock of products subject to antidumping policy only.

(i) Developed Economy Imposers of TTBs

Begin with Figure 1, which illustrates the results for the main developed G20-economy users of TTBs. Consider the case of a policy-imposing country like the United States.[12] The consistency of the data on the use of TTBs with broad macroeconomic trends is visible in both Figure 1a, b; spikes in flows (and increases to stocks) take place in the 1990–91 recession, in response to the 1997–98 Asian crisis that saw surges in imports, and in the 2001–02 recession.[13] Over time, most of the products subject to a US TTB have been affected by (at least) the antidumping policy; the major exception is 2002–03 during which a large number of imported steel products were subject to a global safeguard and not antidumping. Between 1997 and 2007, the share of annual HS-06 US imported products subject to a TTB peaked at slightly more than 6 per cent, though the peaks took place in different years depending on whether the measurement is by *counts* of products (2003) or the trade-weighted *value* of imports (2001). This divergence between the stock series of products subject to all TTBs in Figure 1a versus Figure 1b implies that while the (net) count of HS-06 products subject to US-imposed TTBs increased between 2001 and 2003, the products for which the TTBs were being *removed* during 2001–03 were a much larger share of the value of overall US imports than the products for which new TTBs were being imposed.[14] Finally, it is worth noting

[12] The United States had been using these policies (antidumping in particular) prior to 1990. Since I am starting with barriers first imposed in 1990, there is an underlying stock of products affected by these policies that I am not capturing. (This is because of consistency of access to import classification under the HS which took hold across countries only in 1988.) This will also apply to Australia, Canada and the European Union who each had a substantial stock of antidumping barriers in place by the time the HS system started in 1988.

[13] This is consistent with other research linking antidumping use, in particular, with business cycle fluctuations such as changes in real GDP and currency movements. See Knetter and Prusa (2003).

[14] The share of imports for products that had been subject to a previous TTB that was being removed would be based on what the product's share of the US import market had been *prior* to the TTB first being imposed. See again the discussion of Appendix equation (A2).

that according to both measures, the share of imports subject to US TTBs is substantially lower in 2007 than it was during its peak between 1997 and 2007. Using the *value* approach in particular, 2.33 per cent of imports were covered in 2007 as compared to a 2001 peak of 6.14 per cent of imports. The timing of the decline starting from that peak roughly coincides with the period at which the Uruguay Round Sunset Review provisions were starting to take effect.[15]

Consider next some of the other developed economy imposers of TTBs illustrated in Figure 1. First, compared to the United States, each of the other developed economies generally has lower *levels* of stocks of imported products subject to TTBs during the sample period. The European Union has the second-highest annual stock of products covered by TTBs on average, and its use tracks the data for the United States in terms of broad macroeconomic trends in the stock of product coverage, and the decline in recent years of products subject to TTBs. Furthermore, most of the products subject to EU TTBs are affected by antidumping; similar to the United States, the major exception is 2002–03 during which a large number of steel products were subject to a global safeguard.

With respect to the other major developed economies, historical users of antidumping such as Australia and Canada have also experienced a downward trend in the share of their imported products subject to TTBs during this period, with the exception of 2008–09. South Korea is a relatively new user, though the stock of imported products subject to its TTBs has increased moderately over time. The least active TTB user amongst the set of G20 developed economies during this period is Japan. Japan had an extremely small number of its imported products (panel a) subject to TTBs; nevertheless, when trade-weighting at the HS-06 level, as in panel b, the 2006 imposition of CVDs against imported semiconductors from South Korea has covered a significantly larger fraction of imports.

The lower half of Table 1 summarises the stock information across the economies illustrated in Figure 1. The economies are ordered according to their *value* share measure of imports covered by the stock of TTBs in effect in 2009 (column 3). The table also reports data on the raw count of HS-06 products subject to TTBs in 2009, the *count* share measure for 2009, the annual average

[15] Under Article 18.3.2 of the Uruguay Round's Antidumping Agreement, for sunset purposes, an AD barrier imposed prior to 1995 was deemed to have been imposed on the date of entry into force of the Antidumping Agreement (1 January 1995). Thus, by the end of 1999, the United States had to initiate sunset reviews on all barriers imposed prior to 1995 that were still in effect in 1999. Presumably, a number of these reviews were completed during 2000–02, and when combined with the normal removal of barriers imposed after 1995, this led to sharper reductions in the 'stock' of products subject to antidumping in particular (especially using the 'value' measure) after 2000–02.

TABLE 1
G20 Economies' Annual Stock of Imports subject to TTBs, 1997–2009

G20 Economy Imposer (Ranked by Column 3)	*2009*			*1997–2007*			
	Count of HS-06 Products Subject to TTB (1)	*Import Share, by Count (2)*	*Import Share, by Value (3)*	*Average Annual Import Share, by Count (4)*	*Average Annual Import Share, by Value (5)*	*Minimum Annual Import Share, by Value (6)*	*Maximum Annual Import Share, by Value (7)*
Developing economies							
Turkey	273	5.31	3.05	1.92	2.02	1.32	3.35
India	308	6.09	2.94	2.34	1.97	1.27	2.85
Argentina	139	2.81	2.01	1.82	1.79	0.67	2.96
Brazil	78	1.53	1.73	1.01	1.52	0.66	2.09
China	46	0.87	1.71	0.75	1.70	0.00	4.49
Mexico	58	1.09	0.68	19.91	1.15	0.93	1.59
Indonesia	24	0.49	0.68	0.38	0.35	0.12	0.75
South Africa	40	0.76	0.25	0.96	0.42	0.32	0.54
High-income economies							
United States	256	4.72	2.33	5.11	4.58	2.33	6.14
European Union	137	2.50	1.59	2.62	2.69	2.38	3.37
Japan	3	0.06	1.06	0.02	0.21	0.00	1.05
Canada	69	1.27	0.64	1.71	1.10	0.52	1.57
Australia	31	0.60	0.40	0.32	0.18	0.11	0.45
South Korea	39	0.86	0.39	0.64	0.38	0.30	0.46

Notes:
(i) TTB = temporary trade barrier.
(ii) Columns (2) and (4) are computed using equation (A1) and columns (3), (5), (6) and (7) use equation (A2).

Source: compiled by the author from the Temporary Trade Barriers Database (Bown, 2010a), imports data from *Comtrade*.

for 1997–2007 of affected imports, and the minimum and maximum *value* share measures during that period.[16]

(ii) Developing Economy Imposers of TTBs

Figure 2 presents information in the same form as Figure 1 but with respect to the G20 *developing* countries. The broad pattern of developing economy-imposed TTBs over this time period is much different from the developed economy users.

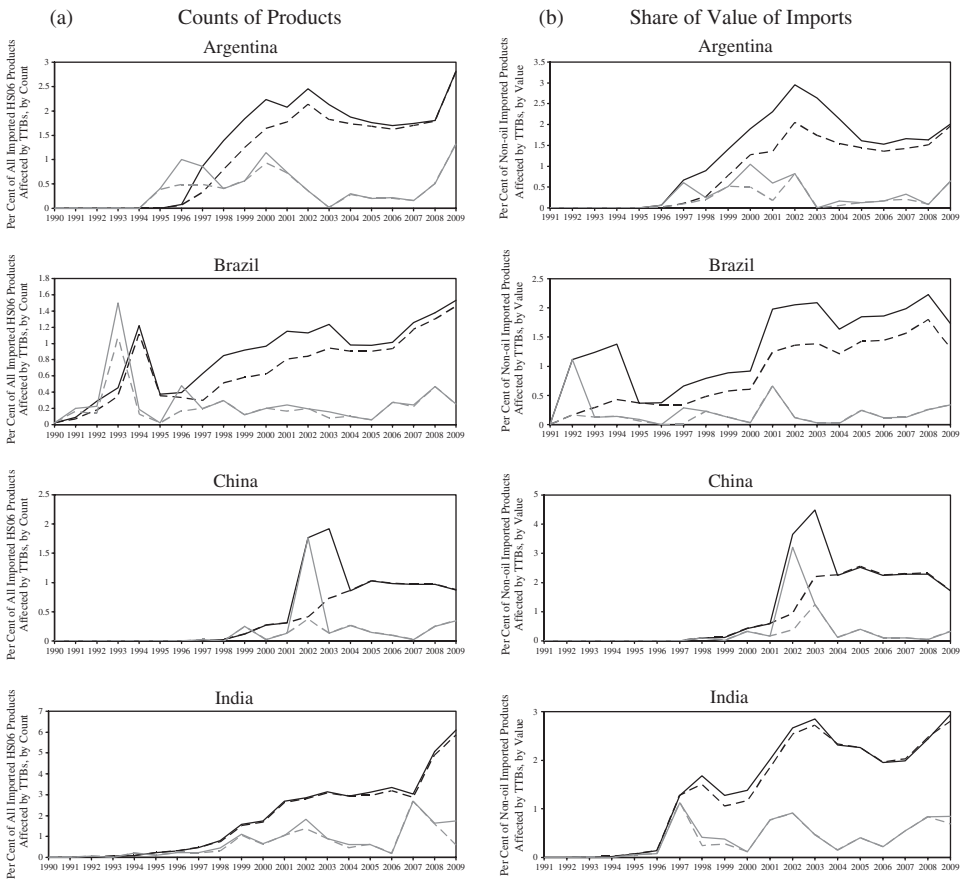
[16] To interpret the magnitude of the count of HS-06 products, note that there are slightly more than 5,000 HS-06 product categories in existence in any one year in the sample. While most of the developed economies and many of the developing economies had nonzero imports of close to 100 per cent of all products in all years, this is not universally the case. India, for example, began the 1990s by importing only around 68 per cent of all HS-06 product categories. By 2001, that share had increased to 90 per cent.

Consider first a major emerging market like India. In response to its balance of payments crisis of 1991–92, India entered a stand-by arrangement with the IMF in which one of the conditions was a substantial unilateral reduction of its applied import tariffs over 1992–97. According to widely-used measures that rely on counts of the number of newly initiated investigations or imposed barriers (thus without normalising for product coverage or the economic importance of imports), India has become the WTO system's most frequent user of policies like antidumping and the global safeguard. India first started using antidumping in 1992, but by 1997, it began to accumulate sizable stocks of products under TTBs (primarily antidumping) according to my two measures illustrated in Figure 2a, b. The stock of affected products continued to increase through the 2000s, and by 2009, India had a stock of TTBs in place that covered 6.09 per cent (2.94 per cent) of its imports according to the count (value) measure. And while India is now a user of each of the four TTB policy instruments – it has filed the most antidumping, global safeguard and China-specific safeguard investigations during this period, and it filed its first CVD investigation in 2009 – Figure 2 also illustrates that antidumping has been the instrument that has affected the majority of products impacted by India's total use of TTBs.

Other emerging economies such as Argentina, Brazil and Turkey have similar patterns to their data on TTB product coverage over time. For Argentina and Brazil, there is a general upward trend in the stock of imported products subject to TTBs after they undertook preferential (reciprocal) trade liberalisation embodied in the Mercosur agreement in the early 1990s. There are also upward spikes in flows (and stock accumulations) around 2000 that correspond to the Argentine financial crisis and currency devaluation. For these two countries, there is also evidence of economically sizable use of nonantidumping TTBs during the 1990s, most of which is the result of the global safeguard. Like Argentina and Brazil, Turkey experienced a similar increase in the stock of its products covered by TTBs after its formation and phasing in of a customs union (with the European Union) after 1995, as well as implementation of its Uruguay Round WTO commitments. Both of these actions constrained Turkey's ability to unilaterally change its applied import tariffs and may have shifted any political pressure to impose new trade barriers onto previously unused TTB policy instruments.

China began using TTBs with its first antidumping case in 1997. Figure 2 indicates a steady, but moderate increase in products covered by its use of AD beginning shortly thereafter. The break in the trend for China is 2002–03 when it, like the EU, followed the US lead and imposed a global safeguard over a large number of imported steel products. The result was a spike to 4.49 per cent of the stock of imports (by value) covered by TTBs in 2003. The trade-weighting in this case reflects a larger economic importance of these products

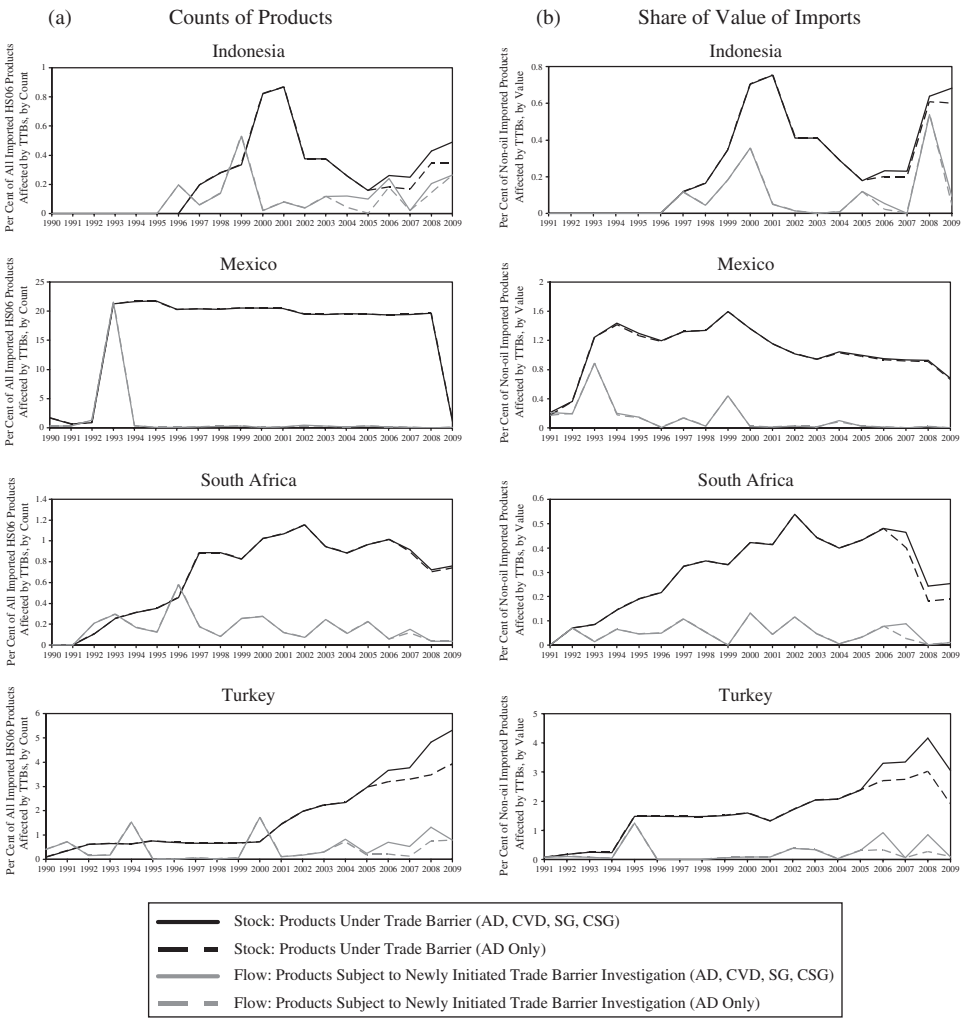
FIGURE 2
Developing (G20) Economy Use of Temporary Trade Barriers, 1990–2009



in China's overall imports than the count measure, which was 1.92 per cent of all imported products in 2003.

Finally, consider the case of Mexico in Figure 2. Mexico imposed antidumping barriers on imports from China covering more than 1000 HS-06 products (more than 21 per cent of Mexico's imported products, see Figure 2a) in 1993 at duties that reached as high as 533 per cent, and these TTBs remained in place until they were finally removed in October 2008. However, because Mexico imposed such barriers *prophylactically* – i.e., 700 different HS-06 products with AD imposed in 1993 had *zero* imports from China in 1992 – cumulatively, the 1000 HS-06 product imports from China covered less than 0.8 per cent of Mexico's imports in 1992 (Figure 2b). Despite Mexico's AD being imposed on what would become some of China's major export product lines to the *world* by the late 1990s (e.g. textiles, clothing, footwear, toys, bicycles, electronics and

FIGURE 2 *Continued*



Source: Calculated using Appendix equation (A1) (panel a) and equation (A2) (panel b) from data in the Temporary Trade Barriers Database (Bown, 2010a).

chemicals), in this instance, the approach of trade-weighting the 1993 TTBs with 1992 import data tends to underemphasise the amount of Mexican trade likely to be affected over time (Figure 2b) relative to the *counts* approach.[17]

[17] Mexico's use of antidumping against China in this instance was likely in anticipation of China's ultimate accession to the WTO (negotiations that began under the GATT in 1987) for which China's exporters would ultimately receive most-favoured nation treatment under Mexico's tariff schedule; see also de la Torre and Gonzalez (2005).

As such, the Mexican example is excellent motivation for my choice to report both the *count* measure and the *value* measure, as they complement each other and thus can provide a more complete and accurate assessment of the economic importance of an economy's TTB use. As the Mexican case reveals, the count measure may be particularly important in my context of studying many developing economy users of TTBs, some of which may follow a strategy similar to Mexico and implement the TTBs prophylactically and before the arrival of substantial imports of particular Chinese products. This is a possibility given that that each of the policy-imposing economies that I analyse heavily target imports from China, as I confirm in the data discussed in Section 4 below.

Finally, note again that the top half of Table 1 summarises the data on the developing economy users of TTBs presented in Figure 2.

b. Policy Volatility and Uncertainty

Thus far, my discussion of Figures 1 and 2 has focused primarily on each policy-imposing economy's 'stock' measures of annual products subject to TTBs. Nevertheless, each of the figures also presents information on the annual 'flow' of all TTBs (*grey solid* line) and antidumping alone (*grey dashed* line), as defined annually by products subject to newly initiated investigations. Table 2 summarises the 'flow' information from Figures 1 and 2 for each of these economies.

Table 2, column (1), documents (and orders policy-imposing economies by) the cumulative share of all HS-06 import products that the economy subjected to at least one TTB investigation over 1990–2009. The first country on the list is Mexico at 21.79 per cent, which is not surprising given my discussion of Mexico's antidumping against imports from China covering 1993–2008 (Figure 2a). Also not surprising for Mexico are columns (5) and (6), which show the annual average flow of products subject to new investigations during 1997–2007 as close to zero. There was little underlying demand in the Mexican economy for more TTBs each year given that such a large share of Mexico's imported products were already subject to a TTB during the entire period. On the other hand, consider an economy like India (8.62 per cent) with a smaller (although still sizable) cumulative share of total imported products that it had subjected to at least one TTB over the period. India had an average of 0.94 (0.50) per cent of imported products by count (value) being subject to new TTB investigations each year during 1997–2007. Its flow measure was much higher than Mexico because India built up its stock more slowly. India is not alone as other economies like the United States, EU, Turkey and Argentina each had flow measures that (by count) averaged more than 0.40 per cent of imported products per year during 1997–2007.

TABLE 2
Cumulative TTB Policy Coverage Over Time and Policy Volatility, 1990–2009

G20 Economy Imposer (Ranked by Column 1)	*1990–2009*		*2009*		*1997–2007*			
	Cumulative Share of Imported Products Ever Subject to a TTB, by Count (1)	*Share of TTB-Subjected Products Affected by AD, by Count (2)*	*Annual Flow of Import Share, by Count (3)*	*Annual Flow of Import Share, by Value (4)*	*Average Annual Flow of Import Share, by Count (5)*	*Average Annual Flow of Import Share, by Value (6)*	*Minimum Annual Flow of Import Share, by Value (7)*	*Maximum Annual Flow of Import Share, by Value (8)*
Developing economies								
Mexico	21.79	100.00	0.06	0.00	0.20	0.07	0.00	0.44
India	8.62	89.42	1.74	0.85	0.94	0.50	0.11	1.13
Turkey	6.63	71.95	0.80	0.09	0.43	0.21	0.00	0.92
Argentina	4.94	90.59	1.32	0.65	0.45	0.42	0.00	1.05
Brazil	3.80	80.09	0.26	0.34	0.19	0.18	0.02	0.66
China	2.74	59.75	0.34	0.32	0.26	0.52	0.00	3.21
South Africa	2.34	100.00	0.04	0.01	0.16	0.06	0.00	0.13
Indonesia	1.31	77.63	0.27	0.09	0.13	0.09	0.00	0.36
High-income economies								
United States	13.37	84.94	0.63	0.50	1.01	0.92	0.02	4.53
European Union	9.62	87.30	0.33	0.33	0.63	0.37	0.04	0.81
Canada	3.70	98.60	0.37	0.28	0.29	0.15	0.01	0.43
Australia	3.24	98.40	0.27	0.19	0.19	0.02	0.00	0.08
South Korea	2.44	89.44	0.00	0.01	0.20	0.07	0.00	0.15
Japan	0.09	0.00	0.00	0.02	0.01	0.11	0.00	1.05

Notes:
(i) TTB = temporary trade barrier.
(ii) Columns (1), (2), (3) and (5) are computed using Appendix equation (A1) and columns (4), (6), (7) and (8) use equation (A2).

Source: compiled by the author from the Temporary Trade Barriers Database (Bown, 2010a), imports data from *Comtrade*.

Combined, these results suggest that a number of major economies in the WTO system may create substantial trade policy uncertainty for foreign exporters through the way they use TTBs. While applied tariffs are quite low in this period, many exporters experienced the possibility of a trade policy adjustment by being subject to a TTB investigation which had a reasonable chance of resulting in imposition of a new trade barrier.

Finally, consider the Table 2 data that examine flow information on potential new TTBs during the recent global economic crisis. Columns (3) and (4) present information from 2009 on the investigations initiated in response to domestic industry petitions for new import protection. In 2009, 0.63 per cent (0.50 per cent) of US imports by count (value) were subject to a new TTB investigation. These data are somewhat surprising given the historical context; at the time, there was a substantial fear that new import protection would result from the deep recession. Injured industries and high levels of unemployment could result in firms and labour unions placing demands for new barriers. However, the US figures for 2009 are well below the average annual share of imported products subject to new US TTB investigations during 1997–2007, which is 1.01 per cent (0.92 per cent) by count (value). This pattern is similar for the EU, South Korea, Japan and South Africa – economies that all registered smaller flow measures (new investigations) in 2009 than their 1997–2007 annual (precrisis) averages. On the other hand, India (1.74 per cent of imports, by count), Argentina (1.32 per cent) and Turkey (0.80 per cent) are countries with the opposite result; each had substantially higher 2009 flows than their 1997–2007 averages. I describe these and other notable 2008–09 crisis trends in the data in more detail in Section 3.

c. Policy Coverage and Focus on Antidumping

Before turning to a more detailed discussion of the 2008–09 crisis, I point to one last feature of Table 2. Column (2) presents information on the extent to which each of the G20 economies was particularly reliant on antidumping, relative to its total cumulation of products that were affected by at least one TTB during 1990–2009.

For economies like Mexico, South Africa, Australia and Canada, antidumping alone covered more than 98 per cent of the products that they subjected to a TTB during this period. And while some countries may use multiple policies simultaneously – e.g. antidumping and a CVD against the same product from the same foreign export source at the same time, an issue to which I return to in Section 5 below – this affects the size of the trade barrier imposed (e.g. the height of the new tariff), not the scope of import product coverage affected by TTBs.

On the other hand, there are some economies for which a singular focus on antidumping misses much of the product coverage associated with TTB use during 1990–2009. Both the United States and EU, for example, had more than 10 per cent of the products subject to some TTB policy during this period that was not antidumping. For China, it was over 40 per cent of all TTB-affected products. For these three economies, I have already discussed the main cause of this in the context of Figures 1 and 2; i.e., 2002–03 when these economies imposed global safeguards on a number of imported steel products. Nevertheless, other economies like Argentina, Brazil, Indonesia and Turkey that were not part of the 2002–03 steel safeguard-imposing group also have sizable shares (10–30 per cent) of TTB-affected products impacted from some policy *other than* antidumping. Despite India being the most frequent user of antidumping, because it is also a frequent user of safeguards and the China-specific safeguard, over 10 per cent of its TTB-affected products were impacted by some policy other than antidumping.

3. THE GLOBAL ECONOMIC CRISIS OF 2008–09

The global recession of 2008–09 served as a 'stress test' to the institutional structure of the multilateral trading system. Previous to the crisis, countries had lowered their applied tariffs but established a set of provisions under the WTO which granted themselves policy flexibility through resort to TTBs in the case of unforeseen events. An evolving consensus is that the response of the WTO system was positive; WTO members withstood the severe storm of uncertainty and economic trauma of the global crisis at least in the short term. Despite domestic economies going into recession, injured domestic industries, high rates of unemployment and political pressure for new import protection, there was not a major retreat towards raising applied tariffs, especially in ways that countries might have adopted in violation of their WTO commitments (Kee et al., 2010). Nevertheless, to the extent that these economies did respond with new policy initiatives, they turned to either the TTB policies that are my focus, to stimulus packages and bailouts (issues to which I return to in Section 5), or to some other nontariff barriers.

The last section began to describe some of the TTB policymaking during the crisis, illustrating heterogeneity across which countries experienced higher flows of imported products subject to new TTB investigations. One question is whether the countries with small flows also had relatively high *precrisis* stocks of products covered by previously imposed TTBs. For a number of the major developed economies in Figure 1, I can quickly rule out this explanation. Their precrisis trends had resulted in relatively low shares of imported products subject to the stock of TTBs in place prior to the crisis in 2007.

Consider Figure 3, which illustrates the data cumulated across G20 policy-imposing economies on the *combined* stocks of imported products subject to TTBs over 1997–2009, using the *count* method of measurement.[18] Figure 3a illustrates that, by the end of 2009, the G20 economies had increased the stock of imported products they subjected to imposed TTBs by 25.42 per cent relative to precrisis levels of 2007 (*black solid* line). By 2009, 2.15 per cent of HS-06 products that the G20 economies imported were now subject to a TTB, having increased from 1.88 per cent of imported products prior to the crisis in 2007. And for all the media attention focused on other policies, such as the China-specific transitional safeguard (used by the United States over imports of tires in September 2009), the vast majority of the increase in TTB product coverage came through antidumping (*black dashed* line).

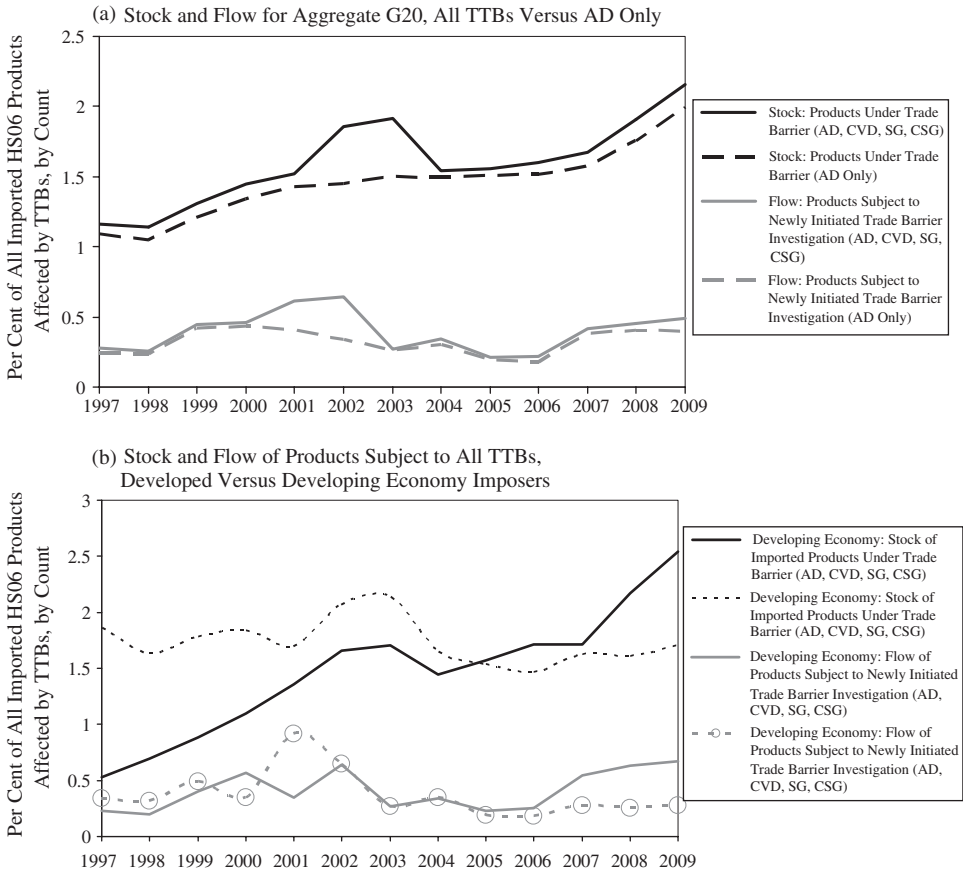
Figure 3b further decomposes the black and grey lines of Figure 3a – i.e., the stock and flow series based on all TTBs – into whether the policy-imposing economy was a developed or developing G20 member. The result shows that the main *source* of the overall increase in the stock of product coverage during the 2008–09 crisis was new TTBs imposed by *developing* economies, which combined to have 40 per cent more products subject to a TTB in 2009 (2.55 per cent of their imported HS-06 products) than before the crisis in 2007 (1.71 per cent of their imported HS-06 products). On the other hand, developed economies combined to have only 5 per cent more products subject to a TTB in 2009 (1.71 per cent of their imported HS-06 products) than before the crisis in 2007 (1.63 per cent of their imported HS-06 products).

The second important point coming out of Figure 3b is that it is difficult to rule out visually that the relative changes in the data between 2007 and 2009 are not simply part of a longer-term trend in TTB use and thus are *unrelated* to the crisis. Put differently, it will be difficult to conclude that the 40 per cent increase in developing economy product coverage subject to TTBs was *caused by* the crisis. Because of the precrisis upward trend for developing economy users, the 40 per cent increase may have taken place even under more 'normal' macroeconomic conditions had the 2008–09 crisis not occurred.

I address this question more closely in Table 3. In addition to summarising Figure 3, Table 3 also provides a breakdown, by policy-imposing G20 economy, of the percentage change in the stock of product coverage of TTBs between 2007 and 2009 using both the counts [column (1)] and values [column (4)] methods. The economies are ordered in the table by which had the largest percentage change in TTB product coverage between 2007 and 2009 using the *count* method. Three major emerging economies – India, Indonesia and Argentina – lead the list with the largest increases in the stocks of products

[18] For reasons described above, Mexico is the only major G20 user of such policies not included in Figure 3 (see again Figure 2a).

FIGURE 3
Combined G20* Use of Temporary Trade Barriers, 1997–2009



Notes:
The data are aggregated over the following thirteen G20 policy-imposing economies: Argentina, Australia, Brazil, Canada, China, the European Union, India, Indonesia, Japan, South Africa, South Korea, Turkey and the United States. Mexico is the only major G20 user of such policies not included in construction of the data for the figures, for reasons explained in the text (see also Figure 2).

Source: Calculated using a modified version of Appendix equation (A1) from data in the Temporary Trade Barriers Database (Bown, 2010a).

covered by TTBs during this period, again reflecting the information presented in Figure 2.

The main piece of new data presented in Table 3 are economy-by-economy *forecasts* of the 2009 level of TTB coverage based on predictions from the historical data. Motivated by Figure 3b, the thought experiment is simply to regress the 1997–2007 import share data on a linear time trend, use the estimated coefficient from the regression to *predict* the (out of sample) import share for 2009 and then to compare the prediction for 2009 with the realised

TABLE 3
The Crisis: Predicted vs. Realised G20 Economies' Stocks of Imposed Temporary Trade Barriers in 2009

G20 Economy Imposer (Ranked by Column 1)	*Per cent Change in 2009 Import Share Relative to Precrisis 2007 Level, by Count (1)*	*2009 Import Share, by Count (2)*	*Predicted 2009 Import Share, by Count (3)*	*Per cent Change in 2009 Import Share Relative to Precrisis 2007 Level, by Value (4)*	*2009 Import Share, by Value (5)*	*Predicted 2009 Import Share, by Value (6)*
Total	25.42	**2.15**	1.88	–	–	–
Developing economy total	39.75	**2.55**	2.14	–	–	–
India	69.69	**6.09**	4.28	39.14	**2.94**	2.62
Indonesia	67.25	**0.49**	0.26	108.69	**0.68**	0.29
Argentina	48.01	**2.81**	2.12	18.66	2.01	2.36
Turkey	34.39	**5.31**	4.36	−9.25	3.05	3.35
Brazil	20.03	**1.53**	1.27	−13.57	1.73	2.49
China	−10.03	0.87	1.65	−28.75	1.71	3.91
South Africa	−18.54	0.76	1.00	−60.57	0.25	0.51
Mexico	−287.94	1.09	18.98	−31.81	0.68	0.76
High-income economy total	4.90	**1.71**	1.60	–	–	–
Japan	40.68	**0.06**	0.02	0.44	**1.06**	0.79
Australia	39.64	**0.60**	0.33	69.17	**0.40**	0.12
Canada	15.68	**1.27**	1.19	21.04	**0.64**	0.59
United States	10.17	**4.72**	4.63	0.11	**2.33**	1.80
European Union	−4.98	**2.50**	2.37	−58.04	1.59	2.66
South Korea	−36.39	0.86	0.92	−14.33	0.39	0.45

Notes:
(i) Column (2) is computed using Appendix equation (A1) and column (5) uses equation (A2).
(ii) Predictions for 2009 in columns (3) and (6) are generated from the coefficients resulting from a regression of 1997–2007 annual import share measures that use the 'count' and 'value' approaches, respectively, on a linear time trend. Bold denotes all realisations of the 2009 import share data that were larger than the 2009 predicted import share stemming from the simple linear regression model.

Source: Compiled by the author from the Temporary Trade Barriers Database (Bown, 2010a), imports data from *Comtrade*. Column (2) is computed using equation (A1) and column (5) uses equation (A2). Predictions for 2009 in columns (3) and (6) are generated from the coefficients resulting from a regression of 1997–2007 annual import share measures that use the 'count' and 'value' approaches, respectively, on a linear time trend.

data for 2009. I report in column (3) the prediction that uses the *count* measure, and I report in column (6) the prediction that uses the *value* measure.

Table 3 comparison of column (2) with (3) and column (5) with (6) makes it difficult to conclude that the change in product coverage taking place between 2007 and 2009 is a substantial deviation from historical trends. First note that in columns (2) and (5), I make bold all realisations of the 2009 import share data that were *larger*

than the 2009 predicted import share stemming from the simple linear regression model. According to the *count* measure, 10 economies (five developing and five developed) had a larger share of 2009 imports become subject to TTBs than was predicted from the models. Only four economies (China, South Africa, Mexico and South Korea) had less product coverage by 2009 than was predicted. On the other hand, using the *value* measure and comparing column (5) with (6) gives different results; only six economies (two developing and four developed) had a higher-than-predicted share of imports become subject to TTBs by 2009. While these economies (India, Indonesia, Australia, Canada, US, Japan) did experience increases in the share of imported products subject to TTBs during the economic crisis [see column (4)], the simple linear time trend model predicted this. Therefore, it is only the small *difference* between the realised 2009 data and the 2009 forecast that is the unpredicted piece of new import protection that one could associate with being related to the crisis. According to column (6), Argentina actually experienced a smaller increase in imports covered by TTBs in 2009 than the time trend model predicts– i.e., not controlling for any of the sizable macroeconomic changes during the recession which would make conditions even more likely for an increase in TTBs. Turkey's *value* measure fell slightly (−9.25 per cent) in 2009 compared to 2007 according to column (4), despite the model predicting a slight increase from the 2007 realised value.[19]

Thus, while there was an increase in import protection during the crisis – at least as measured by the stock of imported products subject to TTBs in 2009 being higher than in 2007 – my interpretation of the preliminary evidence is that it is difficult to support a claim that the increase was *caused by* the crisis, given underlying, precrisis trends already apparent in the data.

4. EXPORTERS AND FOREIGN USE OF ANTIDUMPING

In this section, I switch focus to the *incidence* of TTB policies, and I ultimately take the perspective of the exporters directly and negatively impacted by imposed TTBs. Furthermore, in this section, I restrict my attention to the antidumping policy instrument.

I structure this section in two parts.[20] In the first subsection, I examine the use of antidumping from the perspective of each G20 policy-imposing economy

[19] The substantial difference between the realised import shares for Turkey in 2009 based on the count versus value measures merits an explanation. While Turkey increased (on net) the number of HS-06 products subject to TTBs in 2009 relative to 2007, the particular HS-06 products for which Turkey removed TTBs during this period were such a large share of imports that the value measure declined slightly. The products were associated with Turkey's removal of antidumping barriers on sizable imports of steel billets from Russia, Ukraine and Moldova that had been in effect since 1995.

[20] In this section of the paper, and for reasons described above (see again Figure 2a), Mexico is the only major G20 user of such policies not included in the construction of data behind Figures 4–7 and Table 5.

to identify trends and potential heterogeneity in the application of the policy across different categories of foreign export targets. In the second subsection, I re-orient the analysis to the perspective of the exporters themselves. This allows me to examine the frequency with which their exported products are targeted by foreign use of antidumping over time.

a. Foreign Targets and Developed Versus Developing Economy Users of Antidumping

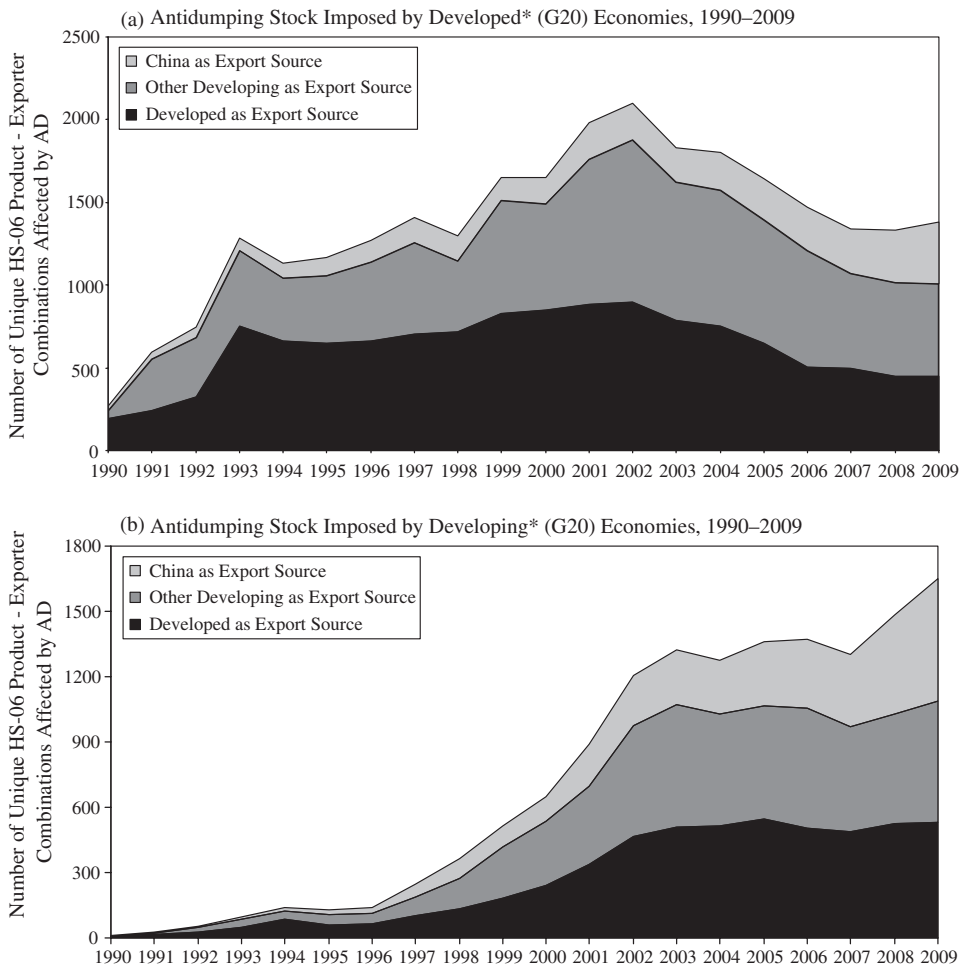
Figure 4 presents cumulative annual G20 stocks of 'count' of the *combination* of HS-06 products and foreign trading partners affected by imposed antidumping barriers over time.[21] Here, the figure splits the analysis into two groups of policy-imposing economies – Figure 4a is the developed economy members of the G20, and Figure 4b is the developing economy members. Each panel's stock of product-trading partner combinations subject to antidumping is subsequently decomposed into three categories of exporting economy targets: China, other developing economies (non-China), and developed economies.

The cumulative stock of product-trading partner combinations subject to antidumping (illustrated in Figure 4) tracks the time trends of Figure 3b (which includes TTB-affected products, but did not count affected trading partners) quite closely. Developed economy users of antidumping have seen their cumulative stock affected by antidumping fall over time, and the level by 2009 is well below the within-period peak of the previous 15 years, which took place around 2002–03.[22] On the other hand, as of 2009, the developing economy users of antidumping are still adding to their stocks of product-trading partner combinations subject to antidumping.

[21] Construction of Figure 4 uses a modified version of Appendix equation (A1). Instead of examining counts of HS-06 products normalised by the set of the economy's total imported HS-06 products, I construct the measure by using counts of *combinations* of HS-06 products and foreign trading partners. Furthermore, I report the measure as a simple count and not as a share of (say) the economy's entire set of HS-06 imported product and foreign trading partner combinations. Specifically, whereas one HS-06 product would be counted once in equation (A1) regardless of how many trading partners were simultaneously subject to an antidumping barrier over that product, this measure adjusts for the number of trading partners subject to the barrier. For example, the AD on one HS-06 product imposed on three trading partners would receive an entry of three in the count measure used in Figure 4.

[22] As I hint at elsewhere in the paper, this is a combination of two factors. First, there are fewer HS-06 products covered by the stock of imposed AD in 2009 than in earlier years. Second, the newest imposed AD on any given HS-06 product is more likely to be imposed on one foreign export source (e.g. China) than in the past, and especially with respect to the products being removed from the previous year's stock after Sunset Reviews. Antidumping imposed over a 6-digit HS product in the 1990s or early 2000s (and thus the products for which AD is being removed in the mid-to-late 2000s) was more likely to have been imposed against *multiple* foreign sources. Bown (2010c) documents how the rate at which a single country (e.g. China) is named in AD cases has risen over time.

FIGURE 4
Exporters Affected by G20 Use of Antidumping



Notes:
*The policies are separately aggregated over six developed G20 economy users (Australia, Canada, European Union, Japan, South Korea and United States) and seven developing G20 economy users (Argentina, Brazil, China, India, Indonesia, South Africa and Turkey). Mexico is the only major G20 user of such policies not included for reasons described in the text (see again Figure 2).

Source: Calculated using a modified version of Appendix equation (A1), in which I focus only on the numerator (dropping the denominator), using data in the Temporary Trade Barriers Database (Bown, 2010a). The figures illustrate the annual count of importing country-product-exporting country target combinations affected by the imposition of antidumping.

Consider next the decomposition of which trading partners are affected by each policy-imposing group's use of antidumping. For the developed economy stock of imports that remains affected by antidumping, over time, the incidence has increasingly shifted away from developed economy exporters and towards

China and other developing economy exporters. Specifically compare 1997 with 2009. In 1997, 50 per cent of the developed economy stock of AD was imposed against other developed economies, 11 per cent was imposed against China, and 39 per cent was imposed against other (non-China) developing economies. By 2009, developed economies imposed only 33 per cent of the stock of AD against each other (developed economies); by contrast, developed economies imposed 27 per cent against China and 41 per cent against other (non-China) developing economies. Table 4 summarises the implications of Figure 4, and it also presents this same data decomposition for each of the G20 policy-imposing economies individually.

For the developing economies, the changing pattern to the exporter incidence of antidumping is even stronger. By 2009, not only are developing economies still adding to their stocks of product-trading partner combinations targeted by antidumping, but also the incidence of this antidumping is increasingly concentrated on *other* developing economies' exports. Overall, 61 per cent of antidumping use by developing economies targeted other developing economies by 2002, and this grew to 68 per cent by 2009. There is also a trend within developing economies to increasingly focus their use of antidumping to specifically address imports from China: 34 per cent of their antidumping use by 2009 was against China, and this is notably higher than both *developed* economy use against China by 2009 (27 per cent) and what *developing* economy use against China was by 2002 (19 per cent). Table 4 also illustrates the substantial heterogeneity in the exporter incidence across the policy-imposing economies. In 2009, Turkey, Brazil and India each targeted China with 40 per cent or more of the stock of product – trading partner combinations that were affected by antidumping. The two notable exceptions to the trend in the increased concentration of antidumping targeting imports of China are Mexico (discussed above) and Japan (a relatively small user of the policy overall).

Finally, for all of the attention focused on the United States use of antidumping, it is worth pointing out that China was affected by *only* 21 per cent of the stock of product – trading partner combinations targeted by a US antidumping barrier by 2009. This is the *lowest* share of all of the developed economy G20 members users of antidumping. Nevertheless, this figure for the United States has increased from 8 per cent in 1997 and from only 10 per cent as late as 2002.

b. Antidumping From the Exporter's Perspective

While China and other developing economies are increasingly the target of the antidumping barriers that are in place, how important are such trade barriers from the perspective of their total exports? Given that China and a number of other emerging economies have exports that have expanded considerably under both

TABLE 4
The Shifting Incidence of G20 Economies' Annual Stock of Imports Subject to Antidumping

G20 Economy Imposer (Ranked by Column 1)	*2009*			*2002*			*1997*		
	Against China (1)	*Against Other Developing (2)*	*Against Developed (3)*	*Against China (4)*	*Against Other Developing (5)*	*Against Developed (6)*	*Against China (7)*	*Against Other Developing (8)*	*Against Developed (9)*
Developing economies[a]	34.10	33.62	32.28	19.19	42.28	38.54	24.10	34.54	41.37
Turkey	48.25	33.96	17.79	46.53	27.72	25.74	12.50	43.75	43.75
Brazil	46.08	26.47	27.45	17.50	40.00	42.50	23.81	38.10	38.10
India	39.76	21.88	38.37	16.58	34.18	49.23	25.64	25.64	48.72
South Africa	33.90	45.76	20.34	20.15	42.54	37.31	24.10	15.66	60.24
Argentina	21.93	55.56	22.51	6.83	64.16	29.01	50.00	27.27	22.73
Mexico	20.00	40.00	40.00	94.05	2.47	3.48	90.63	3.71	5.66
Indonesia	18.18	56.06	25.76	19.30	61.40	19.30	22.22	77.78	0.00
China	na	15.91	84.09	0.00	15.22	84.78	na	na	na
High-income economies	26.78	40.86	32.37	10.62	46.71	42.67	10.84	39.24	49.93
Australia	44.19	20.93	34.88	8.33	50.00	41.67	10.00	28.57	61.43
European Union	42.39	42.80	14.81	15.54	57.77	26.69	14.90	72.57	12.53
South Korea	29.33	29.33	41.33	21.74	17.39	60.87	20.00	8.57	71.43
Canada	26.50	44.02	29.49	9.65	51.54	38.81	8.15	17.39	74.46
Japan	25.00	25.00	50.00	na	na	na	100.00	0.00	0.00
United States	20.80	41.59	37.61	9.89	43.27	46.84	8.19	24.73	67.07

Note:
[a] Not including Mexico as a policy-imposing economy, for reasons described in the text (see again Figure 2).

Source: Compiled by the author from the Temporary Trade Barriers Database (Bown, 2010a) and computed using equation (A1).

the intensive margin (increased growth in volumes of existing products) and extensive margin (entry into new product markets), use of antidumping could be but a nuisance and perhaps a small price they are willing to pay for trading partners' willingness to accommodate their overall export expansion.

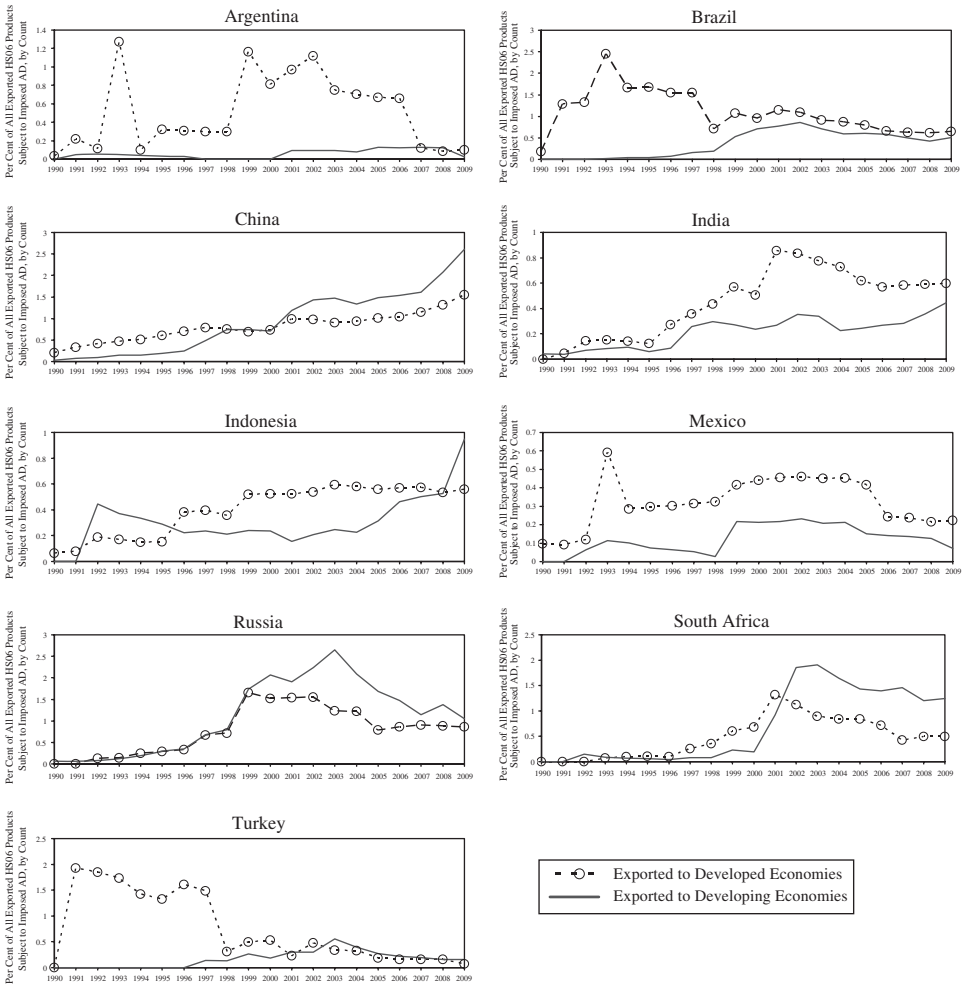
To begin to address these questions, I re-orient the analysis and consider the perspective of the exporting economies that send their products to these G20 import markets that have been my focus thus far. I structure my empirical analysis around a simple modification of the 'count' method defined explicitly in Appendix equation (A1). Now instead of constructing measures of how antidumping trade barriers affect the share of the stock of an importing economy's total set of imported products, I focus on the share of the exporting economy's stock of exported products sent to the G20 that are subsequently subject to foreign (G20) use of antidumping.

Begin with Figures 5 and 6, which present my first results that focus on the G20 developing economies from their perspectives as *exporters* concerned with the share of their stock of exported products subject to foreign-imposed antidumping barriers. Each panel in the figure provides two series of data derived from a modified version of the count measure. The black solid line starts with the total count of HS-06 exported products sent to the G20 *developing* economies (denominator) and reports the share of those products subject to a G20 developing economy-imposed antidumping barrier that year. The dashed line with circles starts with the total count of HS-06 exported products sent to the G20 *developed* economies (denominator) and reports the share of those products subject to a G20 developed economy-imposed antidumping barrier that year.

To interpret Figures 5 and 6, consider the case of China's exports. Just prior to China's WTO accession in 2000, China's exports faced antidumping at about the same rate, regardless of whether they were intended to developing or developed economy markets. Just under 1 per cent of its exports to developing economies and just under 1 per cent of its exports to developed economies were subject to antidumping barriers imposed by governments in those markets. Since the 2001 WTO accession, an increasing share of China's exported product categories have been targeted by foreign antidumping, though the rate of increase is much higher for its exports sent to developing economies. By 2009, 2.61 per cent of all Chinese HS-06 products exported to other *developing* economies were subject to a foreign antidumping barrier. The share of China's exports to developing economies that became subject to antidumping has nearly *tripled* in the 10 years since 2000. On the other hand, only 1.55 per cent of China's exported products to developed economies were subject to foreign antidumping by 2009.

It is also important to note that the rate at which China is increasingly being targeted with foreign antidumping is taking place despite China's continued export growth during this period, including its expansion into new markets. These are factors that would expectedly increase the *level* (number of

FIGURE 5
Developing (G20) Economy Exports and Foreign Antidumping, 1990–2009



Notes:
The figures illustrate the number of importing country-product combinations affected because of the use of antidumping aggregated over the following G20 economies: seven developing (Argentina, Brazil, China, India, Indonesia, South Africa and Turkey) and six developed (Australia, Canada, the European Union, Japan, South Korea and the United States). Mexico is the only major G20 user of such policies not included in construction of the data for the figures, for reasons explained in the text (see also Figure 2).

Source: Calculated using a modified version of Appendix equation (A1) with data in the Temporary Trade Barriers Database (Bown, 2010a).

instances) in which China is targeted with AD and is a measure that I report below in Table 5. China has not only seen an increase in the level of instances hit with foreign antidumping, but it has also seen a rapid increase in the *share* of its overall exported product count that is being affected over time.

TABLE 5
Exporters' Products Subject to Stock of G20*-Imposed Antidumping Barriers, 2009

Exporting Economy (Ranked by Column 1)	*Count of HS-06 Product – G20 Import Market Combinations Subject to AD (1)*	*Share of all Exported Products to Developing Economies, by Count (2)*	*Per cent Change in (2) Relative to Precrisis 2007 Level (3)*	*Share of All Exported Products to Developed Economies, by Count (4)*	*Per cent Change in (4) Relative to Precrisis 2007 Level (5)*
Developing economy exporters					
China	911	2.61	48.34	1.55	30.04
India	150	0.45	46.05	0.60	2.43
Thailand	137	0.76	56.91	0.36	−6.45
Indonesia	129	0.95	63.81	0.56	−2.04
Ukraine	107	1.25	−56.73	1.74	7.53
Brazil	107	0.51	3.14	0.65	4.41
Russia	97	1.05	−9.06	0.86	−5.63
South Africa	91	1.24	−15.77	0.50	15.03
Malaysia	68	0.58	6.13	0.08	−8.81
Vietnam	48	0.31	23.00	0.33	69.31
Kazakhstan	38	7.94	−22.14	0.66	−3.13
Mexico	31	0.07	−64.79	0.22	−6.24
Turkey	17	0.16	−16.39	0.07	−82.08
Argentina	6	0.03	−158.99	0.10	−18.57
Pakistan	5	0.00	0.00	0.09	−0.22
Other developing	59	0.10	−18.51	0.04	−6.87
High-income economy exporters					
South Korea	247	1.07	21.60	0.57	−7.26
European Union	222	0.43	−1.31	0.59	4.55
Taiwan, China	201	0.72	11.33	0.54	2.60
Japan	139	0.29	3.61	0.52	−9.51
United States	91	0.28	20.68	0.12	−33.39
Other high income	85	0.09	2.93	0.04	−23.60

Note:
(i) HS = harmonised system.
(ii) The table documents the number of importing country-product combinations affected because of the use of antidumping aggregated over the following G20 economies: seven developing (Argentina, Brazil, China, India, Indonesia, South Africa and Turkey) and six developed (Australia, Canada, the European Union, Japan, South Korea and the United States). Mexico is the only major G20 user of such policies not included in the computation of the data used to construct the table, for reasons described in the text (see again Figure 2).

Source: Calculated using a modified version of Appendix equation (A1) from data in the Temporary Trade Barriers Database (Bown, 2010a).

Turning away from China, Figure 5 also illustrates substantial heterogeneity across the developing economy exporters as to how frequently each is targeted with foreign antidumping over time. For some G20 countries like Argentina, Brazil, Mexico, Russia and Turkey, both the share of exports to developed

economies targeted by foreign antidumping as well as the overall incidence (the averages of the two series on each panel) have *fallen* dramatically. For other G20 economies like India, Indonesia and South Africa, there have been more recent *increases* to the share of overall exports that are being targeted by foreign antidumping. For these economies, most of this is driven by the antidumping imposed by other developing economy members of the G20. This is further evidence of the concern that antidumping is increasingly a 'South–South' phenomenon, and that developing economies face an increasing concern that TTB use erodes potential benefits through applied tariff cuts, binding of those tariffs and nondiscriminatory, most-favoured-nation (MFN) treatment embodied in the WTO.

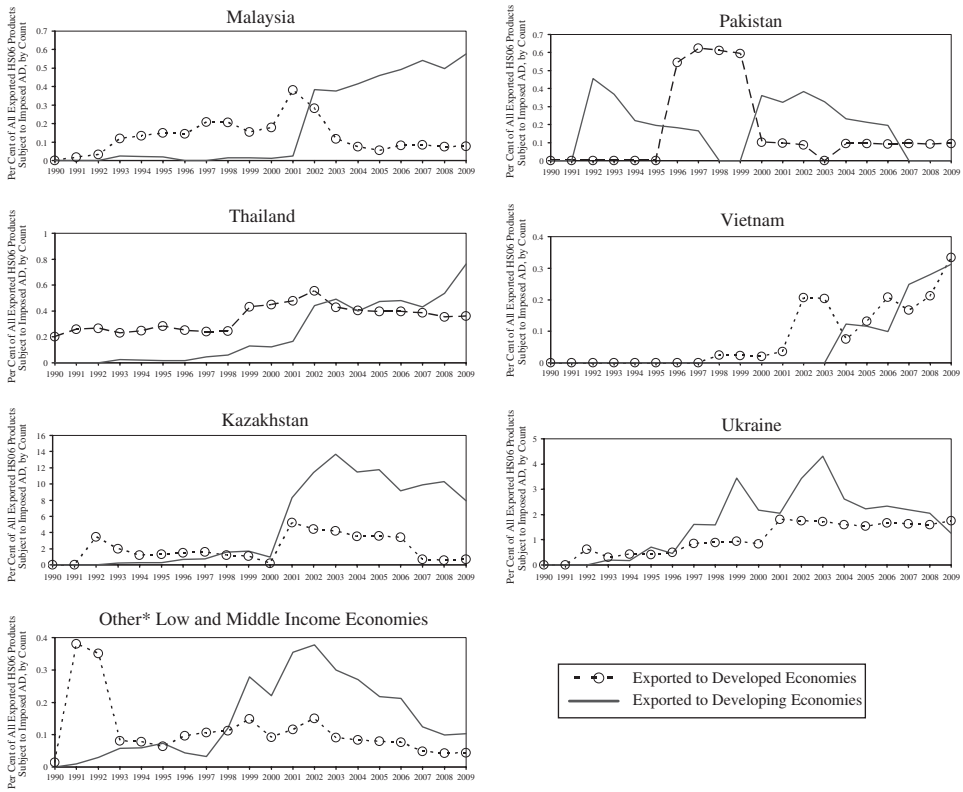
Figure 6 provides the same information for other developing economy exporters which are (or have been) considerable targets of G20 antidumping, but which themselves are not members of the G20. Economies like Malaysia, Thailand and Vietnam have seen considerable increases to the share of their exported products, especially to other developing economies, affected by antidumping. Economies like Kazakhstan and Ukraine are notable because there are years in which sizable shares of their exported products to developing economies are targeted by antidumping, heights reached more than 4 per cent for Ukraine and nearly 14 per cent for Kazakhstan. This is partially driven by the fact that these economies export few HS-06 products overall to other developing economies.

Figure 7 presents the same basic information contained in Figures 5 and 6 but from the perspective of the higher-income economies, a number of which were the major targets of antidumping in the 1980s and 1990s. Overall, each of these exporting economies has seen a reduced share of its exports to other *developed* economies being targeted by foreign antidumping. For the antidumping barriers that remain on high-income economy exports, they increasingly stem from the policies imposed by developing economies. Nevertheless, even for the major developed economy exporters, the share of their exports to developing countries that is targeted by foreign antidumping is much smaller than what confronts China, for example, as well as some other developing economy exporters.

Table 5 summarises and expands upon the results of Figures 5–7. First, note that the ordering of the exporting economies is by the count of product-trading partner combinations in which their exports were subject to a foreign antidumping barrier in 2009.[23] As already indicated, China's exports are first on the list, with nearly four times as many product-foreign market combinations being subject to antidumping in 2009 as the next most targeted group of economies (South Korea; EU; Taiwan, China). Two other features of the data that also separate China from these high-income economy exporters are that the *share* of China's exports to developing (column 2) *and* developed (column 4) economies

[23] Again to be clear, this is the stock of products subject to antidumping barriers in effect in 2009 and *not* only the barriers that were newly imposed in 2009.

FIGURE 6
Developing (non-G20) Economy Exports and Foreign Antidumping, 1990–2009



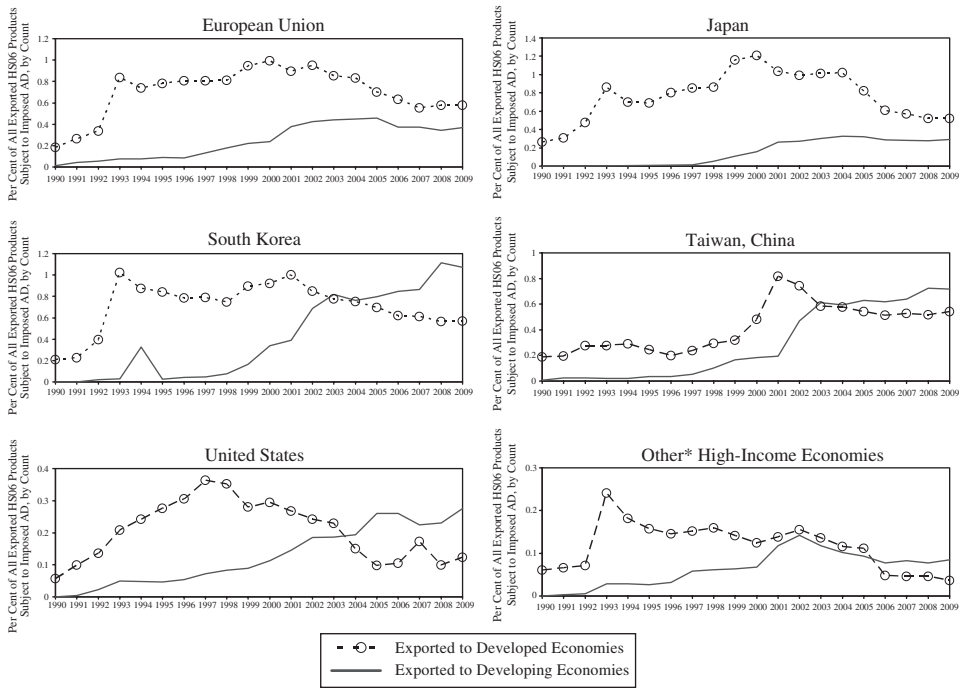
Note:
Other includes Albania, Algeria, Armenia, Azerbaijan, Bangladesh, Belarus, Bosnia and Herzegovina, Chile, Colombia, Cote d'Ivoire, Costa Rica, Cuba, Dominican Republic, Ecuador, Egypt, Georgia, Iran, Kyrgyz Republic, Macedonia, Malawi, Moldova, Nepal, Nigeria, Paraguay, Peru, Philippines, Sri Lanka, Uruguay and Venezuela.

Source: See source notes to Figure 5.

that is being targeted is much higher, and China faces a higher rate of growth at which the targeting of its exports has been increasing over time. While Figures 5–7 illustrate this over a longer time horizon, columns (3) and (5) report the growth (between 2007 and 2009) of the share of the exporting economy's exported products that are targeted by foreign antidumping, as imposed by developing and developed trading partners separately. For China, the share of exported products to developing countries subject to antidumping grew by 48 per cent between 2007 and 2009, and the share of exported products to developed countries subject to antidumping grew by 30 per cent.

Column (3) reveals that developing economy exporters such as India, Thailand, Indonesia and Vietnam share another common tie with China – i.e.,

FIGURE 7
Developed Economy Exports and Foreign Antidumping, 1990–2009



Note:
*Other includes Australia, Canada, Croatia, Hong Kong SAR, China; Israel, Kuwait, Macau SAR, China, Norway, Oman, Qatar, Saudi Arabia, Singapore, Trinidad and Tobago and United Arab Emirates.

Source: See source notes to Figure 5.

substantial growth in the share of their stock of exported products to *developing* economy trading partners becoming subject to TTBs during the crisis. China's increased coverage of 48 per cent between 2007 and 2009 was surpassed by the increases facing Thailand (57 per cent) and Indonesia (64 per cent) and followed by India (46 per cent) and Vietnam (23 per cent). South Korea (22 per cent) and the United States (21 per cent) also saw substantial increases in the share of their exported products to developing economies become subject to foreign antidumping during the crisis, though, in the case of the United States, it started from a much lower baseline share of affected exports in 2007 relative to most of these other economies.

5. COUNTERVAILING DUTIES AND SUBSIDIES BEFORE AND AFTER THE CRISIS

The rules governing the use of CVDs allow the imposition of new trade barriers to offset the allocation of foreign government subsidies to firms that

export products that subsequently injure import-competing industries in another market. Like the antidumping law, economists have questioned the implementation of CVD provisions into trade agreements like the WTO, as well as trade agreement rules limiting the national imposition of subsidies more broadly (Bagwell and Staiger, 2006; Ruta et al., 2009). Regardless of whether use of or rules governing CVDs are economically sensible, understanding the extent of CVD use is economically important.

Furthermore, a number of recent political-economic events coincided to increase the likelihood that CVD use is on an upward trend. First, the 2007 US reversal of its mid-1980s *Georgetown Steel* decision has resulted in a policy shift so that the United States now accepts domestic petitions to apply CVDs against imports from China. After more than 20 years of refusing to consider imposition of CVDs against imports from nonmarket economies, the change resulted in the United States applying duties on Chinese imports after 17 separate investigations between 2007 and 2009. Second, a number of other WTO member economies have also either recently implemented new CVD legislation thus expanding their TTB policy arsenal (India, China, Turkey), or they have joined the United States and also started to use CVDs against China after having previously declined to do so (Australia, Canada, European Union). Third, given that many economies are now willing to consider CVD use against China, the long-standing concern with the value of China's currency and that it can act as an implicit export subsidy may also fuel increased CVD use.[24] Fourth, when access to the China-specific transitional safeguard and China's nonmarket economy status under antidumping expires after 2013–14, countries will have less discretion with respect to how they use *other* TTB policies against China's exports which may push policymakers to use alternative TTB instruments like CVDs. Fifth, the 2008–09 crisis resulted in a number of WTO members bailing out sizable domestic industries; the Global Trade Alert (Evenett, 2009) documents dozens of such subsidies since November 2008. The Global Trade Alert lacks comparable data on bailouts and subsidy packages from *before* the crisis to assess whether the identification of 2008–09 subsidies is any more or less than previous use. Nevertheless, based on anecdotal evidence of the CVD response after earlier financial crises (e.g. multiple economies imposing CVDs on sizable imports of Korean semiconductors after the Korean bailout of Hynix during the Asian crisis), there may be cause to expect more CVD use after the 2008–09 crisis.[25]

[24] Staiger and Sykes (2010) provide a notable critique of the hypothesised link between China's exchange rate undervaluation and export subsidisation, and whether any such link could be addressed through CVDs.

[25] Indeed, China's first CVD case was against the United States over Grain-Oriented Electrical Steel (GOES), and it alleges injurious subsidies in 'Buy America' provisions associated with the 2009 US stimulus package.

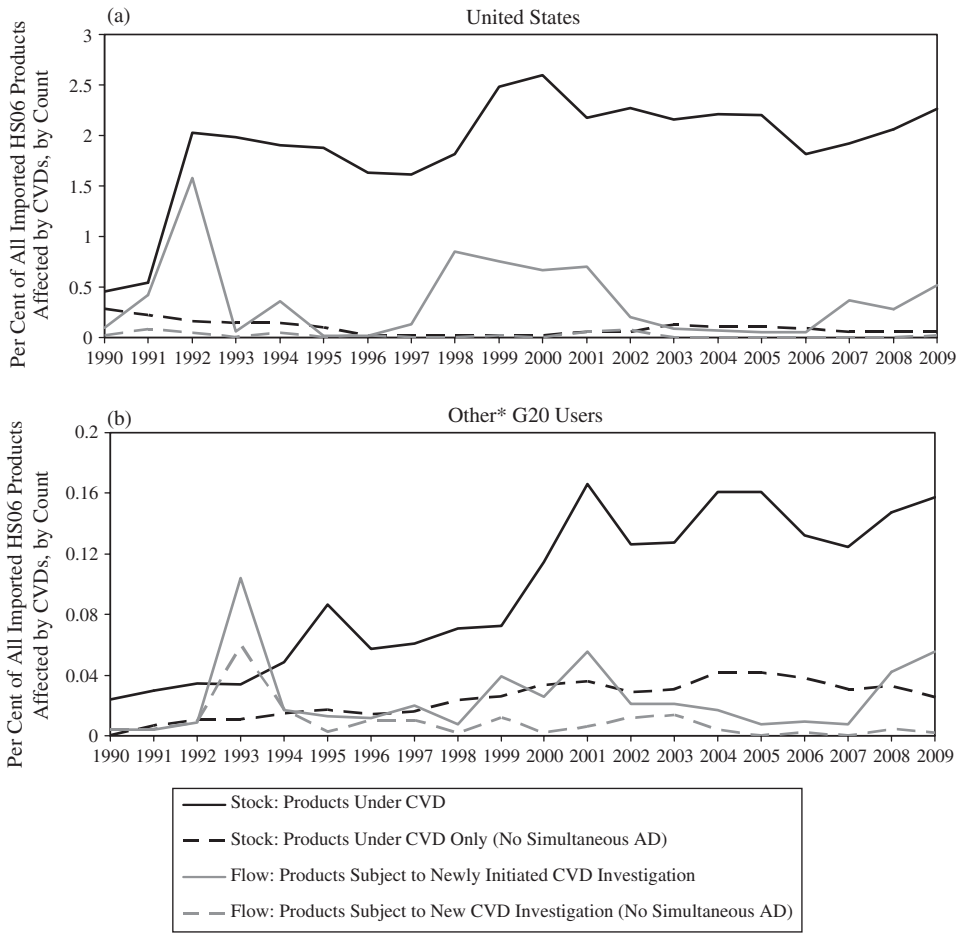
Figure 8a, b illustrate the use of CVDs over 1990–2009 by the United States and all other G20 policy-imposing economies, respectively. The figures adopt the 'count' measure of the share of imported products subject to the TTB (in this case the CVD) over time. However, I define the data series of interest differently from the earlier figures, based on my observation of how CVDs are being used in practice. In a number of economies, policymakers use CVDs *simultaneously* with antidumping. For example, the government initiates a simultaneous investigation under both its AD and CVD law of firms from the same foreign country over imports of the same HS-06 product, responding to a domestic industry's allegation that it has been injured by dumped imports that also received GATT/WTO-illegal foreign government subsidies. Figure 8a, b each present four pieces of information. In each panel of the figure, the *black solid* line represents the annual stock of products subject to a CVD. The *black dashed* line represents the annual stock of products subject to a CVD that are *not* also subject to a simultaneous antidumping action – i.e., where the CVD policy is not 'redundant' (in product-trading partner coverage, though not necessarily in terms of the size of the duty imposed, an issue I do not address here). Similarly, the *grey solid* and *grey dashed* lines reflect the annual *flow* of products subject to all CVD investigations and only those CVD investigations without simultaneous antidumping, respectively. There are two main sets of implications to draw from Figure 8.

First, CVDs have a larger scope of import product coverage in the United States relative to the other G20 policy-imposing economies. In 2009, more than 2 per cent of the stock of US imported HS06 products (by count) were subject to imposed CVDs, and this share has remained relatively constant since the 1990s (Figure 8a). The combined use of the other G20 economy users of CVDs is much smaller – even despite the recent (well-publicised) increase in policy activity, less than 0.2 per cent of these other G20 economies' HS-06 imported products in 2009 were subject to imposed CVDs (Figure 8b).[26]

Second, in both the United States and in the broader use amongst the other CVD-imposing economies in the G20, there is strong evidence of the simultaneous use of CVD alongside antidumping. It is relatively rare for a product to be subject to a CVD and not also be subject to antidumping. It is important to note, however, that the converse is not true; i.e., most use of antidumping by the economies in my sample of data is not accompanied by a simultaneous CVD.

[26] Furthermore, the United States has been and remains the dominant user of CVDs. While not shown in the figure, I can also confirm that the United States was responsible for roughly 50 per cent of the stock of entire HS-06 products that the G20 imported that were subject to CVDs during this period. The other G20 economies combined to contribute the other 50 per cent. The other G20 users of CVD (shown in the lower panel of Figure 8) are Argentina, Australia, Brazil, Canada, China, EU, India, Japan, Mexico and Turkey. According to the WTO, South Africa also has some use of CVDs, but I am unable to identify the HS-06 product codes associated with its use because of lack of publically available information.

FIGURE 8
G20 Use of Countervailing Duties (CVD) (with and without AD), 1990–2009



Notes:
*The data are aggregated over the following 10 other G20 economies: Argentina, Australia, Brazil, Canada, China, the European Union, India, Japan, Mexico and Turkey. The only major G20 user of CVDs not included in the figure is South Africa, for data availability reasons.

Source: Calculated using a modified version of equation (A1) from data in the Temporary Trade Barriers Database (Bown, 2010a). *The data are aggregated over the following 10 other G20 economies: Argentina, Australia, Brazil, Canada, China, the European Union, India, Japan, Mexico and Turkey. The only major G20 user of CVDs not included in the figure is South Africa, for data availability reasons.

6. CONCLUSIONS AND NEW DIRECTIONS FOR RESEARCH

This paper examines the evolving, cross-country use of temporary trade barriers (TTBs) – antidumping, safeguard and countervailing duty policies – during 1990–2009. I construct new measures of annual, product-level stocks

and flows of these TTBs with newly available data drawn from the World Bank's *Temporary Trade Barriers Database*.

I benchmark trends in historical use and establish a number of facts regarding use of the TTB policies to measure any changes in import protection taking place during the global economic crisis of 2008–09. I find that the 2008–09 economic shock mostly accentuates patterns already visible in the precrisis data. While the major G20 users of such policies combined to increase the stock of product lines subject to TTBs by 25 per cent during the crisis, most of this is the result of developing economies that combined to increase their stock of product coverage by 40 per cent. Perhaps surprisingly, high-income economies increased their stock of products affected by TTBs by only 5 per cent during the crisis.

Furthermore, these changes during the global economic crisis are consistent with precrisis trends in the data on TTB use. Developing countries have been increasing their use of TTBs prior to the crisis at such a rate that it is difficult to claim empirically that the 2008–09 crisis *caused* developing economies to increase their stock of TTBs above what the simple time trend would predict even in the absence of a major global recession. On the other hand, the United States and EU have reduced the stock of imported products they subject to TTBs by up to 50 per cent over the last 15 years, which is consistent with the crisis data, indicating a muted response to political calls for new TTBs.

Also significant are the trends in the data from the perspective of the exporting economies. By 2009, China had roughly four times as many products subject to foreign-imposed TTBs as the second most targeted economies. Furthermore, the share of China's exports to other *developing* economies is subject to much more foreign-imposed TTBs than its share of exports to developed economies, and it is also growing at a faster rate. My evidence confirms that this particular feature is not unique to China but is shared by a number of other major developing economy exporters, thus deepening the concern that such discriminatory trade barriers are increasingly a 'South–South' phenomenon.

Finally, I conclude by commenting on how the lack of a substantial increase in new import protection resulting from the 2008–09 crisis beyond that predicted from precrisis data raises important questions for research. If the world trading system does ultimately escape the 2008–09 crisis relatively unscathed with respect to new and extraordinary protectionist initiatives, an open and fundamentally important question is, why?

These facts on TTB use and nonuse during the 2008–09 crisis suggest many potential contributing causes that should form the basis for future research. One is that the WTO architecture was well constructed to handle the crisis; perhaps a system that permits TTB use allowed domestic political pressure for new

trade barriers to escape via a 'safety valve'. These relatively small (in product coverage terms) though nontrivial increases in import protection may have prevented emergence of greater market-closing forces. On the other hand, the lack of a major protectionist response may be unrelated to WTO rules; it could be a result of the political economy of trade policy changing in a way that actually makes the WTO redundant (Blanchard, 2010). With the proliferation of foreign direct investment and global supply chains, perhaps the traditional model of import-competing industries lobbying for protection is less important. Firms are not only import-competing, but they also rely on imports for components; they export, and thus they are substantially more exposed and invested in keeping markets open. Further still, perhaps preferential trade agreements (PTAs) dampened the incentive to impose new trade barriers. Policymakers may have known that with PTAs, the most accessible forms of new import protection might not even benefit domestic industries, but instead favour PTA partners through trade diversion. Finally, perhaps developed economies with resources to implement fiscal stimulus and industry bailouts used alternative (and arguably more efficient than trade policy) subsidy policies to address the political pressure that, in earlier eras, may have resulted in new trade barriers.

Finally, notwithstanding the insights generated by the crisis, the data on heterogeneity in TTB use across countries and over time combined with the current trading system of low average applied tariffs reveal the need for more research. What are the implications for the theory of trade agreements (Bagwell and Staiger, 2002) and the design of liberal trade 'exceptions' embodied in their rules? Furthermore, the data reveal exporter incidence of the imposed TTBs to be extensive *discriminatory* treatment, especially in the form of 'South–South' protection, and this raises a number of questions for the world trading system and the role of MFN treatment in particular (Ludema and Mayda, 2009). Perhaps at the forefront is the question of whether the resulting patterns of discriminatory protection embodied in TTBs enhance or reduce existing differences in tariff treatment that were caused by previously negotiated preferential trade agreements (Limão, 2006; Estevadeordal et al., 2008). Furthermore, there is also the causal question of whether the changing economic incentives induced by preferential trade agreements themselves change the scope of how TTBs are applied.

APPENDIX A: METHODOLOGY

My first methodological approach takes an importing economy's set of HS-06 products as the unit of observation and builds from Bown and Tovar (2011, Figure 1). More formally, let k be the policy-imposing (importing) economy and

let $m_{i,t}^k \in \{0,1\}$ be an indicator for whether the economy had nonzero imports of product i in year t. The HS-06 product i is in the economy's time-varying set of HS-06 products with nonzero imports, defined as I_t^k. Next, let $b_{i,t}^k \in \{0,1\}$ be an indicator for whether the importing economy k 'applies' a TTB on imports of product i in year t. Thus, I define my first 'count' measure of the share of annual stock of economy k imported products subject to a TTB as

$$\frac{\sum_{I_t^k} b_{i,t}^k m_{i,t}^k}{\sum_{I_t^k} m_{i,t}^k}. \tag{A1}$$

I rely on a variety of definitions for the TTB indicator $b_{i,t}^k$. I may define it as an indicator of the initiation of a TTB *investigation* of product i in year t; alternatively, I may define $b_{i,t}^k$ as the actual application of a barrier (e.g. import duty, quantitative restriction, price undertaking) imposed over product i in year t. Note that when referring to applied barriers, I take the year of imposition as the first year that the barrier was imposed, even if it was only a preliminary barrier and even if that preliminary barrier was subsequently removed after completion of the full investigation. The application of even preliminary barriers can affect trade both directly (raising costs to exporters) and indirectly (increasing uncertainty about future policy).

My second approach refines equation (A1) by replacing the binary indicator variable for imports, $m_{i,t}^k$ with product-level, value of import data and thus *trade-weighting* the $b_{i,t}^k$ indicator by the HS-06 product-level value of imports, $v_{i,j,t}^k$. While I build from equation (A1), I adapt the approach in two ways.

First, I can now redefine my product-specific, time-varying TTB indicator to now be at the *bilateral* level: let $b_{i,j,t}^k \in \{0,1\}$ be an indicator for whether a TTB applies to the economy k imports of product i from exporter j in year t. This modification allows me to address the possibility of heterogeneity across foreign sources in terms of which trading partners are negatively affected by the TTB and which are not.

The second adaptation requires a slightly more detailed explanation. To ultimately create coverage ratios that are comparable within a country *over time*, I must make an assumption on the counterfactual level of economy k imports in t (as well as $t + 1$, etc.) from a supplier j whose exports had been subject to a TTB imposed in an earlier year (e.g. $t - 1$, $t - 2$, etc.) and thus which did not grow at a 'normal' rate in later years (e.g. t, $t + 1$, etc.). To determine the counterfactual level of imports for such products, I make the simple and conservative assumption that, beginning in year t, yearly imports of TTB-impacted products would have grown *at the same rate* as the economy's

non-TTB-impacted products.[27] To make this clear, I decompose the set of economy k imported products I^k into two subsets. Define the first subset as $\hat{I}^k$ and allow it to contain those HS-06 products i subject to a TTB imposed during the sample and for which I need to construct *counterfactual* import values, defined as $\hat{v}^k_{i,j,t}$, for all years that the TTB is in effect. I define the second subset of products as I^{*k} and allow it to contain all (other) imported HS-06 products i which were never subject to an imposed TTB and for which I do *not* need to construct counterfactual import values, and thus for which I can rely on the observable import data $v^k_{i,j,t}$.[28] This modification also addresses the well-known concern that any TTB policy imposed in year t may reduce the (contemporaneous) year t value of imports, and this would underweight the economic importance of the trade barrier in the averaging.

My second measure of the share of annual stock of economy k imported products subject to a TTB in year t, reflecting the three modifications to equation (A1) and thus weighted by the 'value' of imports, is defined as

$$\frac{\sum_{I^k_t} b^k_{i,j,t} \hat{v}^k_{i,j,t}}{\sum_{\hat{I}^k_t} \hat{v}^k_{i,j,t} + \sum_{I^{*k}_t} v^k_{i,j,t}}. \tag{A2}$$

There are at least three other and more subtle transmission mechanisms through which (A1) and (A2) can diverge beyond ways through which I have identified trade-weighting the HS-06 products as leading to differences between the two series. First, defining the series according to the stock of covered HS-06 products prevents the case of a product already subject to a TTB in $t - 1$from being double counted if a new TTB is imposed over the same product in subsequent years (e.g. in year t). For example, suppose a HS-06 product from a given foreign trading partner became subject to an AD barrier in $t - 1$ and then a CVD in t. Since I am measuring the 'stock' of products affected by TTBs, this would not result in a change to series (A1) or (A2) between $t - 1$ and t. On the other hand, if there is a *new* trading partner being subject to the TTB between $t - 1$ and t, even if the underlying product is unchanged, there can be a change in series (A2). A change in trading partner coverage could

[27] There are arguments to suggest such products may grow at a rate different from other products in the economy. For example, these are products that typically had been growing at rates faster than the average rate of import growth, perhaps because of a technological innovation or productivity improvement, and thus one might expect that to have continued. On the other hand, if the imports were growing at faster rates because they were dumped or subsidised (and if the dumping or subsidisation had terminated), one might expect the rate of growth to fall (if the dumping or subsidising stopped), even in the absence of the TTB. While acknowledging the range of theoretical arguments for counterfactual import growth, to construct these measures, I rely on the conservative assumption of TTB-impacted imports growing at the same rate as imports not impacted by TTBs.

[28] I use the mean annual growth rate of products from the set I^{*k} in t to construct the counterfactual import levels for the products in $\hat{I}^k$ in t, which I denote $\hat{v}^k_{i,j,t}$.

occur because either the second partner was targeted under a different underlying TTB policy instrument (e.g. AD vs. CVD) or because of differences in the timing under the same policy instrument (e.g. the first AD imposed over the HS-06 product was imposed against country A in $t - 1$ and not against country B until t). Third, the stock series can also be affected through differential timing in the *removal* of a previously imposed TTB over the same HS-06 product. For example, if the TTB on trading partner A is removed in $t - 1$, but the TTB on trading partner B is not removed until t, this differential timing in the removal will affect series (A2). However, there will be no change in series (A1) until *all* previously imposed TTBs affecting this product are removed.

I conclude this section with a discussion of five remaining caveats to my approach.

First, some economies impose TTBs at a level of product disaggregation (e.g. HS-08, HS-10) that is finer than the HS-06 level that is my focus. Nevertheless, examination at the HS-06 level is desirable for our context, since HS-06 is the finest level of disaggregation that is both comparable across countries and with available import value data during 1990–2009. While the application of measures using HS-06 data will overstate the trade impact (in the level) for any economy that typically does not cover all sub-products within an HS-06 category, because my measures are defined consistently over time and across trading partners, measurement error is much less of a concern for two of our main questions of interest: *intertemporal changes* (i.e. whether the scope of imported products subject to a country's use of TTBs is increasing or decreasing over time) and the *relative exporter incidence* (i.e. whether certain exporters are relatively more or less frequently targeted than others by the stock of imposed TTBs).

Second, my approach concentrates entirely on the potential first-order impact of TTBs on trade. There is a substantial theoretical and empirical literature from case studies that identifies potentially important second-order effects of TTBs (especially antidumping) on trade flows. Some accentuate the potential negative trade effects beyond what I identify here, while others are offsetting and reduce the overall size of the trade effects. Examples of accentuating effects include downstream impacts, tariff-jumping foreign direct investment and retaliation, while examples of offsetting effects include trade diversion. For a recent discussion and a relatively comprehensive list of such effects, see Vandenbussche and Zanardi (2010); for an excellent survey of the antidumping literature, see Blonigen and Prusa (2003).

Third, even trade-weighting the incidence of TTBs does nothing to address heterogeneity in the size of the imposed trade barriers. Bown (2010c), for example, notes substantial heterogeneity in the size of duties imposed across both policy-imposing economies and across targeted exporters by (within) a

policy-imposing country, especially with respect to barriers imposed on imports from China.

Fourth, I also do not address potential heterogeneity to the *form* of the applied TTBs. For example, some economies apply antidumping as ad valorem duties, others may be more likely (or against certain trading partners or over certain imported products) to apply it as a specific duty or a 'price undertaking' in which the exporter voluntarily raises its price above some threshold under the threat of an imposed duty. Global safeguards, on the other hand, are frequently applied as quantitative restrictions such as tariff rate quotas.

Fifth, I also do not address the issue of the likely import demand or export supply responses to the imposed TTBs, because I do not control for import demand or export supply elasticities. For an application of the Overall Trade Restrictiveness Index (OTRI) approach to the global economic crisis of 2008–09, see Kee et al. (2010).

APPENDIX B: DATA

Detailed data on antidumping, CVDs, global safeguards and China-specific safeguards are available from the World Bank's *Temporary Trade Barriers Database* (Bown, 2010a). For antidumping and countervailing duty policies, the data in Bown (2010a) are derived from original government source documents. Each government reports tariff-line product codes that are subject to the investigations, the dates and countries from whom imports are being investigated, and the decisions of whether to impose preliminary and final trade barriers, as well as when they are removed. The data on use of global safeguards and China-specific safeguards are derived from both original government source documents and what they report to the WTO's Committee on Safeguards. Bown (2010a) provides a complete discussion of the data sources, as well as the other information contained in the database that is not utilised in the analysis here.

The tariff-line product codes from Bown (2010a) are then matched to bilateral import data at the 6-digit HS product-level taken from Comtrade via WITS. The following countries had missing years of import data at the HS-06 level: Argentina (1990–92), China (1990–91), Japan (2009), South Korea (2009), United States (1990) and South Africa (1990–91). The 'value' share measures derived throughout the paper are based on nonoil import data only.

Because the composition of the European Union changes between 1990 and 2009 and I am especially interested in recent changes to EU policy against nonmembers, I define the European Union as being made up of the EU-27 member countries throughout the entire sample. Given that definition, I focus on extra-EU imports and I drop all EU trade policy actions against other (even

eventual) EU member states during the time period. For example, an EU antidumping case against Romania in 2002 would be dropped from the sample, since Romania eventually became part of the EU27 in 2007.

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