Emerging Economies, Trade Policy, and Macroeconomic Shocks

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Abstract

This paper estimates the impact of aggregate fluctuations on the time-varying trade policies of thirteen major emerging economies over 1989-2010; by 2010, these WTO member countries collectively accounted for 21 percent of world merchandise imports and 22 percent of world GDP. We examine determinants of carefully constructed, bilateral measures of new import restrictions on products arising through the temporary trade barrier (TTB) policies of antidumping, safeguards, and countervailing duties. Our approach explicitly addresses changes to the institutional environment facing these emerging economies as they joined the WTO and adopted disciplines to restrain their application of other trade policies such as applied import tariffs. We find evidence of a counter-cyclical relationship between macroeconomic shocks and new TTB import restrictions in addition to an important role for fluctuations in bilateral real exchange rates. Furthermore, for the subset of major G20 emerging economies, the trade policy responsiveness coinciding with WTO establishment in 1995 suggests a significant change relative to the pre-WTO period; i.e., new import restrictions became more counter-cyclical over time. Finally, we document evidence on changes to some of these empirical relationships coinciding with the Great Recession.

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1 Introduction

To what extent do economic incentives and economic shocks affect the trade policies of emerging economies, especially in light of these countries' increasing engagement in the rules-based multilateral trading system? Recent evidence from emerging economies documenting the importance of economic determinants of trade policy formation pushes beyond traditionally political motives such as income redistribution or lobbying. Broda, Limão, and Weinstein (2008), for example, find that economic incentives affect non-cooperative tariff levels prior to a country's WTO accession; their sample includes a number of emerging economies. Bagwell and Staiger (2011) similarly provide evidence that economic channels affect tariff reductions associated with WTO accession negotiations. On the other hand, much less is known about the potential economic determinants of emerging economy use of the trade policies that exhibit greater time variation under the WTO system. Nevertheless, the economic *relevance* of emerging economies' application of these time-varying trade policies – e.g., the temporary trade barriers (TTBs) of antidumping, safeguards, and countervailing duties in particular – is increasingly apparent. Bown (2012a) documents that for the major Group of 20 (G20) emerging economies, the collective share of import products subject to TTB import restrictions increased more than 50 percent between 2007 and 2010 alone. [1]

The current paper examines empirically the responsiveness of time-varying import protection to macroeconomic shocks for emerging economies over the period covering 1989-2010. We specifically investigate the imposition of new import protection through TTBs by constructing measures of protection built up from disaggregated, product-level data. The emerging economies in our analysis are increasingly important contributors to the global economy; cumulatively by 2010, they combined to account for 21 percent of world merchandise imports and 22 percent of world GDP.[2] Figure 1 and Figure 2 plot the time series of real exchange rate fluctuations, changes to domestic real GDP growth, and counts of imported products subject to new TTB policies over the period of 1989-2010 for emerging economy members and non-members of the G20, respectively. Our econometric investigation of these emerging economies' data indicates evidence of a general

[1] See Bown (2012a, Table A1a) which updates the data originally presented as Table 3 of Bown (2011) through 2011. Note that Mexico, Russia and Saudi Arabia are omitted from the G20 emerging economy sample for these statistics, though Mexico is included in the estimation sample described below.

[2] As we explain in more detail below, our sample only includes major users of these TTB policies of import protection. Our econometric approach exploits country-level fixed effects which themselves would capture non-use by the countries omitted from our analysis if included.

counter-cyclical relationship between macroeconomic shocks and import protection for the period covering the inception of the WTO in 1995 through 2010. Moreover, new import protection through TTBs is also impacted by fluctuations in bilateral real exchange rates as currency appreciations are followed by significantly more new import protection. Finally, we also document that these results represent a significant departure from how the major emerging economies imposed import protection under these trade policy instruments prior to WTO's establishment in 1995; this evidence suggests a potential institutional impact of the WTO as well.

Since the late 1980s and especially since the 1995 inception of the WTO, which led a number of emerging economies to accept multilateral discipline over their general import tariff policies for the first time, TTBs have become increasingly important in emerging economies. For example, Bown (2011) finds that many of the Group of 20 (G20) emerging economies in our sample – including Argentina, Brazil, China, India, Indonesia, Mexico, South Africa, and Turkey – have used TTBs over 1990-2009 in ways that rival the intensity (product coverage) and frequency (policies imposed and removed) of high income economies like the United States and European Union. A major difference, of course, is that the US and EU have a much longer history of multilateral discipline over their tariffs and other trade policies, more binding trade policy discipline, and experience with TTB policy use long pre-dating establishment of the WTO.[3]

Our evidence of a general counter-cyclical relationship between macroeconomic shocks and emerging economy import protection under the WTO serves to complement our companion paper (Bown and Crowley, forthcoming, a) that finds a similar relationship for a sample of major high income economies.[4] However, while the two papers address similar questions, it is instructive to analyze separately the trade policy decisions of emerging economies in the WTO system. In the spirit of Subramanian and Wei (2007), which documented channels through which the WTO system had differential implications for trade *flows* across emerging and high-income countries, we find that the

[3] The extensive research literature examining determinants of TTBs by high income economies is surveyed by Blonigen and Prusa (2003).

[4] Bown and Crowley (forthcoming, a) is most closely related to a prior literature examining antidumping use by the United States and a handful of other high income countries on data from the 1980s and 1990s, including Knetter and Prusa (2003) and Feinberg (1989). Another related paper is Crowley (2011), which is the first that we are aware of that highlights the channel of policy-imposing economies using country-specific bilateral import restrictions against trading partners that were experiencing negative growth shocks at home. Bown (2008) presents an approach that considers macroeconomic and industry-level determinants of antidumping for a number of the emerging economies in our sample for the period 1995-2002.

impact of the WTO system on the trade *policies* of emerging economies is somewhat different from that of high income economies. Furthermore, we also find potentially important differences between the channels through which high-income and emerging economies' trade policies are affected by macroeconomic shocks, especially during the period of the Great Recession and relative to the period prior to establishment of the WTO in 1995.

Our approach is motivated by two important institutional differences between the conduct of high-income and emerging economy trade policy, even when limiting ourselves to the WTO period of 1995-2010. First consider applied import tariff levels. For any given year, most of the emerging markets in our sample had applied border tariffs that made them much less open to trade relative to the high income economies studied in Bown and Crowley (forthcoming, a). Furthermore, many of these emerging economies also had applied tariffs in 2010 that were much lower than at the beginning of the period. Second, emerging economies differ from high income countries in that most retained some freedom to make WTO-consistent *increases* to their applied, most-favored nation (MFN) import tariffs. We document time variation within and across countries in the extent to which WTO disciplines constrain an economy's discretion to change its applied tariff rates. In our empirical approach, we therefore directly address the issue that emerging economy aggregate-level *demand* for TTBs may also be changing over our sample due to WTO disciplines over their other trade policies.

We provide evidence that emerging economies implement TTB import protection during periods when a greater number of their imported products have become subject to the WTO disciplines that constrain the countries' ability to raise applied MFN tariff rates.[5] This evidence in particular, regarding the empirical relevance of the WTO and the role of economic incentives for trade policy formation in emerging economies, is consistent with Broda, Limão, and Weinstein (2008) and Bagwell and Staiger (2011). Our findings on TTBs also relate to a separate study on TTB use by the United States; Bown and Crowley (forthcoming, b) provide evidence that economic incentives at the sector level shape antidumping and safeguard use and thus US participation in cooperative, self-enforcing trade agreements such as the WTO, an idea first formalized theoretically by Bagwell and Staiger (1990).

[5] This evidence on the substitutability between applied MFN tariffs and use of TTBs is consistent with the micro-level results for India provided in Bown and Tovar (2011). That approach estimates a Grossman and Helpman (1994) model at the product level covering the period 1990-2002 and concludes that many of India's cuts to its applied import tariffs resulting from its unilateral liberalization of the 1990s were subsequently unwound through implementation of new TTBs such as antidumping and safeguards.

In terms of our specific results, after controlling for this relationship between changing WTO discipline over a country's other trade policies and its use of TTBs, we find an important counter-cyclical relationship between macroeconomic slowdowns and aggregate-level new import protection through TTBs for the period 1995-2010. For these emerging economies, a decrease in domestic real GDP growth or an increase in the domestic unemployment rate leads to significantly more imported products subject to TTBs in the subsequent year. Real appreciation of the bilateral exchange rate relative to a trading partner is also associated with subsequently more import restrictions, as are weak foreign GDP growth in a trading partner and a surge in bilateral import growth. We are able to make a direct comparison of these effects with estimates for high-income economies over the period 1989-2010, based on a modified version of the model in Bown and Crowley (forthcoming, a).

After we confirm that our baseline results for the emerging economies during the 1995-2010 period are robust to a number of sensitivity checks, we then explore and identify ways through which the responsiveness of TTBs to macroeconomic fluctuations has changed over time. First we investigate how the macroeconomic shocks of the Great Recession may have impacted emerging economy application of TTBs in 2009-2010 differently from both their own use of TTBs during 1995-2008 and when compared to how high-income economies used TTBs during the Great Recession (Bown and Crowley, forthcoming, a).[6] Second, we provide evidence from a number of major emerging economies that the channels affecting new import protection during 1995-2008 are quite different from the pre-1995 period under the GATT; i.e., we show that when comparing the GATT (1989-1994) to WTO (1995-2008), emerging economy import protection through TTBs is becoming more counter-cyclical and responsive to macroeconomic fluctuations over time, evidence consistent with an institutional impact of the WTO. These results are particularly important in light of recent evidence from Rose (2012), which examines a number of other trade policy instruments (and a longer time series of data) and concludes that there has been a secular decline in the sensitivity of import protection. Rose's paper concludes that protectionism is not counter-cyclical anymore; however, it does not address the inter-temporal substitution of trade policy instruments – i.e., away from applied import tariffs and toward temporary trade barriers – that is explicitly addressed through our

[6] The evolving literature on import protection taking place during the Great Recession also includes Bussiere, Perez-Barreiro, Straub and Taglioni (2010), Kee, Neagu and Nicita (forthcoming), Gawande, Hoekman, and Cui (2011), and Davis and Pelc (2012) in addition to Bown (2011).

approach. Our analysis below identifies clearly how we obtain our results and why they expectedly differ from this other research.

As a final exercise we investigate potential channels through which different exchange rate *regimes* impact trade policy determination across emerging economies over time. We find little evidence of a differential effect – depending on whether a fixed or floating exchange rate regime is in place – of the impact of these macroeconomic channels on time-varying trade barriers. However, we do find that the *abandonment* of a pegged currency, in conjunction with a real depreciation of the exchange rate, is subsequently associated with significantly less new import protection through TTBs in the following year. One interpretation of this result is that adoption of a flexible exchange rate regime can help dissipate aggregate-level demands for new import protection through TTBs.

The rest of the paper proceeds as follows. Section 2 summarizes the theoretical work regarding macroeconomic shocks and new import protection, and it characterizes the institutional environment facing emerging economies' trade policies under the WTO during 1995-2010. This section also introduces our empirical model and describes our panel dataset. Section 3 presents our baseline results regarding the relationship between macroeconomic fluctuations and new import restrictions for emerging economies under the WTO covering the years 1995-2010. Section 4 compares these results to those of Bown and Crowley (forthcoming, a) and explores potential changes in trade policy formation taking place during 2009-2010 alongside the Great Recession. In Section 5, we extend the data set back to 1989 where possible and compare emerging economy TTB use under the WTO relative to the prior GATT regime. We also expand our sample of countries to include high-income economies and compare one set of results from our modeling framework with other related research in the literature. In Section 6, we examine the impact of fixed versus floating exchange rate regimes on emerging economy trade policy formation. Finally, Section 7 concludes.

2 Theory, Institutional Environment, Empirical Model, and Data

2.1 Theory

An extensive empirical literature documents evidence of counter-cyclical trade policy in industrialized economies; nevertheless, there are relatively few theoretical contributions that explicitly model the channels through which such import protection arises.[7] Political economy models face two empirical difficulties: first, changes in political parameters do not necessarily match the speed of economic fluctuations; second, there is little evidence that the government's preference for the welfare of import-competing sectors relative to consumers or export-oriented sectors rises during recessions.

Greater success in matching some of the stylized facts on time-varying trade restrictions comes from terms-of-trade-driven models of import protection. Consider first the approach of Bagwell and Staiger (1990); they present a dynamic, repeated-game model of the trade policy choices of two large countries that participate in a trade agreement. While global welfare is higher in such a framework when countries pursue a cooperative agreement that involves more liberal trade, unexpected increases to trade volumes result in the incentive to increase tariffs in order to take advantage of static (one-period) welfare gains. In the face of trade volume shocks, cooperative trade policy in a self-enforcing trade agreement can therefore be characterized by periods in which trade barriers increase. In a related dynamic modeling framework, Bagwell and Staiger (2003) extend this basic approach by considering serially correlated shocks to growth in order to examine the relationship between other aggregate-level fluctuations and import protection.[8] Counter-cyclical trade policy can arise in this environment because the terms-of-trade gain from a tariff increase – that is a response to a transitory increase in import volume – can exceed the long-run cost of a trade war in a persistent recession during which future growth is expected to be slow. This model generates some of the key empirical predictions that we take to the data: new import barriers are expected to

[7] See the extensive list of empirical research referenced in Bagwell and Staiger (2003), Rose (2012), and Bown and Crowley (forthcoming a) for historical evidence. Irwin (2011a,b) provides a recent analysis of the channels through which the shocks of the Great Depression are associated with the counter-cyclical increases in import protection of the 1930s.

[8] More formally, the Bagwell and Staiger (2003) set-up assumes two countries that trade many products with the aggregate growth rate in each country modeled as the rate of new product entry. A Markov-switching process moves the international economy from phases of high growth to low growth. Importantly, in each phase, trade volumes are subject to transitory shocks so that temporarily high import volumes can be observed during recessionary periods.

arise when aggregate growth is weak at home and aggregate growth is weak in an important foreign source of imports.[9]

Real exchange rate fluctuations are another important channel through which aggregate-level shocks can affect time-varying trade policy. Knetter and Prusa (2003) provide a partial equilibrium model of pricing under imperfect competition and examine real exchange rate movements and how international rules regarding dumping – pricing below average cost – impact the likelihood of an antidumping import restriction. Under pricing-to-market strategies, their model predicts foreign firms increase their exports in response to a local appreciation of the exchange rate. Under the multilateral rules that establish permissible standards for application of this form of TTBs, an appreciation of the bilateral real exchange rate and an increase in bilateral imports result in more import restrictions.

2.2 The WTO, discipline over applied tariffs, and emerging economy trade policy formation

Our investigation of the cyclicality of import protection for emerging economies ultimately covers 1989-2010 and thus an important period of change in the institutional environment for the conduct of commercial policy. However, we begin our empirical analysis with the post-1995 period that corresponds with the establishment of the WTO and thus a relatively common set of international rules governing the application of TTB policies. Nevertheless, even when focusing on this particular period, there are a number of other forces at work that likely influence emerging economy application of TTBs. First, a number of these economies undertook substantial trade liberalization and made economically meaningful cuts to their applied MFN import tariffs. Second, a number of countries accepted some WTO discipline over their tariff and other trade policies for the first time. These disciplines define maximum tariff rates at the product level that countries promise not to exceed except through the use of WTO-permissible exceptions such as temporary trade barrier policies of antidumping, safeguards, and countervailing duties. Nevertheless, the binding nature of these disciplines may vary both across countries and within countries over time during this period, and any examination of the macroeconomic forces driving emerging economy trade policy may need to control for such variation.

Consider the data on different trade policy instruments in Table 1. The scope of the WTO's disciplines over a country's import tariffs is most easily summarized through three measures – the

[9] Crowley (2010) generates a similar prediction for the channel of weak trading partner growth by using a segmented markets model to show that antidumping import restrictions increase in response to weak foreign growth at the sector level.

share of the country's total imported products at the 6-digit Harmonized System (HS-06) level that are legally bound (column 1), the average rate at which these tariffs are bound (column 2), and the difference between this legal binding tariff rate and the most favored nation (MFN) applied tariff rate that the country implements over imports at the border (column 2 less column 3 or 4). Table 1 indicates that, for these three measures, there is substantial heterogeneity across the thirteen emerging economies in our sample. The differential in the average applied MFN tariff rates in 1995 and 2010 (columns 3 and 4) also indicates variation within some of these countries over time; for some emerging economies, average applied MFN tariffs in 2010 were higher than they were in 1995, in other economies they are significantly lower.

Columns (3) and (4) in Table 1 suggest that an emerging economy's aggregate-level demand for TTBs may therefore also change over time due to how "close" the country's applied MFN tariffs are relative to its legal tariff bindings. Specifically, for imported products with applied MFN tariff rates that are at or close to the WTO maximum binding rate, the only WTO-permitted option to implement additional import protection for the product may be through a TTB. Columns (5) and (6) report data from Bown (2012a) on the share of products subject to the "stock" of accumulated TTBs in 1995 and in 2010. A comparison of the data in these two columns indicates that there is considerable differentiation both across countries, as well as within countries over time, as to the economic importance of the import coverage of these TTB policies.

Is there a basic, aggregate-level relationship between applied TTBs, MFN applied tariffs, and WTO tariff bindings? To shed initial light on this question, the last three columns of Table 1 provide two cuts of the data from imported products at the HS-06 level. For these three columns, define "under WTO discipline" as a product that has an applied import tariff that is within 10 percentage points or less of its legal binding rate at the WTO; i.e., these are products for which governments have relatively little scope to increase further their applied import tariffs.[10]

Column (8) of Table 1 presents the average over 1995-2010 of the share of all new TTBs per year that are in the product category defined as being "under WTO discipline." For Argentina, 18.3

[10] For this exercise we consider 10 percentage points as opposed to, say, the applied tariff and binding rate being exactly equivalent; in the formal econometric analysis below we consider a number of different definitions. One motivation for using a slightly larger (10 percentage point) cutoff is given by the data on the size of TTBs applied as tariffs. Antidumping, for example, is frequently imposed as a new import duty at ad valorem rates of over 100 percent (Bown, 2012b). In practical terms, it may be costly for a government to change any tariff rate and thus it may only be willing to do so through the applied tariff rate at the border if it can raise its tariff legally by, say, at least 10 percentage points; if not, it may choose a different policy instrument such as a TTB where the upper limit is less constrained.

percent of the products over which it had used TTBs during 1995-2010 had applied MFN tariffs that were relatively constrained because they were within 10 percentage points of the legal binding. The first implication of this column is that there is considerable variation across countries. China, South Africa and India use TTBs in products for which their ability to raise applied rates is largely constrained. On the other hand, while Argentina is relatively low, smaller economies, such as Colombia and Thailand, impose TTBs on products for which there is considerable scope – i.e., more than 10 percentage points for 100 percent of them – for applied tariff increases instead.

Columns (9) and (10) of Table 1 provide an interpretation of the data that allows for a comparison across categories of products within each country. The columns reveal information on whether more TTB-affected products are under WTO discipline than products that are not affected by TTBs. Again consider Argentina. A comparison of the data in columns (9) and (10) indicate that 20.2 percent of its products with new TTBs were constrained by WTO disciplines, whereas only 15.3 percent of TTB-unaffected products were constrained by WTO disciplines. With the exception of Turkey, this pattern is common across the G20 emerging economies; i.e., new TTBs disproportionately arise in products for which WTO disciplines constrain other trade policy choices.

This latter information in Table 1, regarding the relationship between TTBs and WTO commitments over applied tariffs, motivates our construction of an aggregate, time-varying indicator that we employ in our formal econometric analysis described below. We seek to capture the binding nature of the WTO disciplines over a country's tariffs; we therefore begin by focusing on the share of a country's products with applied tariff rates *equal to* the WTO legal binding. We then take annual differences of this variable, and we expect a positive relationship between it and the aggregate-level demand for new import protection through TTBs; i.e., an increase in the share of the country's imported products that have applied tariffs equal to their legal binding rates (and becoming subject to WTO discipline) would be associated with increased demand for TTBs the following year, ceteris paribus.

Figure 3 plots these data on the year-to-year change in the share of each country's products with applied tariff rates equal to the WTO legal binding for the period 1996-2010. There is evidence of substantial variation – both over time and relative to each other – as to how constrained these emerging economies are by WTO disciplines over their applied import tariff policies. Argentina, India, Malaysia, Philippines and Thailand, for example, each have years for which there are major changes in the share of products falling under (or out of) WTO discipline. Given this anecdotal evidence of cross-country and inter-temporal variation in the binding nature of WTO disciplines over tariff policy for

emerging economies, we explicitly control for the changing policy environment in our formal econometric analysis described below. We explore, for example, whether countries that are in a period with applied tariffs that are well below their legal bindings may be less likely to need to use TTB policies of import protection perhaps because they can raise their applied tariffs in response to shocks.

We conclude this section by noting that the environment characterized by Table 1 and Figure 3 for these emerging economies is quite distinct from that facing most of the high income economies studied in Bown and Crowley (forthcoming, a). For example, both the United States and European Union have bound 100 percent of their tariff lines under the WTO, and they have relatively low average bound tariff rates, at 3.6 percent and 4.2 percent, respectively. Furthermore, average applied MFN tariff rates for the US and EU are almost identical to their tariff bindings and they exhibit little time variation; i.e., these economies have little scope to raise applied MFN tariffs in response to economic shocks without violating WTO disciplines, and this is relatively time-invariant for 1995-2010.

2.3 Empirical model

This section presents an empirical model of the aggregate-level determinants of import protection through the number of products that a government subjects to new temporary trade barrier investigations. The model relates the number of products under an antidumping, global safeguard, China safeguard, or countervailing duty investigation in a given year to the first lag of a number of macroeconomic variables. The general approach follows Bown and Crowley (forthcoming, a); we elaborate on the critical similarities and differences in more detail in the next section.

The dependent variable is the number of products imported from country *i* against which the importing economy *j* initiates a temporary trade barrier investigation in a year, *t*. This measure is a non-negative count and exhibits over-dispersion in that the variance of the number of investigations per time period exceeds the mean (see Table 2). We focus on products subject to investigations and not only those that subsequently result in imposed trade barriers, given the Staiger and Wolak (1994) evidence that even a mere TTB investigation can have trade-destroying effects.[11] In the description that follows we use the terminology of temporary trade barriers and investigations interchangeably.

[11] Nevertheless, we confirm that the qualitative nature of our results is robust to a redefinition of the dependent variable to be products subject to TTB investigations that ultimately conclude with the imposition of trade barriers. This result is not surprising given the relatively high frequency with which emerging economies impose such import restrictions after the initiation of investigations; this occurs at a much higher frequency than for high-income countries during this period.

We formally model temporary trade barrier formation as generated by a negative binomial distribution (Hausman, Hall, and Griliches, 1984). In this model, the number of imported products under temporary trade barrier investigations, y_{ijt}, follows a Poisson process after conditioning on the explanatory variables, x_{ijt}, and unobserved heterogeneity, u_{ijt}>0. Specifically,

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

Thus, the distribution of counts of products subject to new temporary trade barriers, y_{ijt} , given x_{ijt} follows a negative binomial with conditional mean and variance

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

We use maximum likelihood to estimate the relationship between the number of products from country *i* that economy *j* subjects to policy investigations in year *t* as a function of the lag (year *t*-1) of the percent change in the bilateral real exchange rate, domestic and trading partner *i* real GDP growth, bilateral import growth, and a measure for how constrained by WTO disciplines the policy-imposing economy is with respect to its applied import tariffs. The model is identified off inter-temporal variation in domestic real GDP growth and the import tariff variable and off inter-temporal and cross-sectional variation in bilateral real exchange rates, foreign trading partner real GDP growth, and bilateral import growth.

In interpreting the coefficient estimates from this model, we report incidence rate ratios (IRRs) for the explanatory variables. That is, we report the ratio of counts predicted by the model when the lag of an explanatory variable of interest is one unit above its mean value (and all other variables are at their means) to the counts predicted when all variables are at their means. To better quantify the results of our model, we also frequently present information on the percent change in the predicted counts of imported products becoming subject to new TTBs that our model generates in response to one standard deviation shocks to each of the explanatory variables of interest.

2.4 Data and Variable Construction

There are a number of similarities and differences in our data and modeling approach relative to our companion paper's (Bown and Crowley, forthcoming, a) estimates on high income economies that require explicit clarification and justification.

Begin with the similarities. Like Bown and Crowley (forthcoming, a), we improve upon the prior literature through how we measure TTB import protection. We construct an annual time series of bilateral trade policy actions based on the universally-defined, 6-digit Harmonized System (HS-06) product level. The data for each policy-imposing economy begins either in 1989 or as soon as the country had TTB laws in place and available data on its use of TTBs (see Table 1, column 7). The data derive from extremely detailed trade policy information found in the World Bank's *Temporary Trade Barriers Database* (Bown, 2012b). Our measure of import protection is comprised of four arguably substitutable temporary trade barrier policies – antidumping, global safeguards, China-specific safeguards, and countervailing duties. Thus the dependent variable in our analysis is the count of HS-06 imported products on which the government has agreed to initiate a new temporary trade barrier investigation against trading partner *i* in year *t* and against which there is not already an existing TTB in place. This count variable is carefully constructed for each policy-imposing country by trading partner and by year in a conservative way that does not allow for redundancy.[12] In robustness checks, we also construct this variable using the antidumping policy alone.

A second innovation relative to the prior literature is emphasis on a number of bilaterally-defined explanatory variables which enable us to focus on relationships between a policy-imposing economy and its key trading partners.[13] This is empirically relevant for two reasons. First, the

[12] At any point in time in the sample period under the Harmonized System, there are roughly 5000 HS-06 imported products that could be imported from any particular trading partner. In terms of policy, governments impose these import restrictions at the 8- or 10-digit product level; unfortunately the HS-06 level is the most finely disaggregated level of data that is comparable across countries. First, so as to avoid double counting in cases in which new import protection at the 8-digit level falls into the same HS-06 category as a previously imposed measure, we do not include such products. Second, for the more expansive import protection measure covering all four policies, we also do not include products that were subject to a simultaneous or previously imposed TTB under a different policy. This phenomenon is particularly relevant as most countervailing duties are imposed simultaneously with antidumping duties on the same products. For a discussion, see Bown (2011).

[13] The Appendix lists the trading partners *i* for each of our thirteen policy-imposing economies. We condition on major trading partners affected by TTBs given that our estimation includes country fixed effects that would otherwise explain non-application against countries that a particular imposing country never targeted. Nevertheless, the trading partners included in our dataset are generally found to be the source of more than two thirds of the policy-imposing economies' non-oil imports during the sample period, ranging from 65 percent for Thailand to 91 percent for Mexico. The Philippines is a notable outlier for which the available bilateral trading partners comprise only 38 percent of non-oil imports.

temporary trade barriers under study can be imposed bilaterally so as to discriminate across import sources. Second, two of the key macroeconomic determinants of import protection in our model - trading partner *i*'s real GDP growth and the bilateral real exchange rate - vary bilaterally. Our dataset with bilateral variation also allows us to examine if countries apply import protection against trading partners facing their own economic shocks.

There are three main differences in variable construction relative to the approach adopted in Bown and Crowley (forthcoming, a). The first distinction is this paper's use of data at the annual frequency, a limitation that the companion paper is able to overcome because data at the quarterly frequency is available for only a smaller set of high income economies. Second, due to data limitations for a number of emerging economies, we use domestic real GDP growth to capture the slowdown of the economy, whereas the companion paper uses the change in domestic unemployment rate or real GDP growth. The unemployment rate data series is not sufficiently available for all of the emerging economies in our analysis to use in the baseline estimates; however, we do employ it where available in our sensitivity analysis. As we document below, here we also find results are typically stronger when we are able to utilize the unemployment measure.

Third, and most importantly, the current paper also directly confronts the changing institutional and policy environment in which emerging economies employ TTBs during 1989-2010. As noted above, when we examine the years after establishment of the WTO, one of our key determinants is defined as the share of the country's HS-06 tariff lines that are equal to its WTO legal binding, and we look at year-to-year changes in this variable. We expect a positive relationship between this determinant and the count of products subject to new TTBs; i.e., if the share of products with applied MFN tariffs equal to the WTO maximum binding tariff increases, then we expect aggregate-level demand for TTBs to increase, ceteris paribus.[14] Note that while there is inter-temporal variation in this determinant, because both MFN applied rates and WTO tariff commitments are applied equally to all trading partners, there is no cross- trading partner variation within a given policy-imposing economy. Furthermore, the country-specific indicator variable that we employ in the estimation captures any time-invariant differences in the restrictiveness of WTO commitments across

[14] Indeed, Bown and Crowley (forthcoming, a) consider the role of WTO disciplines for high income economies. While the estimated IRRs from that paper are in line with theoretical expectations, they are not precisely estimated. One explanation for the imprecision is the lack of inter-temporal and cross-sectional variation in WTO disciplines across the five high income economies during this sample period.

countries.[15] In addition, when we compare trade policy formation under the WTO to policy formation during the GATT years, we interact indicator variables for the relevant trade agreement regime with the other determinants of interest.

Finally, we estimate the negative binomial regression model of the contemporaneous (time t=0) count of imported products subject to new import protection, as a function of the value that these explanatory variables take on one year earlier, i.e., at time t=-1. Table 2 presents summary statistics for the data used in the empirical analysis, and the Appendix provides more information on the underlying sources of the data.

3 Baseline Results for 1995-2010

Table 3 presents results from our empirical model of temporary trade barriers (TTBs) for the full sample of thirteen emerging economies between 1995 and 2010. We begin this period because a common set of rules governing TTB import restrictions came into force with the WTO establishment in 1995. We consider pre-1995 data in Section 5 below.

As is common practice for negative binomial regression models, we report estimates for incidence rate ratios (IRRs). An estimated IRR with a value that is statistically greater than 1 is evidence of a positive effect of the explanatory variable of interest, whereas a value statistically less than 1 is evidence of a negative effect. The table also reports t-statistics for whether the estimated IRR is statistically different from 1. Each explanatory variable – the bilateral real exchange rate, domestic real GDP growth, foreign real GDP growth, bilateral import growth, and the change in the share of products under WTO discipline – is lagged one year. Our basic specifications include bilateral fixed effects for each importing–exporting economy pair to control for time-invariant, trading-partner-pair-specific heterogeneity in the application of temporary trade barrier policies. We also include a time trend in each specification. Finally, while the focus of our analysis is on use of all TTBs – antidumping, safeguards, and countervailing duties – we also include a specification that examines only the antidumping policy. Historically, antidumping has been the most frequently applied TTB in use by high income and emerging economies.

[15] To clarify, we might also expect the *level* of a country's WTO disciplines to impact TTB determination. I.e., policy-imposing countries that have bound less than 100 percent of their tariffs (see column 1 of Table 1) might be less likely to use TTBs than others because there is no WTO discipline over products with unbound tariffs. However, because there is no inter-temporal variation in the share of a country's MFN tariffs that are bound during this period, any level differences are captured by the importing country indicator variables.

Turn to the first column of Table 3. The results on the three macroeconomic variables – the percent change in the bilateral real exchange rate, domestic real GDP growth and foreign real GDP growth – are similar to what has been observed for high income economies. The IRR of 1.01 in the first row indicates an appreciation of the bilateral real exchange rate is associated with more TTBs against that particular partner in the following year. Import protection also reacts counter-cyclically to real GDP growth; a decline in both domestic and trading partner GDP growth is associated with more temporary trade barriers. In particular, the IRR of 0.96 on growth in trading partner *i* means that import restrictions are targeted against trading partners experiencing relatively weaker growth in the previous period. The next row, with an IRR of 1.27, indicates that more temporary trade barriers are imposed against trading partners with strong bilateral import growth.

Our last determinant of interest in column (1) is the change in the share of HS-06 products for which the country's MFN import tariff is equal to the maximum allowable tariff specified by the country's commitments made through the WTO. This variable examines how WTO disciplines on a country's tariffs affect its use of temporary trade barriers. As expected, we find that an increase in the share of products subject to these WTO disciplines is associated with more temporary trade barriers in the following year.

Before moving on to the other specifications in Table 3, we turn to an interpretation of the economic magnitudes of the results. Since understanding the size of effects is difficult when focusing on IRRs, Figure 4 presents additional information on the economic significance of the determinants of temporary new import protection. We begin by computing the model's predicted estimates of temporary trade barriers for all observations in our estimation sample. We then introduce a one standard deviation shock to each variable of interest at time *t*-1 and predict the count of temporary trade barriers at time *t*. Figure 4 illustrates the percent increase in the mean number of HS-06 products subject to TTBs in response to the specified shock.

Overall, Figure 4 indicates that the model predicts sizeable increases in the number of products subject to TTBs in response to the various macroeconomic shocks. A one standard deviation appreciation of the bilateral real exchange rate increases the number of products subject to new TTBs by 21 percent. A negative shock to the domestic economy in the form of a one standard deviation decrease in domestic real GDP growth leads to a 23 percent increase in the number of products subject to new import protection. Weak foreign GDP growth in trading partner *i* has a quantitatively similar effect; a one standard deviation decrease in trading partner *i*'s real GDP growth is associated with a 19 percent increase in the number of temporary trade barriers it faces in the following year. A

one standard deviation increase in aggregate real import growth from trading partner *i* is also sizeable; the predicted count of products subject to new TTBs increases by 16 percent. Finally, a one standard deviation increase in the share of products that becomes subject to WTO disciplines leads to a 30 percent increase in TTBs.

This last result merits additional discussion. As again documented by Table 1, a number of emerging economies have maximum permissible tariff rates that are well above the tariff rates they apply at the border. Even though these countries are WTO members, they retained a considerable amount of discretion during this period – sometimes referred to as "water in the bindings" – to raise their applied MFN tariffs. A country with such tariff discretion would not necessarily need to use the WTO's more formal antidumping, safeguards, or countervailing duty provisions to make time-varying changes to its trade policy. Our result shows that the use of TTBs is also related to time variation in the restrictiveness of WTO disciplines that these countries have adopted.

Returning to Table 3, columns (2) through (8) demonstrate the robustness of our results for the 1995-2010 period to various sensitivity checks. Column (2) replaces the set of bilateral importer-exporter indicators with a set of importer indicators and a separate set of exporter indicators. The IRRs for the variables of interest exhibit little change from the baseline specification. The exception is the IRR on bilateral import growth which is reduced slightly in magnitude and is no longer significant at the 10 percent level.

In column (3), we explore the sensitivity of our results to changes in the definition of the WTO disciplines variable. Here we redefine the share of products under WTO discipline so that any HS-06 product with an applied import tariff within 10 percentage points of its tariff binding is under WTO discipline, a less restrictive condition than considering only products with applied tariffs equal to the binding. Use of this alternative measure has only a small impact on the size of the estimated IRRs.

In column (4), we omit bilateral import growth and find that the estimated IRRs on the other variables of interest are virtually unchanged.

Column (5) introduces an additional control variable defined as the count of products imported from country *i* that economy *j already* has subject to a temporary trade barrier imposed as of the previous year. This variable is included to address the concern that a trading partner might face fewer new trade barriers at year *t* if there are already a substantial number of temporary trade barriers in place. The estimated IRR is not statistically different from 1 indicating that an increase the previous year has no effect on the count of temporary trade barriers initiated at time *t*.

Column (6) considers the macroeconomic determinants of antidumping policy alone by redefining the dependent variable to be the bilateral count of products subject to only new antidumping investigations, thereby leaving out the other TTB policies of safeguards and countervailing duties. As Table 2 indicates, the count of products subject to new antidumping investigations in a year is considerably smaller than that of all temporary trade barriers, averaging slightly less than 2 per year per trading partner. Nevertheless, many of our results in Table 3 continue to hold even when restricting attention to antidumping in isolation. The IRRs for the percent change in the bilateral real exchange rate, bilateral import growth, and the change in the share of products under WTO discipline remain greater than one, indicating that increases in these variables are associated with more antidumping investigations. We also find that antidumping alone is triggered by declines in domestic GDP growth, a result consistent with our evidence for all temporary trade barriers. One notable difference is that GDP growth in a foreign trading partner has no statistically significant impact on the number of products subject to antidumping. Figure 4 illustrates the size of the estimates of the impact of these macroeconomic determinants on antidumping policy alone, relative to the model specification (1) that includes all TTBs.

Column (7) of Table 3 presents a specification in which the change in the domestic unemployment rate at time *t*-1 is substituted for domestic real GDP growth as the measure of the health of the domestic economy. The results are broadly consistent with those reported in column (1). The IRR of 1.23 on the change in the domestic unemployment rate indicates that temporary trade barriers increase substantially in the year following an increase in unemployment. As shown in Figure 4, a one standard deviation increase in the change in the domestic unemployment rate leads to a 58 percent increase in the number of products subject to TTBs. While the change in the domestic unemployment rate variable is the preferred measure of the domestic macroeconomic shock in the analysis of high-income economies of Bown and Crowley (forthcoming, a), the lack of good unemployment rate data for China and India means that those countries are excluded from any analysis using the unemployment rate. For this reason, we emphasize the results which use real GDP growth as the measure of the domestic economy.

Finally, column (8) of Table 3 presents the results from the empirical model of temporary trade barriers for an important subsample of emerging economies members of the Group of 20; i.e.,

Argentina, Brazil, China, India, Indonesia, Mexico, South Africa, and Turkey.[16] The results for this set of countries are broadly similar to those for the larger sample of emerging economies.

4 The Great Recession Period and Comparison to Results from High-Income Economies

Table 4 decomposes IRR estimates of macroeconomic determinants of new import protection policies taken prior to the Great Recession (1995-2008) versus subsequent to the onset of the Great Recession (2009-2010). We investigate the possibility of differences by using an interaction of each of the key macroeconomic determinants with indicators for the two periods during which the trade policy decisions were made. Below each pair of interacted IRRs we report in square brackets the Chi-squared test statistic of the hypothesis that there is no difference between the variable's impact across the two time periods.

The first three columns of Table 4 present estimates from samples of data involving only the emerging economies. Column (1) is the baseline model and includes the full sample of data, column (2) restricts the subsample to only the major G20 emerging economies, and column (3) substitutes the domestic unemployment rate change for domestic real GDP growth as the measure of the health of the domestic economy. As an important comparison, column (4) presents evidence of the trade policy responsiveness of the same baseline model as (1) – i.e., using the domestic real GDP growth rate measure – estimated on a 1989-2010 sample of policy-imposing data from five major *high-income* economies. Column (4) thus summarizes a number of the results of macroeconomic determinants of the trade policy decisions of the United States, European Union, Australia, Canada and South Korea from the analysis provided in Bown and Crowley (forthcoming, a), and to which we direct the reader for additional detail.[17]

In the following sections, we compare the results in columns (1) through (3) with the results of column (4) so as to shed light on two questions. First, in the period *before* the Great Recession, to

[16] Collectively, by 2010 these eight countries accounted for 18 percent of world merchandise imports and 20 percent of world GDP.

[17] See Table 2 for the summary statistics of the variables used to estimate the model specifications on the high-income economies' sample of data. Bown and Crowley (forthcoming, a) considers the period 1988-2010 and focuses on data defined at the quarterly frequency. One benefit of focusing estimation on the quarterly frequency for the high-income economies is due to the sensitivity of the results for the Great Recession period on data at the annual frequency. Part of this is explained by the fact that for many countries the depth of the macroeconomic shock took place over the second half of 2008 and the first half of 2009; i.e., measuring macroeconomic changes at the annual frequency tends to under-estimate its depth and makes it difficult to time its impact on trade policy.

what extent are the macroeconomic channels that affect emerging economy import protection similar to those that affect high-income economy import protection? Second, even in the "early" data on trade policy actions taken in the post-Great Recession period (2009-2010), is there any evidence of potential changes to the channels through which macroeconomic shocks impact emerging and high-income economies' trade policy?

4.1 Real exchange rate fluctuations and import protection

Consider first the impact of real exchange rate fluctuations on new import protection. There is evidence that a real appreciation of the domestic currency is subsequently associated with more trading partner-specific import protection for both emerging and high-income economies, and there is no robust evidence that this changed in 2009-2010.

For the full emerging economy sample of Table 4 column (1), the estimated IRR is greater than 1 in both the 1995-2008 and Great Recession periods, indicating that real appreciations are associated with increases in TTBs.[18] In the column (2) subsample of major G20 emerging economies, the estimated IRRs across the two periods are both statistically greater than 1 and also are not statistically different from one another, indicating no change in responsiveness over the two periods. In column (3), we substitute the change in the domestic unemployment rate for the domestic real GDP growth rate. The estimated IRRs are both larger than 1 and marginally statistically different from one another, but this result admittedly derives from a particular subsample of data which drops from the estimation major policy-imposing economies like China and India due to their lack of available unemployment data. Finally, for the high-income economies in column (4), the IRR of 1.01 indicates real appreciations of the exchange rate before the Great Recession are associated with subsequently more import protection, and there was no statistically significant change to the IRR during 2009-2010.

However, one difference to the trade policy use in 2009-2010 worth highlighting when interpreting these results stems from the substantial heterogeneity in the actual real exchange rate *movements* taking place during the Great Recession. High-income economies like the United States and European Union experienced first a sharp appreciation of the real value of their domestic currency early in the crisis (2008) before a sharp and persistent depreciation beginning in 2009. For these economies, the estimates suggest an appreciation in 2008 contributed to their new import restrictions in 2009, whereas the depreciations shortly thereafter likely contributed to the relative

[18] Although the IRR in the pre-Great Recession period is imprecisely estimated, the Chi-squared test statistic of 1.10 indicates that we cannot reject the null hypothesis that the pre-Great Recession and Great Recession IRRs are the same.

restraint on new import restrictions that ultimately arose in 2010. Put differently, had the US and EU not experienced sharp and persistent real currency depreciations beginning in 2009, evidence from their prior behavior indicates many more TTBs would have been expected to arise.

On the other hand, a number of major emerging economies experienced sharp depreciations in 2008, before beginning a period of real currency appreciation in 2009, punctuated by the impending concern in 2010 of "currency wars."[19] See again Figure 1 which reports data on trade-weighted real exchange rates; such data trends during this period are apparent for countries like Brazil, India, Mexico, South Africa and Turkey. Our model estimates in Table 4 suggest these real appreciations beginning in 2009 for a number of emerging economies likely contributed to the pressure to impose new import restrictions through TTBs that continued through 2010. We return to the issue of exchange rates, and pegged versus floating exchange rate regimes, in more detail in Section 6 below.

4.2 Domestic macroeconomic slowdowns and import protection

Next consider the impact of shocks to the domestic macroeconomic climate on new import protection. Compare the full emerging economy sample presented in Table 4, column (1) with the high-income economy sample in column (4). First examine the IRRs covering the period before the Great Recession. The column (1) IRR of 0.93 and the column (4) IRR of 0.86 are both statistically less than 1, indicating a counter-cyclical relationship between macroeconomic slowdowns and new import protection for both samples of policy-imposing countries prior to the Great Recession. Specifications (2) and (3) provide confirmation of this pre-Great Recession period evidence for the G-20 emerging economies.

Compare the IRR estimates within the column (1) specification for emerging economies but over the two different time periods. While the IRR of 0.93 on real GDP growth in the years before the crisis is indicative of the counter-cyclical relationship between macroeconomic slowdowns and TTBs, the IRR of 1.11 in 2009-2010 is both statistically greater than 1 and statistically different from the 1995-2008 IRR. In 2009-2010, the emerging economies imposed fewer TTBs alongside weak GDP growth and imposed more TTBs when growth was relatively strong. This result is also robust to the

[19] For example, in September 2010, according to Brazil's finance minister Guido Mantega, "We're in the midst of an international currency war, a general weakening of currency. This threatens us because it takes away our competitiveness." (Wheatley and Garnham, 2010).

sensitivity analysis presented in columns (2) and (3).[20] This result is different from the evidence presented in column (4) for the sample of high-income economies. For these economies, because there is no statistical difference to the IRRs across the two periods, there is no evidence of a change in behavior alongside the Great Recession.

Nevertheless, we do caveat these particular results for the estimated differential for emerging economies and caution against drawing too much inference from the post-Great Recession period, given that identification is coming off only two years of data. For example, for the high-income economies in column (4), the policy decisions made during 2009-2010 were based on a period of extremely weak (or negative) real GDP growth in both 2008 and 2009 and thus little variation so as to allow for identification. For the emerging economy specifications, because there is a larger sample of countries, there is slightly more variation that improves identification. Nevertheless, most of the identification derives from differences *across countries* in the sample – i.e., countries that imposed relatively more TTBS in 2009 and 2010 coincidentally were the ones with *relatively* stronger economic growth during the crisis years of 2008 and 2009, respectively – as opposed to within the same country over time.

4.3 Foreign real GDP growth and import protection

One of the most interesting findings for the high-income economies during the Great Recession relates to the channel of trading partner real GDP growth. During the pre-Great Recession period 1989-2008, the IRR estimates from Table 4, column (4) indicate that high-income economies typically imposed new import restrictions on trading partners going through periods of weak economic growth at home. During 2009-2010, there is a statistically significant differential to the estimated IRR (1.06) away from its pre-Great Recession level (0.93); this indicates that high income economies refrained in 2009-2010 from imposing new TTBs on trading partners that were contracting. This was a particularly important channel dampening the total amount of import protection arising during this period for the high-income economies, given that so many trading partners were going through periods of weak growth.

[20] Note finally that we can also confirm that these results are not purely an artifact of relying on annual data. The qualitative nature to the results for 2009-2010 continues to hold when we replace lagged values for the macroeconomic determinants with their contemporaneous values.

On the other hand, for the emerging economies in columns (1) through (3), there is no robust evidence of any change across periods through which foreign shocks to trading partners' economic growth affect new import protection through TTBs.

4.4 Import growth and import protection

Finally, the IRRs on import growth for the emerging economies are statistically different from each other in the two periods. In Table 4, column (1), the estimated IRR of 1.43 before the crisis implies that a one standard deviation (52.7 percent) increase in bilateral import growth led to a 20 percent increase in products from that trading partner becoming subject to new TTBs. The sharp decline in worldwide imports – i.e., the "trade collapse" associated with the Great Recession (Baldwin and Evenett, 2009) – does not appear to have led to fewer import restrictions during this period. The IRR of 0.35 on bilateral import growth suggests that a one standard deviation (15.1 percent) *decrease* in import growth during the crisis is associated with a 17 percent increase in TTBs one year later. This differential result is robust across each of the alternative specifications on the subsamples of emerging economy data presented in columns (2) and (3). On the other hand, there is no evidence of a differential IRR for the high-income economy sample presented in column (4).

5 The Effect of the WTO and Comparisons to Related Research

Thus far our estimates for the emerging economies' use of TTBs have all been undertaken on samples of data beginning in 1995. We have argued that this is the period during which emerging economies faced a relatively common set of rules under the WTO regarding how to implement import protection through TTB policies. In this section we investigate empirically whether this new environment has affected how aggregate-level shocks feed into new import protection by identifying potential changes across time associated with the GATT versus WTO institutional regimes. We are able to do so because a number of emerging economies had already established and were using TTB policies prior to 1995.[21] Here we exploit that information in order to shed additional light on the impact of the WTO institution by comparing emerging economy use of import protection through TTBs prior to 1995 with

[21] Table 1 documents the first year for which the sample begins for each policy-imposing economy, based on its initial use of TTBs during our sample period.

their use under the WTO period of 1995-2008.[22] We begin by limiting the sample to the major G20 emerging economies.

Consider the results presented in Table 5. Column (1) uses real GDP growth as the measure for the health of the domestic economy, whereas column (2) relies on the change in unemployment rate. For each of the estimated IRRs, the table also reports the test statistic for whether there is a difference between the estimated IRR of the GATT (1989-1994) and WTO (1995-2008) periods. The evidence from columns (1) and (2) indicates there are two important channels through which aggregate-level fluctuations *differentially* affect import protection through TTBs under the WTO relative to the GATT period: real exchange rate movements and domestic macroeconomic shocks.

For real exchange rates, the estimated IRRs are significantly greater than 1 for the WTO period, a result we have seen already, indicating that appreciations are associated with subsequent increases in import protection. However, this is a significant change from the GATT period. Over 1989-1994, depreciations were associated with new import protection. In both columns (1) and (2) the estimated IRRs are statistically different from one another across the two periods.

The second important result is that over the period 1995-2008, there is a strong counter-cyclical relationship between slowdowns to the domestic economy and new import protection. Whether measured as a reduction in domestic real GDP growth (IRR of 0.94 in column 1) or an increase in the unemployment rate (IRR of 1.51 in column 2), a domestic slowdown under the WTO period was typically associated with more import protection. This is also distinct from the role these variables took on prior to the WTO; the estimated IRRs in columns (1) and (2) for the 1989-1994 period are of the opposite sign, they are statistically different from 1, and they are statistically different from their corresponding model estimates from the WTO period.

One way to interpret this evidence in the first two columns of Table 5 is that the inception of the WTO in 1995 led these G20 emerging economies to respond to macroeconomic shocks by using new TTB import protection in the same way that high-income economies had been doing since the 1980s. (See again Table 4, specification 4 and the more complete analysis of Bown and Crowley, forthcoming, a). The evidence suggests a significant change for these emerging economies relative to the pre-WTO period of 1989-1994, during which factors other than aggregate-level shocks apparently led to new import protection under TTB policies.

[22] To be precise, our analysis does compare the period of WTO membership against the "pre-membership" period – and not the GATT period – for one of the countries in our sample. I.e., for China we consider differential impacts of its years as a WTO member (2002-2008) with its years of TTB use prior to joining the WTO (1997-2001). For all other countries in the sample we compare 1995-2008 with the pre-1995 period.

Given these results and the results of the previous section, in the last two columns of Table 5 we estimate our baseline model on the 1995-2008 period for an expanded sample of 18 economies that include the 13 emerging economies and the 5 high-income economies from Bown and Crowley (forthcoming, a). These 18 economies combined in 2010 to cover roughly 75 percent of world merchandise imports and world GDP. Estimation of the model on this wider sample of TTB-using economies allows us to present as general a set of results as possible so as to make our most directed comparison to Rose (2012), for example, which employs an alternative approach but concludes that import protection is no longer counter-cyclic. [23] In sharp contrast, specifications (3) and (4) in Table 5 provide strong evidence that, on average across these policy-imposing economies during the WTO period, import protection through TTBs has been applied subsequent to domestic economic downturns. The IRR in specification (3) on the domestic real GDP growth is significantly less than 1, and the IRR in specification (4) on the domestic change in the unemployment rate is significantly greater than 1; i.e., across countries, TTBs tend to increase in the year following a slowdown in domestic real GDP growth or an increase in the unemployment rate. Furthermore, the IRRs on the other main determinants of interest – i.e., percent change in the bilateral real exchange rate, the trading partner's real GDP growth, and the change in the share of products subject to WTO tariff discipline – are also statistically different from 1 and align with theoretical expectations.

6 Pegged versus floating exchange rate regimes

Table 6 presents a last exercise in which we consider how trade policy determination varies across exchange rate regimes. As discussed in Section 2, the Knetter and Prusa (2003) model of pricing to market suggests a positive association between real exchange rate appreciation and new TTBs. In this section we utilize exchange rate regime data from Shambaugh (2004) updated through 2010, and we examine whether TTB policies respond *differentially* to aggregate fluctuations under pegged versus floating regimes. [24]

[23] Specifically, specification (3) includes the 13 emerging economies of this paper and the 5 high-income economies (Australia, Canada, European Union, South Korea, United States) of Bown and Crowley (forthcoming, a). Specification (4) only includes 16 economies as it drops India and China as policy-imposing countries due to the lack of unemployment data. Rose (2012) includes 30 policy-imposing economies (though it omits the European Union) for a period dating back to the 1970s. Furthermore, the most relevant policy instrument in that paper is a coarse measure of annual antidumping cases for policy-imposing countries. Our measure includes all TTBs and is constructed from the commonly-defined HS-06 level, with trading partner variation.

[24] Thanks to Jay Shambaugh for using his methodology and providing an update to his classification scheme for data through 2010.

First we establish expectations. Shatz and Tarr (2002), for example, describe the literature on exchange rate management and import protection more generally; they note that pegged (or managed) currencies are more common in emerging economies than industrialized economies. One concern that this literature has identified is that managed currencies often end up being overvalued, which can lead to balance of payments difficulties. To relieve this balance of payments pressure, one policy option is simply to devalue the currency. Another option is for a country to attempt to defend the value of its currency with newly applied import protection. For our context, we might expect differential results for countries with floating versus pegged currency regimes, resulting in additional TTBs in countries that peg when the real exchange rate appreciates and imports rise. Nevertheless, because *real* exchange rates typically exhibit lower variation when their nominal rates are pegged, our data may have too little variation for our empirical model to identify the effect of the real exchange rate in pegged economies. The flip side of this is that we typically observe large movements in the real exchange rate when a country abandons the currency peg and adopts a floating regime. Therefore, our specifications include a variable defined as the percent change in the real exchange rate interacted with an indicator for a country's move from a pegged to a floating currency regime. Because the adoption of a float typically coincides with a sharp currency depreciation, we expect an IRR greater than one on this interaction variable.

Begin with Table 6, column (1), which estimates the model on our full sample of thirteen emerging economies from 1995-2010. We interact each explanatory variable, except the change in WTO disciplines, with an indicator for the type of exchange rate regime in place in year *t*-1. Overall, we find little evidence that changes in macroeconomic variables have differential impacts on TTBs across pegged and floating currency regimes, as the test statistics do not indicate statistically significant differences between the IRRs. Countries with pegged currencies *and* countries with floating currencies increase trade barriers in response to real exchange rate appreciations, weakening of the domestic macroeconomy, and increases in import growth. We confirm the similarity across currency regimes in column (2) that substitutes the change in the domestic unemployment rate for domestic GDP growth. The basic pattern of results also holds when we restrict our sample to include only the G20 emerging economies in columns (3) and (4).

Nevertheless, one interesting result arises from these specifications' interaction variable which isolates the effect of a *switch* in the type of exchange rate regime from a peg to a float. We estimate an IRR that is greater than 1 for the variable that interacts the adoption of a float in year *t*-1 with the coincident change in the real exchange rate. For example, in column (1) the IRR of 1.05

indicates that a depreciation of the currency alongside this exchange rate regime switch leads to fewer TTBs in the following year. Further, the magnitude of this effect is economically important; the column (1) empirical model finds that when a floating currency is adopted, a one standard deviation decline in the real exchange rate (5.8 percent) leads to 25 percent fewer products subject to new TTBs. One interpretation of this result is that the countries that adopt a flexible exchange rate regime consequently experience a dissipation in pressure for new import protection through TTBs.

7 Conclusion

Many emerging economies now exceed high income economies in the frequency and intensity of their application of the import-restricting antidumping, safeguards, and countervailing duty policies – collectively referred to as temporary trade barriers (TTBs). This paper investigates the impact of macroeconomic shocks on these trade policies for thirteen emerging economies between 1989 and 2010. We provide evidence of a general counter-cyclical relationship for the period 1995-2010 under the WTO. We also provide evidence on changes to these empirical relationships relative to the pre-WTO period; i.e., emerging economy import protection through TTBs became more counter-cyclical over time. Finally, we exploit data on trade policy actions in 2009-2010 – i.e., early in the post-Great Recession period – and document evidence of potential differences relative to the pre-Great Recession period. An important question for future research is whether such changes persist over time or whether they were temporary aberrations during the recent crisis.

Our approach allows us to examine not only the impact of the WTO institution on aggregate-level channels for new import protection, but we also explicitly address the separate role played by WTO disciplines on a country's access to *other* trade policies such as applied MFN import tariffs. For these emerging economies, we find that an increase in the share of a country's imported products that become subject to WTO disciplines results in significantly more products facing import protection through TTBs. Nevertheless, our aggregate-level evidence on trade policy substitutability between applied import tariffs and application of TTBs does not fully resolve the question of why many emerging economies use TTBs to respond to economic shocks despite the significant "water" that remains in their tariff bindings. Some of these countries retain considerable freedom under the WTO to raise applied MFN tariffs, and yet they frequently respond to aggregate-level shocks with more discriminatory, trading partner-specific TTBs such as antidumping. These puzzles merit further micro-oriented theoretical and empirical research.

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Appendix: Data Description

Antidumping, safeguards, and countervailing duty policy data at the Harmonized System 6-digit level by trading partner for 1995-2010 is compiled by the authors from the World Bank's Temporary Trade Barriers Database (Bown, 2012b) which is publicly available at http://econ.worldbank.org/ttbd/ . The construction of the *t*-1 stock of TTBs in effect follows the methodology in Bown (2011).

Bilateral real exchange rate series come from the USDA's Agricultural Exchange Rate Dataset. For each observation we use the value as of the last month of the year.

Real GDP growth series comes from IMF's IFS series with the exception of the European Union. For the European Union, we use the OECD's real GDP series for the EU-15.

Domestic unemployment rate change is constructed with data from the International Labor Organization.

WTO disciplines over tariff come from 6-digit Harmonized System tariff data (simple averages) by country from TRAINS and WTO.

Trading Partners: For each of the thirteen policy-imposing economies, we start with the 20 trading partners that are the most frequent targets against which each economy used TTBs over the sample period. From there, we include all of the top 20 trading partners for which we have quality macroeconomic data. This reduces the number of included partners to between 10 and 14. The reported information on percent of imports is based on non-oil imports during the 1995-2010 period. The trading partners for each policy-imposing economy used in the sample are:

- **Argentina** (14): Australia, Brazil, China, European Union, India, Indonesia, Malaysia, Paraguay, Russia, South Africa, South Korea, Switzerland, Thailand, United States. These economies were the source of 85 percent of imports.
- **Brazil** (13): Argentina, Chile, China, European Union, India, Japan, Mexico, Pakistan, Russia, South Africa, South Korea, Thailand, United States. These economies were the source of 84 percent of imports.

- **China** (10): European Union, India, Indonesia, Japan, Malaysia, Russia, Singapore, South Korea, Thailand, United States. These economies were the source of 67 percent of imports.
- **Colombia** (12): Brazil, China, European Union, Indonesia, Malaysia, Mexico, Russia, Thailand, South Korea, Trinidad and Tobago, United States, Venezuela. These economies were the source of 75 percent of imports.
- **India** (13): Canada, China, European Union, Indonesia, Japan, Malaysia, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Thailand, United States. These economies were the source of 69 percent of imports.
- **Indonesia** (11): Australia, China, European Union, India, Japan, Malaysia, Russia, Singapore, South Korea, Thailand, Turkey. These economies were the source of 74 percent of imports.
- **Malaysia** (12): Australia, Canada, China, European Union, Hong Kong, China; India, Indonesia, Japan, Philippines, South Korea, Thailand, United States. These economies were the source of 77 percent of imports.
- **Mexico** (12): Argentina, Brazil, Canada, China, Colombia, European Union, Hong Kong, China; Japan, Pakistan, Russia, South Korea, United States. These economies were the source of 91 percent of imports.
- **Peru** (12): Argentina, Brazil, Chile, China, Colombia, European Union, India, Indonesia, Mexico, Pakistan, Russia, United States. These economies were the source of 77 percent of imports.
- **Philippines** (8): China, European Union, Hong Kong, China; Indonesia, Malaysia, Russia, South Korea, Thailand. These economies were the source of 38 percent of imports.
- **South Africa** (13): Australia, Brazil, China, European Union, Hong Kong, China; India, Indonesia, Pakistan, Russia, South Korea, Thailand, Turkey, United States. These economies were the source of 78 percent of imports.
- **Thailand** (11): Argentina, China, European Union, India, Indonesia, Japan, Malaysia, Russia, South Africa, South Korea, Venezuela. These economies were the source of 65 percent of imports.
- **Turkey** (13): China, Egypt, European Union, Hong Kong, China; India, Indonesia, Israel, Malaysia, Pakistan, Russia, Saudi Arabia, South Korea, Thailand. These economies were the source of 73 percent of imports.

Table 1. Temporary Trade Barriers and WTO Disciplines over MFN Tariffs

Economy	MFN tariff binding coverage under WTO (1)	Average bound MFN tariff rate under WTO (2)	Average applied MFN tariff rate in 1995* (3)	Average applied MFN tariff rate in 2010 (4)	TTB import product coverage in 1995 (5)	TTB import product coverage in 2010 (6)	Year of first TTB in our estimation (7)	Share of products with imposed TTBs under WTO discipline, 1995-2010 (8)	Share of products with new TTB imposed under WTO discipline, 1995-2010 (9)	Share of products with no new TTB imposed under WTO discipline, 1995-2010 (10)
Emerging economy G20 members in sample										
Argentina	100.0	31.9	12.1	12.5	1.3	3.3	1989	18.3	20.2	15.3
Brazil	100.0	31.4	13.0	13.7	0.4	1.6	1989	39.4	27.3	17.6
China	100.0	10.0	15.9	9.6	0.0	1.4	1997	76.8	67.9	67.3
India	73.8	49.4	14.5	12.4	0.2	6.6	1992	55.4	49.4	30.1
Indonesia	95.8	37.2	15.3	6.7	0.0	0.6	1996	12.0	12.7	8.4
Mexico	100.0	35.0	13.1	8.9	24.1	1.2	1989	3.8	9.0	8.1
South Africa	96.6	19.2	14.2	7.6	0.4	0.6	1992	77.4	78.1	63.0
Turkey	50.4	28.5	9.4	9.9	0.7	6.9	1989	3.7	4.4	25.6
Emerging economy non-G20 members in sample										
Colombia	100.0	42.9	13.7	12.5	0.1	0.8	1991	0.0	0.0	0.3
Malaysia	84.3	14.6	8.1	7.0	0.0	0.1	1996	24.9	32.7	69.1
Peru	100.0	30.1	16.5	5.4	0.2	2.5	1992	27.0	37.1	12.9
Philippines	67.0	25.7	20.3	6.3	0.0	0.2	1994	11.1	10.0	19.1
Thailand	75.0	25.7	23.1	9.7	0.0	0.5	1996	0.0	32.6	27.9

Source: All data computed from the HS-06 level. Column (1) is from WTO (2011), columns (2), (3), and (4) are calculated by the authors from WITS, columns (5) and (6) are from Bown (2012a). Columns (8), (9) and (10) calculated by the authors for each year, 1995-2010, and then time-averaged; note that 'under WTO discipline' is defined as products for which the **a**pplied MFN tariff rate is no more than 10 percentage points lower than the binding. Column (8) is the average over 1995-2010 of the share of all newly imposed TTBs in year *t* that are under WTO discipline in year *t*. Column (9) is the share of products with a new TTB imposed in year *t+1* that is under WTO discipline in year *t*. Column (10) is the share of products with no new TTB imposed at *t*+1 that is under WTO discipline in year *t*. *Tariff year data for China is 2001, its year of WTO accession, whereas tariff year data for economies such as European Union (1996) Malaysia (1996), South Africa (1996) and India (1997) is the first year available after 1995.

Table 2. Summary Statistics

Variables	Full sample of 13 emerging economies, 1995-2010	G20 emerging economies only, 1995-2010	G20 emerging economies, 1989-1994	High-income economies, 1989-2010
Dependent Variables				
All temporary trade barrier initiations *ijt* (products per year per trading partner)	6.03 (26.45)	4.98 (11.83)	3.47 (13.51)	4.64 (13.21)
Antidumping initiations *ijt* (products per year per trading partner)	1.72 (6.10)	2.20 (6.96)	3.39 (13.49)	3.04 (8.13)
Explanatory Variables				
Percent change in bilateral real exchange rate *ijt-1*	1.24 (17.91)	1.73 (19.48)	14.49 (69.65)	1.43 (15.68)
Domestic real GDP growth *jt-1*	4.41 (4.03)	4.35 (4.27)	2.99 (3.60)	2.90 (2.55)
Change in domestic unemployment rate *jt-1*	-0.01[a] (1.42)	-0.08[b] (1.59)	0.37[c] (1.06)	0.09 (1.03)
Real GDP growth of trading partner *it-1*	4.12 (4.04)	4.07 (3.88)	5.21 (1.67)	3.60 (3.59)
Bilateral import growth from trading partner *ijt-1*	0.19 (0.55)	0.19 (0.51)	1.06 (6.06)	8.57 (17.39)
Change in the share of imported products under WTO discipline *jt-1*	-1.05 (6.08)	-0.79 (4.45)	--	-0.93 (3.24)
Outstanding stock of TTBs imposed on *ijt-1*	18.75 (89.05)	25.96 (109.03)	2.52[d] (8.59)	18.21 (32.97)
Observations	1778	1168	404	1133

Notes: Sample means reported with standard deviations in parentheses. [a] Summary statistics based on 1198 observations; [b] 708 observations; [c] 191 observations; [d]356 observations.

Table 3. Negative Binomial Model Estimates of Determinants of Import Protection, 1995-2010

	Dependent variable: Bilateral (*ij*) count of products initiated under all temporary trade barrier policies in year *t*							
Explanatory Variables	Baseline specification (1)	Modify country indicators (2)	Change tariff variable (3)	Drop import growth (4)	Add TTB stock (5)	Redefine dependant variable to AD only (6)	Substitute domestic un-employment (7)	G20 emerging economies only (8)
Percent change in bilateral real exchange rate *ijt-1*	1.01[a]	1.01[a]	1.01[b]	1.01[a]	1.01[b]	1.01[a]	1.02[a]	1.02[a]
	(2.59)	(2.77)	(2.40)	(2.63)	(2.55)	(3.65)	(3.06)	(5.06)
Domestic real GDP growth *jt-1*	0.96[b]	0.96[c]	0.97[c]	0.97[c]	0.96[b]	0.92[a]	--	0.93[a]
	(2.17)	(1.67)	(1.63)	(1.66)	(1.93)	(3.63)		(3.36)
Domestic unemployment rate change *jt-1*	--	--	--	--	--	--	1.23[a]	--
							(3.12)	
Real GDP growth of trading partner *it-1*	0.96[b]	0.97[c]	0.96[b]	0.97[c]	0.96[b]	1.02	0.96	0.99
	(2.06)	(1.80)	(2.15)	(1.72)	(1.98)	(1.02)	(1.43)	(0.71)
Bilateral import growth from trading partner *ijt-1*	1.27[b]	1.17	1.25[c]	--	1.25[c]	1.56[a]	1.30	1.41[b]
	(1.98)	(1.58)	(1.89)		(1.85)	(2.94)	(1.58)	(2.48)
Change in the share of imported products under WTO discipline *jt-1*	1.07[a]	1.07[a]	1.04[a]	1.07[a]	1.07[a]	1.08[a]	1.07[a]	1.06[a]
	(5.13)	(5.36)	(4.42)	(5.19)	(4.90)	(5.48)	(3.62)	(4.13)
Time trend	0.97	0.97	0.99	0.97[b]	0.97[b]	0.93[a]	0.93[a]	1.02
	(1.58)	(1.51)	(0.80)	(2.01)	(1.97)	(3.83)	(2.94)	(1.03)
Outstanding stock of TTBs imposed on *ijt-1*	--	--	--	--	1.00	--	--	--
					(0.07)			
Importer-exporter combined fixed effects	yes	no	yes	yes	yes	yes	yes	yes
Separate importer and exporter fixed effects	no	yes	no	no	no	no	no	no
Observations	1778	1778	1778	1791	1767	1778	1198	1168

Notes: Policy-imposing economies *j* vis-à-vis one of the trading partners *i* (listed in the Appendix) over 1995-2010. Explanatory variables are each lagged one year (at *t-1*). Incidence Rate Ratios (IRRs) are reported in lieu of coefficient estimates, with *t*-statistics in parentheses. Model includes a constant term whose estimate is suppressed. Superscripts a, b, and c indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. AD=antidumping.

Table 4. Emerging Economies, the Great Recession, and a Comparison to High-Income Economies

Dependent variable: Bilateral (*ij*) count of products initiated under all temporary trade barrier policies in year *t*

	Emerging economies, 1995-2010			**High income economies, 1989-2010**
Explanatory variables	Full sample, domestic real GDP (1)	G20 emerging, domestic real GDP (2)	G20 emerging, domestic un-employment (3)	Domestic real GDP (4)
Percent change in bilateral real exchange rate *ijt-1* x (pre-2009)	1.01	1.02[a]	1.03[a]	1.01[b]
	(1.46)	(4.18)	(4.80)	(2.30)
Percent change in bilateral real exchange rate *ijt-1* x (2009-2010)	1.02[c]	1.02[b]	1.01	1.00
	(1.91)	(2.04)	(0.62)	(0.10)
[Test statistic]	[1.10]	[0.74]	[3.56][c]	[0.65]
Domestic economy *jt-1* x (pre-2009)	0.93[a]	0.92[a]	1.30[a]	0.86[a]
	(3.14)	(4.29)	(3.75)	(3.31)
Domestic economy *jt-1* x (2009-2010)	1.11[a]	1.14[a]	0.71[c]	1.00
	(3.06)	(3.45)	(1.92)	(0.02)
[Test statistic]	[27.22][a]	[18.66][a]	[8.18][a]	[1.58]
Real GDP growth of trading partner *it-1* x (pre-2009)	1.00	1.04[c]	0.99	0.93[a]
	(0.16)	(1.85)	(0.29)	(2.74)
Real GDP growth of trading partner *it-1* x (2009-2010)	0.99	1.02	1.00	1.06
	(0.36)	(0.60)	(0.03)	(1.11)
[Test statistic]	[0.08]	[0.37]	[1.59]	[6.24][b]
Import growth from trading partner *ijt-1* x (pre-2009)	1.43[a]	1.77[a]	1.73[b]	1.00
	(2.65)	(3.03)	(2.28)	(0.74)
Import growth from trading partner *ijt-1* x (2009-2010)	0.35[b]	0.23[a]	0.29[b]	0.99
	(2.39)	(3.62)	(2.17)	(0.52)
[Test statistic]	[9.79][a]	[7.59][a]	[3.24][c]	[0.50]
Time trend included	yes	yes	yes	yes
Import and exporter combined fixed effects	yes	yes	yes	yes
Observations	1778	1168	708	1133

Notes: Policy-imposing economies *j* vis-à-vis one of the trading partners *i* (listed in the Appendix) over 1995-2010. Explanatory variables are each lagged one year (at *t*-1). Incidence Rate Ratios (IRRs) are reported in lieu of coefficient estimates, with *t*-statistics in parentheses. Each model includes a constant term, indicators for the WTO period interacted with the WTO discipline variable whose estimates are suppressed. Superscripts a, b, and c indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The notation x (pre-2009) indicates that a dummy for the pre-Great Recession years (2008 and earlier) is turned on, whereas x (2009-2010) indicates that a dummy for the years 2009-2010 is turned on.

Table 5. Comparing the WTO Period with the GATT and Other Results

Dependent variable: Bilateral (*ij*) count of products initiated under all temporary trade barrier policies in year *t*

	G20 emerging economies only, 1989-2008		**All emerging and high-income economies, 1995-2008**	
Explanatory variables	Domestic real GDP (1)	Domestic un-employment (2)	Domestic real GDP (3)	Domestic un-employment (4)
Percent change in bilateral real exchange rate *ijt-1* x GATT	0.98	0.99[b]	--	--
	(1.40)	(2.29)		
Percent change in bilateral real exchange rate *ijt-1* x WTO	1.01[a]	1.03[a]	1.01[b]	1.02[a]
	(2.77)	(3.65)	(2.21)	(3.40)
[Test statistic]	[9.74][a]	[16.78] [a]	--	--
Domestic economy *jt-1* x GATT	1.14[a]	0.64[b]	--	--
	(3.29)	(2.45)		
Domestic economy *jt-1* x WTO	0.94[a]	1.51[a]	0.93[a]	1.34[a]
	(3.20)	(5.93)	(4.25)	(5.50)
[Test statistic]	[19.91][a]	[17.58][a]	--	--
Real GDP growth of trading partner *it-1* x GATT	0.99	0.95	--	--
	(0.18)	(0.91)		
Real GDP growth of trading partner *it-1* x WTO	1.02	0.99	0.96[a]	0.93[a]
	(1.13)	(0.12)	(2.78)	(3.16)
[Test statistic]	[0.59]	[0.64]	--	--
Import growth from trading partner *ijt-1* x GATT	0.99	0.99	--	--
	(0.50)	(0.37)		
Import growth from trading partner *ijt-1* x WTO	1.00	1.77[b]	1.00	1.01
	(0.64)	(2.27)	(0.37)	(0.92)
[Test statistic]	[0.27]	[5.29][b]	--	--
WTO	2.57[a]	0.52	--	--
	(2.84)	(1.32)		
Change in the share of imported products under WTO discipline *jt-1* x WTO	1.03[b]	1.08[c]	1.02[b]	1.02
	(2.05)	(1.67)	(2.14)	(1.41)
Time trend included	yes	yes	yes	yes
Import and exporter combined fixed effects	yes	yes	yes	yes
Observations	1663	814	2917	1985

Notes: Policy-imposing economies *j* vis-à-vis one of the trading partners *i* (listed in the Appendix) over 1989-2008 or 1995-2008. Explanatory variables are each lagged one year (at *t*-1). Incidence Rate Ratios (IRRs) are reported in lieu of coefficient estimates, with *t*-statistics in parentheses. Model includes a constant term whose estimate is suppressed. Superscripts a, b, and c indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

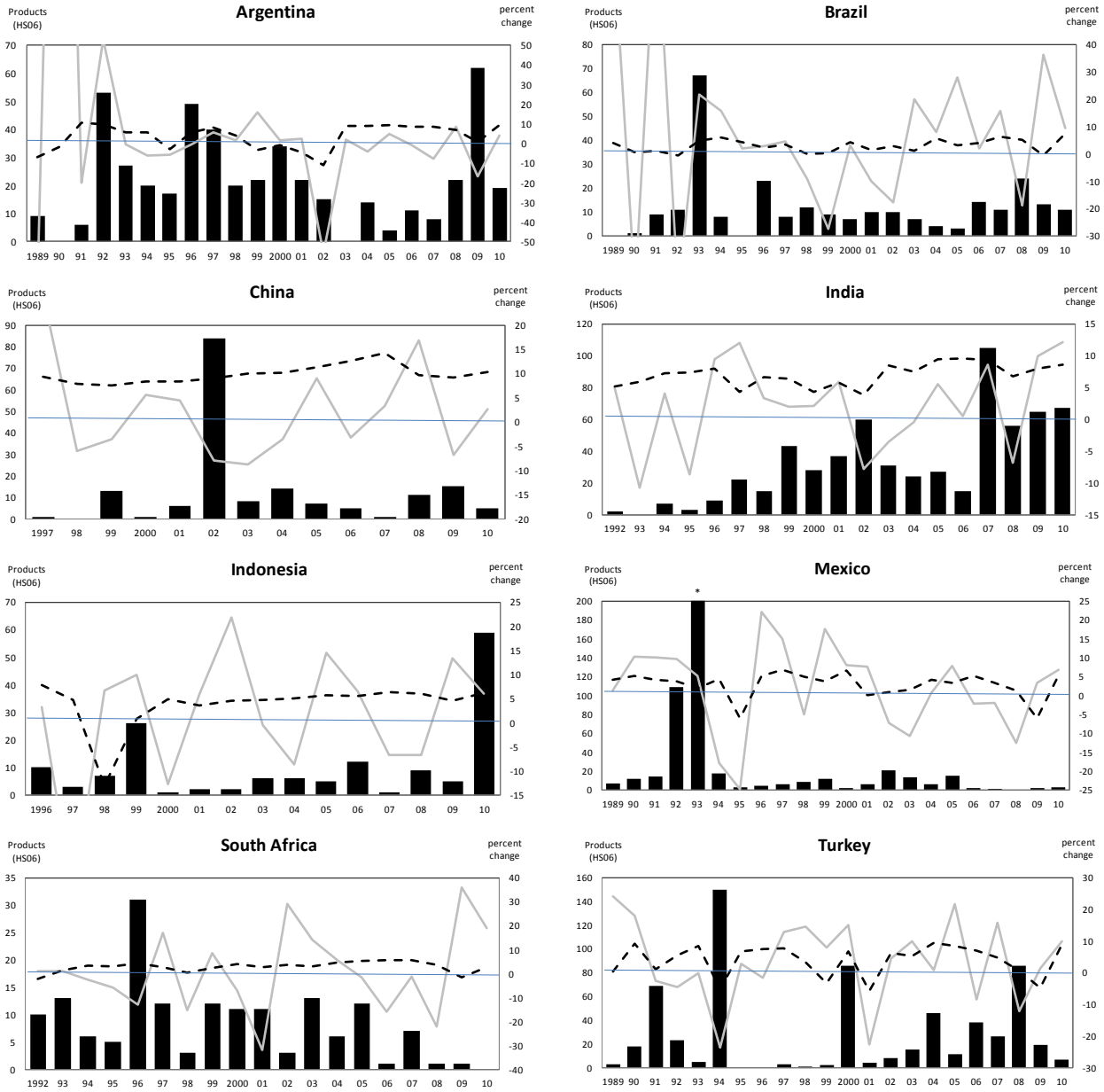
Table 6. Exchange Rate Regime Differentials for Emerging Economies, 1995-2010

Dependent variable: Bilateral (*ij*) count of products initiated under all temporary trade barrier policies in year *t*

	All emerging economies		**G20 emerging economies**	
Explanatory variables	Domestic real GDP (1)	Domestic un-employment (2)	Domestic real GDP (3)	Domestic un-employment (4)
Percent change in bilateral real exchange rate *ijt-1* x float	1.01[c]	1.01[b]	1.02[a]	1.03[a]
	(1.68)	(2.31)	(4.18)	(4.38)
Percent change in bilateral real exchange rate *ijt-1* x peg	1.01	1.00	1.01	1.01
	(0.55)	(0.04)	(0.99)	(0.35)
[Test statistic]	[0.00]	[0.34]	[0.44]	[1.19]
Percent change in bilateral real exchange rate *ijt-1* x float adopted in *t*-1	1.05[a]	1.04[b]	1.05[a]	1.03
	(2.85)	(2.01)	(2.95)	(1.47)
Domestic economy *jt-1* x float	0.97	1.19[b]	0.94[b]	0.99
	(1.22)	(2.11)	(2.42)	(0.12)
Domestic economy *jt-1* x peg	0.90[a]	1.37[a]	0.90[a]	1.39[a]
	(3.25)	(2.59)	(3.70)	(3.21)
[Test statistic]	[4.58]	[0.93]	[2.35]	[6.04]
Real GDP growth of trading partner *it-1* x float	0.95[b]	0.97	0.99	0.99
	(2.18)	(1.04)	(0.48)	(0.16)
Real GDP growth of trading partner *it-1* x peg	1.03	0.92	1.02	0.94
	(0.69)	(1.19)	(0.47)	(0.91)
[Test statistic]	[2.66]	[0.57]	[0.48]	[0.64]
Import growth from trading partner *ijt-1* x float	1.10	1.17	0.97	0.84
	(0.59)	(0.73)	(0.14)	(0.77)
Import growth from trading partner *ijt-1* x peg	1.87[c]	1.72	1.96[b]	1.96[c]
	(1.79)	(1.27)	(2.35)	(1.74)
[Test statistic]	[1.89]	[0.64]	[4.31]	[3.56]
Change in the share of imported products under WTO discipline *jt-1* x WTO	1.07[a]	1.07[a]	1.06[a]	1.04
	(4.95)	(3.15)	(4.36)	(0.91)
Time trend included	yes	yes	yes	yes
Import and exporter combined fixed effects	yes	yes	yes	yes
Observations	1745	1165	1168	708

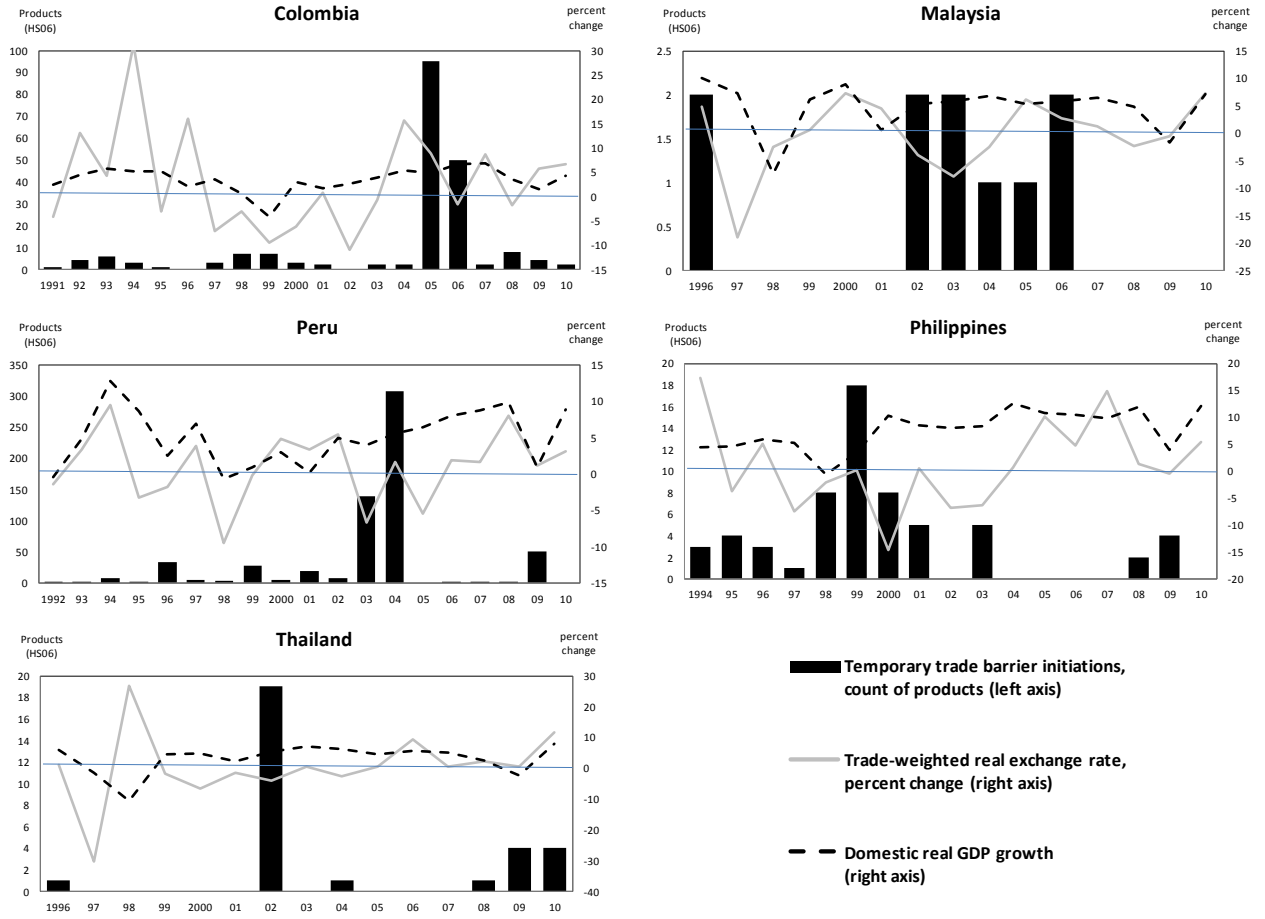
Notes: Policy-imposing economies *j* vis-à-vis one of the trading partners *i* (listed in the Appendix) over 1995-2010. Explanatory variables are each lagged one year (at *t*-1). Incidence Rate Ratios (IRRs) are reported in lieu of coefficient estimates, with *t*-statistics in parentheses. Model includes a constant term whose estimate is suppressed. Superscripts a, b, and c indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Figure 1. Import Protection, Real Exchange Rates, and Domestic Real GDP Growth: Emerging Economy G20 Members



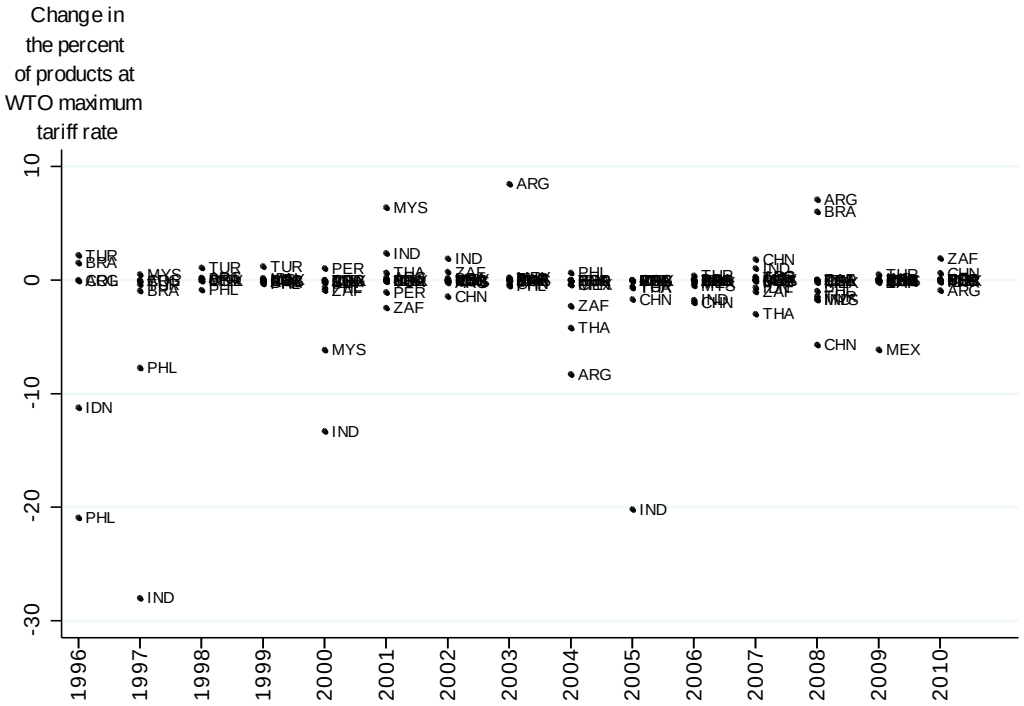
Source: constructed by the authors from annual data from OECD, USDA, and IMF and Bown (2012b). Increases in the real exchange rate series reflect appreciations of the domestic currency. Some outlier observations in certain years have been truncated as to maintain a usable scale for the variation in the other annual observations of the data. *Truncated as Mexico implemented TTBs over 1100 different HS-06 products in 1993.

Figure 2. Import Protection, Real Exchange Rates, and Domestic Real GDP Growth: Other Emerging Economies



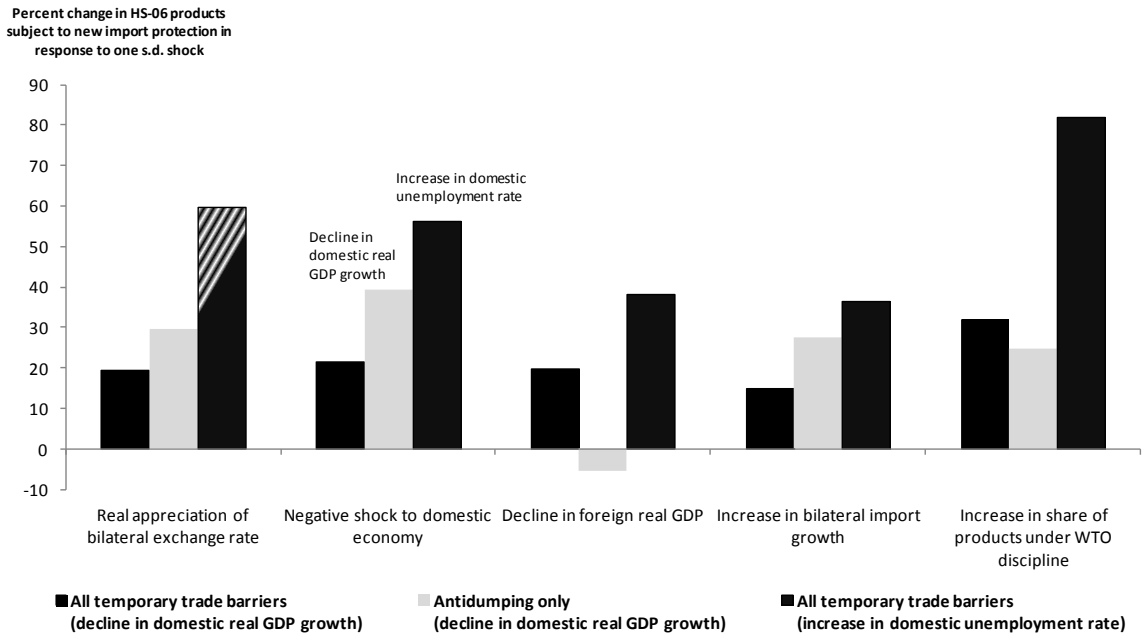
Source: constructed by the authors from annual data from OECD, USDA, and IMF and Bown (2012b). Increases in the real exchange rate series reflect appreciations of the domestic currency. Some outlier observations in certain years have been truncated as to maintain a usable scale for the variation in the other annual observations of the data.

Figure 3. Changes to WTO Disciplines over Emerging Economy Applied Tariffs, 1996-2010



Notes: Constructed by the authors from WTO (2011) and WITS. For scaling purposes, one observation for Thailand of -60 percent in 2000 is omitted from the figure; this observation is included in the empirical analysis.

Figure 4. Temporary Trade Barrier Responsiveness to Macroeconomic Shocks



Notes: Percent increase in HS-06 products subject to new import protection per year per trading partner. Based on Table 3 model estimates of specifications (1), (6) and (7) and a one standard deviation change in each explanatory variable away from the sample mean, holding all other variables constant.