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Import Protection, Business Cycles, and Exchange Rates

Evidence from the Great Recession

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Abstract

This research estimates the impact of macroeconomic fluctuations on import protection policies over 1988:Q1–2010:Q4 for the United States, European Union, and three other industrialized economies. First, estimates on a pre-Great Recession sample provide evidence of three key relationships for the US and EU. Increases in domestic unemployment rates and real appreciations in bilateral exchange rates led to substantial increases in antidumping and related forms of import protection. Furthermore, economies historically imposed these bilateral import restrictions on trading partners going through their own periods of weak economic growth. Second, estimates from the pre-Great Recession model predict a major trade policy response during 2008:Q4–2010:Q4, given the realized macroeconomic shocks. New US and EU trade barriers were projected to cover up to an additional 15 percentage points of nonoil imports, well above the baseline level of 2-3 percent of import coverage immediately preceding the crisis. Third, re-estimating the model on data from the Great Recession period illustrates why the realized trade policy response differed from model predictions based on historical data. While exchange rate movements played an important role in limiting new import protection, the US and EU also "switched" from their historical behavior during the Great Recession and shifted new import protection toward trading partners experiencing economic growth and away from those that were contracting.

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Produced by the Research Support Team

Import Protection, Business Cycles, and Exchange Rates: Evidence from the Great Recession

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We underscore the critical importance of rejecting protectionism and not turning inward in times of financial uncertainty. In this regard, within the next 12 months, we will refrain from raising new barriers to investment or to trade in goods and services, imposing new export restrictions, or implementing World Trade Organization (WTO) inconsistent measures to stimulate exports.

- G20 Declaration, November 15, 2008

1. Introduction

Since the imposition of the Smoot-Hawley tariffs during the early days of the Great Depression, a widespread presumption is that import tariffs and other forms of trade protection rise during periods of macroeconomic weakness. During the Great Recession, the fear of widespread import restrictions led to pre-emptive statements like the G20 Declaration of November 2008.

This paper uses quarterly data for the United States, European Union, Canada, Australia and South Korea to estimate the impact of macroeconomic shocks on import protection policies over 1988-2010. We investigate different periods of data and find that key features of business cycles, such as increases in domestic unemployment, as well as real appreciations in bilateral exchange rates and changing macroeconomic conditions in important trading partners, result in substantial, countercyclical increases in import protection. Not only do these macroeconomic shocks matter, but our evidence suggests that the changing nature over time and across trading partners of the relationship between protection and macroeconomic shocks has important implications for understanding any countercyclical patterns taking place across the multilateral trading system.

In the wake of the Great Depression, countries established the General Agreement on Tariffs and Trade (GATT) in the 1940s and created an institutional framework by which governments could more predictably, cooperatively, and transparently manage changes to their trade policies. In particular, at the same time that countries began to engage in multilateral negotiations to eventually reduce and bind their applied, non-discriminatory tariffs – rates that have been negotiated to what are now historically low levels – they wrote rules into the GATT that established *exceptions* that permit countries to temporarily opt-out and raise their trade barriers in the face of economic shocks.

Import restrictions such as antidumping, global safeguards, the China-specific safeguard, and countervailing duties – what we refer to throughout jointly as *temporary trade barriers* (TTBs) – are the primary policy exceptions to the liberal trade rules embodied in the GATT and its successor, the World Trade Organization (WTO). These policies are relatively substitutable and are the means

through which industrialized countries have most predominantly implemented *new* trade restrictions since the 1980s. Quantitatively, these restrictions are still economically important for the United States and European Union; 2-3 percent of nonoil imports were subject to some temporary trade barrier by the end of 2007, though this was down from a peak level of 5-6 percent for the US in the early 2000s.[1] While 2008-10 did not lead to the same sort of import restrictions that took place under the US Smoot-Hawley tariff and trading partners' response in the 1930s (Irwin 2011a,b), national trade policies were not left unchanged during the Great Recession. To the contrary, Bown (2011a) provides evidence of substantial trade policy "churning" – economies used TTBs to impose and remove a large number of *bilateral* import restrictions during this period. In the United States, for example, the cumulative effect of this churning was roughly a 20 percent increase in the stock of imports subject to these trade barriers by the end of 2010 relative to the level immediately prior to the crisis.

A substantial theoretical literature has evolved to explain the role of trade agreements and the use of temporary trade policy exceptions in the multilateral trading system under the GATT and WTO. The theoretical literature on these trade policy exceptions encompasses both terms-of-trade models of trade policy (Bagwell and Staiger, 1990, 2003) and segmented markets models of imperfect competition deriving from the seminal contribution of Brander and Krugman (1983). Our paper provides empirical support for the common predictions from these two different classes of trade models regarding the use of temporary trade barriers in the face of adverse macroeconomic shocks. Nevertheless, as Bagwell and Staiger (2003) and others have established, while there is an empirical presumption that import protection rises during recessions, there is not a universally acknowledged theory articulating the channels through which the countercyclical relationship between new import restrictions and macroeconomic shocks arise. [2] Thus, one purpose of this paper is to provide, in as

[1] More precisely, these estimates are constructed from the trade-weighted shares of 6-digit Harmonized System imports in non-oil product categories that are subject to one or more import-restricting policies under antidumping, countervailing duties, global safeguards, or China-specific safeguards. The computation uses the methodology presented in Bown (2011a). When measuring by the share of 6-digit Harmonized System product lines instead of the trade-weighted average, the import product coverage of these policies for the US and EU is greater at 3-4 percent by 2007.

[2] In their theoretical paper, Bagwell and Staiger (2003, pp. 1-2) best articulate the failure of "political" or "distributional" theories for trade policy to explain the countercyclical relationship between business cycles and import protection policies with

> "…a common argument is that tariffs are higher in recessions, because the political pressure from import-competing firms is then most pronounced. This explanation, however, is incomplete, since it

much detail as possible, evidence on the explicit linkages between macroeconomic shocks and import protection. Such evidence is important for understanding the role of trade agreements, their provision of exceptions, and the potential *limits* to what trade agreements can accomplish with respect to cooperative trade policy.

In addition to investigating the theory linking macroeconomic shocks to changes in trade policy, our paper provides a special focus on the events of 2008-2010.[3] Given the severity of macroeconomic shocks during the Great Recession, an open research question is: Why was the trade policy response so mild relative to expectations? As a first empirical assessment, we estimate the impact of macroeconomic fluctuations on the import-restricting policies of five separate industrialized economies – the United States, European Union, South Korea, Australia and Canada. Figure 1 shows for each of our five policy-imposing economies the time series of real exchange rate fluctuations, changes to domestic unemployment rates, and counts of imported products subject to new antidumping and related TTB policies in the quarterly data over 1988-2010.

We begin our formal analysis by estimating a model of new import restrictions on data that begins at the first quarter (Q1) of 1988 and ends in 2008:Q3. We estimate this model separately for each of the five policy-imposing economies and interpret the responsiveness of import protection to macroeconomic fluctuations. We then use the model to generate out-of-sample predictions for trade policy responses during 2008:Q4-2010:Q4, given the macroeconomic shocks that arose during the Great Recession. Finally, we estimate the models on data that includes 2008:Q4-2010:Q4 in order to compare how the responsiveness of import protection policies to macroeconomic shocks changed during the crisis, relative to the earlier period.

> ignores the political influence of other production sectors that might press for *less* protection in recessions…In light of these competing political influences, the common argument for countercyclical tariffs fails to be convincing, as it does not explain why the political pressures from import-competing sectors dominate in recessions but not in booms."

[3] A reasonable question is the extent to which our singular focus on TTB policies fully captures the new import protection activity during 2008-2010 by the five economies in our sample. According to data from the Global Trade Alert, TTBs are by far the predominant trade policy instruments through which these economies directly erected new import-restricting trade barriers in 2008-2010. Appendix Table I lists the *only other* examples from these economies that the Global Trade Alert characterizes as "red" – i.e., the measure has been implemented and almost certainly discriminates against foreign commercial interests - and is directed at imports. From this list, it appears that only a South Korean increase in tariffs on 16 different products in January 2009 would be characterized as a substantial protectionist import restriction that is not captured by our focus on TTBs.

We find evidence of a strong empirical relationship between macroeconomic fluctuations and US and EU import protection policies. Real appreciations in bilateral exchange rates and increases in domestic unemployment lead to substantial increases in antidumping and related forms of import protection. Furthermore, policy-imposing economies historically used such bilateral import restrictions on trading partners that were going through their own periods of weak economic growth. With the exception of Crowley (2011), most previous research does not sufficiently exploit the trading partner variation to identify this latter relationship. Empirically this is important because in the modern WTO system, new import protection is typically imposed bilaterally, unlike more general tariff protection.[4] Furthermore, evidence that potentially WTO-consistent TTBs were used to protect importing economies from negative growth shocks in trading partners is broadly consistent with the theory of trade agreements summarized by Bagwell and Staiger (2002); i.e., *international externalities* are the fundamental problem that trade agreements exist to solve.

Second, we use model estimates from pre-2008:Q3 data to generate out-of-sample predictions for expected trade policy reactions. The model predicts a surge in import protection in the United States and European Union in 2009:Q3. In terms of trade values, back of the envelope calculations put the forecasted *new* TTB import protection during 2008:Q4-2010:Q4 as covering up to an additional 15 percentage points of US and EU non-oil imports. This projected new coverage would have added roughly five to seven times as much import protection as the entire US and EU stock of imports cumulatively covered by TTBs immediately prior to the crisis (Bown, 2011a). We interpret the surge of new trade barriers predicted by the historical model as providing a rationale for the widespread fear of "protectionism" among policymakers that ultimately led to the coordinated, G20 declaration presented above.

Finally, while the US and EU did experience a surge in new trade barriers during the Great Recession, the increase turned out to have been much smaller than that predicted by the models estimated on the historical data. In our final exercise, we present estimates from a longer time series of data through 2010:Q4 so as to identify potential changes in the responsiveness of import restrictions to macroeconomic fluctuations relative to the pre-crisis period. First, a number of these

[4] Even when focusing on the antidumping alone, there is evidence that policymakers are applying the policy on a more discriminatory basis over time as it is increasingly imposed on imports from China. For a discussion, see Bown (2010). Antidumping is being less frequently imposed simultaneously on imports from multiple foreign sources of the same product, as had been the case in the 1980s and early 1990s (Hansen and Prusa, 1996).

policy-imposing economies, including the US and EU, "switched" from their historical behavior and refrained, on average, from implementing new import restrictions against those trading partners that were contracting during the Great Recession. Instead, these economies applied import restrictions against trading partners that were experiencing relatively stronger economic growth. This transmission channel may have been a particularly important force for dampening the overall incidence of import protection, in line with the G20 Declaration, given that so many trading partners were undergoing periods of macroeconomic contraction during the crisis.

A second contributing explanation to the substantially muted trade policy response for economies like the United States and European Union is the sharp and persistent real currency depreciations that started taking place in 2009. Had the sharp appreciations of the US dollar and euro of 2009 continued (see again the grey lines of Figure 1) or not been reversed, the historical estimates suggest a much larger surge in new trade barriers than what was ultimately realized.

Our paper is most closely related to the literature on macroeconomic determinants of antidumping import protection estimated on data from the 1980s and 1990s (Feinberg 1989, Knetter and Prusa 2003, Crowley 2011).[5] In addition to a first empirical analysis of the relationship between macroeconomic shocks and import protection during the Great Recession, our approach makes a number of advances, extensions and refinements to the previous literature. First, we take advantage of newly available and detailed data at the product-level from the World Bank's *Temporary Trade Barriers Database* (Bown, 2011b) to construct more precise, bilateral measures of import protection at the quarterly frequency. Second, we examine not just antidumping policy, but we also consider use of other, relatively substitutable forms of import protection that have taken on particular importance in the first decade of the 2000s, such as global safeguards, China-specific safeguards, and countervailing duties. Third, we rely on higher frequency macroeconomic data than most previous research, and this allows us to better address the relationship between business cycles, exchange rates, and import restrictions as well as the timing of any linkages. Fourth, we focus our analysis at the

[5] Feinberg (1989) focused on the 1982-1987 period for the United States and found evidence that more antidumping cases were associated with dollar depreciations. Knetter and Prusa (2003) examine annual data for the US, Canada, Australia and the EU over 1980-1998 and find strong evidence of a relationship between antidumping cases and local currency appreciations over this longer time series of data. Feinberg (2005) further investigates the Knetter and Prusa (2003) result to examine why the responsiveness of import protection to exchange rate movements has changed over this sample. Irwin (2005) extends the analysis for the US back to 1947 (through 2002) and provides evidence that nominal appreciations of the dollar are associated with more antidumping case filings per year.

bilateral level – i.e., between a policy-imposing economy and a particular trading partner – and this bilateral emphasis is important given the discriminatory (i.e., trading partner-specific) nature of import protection.

This paper also contributes to a growing literature on the role of trade policy during the Great Recession. In addition to Bown (2011a), which estimates the changing stock of imported products subject to temporary trade barriers, other research has catalogued tariff increases at the product-line level for large numbers of countries during the early period of the crisis. Kee, Neagu and Nicita (forthcoming) calculate Overall Trade Restrictiveness Indices for 2008 and 2009 and conclude that there was little increase in protectionism during the Great Recession with only a handful of countries (Russia, Argentina, Turkey and China) instituting tariff increases on important imported products. Gawande, Hoekman, and Cui (2011) examine changes in most-favored nation tariffs for a large set of countries as a function of microeconomic determinants such as the extent of intra-industry trade and vertical specialization in an industry. They conclude that a high degree of vertical specialization within an industry led to less import protection in 2009. In contrast, our empirical work focuses on identifying the initiation of new trade policy restrictions in a small number of industrialized countries both over a long time period (previous to, and through the crisis) and we seek to understand the macroeconomic determinants of new trade restrictions.[6]

The rest of the paper proceeds as follows. Section 2 presents the predictions of the theoretical literature on trade policy exceptions such as antidumping, safeguards, and countervailing duties, the empirical model, and the panel dataset that is used to estimate the five economy-specific models of macroeconomic determinants of import restrictions. Section 3 presents our basic results regarding the relationship between trade restrictions and macroeconomic fluctuations based on historical data leading up to the Great Recession. Section 4 analyzes the import protection response after the onset of the worldwide financial crisis. Section 5 concludes.

[6] A number of detailed case studies have examined micro-level features of the use of TTBs during the Great Recession, including for the United States (Prusa, 2011), European Union (Vandenbussche and Viegelahn, 2011), Canada (Ludema and Mayda, 2011) and South Korea (Kang and Park, 2011). However, none of these studies examine the macroeconomic relationships or models that our approach emphasizes.

2. Theory, Empirical Model and Data

2.1. Theoretical models of temporary trade barriers and macroeconomic shocks

A large theoretical literature examines the role of temporary trade barriers in trade agreements such as the GATT/WTO. Nevertheless, despite substantial research documenting the countercyclical nature of business cycles and import protection dating back to at least the Great Depression (Irwin, 2011a,b), there is not one universal theory linking imposition of new import restrictions to macroeconomic shocks. Bagwell and Staiger (2003), Crowley (2010) and Knetter and Prusa (2003) are the theoretical contributions that inform our basic empirical approach.

The Bagwell and Staiger (2003) theory models dynamic, self-enforcing trade agreements that are characterized by trade policy that fluctuates in response to macroeconomic conditions.[7] They relate business cycles to tariff increases in a model with serially correlated shocks to growth. In this rich model, two large symmetric countries play a trade policy game in which each period's one-shot game for every traded product is characterized by a terms-of-trade-driven prisoner's dilemma. An international business cycle is modeled as fluctuations in the rate of growth of new product entry and the international economy moves between periods of high growth and low growth according to two Markov-switching processes. Because of the possibility of terms-of-trade gains, the static welfare gain of a tariff hike increases with trade volume, and this would otherwise result in tariff increases being pro-cyclical. However, in the presence of the kind of positively serially correlated growth shocks that give rise to recessions, cooperation to maintain low tariffs is more difficult in periods in which the expected rate of future trade growth is low. Thus, unilateral tariff increases are less costly in welfare terms during recessions with persistently underperforming growth because it is precisely then that the cost of a trade war is relatively low. This basic intuition generates the key empirical prediction of the model: import restrictions increase during recessions.

The theory that import restrictions increase in response to macroeconomic weakness abroad is also found in Crowley (2010), which builds from the seminal, reciprocal dumping model of Brander and Krugman (1983). This theory focuses on the international trade rules regarding antidumping import restrictions, one of the policies of particular emphasis to our empirical analysis. In a model of

[7] Bagwell and Staiger (2003) build from an earlier model (Bagwell and Staiger, 1990) of self-enforcing trade agreements that links changes in trade policy to iid trade volume shocks. Bown and Crowley (2011) use a sample of annual US data from 1997-2006 to provide evidence from much more disaggregated, industry-level relationships in support of the Bagwell and Staiger (1990) theory.

imperfect competition in which domestic and foreign firms have capacity constraints, the foreign firm increases its exports to the domestic market at a "dumped" price when the foreign country's own demand for the product falls. In this environment, it is welfare-improving for the importing country to impose import restrictions against the foreign country that is trying to export its way out of a recession. The cross-sectional empirical prediction of this model is that an importer will impose trade restrictions against those foreign trading partners that are experiencing negative demand shocks in their own markets.[8]

Finally, Knetter and Prusa (2003) develop a stylized model of pricing behavior in a market with imperfect competition. Their focus is on understanding how international trading rules regarding dumping, i.e. pricing below average cost, are impacted by exchange rate fluctuations. In their simple model of a foreign firm that prices to market, an appreciation of the domestic currency leads to a decline in the foreign firm's marginal cost in terms of the importing country's domestic currency. At the same time, pricing to market under imperfect competition implies a relatively smaller decline in the domestic currency price of the foreign good. Thus, the foreign firm will simultaneously increase its sales in the domestic market (increasing the likelihood of injury to the domestic import-competing industry) and be less likely to be guilty of dumping. Because an exchange rate movement has opposite effects on the two criteria for dumping, the model gives ambiguous empirical predictions regarding the relationship between an exchange rate appreciation and new antidumping import restrictions.[9]

In summary, the literature on macroeconomic fluctuations suggests that temporary trade barriers increase when domestic macroeconomic conditions are weak (Bagwell and Staiger, 2003) and foreign domestic macroeconomic conditions are weak (Bagwell and Staiger, 2003; Crowley, 2010). An appreciation of the domestic currency relative to a trading partner's currency implies more import restrictions if a national authority's antidumping investigation places more weight on the criterion of injury to the domestic industry than it places on the criterion of dumping (Knetter and Prusa, 2003).

[8] Crowley (2011) examines US antidumping data for industries over 1980-2001 and finds evidence in support of this theory at the relatively disaggregated level.

[9] While Knetter and Prusa (2003) acknowledge the ambiguous theoretical predictions of their model, they find strong empirical evidence in annual data for 1980-1998 linking exchange rate appreciations to aggregated counts of antidumping filings for a sample of data including the US, EU, Canada and Australia.

2.2 Empirical model

This section presents an empirical model of the determinants of the number of imported products becoming subject 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 quarter to a lagged value of the percent change in the bilateral real exchange rate, the change in the domestic unemployment rate, and foreign real GDP growth.

The dependent variable is the number of products imported from country *i* against which temporary trade barrier investigations are initiated by an importing economy in a quarter, *t*. Empirically, the dependent variable is a non-negative count which exhibits over-dispersion in that the variance of the number of investigations per time period exceeds the mean (see Table 1).

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_{it}, follows a Poisson process after conditioning on the explanatory variables, x_{it}, and unobserved heterogeneity, u_{it}>0. Specifically,

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

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

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

We use maximum likelihood to estimate the relationship between the number of products subject to policy investigations by an importing economy (United States, European Union, South Korea, Australia, Canada) against country *i* in quarter *t* as a function of the second lag (quarter *t-2*) of the percent change in the bilateral real exchange rate, the change in the domestic unemployment rate, and foreign real GDP growth. The model for each importing country is identified off intertemporal variation in the domestic unemployment rate in addition to intertemporal *and* cross-sectional variation in bilateral real exchange rates and foreign trading partner GDP 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 second 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 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.

2.3 Data and variable construction

There are a number of innovations in our data and modeling approach relative to the previous literature (e.g., see Knetter and Prusa, 2003). Our first innovations consider how to measure import protection. For one, we are able to construct a quarterly series of bilateral trade policy actions at the universally-defined, 6-digit Harmonized System (HS-06) product level. The data dates back to the 1980s and derives from extremely detailed trade policy information found in the World Bank's *Temporary Trade Barriers Database* (Bown, 2011b). Second, we include not only import protection under the antidumping policy, as has been the focus of the previous literature, but we also include arguably substitutable policies such as global safeguards, China-specific safeguards, and countervailing duties. This second point may be particularly relevant given that a number of high-profile recent episodes of import protection – including the 2001-3 global safeguard on steel products imposed by the US, EU, and a number of other countries, and the 2009 US China-specific safeguard on imports of tires – took place under these alternative temporary trade barrier policies and would not be captured by an analysis restricted to antidumping.

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 quarter *t* and against which there is not already an existing TTB in place.[10] This count variable is carefully constructed for each policy-imposing country by trading partner and by quarter in a conservative way that does not allow for redundancy.[11] In robustness checks, we also construct this

[10] In Appendix II, we present evidence from robustness checks that include a focus only on counts of products under investigation that ended in formal trade barriers being imposed.

[11] 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 6-digit HS 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 6-digit category as a previously imposed measure, we do not include such products. Second, for the more expansive import protection measure

variable using the antidumping policy alone. Because the Harmonized System has been in place and utilized across countries only since 1988, the time series dimension of our data begins at the earliest in 1988:Q1.

A second innovation to our approach is to examine data at the quarterly frequency, a potentially important phenomenon given that macroeconomic shocks may cross calendar years. The key macroeconomic determinants of import protection in our model are bilateral real exchange rates, domestic unemployment rates, and the foreign trading partner's real GDP growth, with each of the variables reflecting year-over-year changes at the quarterly frequency.[12] We define the exchange rate variable for each partner as the percent change in the real bilateral exchange rate between the foreign and local currency, so that an increase indicates an *appreciation* of the local (policy-imposing economy's) currency.[13] The domestic unemployment variable is defined as the level change in the domestic unemployment rate. This approach follows Irwin (2005); in robustness checks we have used domestic real GDP growth in lieu of unemployment and found for some countries that temporary trade barriers are more responsive to domestic unemployment changes than to real GDP growth.

The third innovation that we stress in our panel data approach is to focus on bilateral relationships between policy-imposing economies and their key trading partners.[14] This is potentially

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covering all four policies, we also do not include products that were subject to a simultaneous or previously imposed measure 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 (2011a).

[12] We are forced to use year-over-year changes in these variables as opposed to quarter-to-quarter changes due to how quarterly real GDP for China, one of the key trading partners in the analysis, is defined and available in the underlying data. Thus each of the key macroeconomic determinants are defined as year-over-year changes; i.e., quarter 1 of year *t* over quarter 1 of year *t-1*, quarter 2 of year *t* over quarter 2 of year *t-1*, etc.

[13] Finally, there are a number of unique issues associated with variable construction for the EU over this time period that also merit discussion. The EU underwent a still sizeable membership expansion during the period 1999-2010 – from 15 countries at the beginning of the period to 27 by the end of the sample. Once a country becomes a member of the EU it can no longer be targeted by EU antidumping, safeguard, or countervailing duty policies – as such, 12 countries that were significant EU trading partners (and hence potential antidumping targets) in 1999 cannot be included in the sample because they were part of the EU by 2007. Furthermore, the expanding membership means the definition of the economies comprising domestic employment and being subject to a common EU exchange rate are changing over time, which creates potential additional issues of measurement error.

[14] Appendix I provides a list of the fifteen trading partners included in each of the five policy-imposing economies' panel data sets used in the estimation. These trading partners range from cumulatively accounting for the source of 75 percent (EU) to 94 percent (Canada) of each policy-imposing economy's non-oil imports during the sample periods.

important for two reasons. First, the temporary trade barriers that high income economies are employing are bilateral or discriminatory in nature.[15] Furthermore, a theoretical relationship that we wish to examine is whether import protection is applied against trading partners that are experiencing negative economic shocks at home. Thus a modeling approach that considered only the use of import protection aggregated over trading partners may not accurately capture the importance of these potential shocks. To assess this empirically, we rely on trading partner *i*'s real GDP growth to capture the relative strength of the exporting economy's domestic macroeconomic conditions.

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 two quarters earlier, i.e., at time *t*=-2.

Table 1 presents summary statistics for the quarterly data used in the empirical analysis. Appendix I provides more information on the underlying sources of the data.

3 Baseline Estimates from the Pre-Crisis Period

Table 2 presents our first set of results on the quarterly data for the "pre-Crisis" period 1988:Q1 - 2008:Q3. We consider a separate panel data set for each of five policy-imposing economies – the United States, the European Union, South Korea, Australia and Canada – and their bilateral trade policy actions with respect to 15 of their top trading partners. The dependent variable is defined as the count of 6-digit Harmonized System (HS-06) imported products against which the government has newly initiated a temporary trade barrier investigation against trading partner *i* in quarter *t*.

As is common practice for negative binomial regression models, the tables 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 determinant of interest; i.e., the explanatory variable is associated with an increase in the number of imported products from trading partner *i* in quarter *t* subject to a new TTB investigation. Conversely, an estimated IRR that is statistically less than 1 is evidence that an increase in the explanatory variable is associated with a reduction in the count of imported products subject to new import protection. The table also reports t-statistics for whether the estimated IRR is

[15] Even in the case of the application of global safeguards – which are supposed to be applied on a nondiscriminatory basis against all import sources of a product – economies typically apply them in a discriminatory fashion to exclude PTA partners or some developing countries. For a discussion, see Bown and McCulloch (2003). The construction of the policy variables in our bilateral panel data set only counts global safeguards against trading partners that were included in the policy.

statistically different from 1. The three macroeconomic determinants of interest are the percent change in the bilateral real exchange rate, the change in domestic unemployment rate, and the foreign trading partner's real GDP growth. Each model includes trading-partner specific fixed effects to control for time-invariant, partner-specific heterogeneity in their treatment under these policies – e.g., China's designation as a non-market economy could affect the treatment of its exporters (relative to another economy's exporters) under antidumping provisions. Finally, there are two sets of results for each of the policy-imposing economies: one that focuses on that economy's use of antidumping policy alone (the emphasis of the traditional literature), and a second that includes the broader definition of import protection inclusive of each of the relatively substitutable forms of temporary trade barriers – antidumping, countervailing duties, global safeguards, and China-specific safeguards.

3.1 Pre-crisis estimates for the United States and European Union

Consider column (1) of Table 2 and the results examining the United States' antidumping import policy response to these macroeconomic shocks over 1988:Q1-2008:Q3. Each of the three key determinants for the United States has the expected impact and is statistically significant at the 1 percent level.

An estimated IRR of 1.02 indicates that a real appreciation of US dollar is associated with increased import protection through the antidumping policy; this evidence is consistent with related results from a 1980-1998 sample reported by Knetter and Prusa (2003). The IRR of 1.75 on the change in domestic unemployment rate is greater than 1 and indicates that import protection also increases when the domestic economy is weakening through rising unemployment. The IRR of 0.92 on foreign real GDP growth is evidence that the US uses additional import protection against trading partners that are going through their own periods of weak economic growth. The time trend estimate of 0.98 indicates that US import protection through this policy has been declining over the sample period. Finally, the IRR of 19.88 on the indicator that the trading partner is China is evidence that it was substantially more likely than the omitted trading partner (in this case, Australia) to face additional

import protection.[16] As has been well documented elsewhere (e.g., Bown, 2010), this China phenomenon is pervasive across policy-imposing economies, including each under examination here.

Column (2) of Table 2 reports our preferred specification for the United States. It uses the same sample of data and model as the first column; the only innovation is the dependent variable reflects not only US antidumping import protection but also its use of other temporary trade barriers such as global safeguards, China-specific safeguards, and countervailing duties. While the qualitative nature of the IRRs in the second column is similar to the first column, the magnitude of the impact of an appreciating US exchange rate changes considerably. One implication is that for the United States, a sole focus on antidumping misses an important component to the relationship between import protection and macroeconomic shocks during this period; importantly, it misses the global safeguard on steel products associated with the 2001-2 recession and period of an appreciating US dollar (see again Figure 1). Therefore, the subsequent analysis for the United States in the remaining sections of the paper relies on the more expansive definition of temporary trade barriers. This issue will be important to consider for a number of the other four policy-imposing economies as well.

Consider next an interpretation of the economic significance of the magnitudes of the results for the United States. Figure 2 presents a graphical interpretation of the economic effect of these macroeconomic shocks on the quantity of new import protection. We present the percent increase in the count of imported products per trading partner per quarter subject to new TTBs that are associated with a one standard deviation change in each macroeconomic determinant. Specifically, we compute the median of the model's predicted estimates of import protection evaluated using the sample data; and we then introduce (one at a time) a one standard deviation shock to each of the macroeconomic determinants of interest, holding everything else constant, and regenerate the model's predictions of import protection.

The US panel of Figure 2 interprets estimates for impacts on both the antidumping policy alone and all temporary trade barriers. In terms of magnitudes, a one standard deviation increase in the percent change of the US dollar-bilateral real exchange rate in the quarterly data for this sample period (see Table 1) is roughly a 16 percent (year-over-year) appreciation. This 16 percent appreciation is associated with a 37 percent increase in imported products subject to antidumping

[16] The IRRs for the other trading partners are not reported in the table but are available from the authors upon request. In terms of scale, the estimated IRR for China in the US models, for example, is more than twice as large as that for the second-highest trading partner.

protection per trading partner per quarter. The same size shock is associated with a 99 percent increase in imported products subject to all TTB protection per trading partner per quarter.

The US estimates for shocks to the other key macroeconomic determinants are also sizeable. Figure 2 illustrates how a one standard deviation increase in the US unemployment rate – i.e., roughly two-thirds of a percentage point (see again Table 1) - is associated with, *per trading partner*, a 43 percent increase in antidumping protection and a 40 percent increase under the more expansive measure of import protection. Furthermore, a one standard deviation shock to a trading partner's real GDP growth in the form of an economic contraction is associated with a 33 percent increase in US antidumping protection against that partner and a 25 percent increase in the more expansive import protection measure.

Consider next the Table 2 results for the European Union, which we have noted are estimated on a shorter time series of data (1999:Q1-2008:Q3) to coincide with the implementation of the common euro currency which began for much of the European Union only in 1999. The model produces weak estimates when considering EU import protection through its antidumping policy alone. The IRR for the exchange rate appreciation is greater than 1 and the IRR for foreign GDP growth is less than 1. While these estimates are consistent with the theory, neither IRR is statistically significant. Furthermore, the IRR for the change in domestic unemployment is less than 1, though this is also not statistically significant.

However, Table 2 estimates of the EU model in column (4) are in line with the theory when we consider the more expansive measure of TTB import protection. The main contributor to the differential in the data across the two policy variables is due to EU imposition of an extensive set of import restrictions on steel products through its global safeguards policy in 2002. In this specification, an IRR of 1.05 indicates that a real appreciation of the euro is associated with increased import protection. Figure 2 interprets a one standard deviation appreciation of the euro as leading to 95 percent more imported products being subject to TTBs per trading partner per quarter, relative to the model's estimates at the means of the data. The IRR of 1.61 on the change in the EU's domestic unemployment rate implies that import protection also increases when unemployment is rising at home. While this IRR estimate is (marginally) not statistically different from 1, Figure 2 illustrates that a one standard deviation shock to this variable results in a 26 percent increase in import protection per trading partner per quarter. The IRR of 0.81 on foreign real GDP growth is strong evidence that the EU responds to trading partners' macroeconomic weakness through additional import protection

– a one standard deviation decline in a trading partner's real GDP growth is associated with the EU subjecting 101 percent more imported products from that trading partner to TTBs.

To summarize, there is strong evidence for the United States and the European Union from the period before 2008:Q3 that macroeconomic shocks are associated with substantial increases in antidumping and related forms of import protection. Furthermore, an important innovation relative to the prior literature is to consider a more comprehensive definition of import protection beyond antidumping; e.g., estimates on antidumping alone on this period's data fail to capture the true impact of these shocks on import protection. In terms of particular US and EU results, a 13-16 percent real appreciation of the bilateral exchange rate can result in nearly twice as many products being subject to these forms of import protection per trading partner per quarter. An increase in the domestic unemployment rate by roughly one half of a percentage point is associated with 26-40 percent more imported products per trading partner per quarter being subject to new TTBs.

The third point worth highlighting is that the IRR for foreign GDP growth is frequently less than 1 throughout the estimates of Table 2. Though this IRR is not always statistically different from 1, there is evidence from 1988:Q1–2008:Q3 that the US and EU tended to impose new import protection on trading partners that were themselves undergoing a period of weak economic growth or an economic contraction. This result is particularly important for understanding the differential government policy responses during the Great Recession, as we discuss in section 4. Furthermore, evidence that governments use new import restrictions against trading partners experiencing negative growth shocks is broadly supportive of the theory that a central role for trade agreements and their policy exceptions is to address international externalities (Bagwell and Staiger, 2002).

Finally, while Table 2 presents a relatively compact number of specifications for each policy-imposing economy due to space constraints, Appendix II provides detail on a number of additional robustness checks that we have undertaken so as to provide clarity as to the sensitivity of our US and EU results to alternative formulations of the data and model.

3.2 Pre-crisis estimates for South Korea, Australia and Canada

Thus far, our discussion has focused on the estimated trade policy response to macroeconomic shocks for the relatively "large" importing economies of the United States and European Union. The remaining columns of Table 2 apply the same methodological approach to data for three other, relatively smaller, high-income economies– South Korea, Australia, and Canada.

The Table 2 estimates for South Korea in columns (5) and (6) are mixed. Real appreciation of the South Korean won, as well as periods of weak foreign economic growth, are associated with Korea applying more import protection on trading partners through antidumping and related TTB policies. However, the IRRs on the real exchange rate estimate are not statistically different from 1. Furthermore, periods of rising unemployment in South Korea are *not* associated with more import protection – in fact, the IRRs for South Korea are less than 1 (and statistically significant under the more expansive import protection specification 6) and suggest that periods of a strong domestic economy were associated with episodes of greater import protection.

Columns (7) and (8) provide evidence that Australia's use of these forms of import protection is associated with periods of rising domestic unemployment. An IRR of 1.46 implies that a one standard deviation increase to the unemployment rate results in a 37 percent increase in import protection per trading partner per quarter. However, unlike the results for the US, EU and South Korea, Australia's use of import protection is associated with periods of a depreciating national currency. Furthermore, while the IRR on Australian trading partners' real GDP growth is less than 1, it is not statistically significant. However, like the United States, and the EU, Australia's use of these forms of import protection has also trended down during 1988:Q1-2008:Q3.

The final three columns of Table 2 present evidence for Canada. Columns (9) and (10) apply the Canadian data and the same model specifications that we have used for each of the other economies. There are no statistically robust results across specifications except for the higher frequency with which China as a trading partner faces import protection. In the final specification for Canada presented in column (11), we introduce a new determinant defined as simply the count of imported products against which the *United States* initiated import protection policy actions against trading partner *i* one quarter earlier. The IRR on this variable is 1.06 and statistically significant, suggesting that Canada's use of TTBs may be closely linked with US use of TTBs against common trading partners.[17] While speculative, such linkages could come through political-economic shocks at the industry level that are common across the two countries (e.g., due to multinational firms,

[17] As documented in Bown (2011b), there are a number of instances in which the United States initiated a TTB investigation against a third country and Canada initiated a TTB investigation over the same product against the same country soon thereafter, with both economies imposing new import protection. For example, the United States initiated antidumping on carbon steel plate products from China in 1996:Q4, followed by a Canadian antidumping case on 2 of the same HS06 products from China in 1997:Q1. Second, the United States initiated antidumping on steel concrete bar from Indonesia, Japan and four other countries in 2000:Q3, and Canada did the same in 2000:Q4. As a third example, the US initiated antidumping on oil country tubular goods from China in 2009:Q2, and Canada replicated this in 2009:Q3.

common union organization) or through the secondary impact on Canada when the United States is confronted with macroeconomic shocks, perhaps due to Canada's heavy reliance on the US market for imports and exports.

To conclude this section, the estimated trade policy response to macroeconomic shocks appears to be somewhat weaker for smaller industrialized countries such as South Korea, Australia and Canada than for the United States and European Union.

4 Import Protection during the Great Recession

4.1 Protectionist expectations

The early period of the Great Recession and the widespread fear of "protectionism" among policymakers led to the coordinated, G20 declaration of November 2008 cited above. Furthermore, policymakers asked major multilateral institutions to establish new trade policy surveillance initiatives in order to monitor and report on national changes in policies that could impact international trade.[18] Figure 3 uses data on Internet searches from Google Trends to summarize the general public's increasing awareness of "protectionism" (and the "Great Depression") during this period.[19]

Figure 4 provides one explanation for the increased concern over "protectionism" and the associated response. The left panels of Figure 4 take the US and EU model estimates from Table 2 – i.e., based on pre-crisis data – and generate the *predicted* import protection response over 2008:Q4-2010:Q4 given the realized macroeconomic shocks that took place. The historical models for the US and EU predicted a sharp increase in import protection beginning in 2009:Q2 and lasting through 2010:Q1, peaking in 2009:Q3. As one way of providing context, the median number of products subject to new US TTBs against these 15 trading partners per quarter between 1988:Q1 and 2008:Q3 was 12. The model's US prediction for 2008:Q4-2010:Q4 peaks at *647 products* being subject to new TTBs in 2009:Q3 alone. The median number of products subject to new EU TTBs against these 15 trading partners per quarter between 1999:Q1 and 2008:Q3 was 9. The model's EU prediction for 2008:Q4-2010:Q4 peaks at *264 products* being subject to new TTBs in 2009:Q3.

[18] Bown (2011c) provides a discussion of the World Bank's initiatives, as well as efforts by the World Trade Organization Secretariat and the establishment of the high-profile Global Trade Alert. Baldwin and Evenett (2009) provide an initial collection of research taking stock of what was known about the trade collapse of 2008-9 and the protectionist response to date as of March 2009.

[19] Choi and Varian (2009) present a discussion of alternative uses of Google Trends in economic research.

To provide additional context, our back of the envelope calculations suggest the historical models forecast an upper bound at roughly 15 percent of US and EU nonoil imports becoming subject to *new* import protection during the Great Recession. In particular, the US model predicted that cumulatively 1558 new imported product – trading partner combinations would become subject to new TTB investigations during the period of 2008:Q4 through 2010:Q4. If we use the value of imports for a typical product – trading partner combination subject to one of these 1558 new TTBs as the mean from the realized sample (of product – trading partner combinations) that were *actually* confronted with new US TTBs during this period, we arrive at an upper estimate that 15.4 percent of US non-oil imports could be expected to become confronted with new US TTBs.[20] Similarly for the EU, the cumulative effect of its 623 imported product – trading partner combinations (see again Figure 4) translates into 14.0 percent of EU non-oil imports forecasted to become confronted with new EU TTBs between 2008:Q4 and 2010:Q4.[21] Estimates from Bown (2011a) put the pre-crisis, trade-weighted share of US and EU imports subject to the existing stock of TTBs at only 2-3 percent; i.e., the predictions were that this TTB coverage of imports would increase 5-7 times above pre-crisis levels.

The reasons for the predicted run-up in new import protection illustrated in Figure 4 are clear given the results of Table 2 for the US and EU and the magnitude of the worldwide recession – i.e., new import protection was historically associated with appreciating real exchange rates, rising domestic unemployment, and economic contraction abroad. The US saw a sharp appreciation of the US dollar, and the EU experienced a brief period of an appreciating euro. The unemployment rate rose significantly in both economies. Finally, the simultaneity of the recession *across the world* implied that virtually every US and EU trading partner was also undergoing a sharp decline in real GDP

[20] To clarify the thought experiment, the import data used to construct these shares are all taken from 2007, to remove any potential contamination associated with the 2008-9 trade collapse. Nevertheless, the products in focus would not become subject to TTB policies until 2008:Q4-2010:Q4. The mean value of annual imports in 2007 for one of the 94 product – trading partner combinations that were actually confronted with new US TTBs between 2008:Q4 and 2010:Q4 was $133.4 million. The estimate of 15.4 percent is derived by taking this $133.4 million, multiplying it by 1558 product – trading partner combinations, and dividing by $1.34 trillion – i.e., the total US non-oil imports from these 15 trading partners in 2007. The estimate is an upper limit given that product – trading partner combinations affected by US TTBs in the data ($133.4 million) are much higher than the mean product – trading partner combination in the entire sample ($30.2 million) which includes non-TTB affected products.

[21] Compared to the US, even though the EU had a much lower count of product – trading partner combinations predicted to become subject to TTBs (623 versus 1558), the mean value of EU annual imports in 2007 for the 84 product – trading partner combinations that were actually confronted with new TTBs between 2008:Q4 and 2010:Q4 was $247.3 million. Finally, EU non-oil imports from its sample of 15 trading partners in 2007 were $1.1 trillion.

growth during this period. These three factors combined to create a potential perfect storm of conditions for a large increase in new import protection, given the way policymakers in the US and EU had historically responded, as documented in Table 2.

Nevertheless, as the solid line of the right panel of Figure 4 illustrates, the realization of new import protection for the US and EU was much different from that which was predicted from model estimates based on historical data. While the timing of the US peak of the predicted response corresponds exactly (2009:Q3) with what actually took place, the *magnitude* of the realized increase was much smaller. Cumulatively across the 15 trading partners under study, the US responded with 16 times fewer new products being covered by these trade barriers than the pre-crisis model estimates predicted. Similarly, the EU responded with nearly 8 times fewer new products being covered by these trade barriers than the model predicted. US TTBs affected 0.9 percent of nonoil imports, far less than the forecasted upper limit of 15.4 percent. EU TTBs affected 1.9 percent of nonoil imports, also far less than its forecasted upper limit of 14.0 percent.[22]

Furthermore, for the EU, the difference between the left panel and the solid line of the right panel also illustrates that the *timing* of new import protection was delayed by three quarters (from 2009:Q3 to 2010:Q2) relative to the pre-crisis model's predictions.

4.2 Why did so little import protection arise?

Given the severity of macroeconomic shocks that took place during the Great Recession, a fundamental research question of interest is: What explains the import protection that did and did not arise? To address this question systematically, we re-estimate our preferred specifications from Table 2 on a time series of data that extends through the crisis period of 2010:Q4. We introduce pre-crisis (1988:Q1-2008:Q3) and crisis (2008:Q4-2010:Q4) dummy variables to interact with the three key macroeconomic determinants so that we can test for whether import protection responded to macroeconomic shocks differentially across the two sub-periods.[23] Table 1 again presents summary

[22] Specifically, these figures are based on matching the 94 (84) US (EU) product – trading partner combinations that were actually confronted with new US (EU) TTBs between 2008:Q4 and 2010:Q4 with the 2007 import value data, and comparing it with the 2007 value of nonoil imports from the 15 partners in its sample.

[23] The qualitative pattern to our results does not change if we move the definition of the beginning of the crisis period by 1 or 2 quarters.

statistics that highlight the differences in means and standard deviations of the underlying data series across the two periods.

Table 3 presents our results under this approach. First consider the estimates on the US sample of data. For the 1988:Q1-2008:Q3 period, the estimated IRRs for each of the three macroeconomic determinants are close to the size of the corresponding estimates in Table 2 that we discussed in Section 3.1.[24]

How did the US responsiveness to macroeconomic fluctuations *change* during 2008:Q4-2010:Q4? For two of the three macroeconomic determinants, the estimated IRRs did not change in statistically meaningful ways away from the 1988:Q1-2008:Q3 estimates. The IRR estimate of 1.06 on the bilateral real exchange rate is not statistically different from the pre-crisis IRR estimate of 1.04, and the IRR estimate of 1.76 on the domestic unemployment change is not statistically different from the pre-crisis IRR estimate of 1.67. Thus model estimates do not support the idea that the there was a significant behavioral change in the United States when it came to the impact of the exchange rate shock and the domestic shock to unemployment.

The one variable in the first column of Table 3 for which there is an estimated behavioral change concerns the impact of foreign real GDP growth on new US TTBs. Whereas a pre-crisis IRR estimate of 0.92 on foreign real GDP growth indicates that the US had used import protection historically against trading partners that were experiencing periods of weak economic growth, the estimated IRR is 1.08 during 2008:Q4-2010:Q4. While this second IRR was not statistically greater than 1, the pre-crisis and crisis IRRs are statistically different *from one another*, thus signaling a change in behavior. Overall, the US "switched" from its previous behavior and toward implementation of new TTB import protection against those trading partners that were experiencing economic growth and not against those that were contracting. This is a particularly important contributor to the low levels of import protection that arose given that so many of the US's key trading partners were themselves experiencing periods of severe economic contraction or weak economic growth during the Great Recession.

[24] The estimates for the 1988:Q1-2008:Q3 period in Table 3 are not identical to Table 2 because of the assumption that the impacts of the trading partner-specific effects are the same across both the 1988:Q1-2008:Q3 and 2008:Q4-2010:Q4 sub-periods.

The second column of Table 3 presents a robustness check for the United States by including one additional explanatory variable, defined as the growth rate in bilateral imports.[25] This variable is included to address the concern that import protection through TTBs is typically associated with substantial import growth; thus the muted import protection response during 2008:Q4-2010:Q4 could be due to the global collapse in trade flows that took place in 2008-9 (Baldwin and Evenett, 2009).[26] Table 3 illustrates that controlling for this does not affect either the qualitative nor quantitative nature of our results.

A final explanation from the first two columns of Table 3 for the lack of a major import protection response by the United States during 2008:Q4-2010:Q4 is taken from the bilateral real exchange rate IRR estimate. We have already noted that it remains greater than 1 and it is also not statistically different from the pre-crisis IRR estimate, implying in both cases temporary trade barriers increase when the US dollar appreciates. Consider this in the context of the time path of the US real exchange rate data illustrated with the grey line in Figure 1; i.e., shortly after the sharp appreciation of the US dollar in 2009:Q1, the dollar depreciated by a nearly identical amount, and then continued a period of weakening throughout 2009-2010. A contributing explanation to the lack of a larger US import protection response during 2009-2010 was likely that the US dollar was weakening vis-à-vis a number of major trading partners.

Table 3's results for the EU share a number of qualitative similarities with the evidence from the United States. Consider the third and fourth columns of Table 3. The most important result is that, like the United States, there is a statistically differential estimated IRR on foreign real GDP growth across the two periods. Thus there is also evidence of a behavioral change by the EU to switch away from imposing import protection on trading partners that were contracting, as had been the historical pattern, and toward those that were growing. With so many of the EU's trading partners also experiencing economic contraction during 2008:Q4-2010:Q4, the implication of this effect was to

[25] Due to a lack of quarterly data on trading-partner specific import price indices, these data are in nominal terms. However, because this variable is also constructed from year-over-year data, we are not concerned with potential seasonality issues.

[26] In principle, a necessary legal condition under WTO rules for applying each of the TTB policies is that the domestic industry should be injured *because of* imports – whether they be dumped (antidumping), subsidized (countervailing duties) or surging (safeguards). In theory, evidence that imports had recently been in decline could make it more difficult for government authorities to justify decisions on whether to impose TTBs. Nevertheless, the extent to which such policy decisions are made based on evidentiary criterion found in the legal statutes versus other political and economic factors, such as those under investigation here, is an open research question and the subject of an extensive literature.

reduce new EU import protection. Like the United States, the EU's IRR estimate on the domestic unemployment change during 2008:Q4-2010:Q4 (2.28 in the third column) is not statistically different from the pre-crisis IRR estimate (1.58), indicating that a weak domestic economy leads to more TTBs in both periods.

Unlike the United States, the estimated IRRs for the EU's bilateral real exchange rate for 2008:Q4-2010:Q4 are less than 1 and they are statistically less than the EU's IRR estimate for the earlier period. Thus there is some evidence that the EU imposed fewer TTBs in response to the euro appreciation early in the crisis; the 1999:Q1-2008:Q3 IRR estimates indicate an appreciation leading to more TTBs. Furthermore, as Figure 1 again illustrates, for much of the 2008-2010 period the euro is depreciating; based on historical EU evidence from Table 2 of exchange rate movements, this suggests another dampening effect on import protection.

Table 3 also reports mixed evidence of responsiveness of import protection to macroeconomic shocks for Australia and Canada.[27] The most robust result is across the specifications for Canada. Like the United States and the European Union, the pre-crisis IRR and crisis IRR on the foreign real GDP growth variable are statistically different from one another, indicating that Canada also switched away from imposing import protection on trading partners that were contracting and toward those that were growing.

Figure 5 provides an illustration of Australia, Canada, and South Korea's model predictions for import protection over 2008:Q4 – 2010:Q4 compared to the realized response. As was the case in the otherwise comparable Figure 4 for the United States and European Union, the dotted lines in Figure 5 for Canada and South Korea illustrate that the models based on historical data strongly overpredict the amount of products that would subsequently become subject to new import protection during the Great Recession. The model from Table 2 overpredicts Canada's new import protection by a factor of 10 and overpredicts South Korea's by a factor of 50, relative to the new import protection that was realized in the data.

5 Conclusion

This paper uses quarterly data for the United States, European Union, and three other industrialized economies to estimate the impact of macroeconomic shocks on import protection over 1988:Q1-

[27] We do not report Table 3 estimates for South Korea because it imposed so few new import restrictions during 2008:Q4-2010:Q4 that there was insufficient variation in the dependent variable for identification.

2010:Q4. Estimates for the US and EU from before the Great Recession exhibit evidence of three key relationships. First, a 13 percent (EU) and 16 percent (US) real appreciation of the bilateral exchange rate can result in nearly twice as many imported products per trading partner per quarter being subject to temporary trade barriers. Second, an increase in the domestic unemployment rate by roughly one half of a percentage point is associated with 26-40 percent more imported products per trading partner per quarter being subject to new import protection. Third, we find a previously overlooked result that the US and EU historically imposed bilateral import restrictions on trading partners that were going through periods of weak economic growth; suggestive evidence consistent with the Bagwell and Staiger (2002) theory that the central role of trade agreements is to address international externalities.

In a second exercise, we use estimates from the pre-Great Recession model to then show the expected trade policy response during 2008:Q4-2010:Q4 given the realized macroeconomic shocks. The historical models for the US and EU predicted a sharp increase in import protection taking place beginning in 2009:Q2 and lasting through 2010:Q1, peaking in 2009:Q3. While the increase in import protection during the Great Recession was not as large as the potential additional 15 percentage point coverage of imports that some historical models predicted, arguably the fear of this realization contributed to the pre-emptive "anti-protectionism" G20 declaration of November 2008 and a number of initiatives to actively monitor trade policy (by the WTO, World Bank, and Global Trade Alert) beginning in early 2009.

Third, we re-estimate the models on data from the Great Recession period in order to explain deviations to the realized protectionist response away from historical behavior. While the sharp and persistent real depreciations of the US dollar and euro after their initial run-up in 2009 played an important role in limiting the import protection that followed in 2009-2010, we also provide evidence that the US and EU "switched" from their historical behavior; during the Great Recession they shifted new import protection away from those trading partners that were contracting and toward those experiencing economic growth. This evidence is a particularly important contributor to the relatively low levels of import protection that arose given that so many US and EU trading partners were themselves experiencing periods of severe economic contraction during 2008-2010. Nevertheless, still open research questions include the underlying micro-level determinants that led to this macro-level change in behavior and whether this behavioral change is permanent or temporary.

Finally, our results contribute to a substantial literature that has evolved to explain the role of trade agreements and the use of temporary trade barriers under the WTO. While there is not yet a

universal theory of the relationship between new import restrictions and macroeconomic shocks, our paper identifies the importance of bilateral channels through which new trade barriers arise, and how these channels differed in 2008-2010 relative to periods before the Great Recession. Nevertheless, even this research is just one additional step in understanding the role of trade agreements, including the potential limits to what trade agreements can accomplish in maintaining trade policy cooperation across countries. Indeed, economies like the United States and European Union are no longer the "biggest" users of temporary trade barrier policies. Whether the major new emerging economy users of these policies – India, China, Brazil, Argentina, and Turkey, for example – respond similarly to macroeconomic shocks remains an open question.

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Appendix I: Data Description

Antidumping, safeguards, and countervailing duty policy data at the Harmonized System 6-digit level by trading partner for 1988-2010 is compiled by the authors from the World Bank's *Temporary Trade Barriers Database* (Bown, 2011b) which is publicly available at http://econ.worldbank.org/ttbd/ .

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

Real GDP growth is calculated as the year-over-year changes. There are a total of 18 economies from which we require data on real GDP growth. Unless otherwise noted, each economy had data available for 1988:Q1-2010:Q4 in the form of a seasonally adjusted, quarterly real GDP series taken from OECD. The EU (EU27) and Israel's series begin in 1995:Q1. Turkey's series begins in 1998:Q1. Furthermore, series for Brazil (beginning in 1996:Q1), Japan, Indonesia (beginning in 1990:Q1), and India (beginning in 1996:Q2 and available only through 2010:Q1) are from Haver OECD MEI. Mexico and South Africa's series are from IFS. China's quarterly year-on-year real GDP growth series are from official government statistics and begin in 1992:Q1. The series for Taiwan, China are from official government statistics.

Trading Partners: For each of the five policy-imposing economies, with the exception of South Korea, the cross-sectional component to the panel data series is based on 15 trading partners. The 15 partners are determined as the most frequent targets against which each economy used such import protection over the sample period, conditional on availability of that trading partner's macroeconomic data at the quarterly frequency. The trading partners for each sample are:

- **United States (15):** Australia, Brazil, Canada, China, European Union, India, Indonesia, Japan, Mexico, New Zealand, South Africa, South Korea, Switzerland, Taiwan, China; Turkey. These economies were the source of 85 percent of non-oil imports during this period.
- **European Union (15):** Australia, Brazil, China, India, Indonesia, Japan, Mexico, New Zealand, Norway, South Africa, South Korea, Switzerland, Taiwan, China; Turkey, United

States. These economies were the source of 75 percent of non-oil imports during this period.

- **South Korea (10):** Canada, China, European Union, India, Indonesia, Japan, New Zealand, Switzerland, Taiwan, China, United States. These economies were the source of 79 percent of non-oil imports during this period.
- **Australia (15):** Brazil, Canada, China, European Union, India, Indonesia, Israel, Japan, Mexico, Norway, South Africa, South Korea, Taiwan, China; Turkey, United States. These economies were the source of 81 percent of non-oil imports during this period.
- **Canada (15):** Australia, Brazil, China, European Union, India, Indonesia, Japan, Mexico, New Zealand, South Africa, South Korea, Switzerland, Taiwan, China; Turkey, United States. These economies were the source of 94 percent of non-oil imports during this period.

Appendix II: Sensitivity Analysis

Appendix Table 2 provides a number of robustness checks to the model estimates from the pre-crisis period for the United States (1988:Q1-2008:Q3) and the European Union (1999:Q1-2008:Q3). Recall from Table 2 that our preferred specifications were (2) and (4), in which the dependent variable included all temporary trade barriers implemented by the United States and European Union, respectively. The table presents four different robustness checks for each policy-imposing economy.

Specifications (1) and (5) replace the variable capturing the domestic macroeconomic shock – the change in the domestic unemployment rate – with growth in domestic real GDP. The theoretical prediction is for an IRR that is less than 1; i.e., domestic macroeconomic contraction is associated with a higher incidence of TTBs. For the EU, the IRR is 0.44 and statistically significant. However, for the US the IRR of 1.03, though it is not statistically different from 1. Nevertheless the IRR estimates for the other determinants of interest (i.e., compared to the baseline models in Table 2) are qualitatively unaffected by use of this alternative indicator of the health of the domestic macroeconomy.

In specifications (2) and (6) we add a new variable to the baseline specification defined as the stock of imported products against trading partner *i* already subject to temporary trade barriers in *t-1*. Since the stock of imported product categories is fixed over time, the rationale for including this variable is to control for the concern that higher coverage of those products by existing import protection could lead to less need for new import protection. The IRR for the EU (0.97) is statistically less than 1 and is thus consistent with this theory, while the IRR for the US (1.00) is not statistically different from 1. More importantly, inclusion of this variable also does not affect the qualitative pattern of results for the main determinants of interest.

The change in specifications (3) and (7) is to simply replace the values of the macroeconomic determinants used in the baseline specification (defined in year *t-2*) with their values in *t-1*. The results are unaffected.

Finally, in specifications (4) and (8) we redefine the policy variable to only include imported products that were ultimately hit with imposed trade restrictions. Recall the baseline definition was the count of products subject to an investigation (under antidumping, countervailing duty, or safeguard provisions) against trading partner *i* in quarter *t*, regardless of how the investigation terminated. Early research from Staiger and Wolak (1994) has shown how even an investigation can have trade-destroying effects. As a final robustness check we reconstruct the dependent variable so that it is defined as the count of products subject to an investigation (under antidumping, countervailing duty, or safeguard provisions) from trading partner *i* in quarter *t* that ultimately were

subject to a new import-restriction. However, because the final policy decisions by government authorities take place many months after the initiation of the investigation (quarter *t*) and may be influenced by "updated" macroeconomic conditions, we shift forward the timing of the exchange rate and domestic unemployment rate variables. For the United States we shift these variables ahead two quarters, whereas for the European Union (was has a lengthier government investigation procedure) we shift these variables ahead three quarters. Under these specifications of the model reported in columns (4) and (8), the qualitative nature of the empirical results are consistent with those reported in Table 2.

Table 1. Summary Statistics, 1988:Q1-2010:Q4

	Policy-imposing economy…				
Variables	**US**	**EU‡**	**KOR**	**AUS**	**CAN**
Dependent Variables					
Antidumping initiations (products per quarter per trading partner), 1988:Q1-2008:Q3	1.80 (5.92)	0.53 (1.73)	0.35 (1.85)	0.28 (0.74)	0.56 (2.94)
Antidumping initiations (products per quarter per trading partner), 2008:Q4-2010:Q4	0.68 (2.83)	0.41 (1.44)	0.03 (0.24)	0.25 (0.92)	0.14 (0.94)
All trade policy initiations (products per quarter per trading partner), 1988:Q1-2008:Q3	2.76 (10.30)	1.98 (9.14)	0.45 (2.00)	0.29 (0.75)	0.76 (3.46)
All trade policy initiations (products per quarter per trading partner), 2008:Q4-2010:Q4	0.70 (2.88)	0.63 (1.57)	0.03 (0.24)	0.25 (0.92)	0.14 (0.94)
Explanatory Variables					
Percent change in bilateral real exchange rate, 1988:Q1-2008:Q3	0.13 (15.94)	1.92 (13.41)	1.28 (14.31)	1.54 (14.78)	0.92 (14.95)
Percent change in bilateral real exchange rate, 2008:Q4-2010:Q4	0.45 (15.84)	-1.32 (13.31)	-7.93 (15.60)	2.02 (15.57)	-1.47 (11.37)
Domestic unemployment rate change, 1988:Q1-2008:Q3	-0.07 (0.64)	-0.41 (0.49)	0.05 (1.32)	-0.21 (0.83)	-0.20 (0.84)
Domestic unemployment rate change, 2008:Q4-2010:Q4	2.22 (1.32)	1.73 (1.08)	0.21 (0.33)	0.54 (0.85)	0.96 (1.10)
Real GDP growth of trading partner *i*, 1988:Q1-2008:Q3	4.11 (3.58)	3.98 (3.39)	4.06 (3.56)	4.20 (3.60)	4.12 (3.55)
Real GDP growth of trading partner *i*, 2008:Q4-2010:Q4	1.69 (5.24)	1.72 (5.20)	1.68 (5.26)	1.59 (5.33)	1.64 (5.28)
Import growth from trading partner *i*, 1988:Q1-2008:Q3	8.38 (12.00)	10.97 (13.80)	13.13 (25.88)	13.70 (34.06)	11.16 (20.81)
Import growth from trading partner *i*, 2008:Q4-2010:Q4	-3.20 (22.64)	-4.96 (23.34)	4.48 (32.40)	4.91 (35.99)	0.11 (24.50)
Observations	1187	717	790	1124	1187
Number of trading partners	15	15	10	15	15

Notes: sample means reported with standard deviations reported below in parentheses. ‡EU is defined throughout as EU-27, its data are for 1999:Q1-2010:Q4 only.

Table 2. Negative Binomial Model Estimates of Macroeconomic Determinants of Import Protection, 1988:Q1-2008:Q3

	Dependent variable: **Bilateral count of products initiated under either all temporary trade barrier policies or AD policy only in quarter *t***										
Explanatory variables	US AD Only (1)	US All Policies (2)	EU‡ AD Only (3)	EU‡ All Policies (4)	KOR AD Only (5)	KOR All Policies (6)	AUS AD Only (7)	AUS All Policies (8)	CAN AD Only (9)	CAN All Policies (10)	CAN All Policies (11)
Percent change in bilateral real exchange rate	1.02[a]	1.04[a]	1.02	1.05[a]	1.01	1.03	0.98[a]	0.98[a]	1.00	1.00	1.00
	(2.72)	(5.26)	(1.41)	(3.91)	(0.78)	(1.60)	(2.77)	(2.85)	(0.38)	(0.22)	(0.39)
Domestic unemployment rate change	1.75[a]	1.69[a]	0.66	1.61	0.77	0.70[b]	1.46[a]	1.46[a]	0.68[c]	1.01	1.01
	(3.39)	(2.72)	(1.38)	(1.17)	(1.47)	(2.02)	(4.91)	(4.86)	(1.71)	(0.07)	(0.07)
Real GDP growth of trading partner *i*	0.92[a]	0.94[b]	0.97	0.81[a]	0.82[c]	0.79[b]	0.97	0.97	1.03	0.91	0.93
	(2.72)	(2.03)	(0.57)	(2.65)	(1.87)	(2.21)	(1.20)	(1.00)	(0.43)	(1.55)	(1.24)
Time trend	0.98[a]	0.98[a]	0.99	0.95[a]	1.03[a]	1.02[b]	0.98[a]	0.99[a]	0.98[c]	1.01	1.01
	(4.38)	(3.61)	(0.93)	(3.33)	(3.85)	(2.49)	(4.02)	(3.60)	(1.93)	(1.12)	(0.98)
Trading partner *i* is China	19.88[a]	10.58[a]	84.16[a]	66.58[a]	18.12[b]	26.62[a]	30.35[a]	29.78[a]	16.69[a]	8.71[a]	5.58[b]
	(5.89)	(4.52)	(4.97)	(4.54)	(2.48)	(2.82)	(3.25)	(3.23)	(3.09)	(2.75)	(2.15)
US TTBs initiated in t-1	--	--	--	--	--	--	--	--	--	--	1.06[b]
											(2.33)
All other trading partner indicators	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1053	1053	583	583	701	701	990	990	1053	1053	1046
Number of trading partners	15	15	15	15	10	10	15	15	15	15	15

Notes: Explanatory variables are each lagged two quarters (at *t-2*). 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. ‡EU data for 1999:Q1-2008:Q3 only.

Table 3. Differential Impacts on Policy Response during the Great Recession

Dependent variable: **Bilateral count of products initiated under all temporary trade barrier policies in quarter *t***								
Explanatory Variables	US	US	EU‡	EU‡	AUS	AUS	CAN†	CAN†
Percent change in bilateral real exchange rate, 1988:Q1-2008:Q3	1.04[a]	1.04[a]	1.05[a]	1.05[a]	0.98[a]	0.98[a]	1.00	0.99
	(5.31)	(5.08)	(4.45)	(4.26)	(2.72)	(2.65)	(0.41)	(0.43)
Percent change in bilateral real exchange rate, 2008:Q4-2010:Q4	1.06[c]	1.05[c]	0.94[a]	0.93[b]	1.00	1.01	0.93[c]	0.93[c]
	(1.93)	(1.82)	(2.57)	(2.50)	(0.01)	(0.55)	(1.71)	(1.73)
[Test statistic]	[0.15]	[0.13]	[17.08][a]	[15.44][a]	[1.81]	[3.12][c]	[2.34]	[2.42]
Domestic unemployment rate change, 1988:Q1-2008:Q3	1.67[a]	1.94[a]	1.58	2.02[b]	1.47[a]	1.47[a]	1.00	1.02
	(2.58)	(3.29)	(1.19)	(1.96)	(4.61)	(4.56)	(0.01)	(0.11)
Domestic unemployment rate change, 2008:Q4-2010:Q4	1.76[b]	2.97[b]	2.28[b]	2.54	0.98	0.52	1.59	1.16
	(2.18)	(2.05)	(1.92)	(1.48)	(0.05)	(1.48)	(0.52)	(0.14)
[Test statistic]	[0.03]	[0.56]	[0.41]	[0.10]	[1.52]	[5.34][b]	[0.26]	[0.01]
Real GDP growth of trading partner *i*, 1988:Q1-2008:Q3	0.92[a]	0.90[a]	0.85[b]	0.91	0.98	0.98	0.92	0.91
	(2.62)	(3.02)	(2.46)	(1.51)	(0.90)	(0.89)	(1.47)	(1.52)
Real GDP growth of trading partner *i*, 2008:Q4-2010:Q4	1.08	1.04	1.09	1.06	0.99	1.03	1.21	1.25
	(1.30)	(0.63)	(1.09)	(0.76)	(0.27)	(0.59)	(1.24)	(1.29)
[Test statistic]	[6.14][b]	[4.18][b]	[8.38][a]	[3.20][c]	[0.04]	[1.03]	[3.19][c]	[3.32][c]
Import growth from trading partner *i*, 1988:Q1-2008:Q3	--	1.03[a]	--	0.95[a]	--	1.00	--	1.00
		(2.57)		(4.10)		(0.09)		(0.43)
Import growth from trading partner *i*, 2008:Q4-2010:Q4	--	1.05	--	1.01	--	0.97[b]	--	0.98
		(1.15)		(0.36)		(2.02)		(0.45)
[Test statistic]	--	[0.20]	--	[3.41][c]	--	[3.85][b]	--	[0.27]
Time trend included	yes	yes	yes	yes	yes	yes	yes	yes
All trading partner indicators	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1187	1187	717	717	1124	1124	1180	1180
Number of trading partners	15	15	15	15	15	15	15	15

Notes: Explanatory variables are each lagged two quarters (at *t-2*). Incidence Rate Ratios (IRRs) are reported in lieu of coefficient estimates, with t-statistics in parentheses. In square brackets are t-statistics that the estimated IRRs across the two sub-periods are different. 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. ‡EU data for 1999:Q1-2010:Q4 only. †CAN regressions also include US TTBs initiated in *t-1* as a regressor.

Appendix Table 1. The Only Other (Non-TTB) Import Restricting Policies for these Five Economies, 2008-2010

Country, non-TTB Import-restricting policy	Date of Inception
Australia	
• Increase of excise rates on imports of tobacco	April 30, 2010
• Customer price index adjustment for alcohol and tobacco products	August 2, 2010
Canada	
• Temporary tariff-rate quota on milk protein substitutes	March 1, 2009
• Lower threshold for delisting wines in provincial liquor stores	July 20, 2009
South Korea	
• Increased tariffs for 16 selected products	January 1, 2009
• Restoration of tariff on imports of crude oil to 3%	March 1, 2009
United States	
• Reclassification subjecting certain solar panels to a 2.5% tariff	January 9, 2009
• Ban on poultry imports from China	March 11, 2009
• Adoption of a ban against imports of Mexican shrimp	April 20, 2010
• Ban on the importation of Asian carp	December 14, 2010

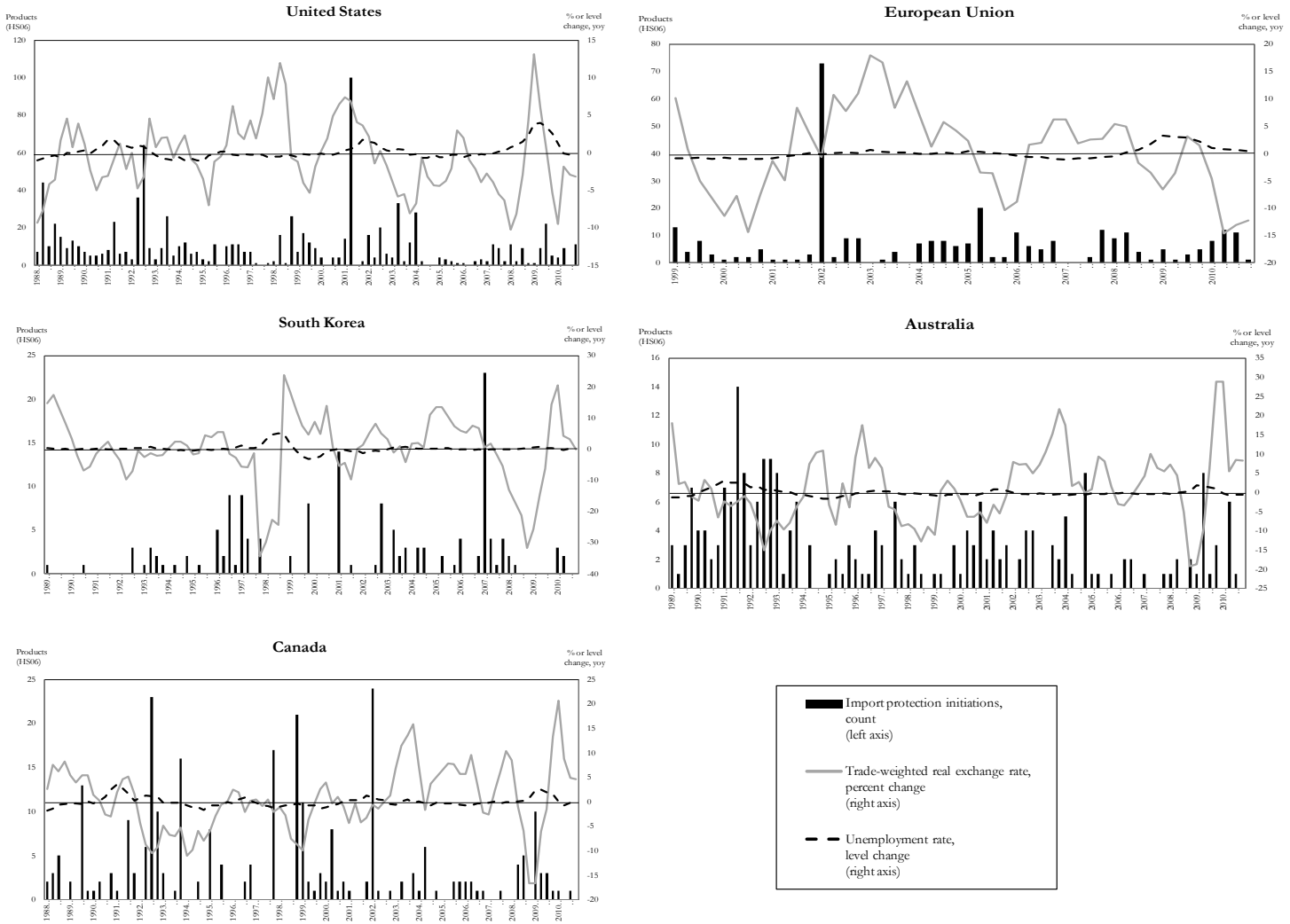
Source: compiled by the authors from Global Trade Alert at www.globaltradealert.org, last accessed 29 February 2012. See discussion in footnote 3 on p. 3

Appendix Table 2. Robustness Checks for Determinants of US and EU Import Protection Before 2008:Q3

	Dependent variable: **Bilateral count of products initiated under all temporary trade barrier policies in quarter *t***							
	US				**EU‡**			
Explanatory variables	Substitute real GDP growth for domestic unemployment (1)	Add stock of products covered by TTBs in *t-1* (2)	Use first lag of determinants in lieu of second lag (3)	TTBs redefined to include only final measures (4)	Substitute real GDP growth for domestic unemployment (5)	Add stock of products covered by TTBs in t-1 (6)	Use first lag of determinants in lieu of second lag (7)	TTBs redefined to include only final measures (8)
Percent change in bilateral real exchange rate	1.05[a]	1.04[a]	1.03[a]	1.07[a]	1.04[a]	1.05[a]	1.03[b]	1.04[b]
	(5.43)	(5.13)	(3.53)	(6.15)	(3.31)	(3.99)	(2.28)	(2.46)
Domestic unemployment rate change	---	1.73[a]	2.16[a]	2.17[a]	---	3.63[a]	10.80[a]	4.85[a]
		(2.69)	(4.62)	(3.27)		(2.64)	(6.33)	(4.20)
Domestic real GDP growth	1.03	---	---	---	0.44[a]	---	---	---
	(0.36)				(3.83)			
Real GDP growth of trading partner *i*	0.93[b]	0.94[b]	0.86[a]	0.85[a]	0.88[c]	0.83[b]	0.90[c]	0.80[a]
	(2.25)	(2.03)	(4.69)	(4.77)	(1.75)	(2.38)	(1.65)	(3.06)
Time trend	0.98[a]	0.98[a]	0.98[a]	0.99[c]	0.95[a]	0.94[a]	0.93[a]	0.89[a]
	(3.46)	(2.57)	(3.74)	(1.74)	(3.30)	(3.67)	(4.96)	(5.70)
Trading partner *i* is China	11.09[a]	11.85[a]	22.66[a]	38.46[a]	54.89[a]	349.25[a]	65.66[a]	128.16[a]
	(4.51)	(4.42)	(6.01)	(5.22)	(4.55)	(5.51)	(5.02)	(4.97)
Stock of own TTBs against trading partner *i* in place in *t-1*	---	1.00	---	---	---	0.97[a]	---	---
		(0.64)				(3.87)		
All other trading partner indicators	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1053	1045	1060	1053	583	583	584	583
Number of trading partners	15	15	15	15	15	15	15	15

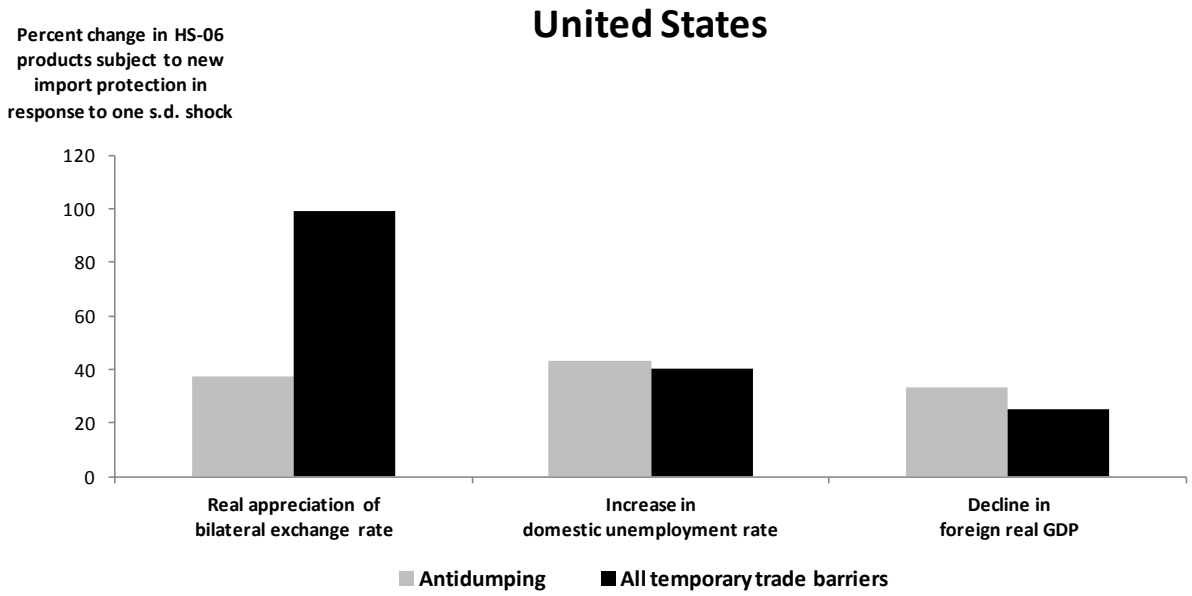
Notes: Incidence Rate Ratios (IRRs) are reported in lieu of coefficient estimates, with t-statistics in parentheses. Model includes a constant term whose estimate is suppressed. Superscripts a, b, and c indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. US data begins in 1988:Q1 while EU data begins in 1999:Q1.

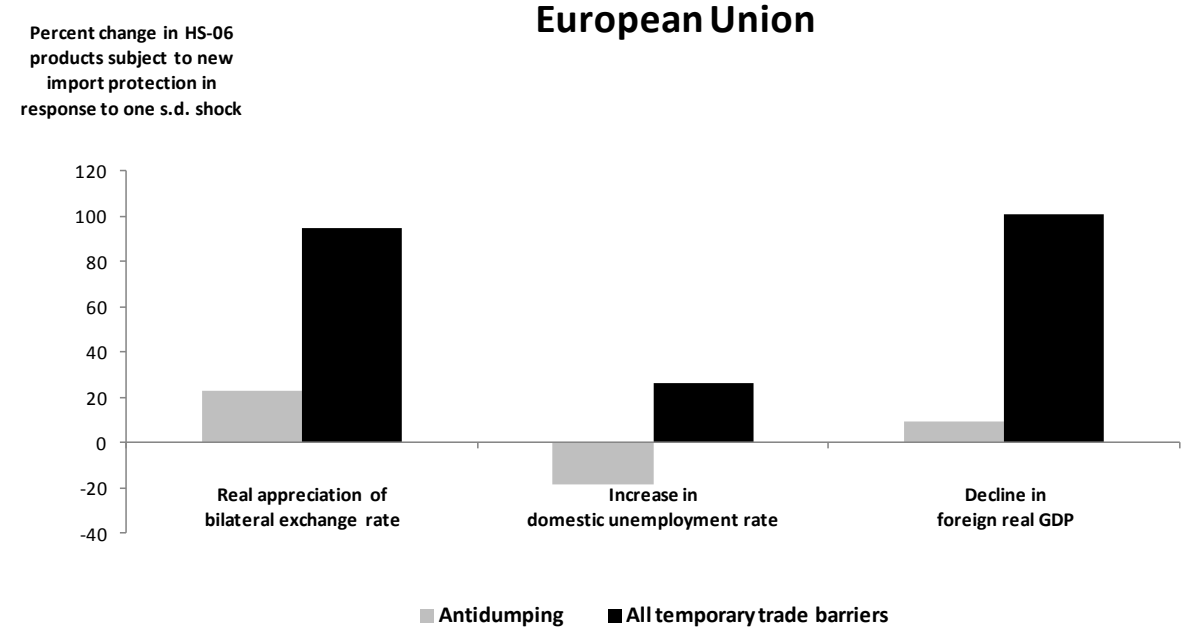
Figure 1. Import Protection, Real Exchange Rates, and Unemployment, 1988:Q1-2010:Q4



Source: constructed by the authors from quarterly data from OECD, USDA, and IMF and Bown (2011b). Increases in the real exchange rate series reflect appreciations of the domestic currency. EU data for 1999:Q1-2010:Q4 only.

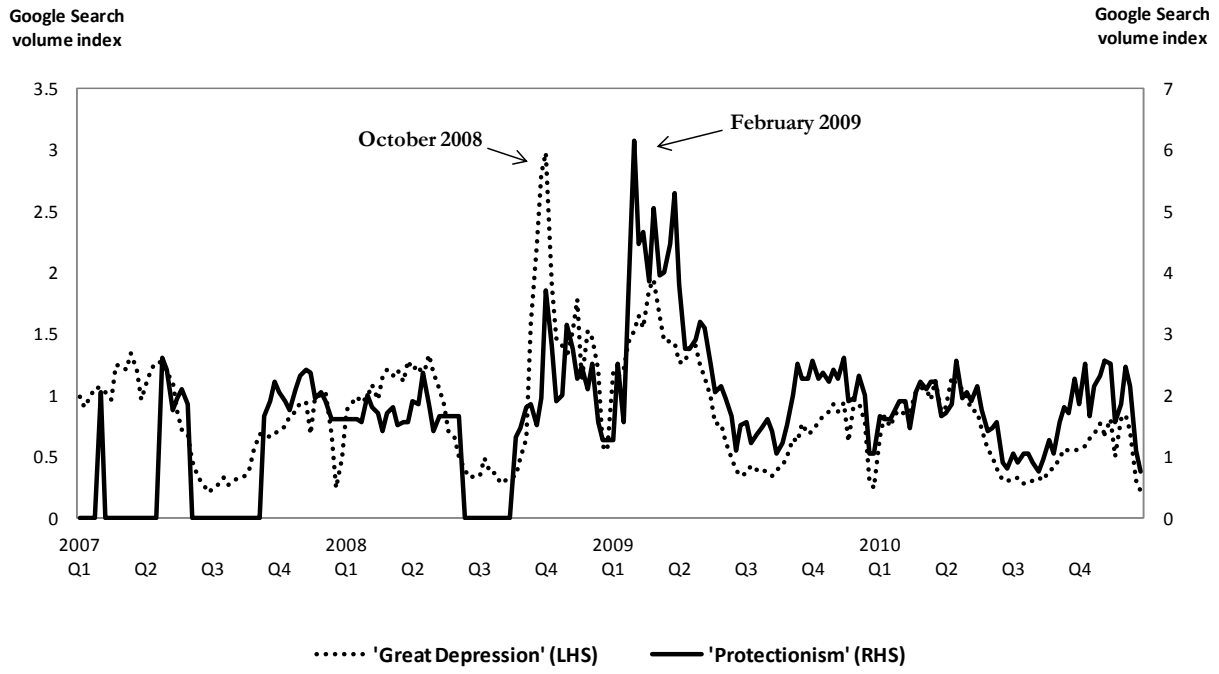
Figure 2. US and EU Trade Policy Responsiveness to Macroeconomic Shocks, Pre-Crisis





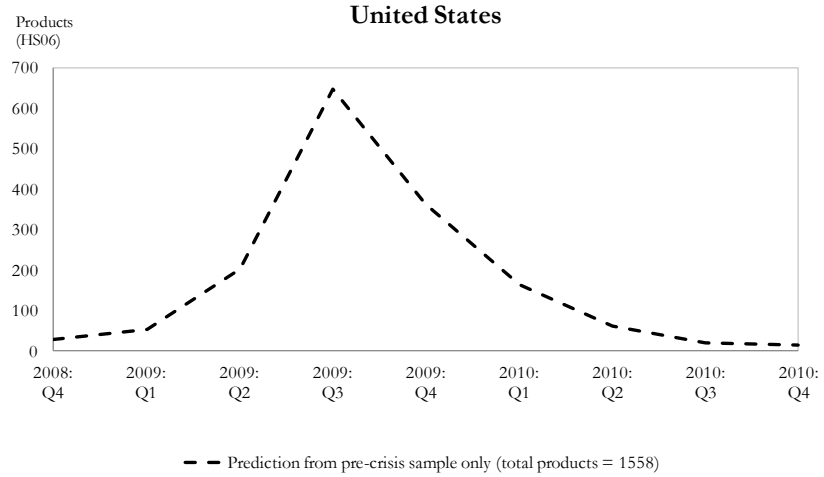
Notes: Percent increase in HS-06 products subject to new import protection per quarter per trading partner. Based on table 2 model estimates and a one standard deviation change in each explanatory variable away from the sample mean, holding all other variables constant.

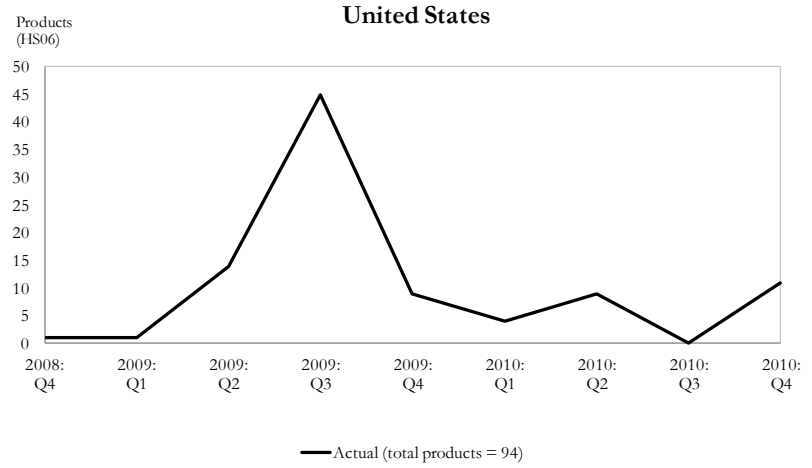
Figure 3. Increased Public Awareness in 'Protectionism' and 'Great Depression' during 2008-9

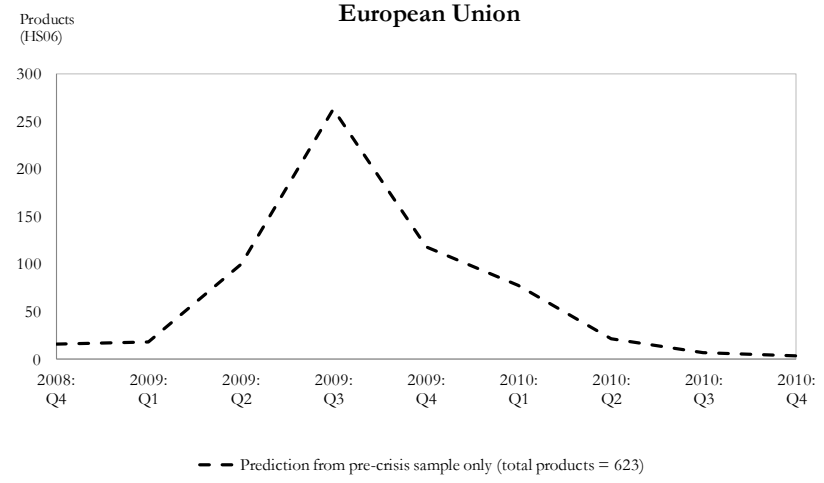


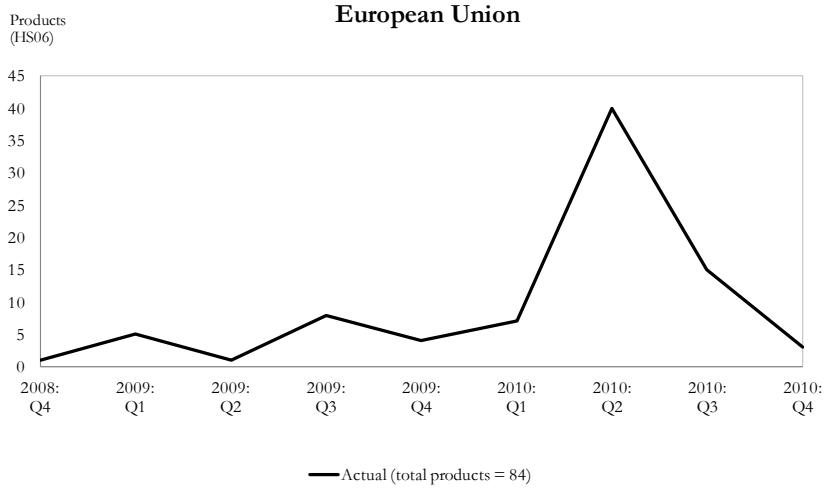
Source: Figure 1.3 of Bown (2011c). Calculations from Google Trends based on Internet searches for 'Great Depression' and 'Protectionism.' Data reported weekly and each index averages a value of 1 for 2004-2010.

Figure 4. United States and European Union:
Predicted versus Realized Trade Policy Response to Macroeconomic Shocks during 2008:Q4 – 2010:Q4



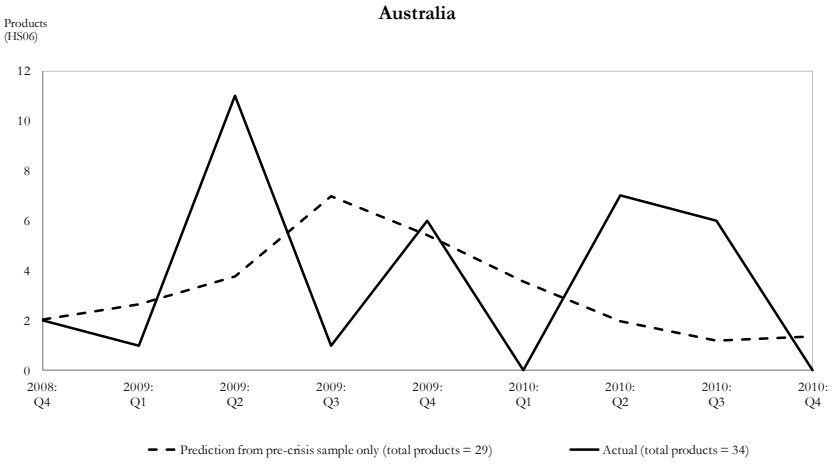


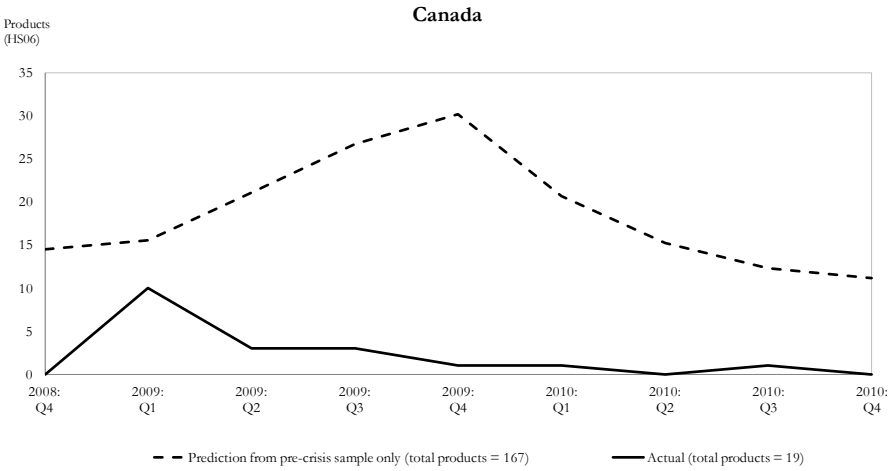


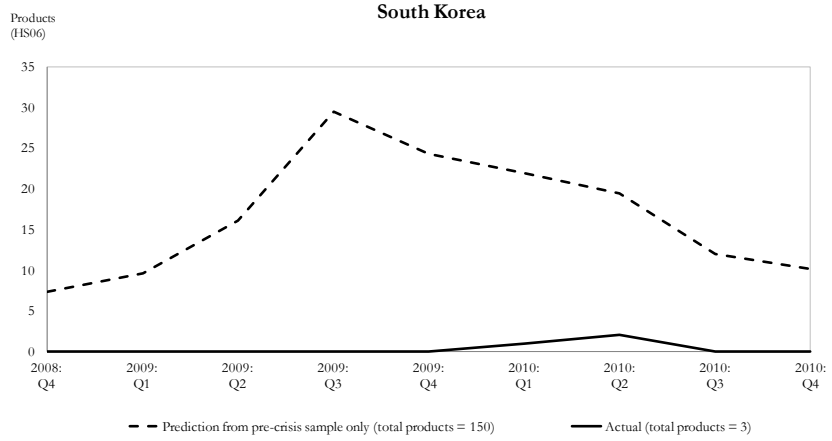


Notes: Prediction of number of imported products from 15 trading partners per quarter subject to new TTBs from the pre-crisis sample based on table 2 estimates. For context, the median number of products subject to new US TTBs against these 15 trading partners per quarter between 1988:Q1 and 2008:Q3 was 12, for the EU between 1999:Q1 and 2008:Q3 the median was 9.

Figure 5. Australia, Canada, and South Korea:
Predicted versus Realized Trade Policy Response to Macroeconomic Shocks during 2008:Q4 – 2010:Q4







Notes: Prediction of number of imported products from 15 trading partners per quarter subject to new TTBs from the pre-crisis sample based on table 2 estimates.