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

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Abstract

This paper uses highly detailed, quarterly data for the United States, European Union, and three other industrialized economies to estimate the impact of macroeconomic fluctuations on import protection policies over 1988:Q1–2010:Q4. First, estimates on a pre–Great Recession sample of data provide evidence of three key relationships for the US and EU. Increases in domestic unemployment rates and real appreciations in bilateral exchange rates lead to substantial increases in antidumping and related forms of import protection. We also provide evidence of a previously overlooked result that policy–imposing countries historically imposed such bilateral import restrictions on trading partners that were going through periods of weak economic growth. Second, we use estimates from the pre–Great Recession model to then show the expected protectionist response during 2008:Q4–2010:Q4 given the realized macroeconomic shocks. Third, we re–estimate the model on data from the Great Recession period in order to explain deviations to the realized protectionist response away from historical behavior. While exchange rate movements played an important role in limiting import protection, the US and EU also “switched” from their historical behavior during the Great Recession and shifted implementation of new import protection away from those trading partners that were contracting and toward those experiencing economic growth.

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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 tariffs and other trade barriers rise during periods of macroeconomic weakness. During the Great Recession, the fear of a comparable import protectionist policy response led to pre-emptive statements like the G20 Declaration of November 2008 cited above.

In the wake of the Great Depression, in the 1940s countries established the General Agreement on Tariffs and Trade (GATT) to create an institutional framework and rules 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. A substantial theoretical literature, much of it summarized in Bagwell and Staiger (2002), has evolved to explain the role and use of such exceptions in the multilateral trading system under the GATT and its successor, the World Trade Organization (WTO).¹

¹ 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 like the seminal model of Brander and Krugman (1983). The first contribution of our paper is to empirically examine the predictions from these two different classes of trade models regarding the use of temporary trade barriers during adverse macroeconomic conditions. Both the terms-of-trade models of trade agreements (Bagwell and Staiger, 2003) and imperfect competition models of dumping (Crowley, 2010a) predict that World Trade Organization rules on temporary trade barriers support an increase in trade protection during adverse business cycle fluctuations.
Empirically, trade restrictions such as antidumping, global safeguards, the China-specific safeguard, and countervailing duties – what we refer to throughout jointly as temporary trade barriers – are the primary policy exceptions to the liberal trade rules embodied in the GATT/WTO. These are the relatively substitutable policies through which industrialized countries have implemented new trade restrictions over the last twenty years. While 2008–10 did not lead to the severe tariff hikes and quantitative restrictions that took place under Smoot–Hawley and the international retaliatory 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” – a large number of import restrictions were imposed and removed during this period. In the United States, the cumulative effect of this churning was a 23 percent increase in the stock of trade barriers in 2010 relative to the pre-crisis (2007) level. Quantitatively, these restrictions are substantial; by 2010, over 5 percent of US imported products were subject to temporary trade barriers.2

Nevertheless, given the severity of macroeconomic shocks that took place during the Great Recession, open research questions include (1) what explains the import protection that did arise and (2) why was the trade policy response to the Great Recession mild. Our paper provides a first empirical assessment of these questions by estimating the impact of macroeconomic fluctuations on antidumping and related import restrictions. In particular, we estimate the impact of macroeconomic fluctuations on the import-restricting policies of five separate industrialized economies – the US, Canada, European Union, Korea and Australia. Figure 1 shows for each of our five policy-imposing economies the basic relationship between real exchange rate fluctuations, periods of rising domestic unemployment, and antidumping and related trade policies over the 1988–2010 period.

2 More precisely, this is the share of 6-digit Harmonized System imported products 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) applied to updated data for 2010.
We begin our formal analysis by estimating a model of new import restrictions on quarterly data that begins at the first quarter of 1988 and ends in 2008:Q3. We estimate this model for each policy-imposing economy. After we estimate these “historical” models, we first interpret the responsiveness of import protection to macroeconomic fluctuations. We then use the models to generate out-of-sample predictions for the trade policy responses during 2008:Q4–2010:Q4, given the macroeconomic shocks that actually arose during the Great Recession. Finally, we estimate the models on data that includes the 2008:Q4–2010:Q4 period and compare how the responsiveness of import protection policies to macroeconomic shocks changed during the crisis, relative to the earlier period.

Our results indicate that, prior to the crisis for the United States and European Union, there was a strong empirical relationship between macroeconomic fluctuations and import protection policies. In particular, two results stand out as being important. First, appreciations in bilateral real exchange rates lead to substantial increases in antidumping and related forms of import protection. Second, policy-imposing countries historically used such bilateral import restrictions on trading partners that were going through 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 relationship, a failure that we argue is critical to understand the determination of these particular forms of import protection policies in use under the current WTO system; i.e., import protection that is typically bilateral (and hence discriminatory) in nature, unlike more general tariff protection.3

Our first exercise uses the historical models to generate out-of-sample predictions over 2008:Q4–2010:Q4 for expected policy reactions to the Great Recession’s macroeconomic shocks. For the United States and European Union, the model predicts a surge in import protection in 2009:Q3; we interpret this predicted surge

3 Even when focusing on the antidumping alone, policymakers are applying the policy on a more discriminatory basis over time as more trade barriers are increasingly imposed on imports from China and fewer are imposed on imports of the same product from multiple foreign sources simultaneously, as had been the case in the 1980s and early 1990s. For a discussion, see Bown (2010). Hansen and Prusa (1997) examine an earlier period’s use of antidumping for the United States and the impact of the “cumulation” rule which they found led to antidumping being imposed typically against many foreign sources.
as being consistent with the impending fear of protectionism outlined by the G20 declaration presented earlier.

Our second exercise estimates the models on the longer time series of data through 2010:Q4 so as to identify any changes in the responsiveness of import restrictions to macroeconomic fluctuations. First, there is strong evidence that a number of these economies “switched” from their historical behavior and refrained from implementing import restrictions against those trading partners that were contracting during the Great Recession. Instead, to the extent that countries implemented such import restrictions at all, they were used against trading partners that were experiencing stronger economic growth. Weak GDP growth in trading partners may have been a particularly important force for dampening 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 protectionist response for economies like the United States and European Union is the sharp depreciations of their currencies that started taking place in 2009. Had the sharp appreciations of the US dollar and Euro of early 2009 continued (see again Figure 1), behavior from the historical evidence suggests a much larger surge in import protection than what was ultimately realized.

Our paper is most closely related to an existing literature that has focused on macroeconomic determinants of antidumping import protection estimated on samples of data from the 1980s and 1990s (Feinberg 1989, Knetter and Prusa 2003, Crowley 2011). However, in addition to providing a first empirical analysis of the relationship between macroeconomic shocks and import protection during the Great Recession period, our approach makes a number of advances, extensions and

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4 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 1980–98 and find strong evidence of a relationship between antidumping cases and local currency appreciations, over this longer time series of data. Feinberg (2005) further extends the Knetter and Prusa (2003) approach 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.
refinements to the previous literature. First, we take advantage of newly available 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 bilateral level - i.e., between a policy-imposing economy and a number of its trading partners - and this bilateral emphasis for macroeconomic channels such as shocks to bilateral real exchange rates or a particular partner’s real GDP growth is important given the discriminatory (i.e., trading partner-specific) nature of these forms of import protection.

Our paper also contributes to a growing literature on the role of trade policy during the Great Recession. In addition to Bown (2011a) which carefully estimates the changing stock of temporary trade barriers, two papers have carefully catalogued the increases in tariffs at the product-line level for large numbers of countries during the early period of the Great Recession. Kee, Neagu and Nicita (2011) calculate Overall Trade Restrictiveness Indices for 2008 and 2009 using detailed data from national tariff schedules. They 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 variables 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 protectionist trade policy activism 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 long time period (previous to, and through the crisis) and we seek to understand the macroeconomic determinants of new trade restrictions.\(^5\)

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 – in trade agreements, the empirical model and the bilateral 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 examines the special role of trade restrictions against China, and Section 6 concludes.

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 a trade agreement characterized by a general reduction in trade restrictions like the World Trade Organization’s General Agreement on Tariffs and Trade.\(^6\) This paper assesses the predictions of previous research (Bagwell and Staiger, 2003; Crowley, 2010a; Knetter and Prusa, 2003) that relates macroeconomic fluctuations to temporary trade barriers like antidumping (AD), global safeguards (SG), China-specific safeguards (CSG) and countervailing duties (CVD).

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\(^5\) A number of detailed case studies have examined micro-level features of the use of trade policies 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.

\(^6\) Crowley (2010b) provides a recent survey.
Bagwell and Staiger (2003) show that dynamic self-enforcing trade agreements are characterized by trade policy that fluctuates in response to macroeconomic conditions. 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 the one-shot game for every traded product is characterized by a terms-of-trade-driven prisoner’s dilemma. In every period, the home country imports $G_t$ products while the foreign country imports $G_t^*$. An international business cycle is modeled as fluctuations in the rate of growth of new product entry ($G_t + G_t^*$).\(^7\) The international economy moves between high growth periods and low growth periods according to two Markov-switching processes. Intuitively, because of terms of trade gains, the (static) welfare gain of a tariff hike increases with trade volume. Thus, we might expect pro-cyclical tariff increases. However, in the presence of positively serially correlated growth shocks, cooperation to maintain low tariffs is easier (more difficult) in periods in which the expected rate of future trade growth is high (low). Thus, unilateral tariff increases are less costly in a welfare sense during persistent recessions because the cost of a trade war is relatively low during a recession. This basic intuition generates the key empirical prediction of the model: an increase in trade restrictions during recessions.

The idea that trade restrictions increase in response to macroeconomic weakness is also found in Crowley (2010a). This paper focuses on the international trade rules regarding antidumping import restrictions. In a model of 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.

\(^7\) Bagwell and Staiger (2003) also show that the central results of the international business cycle model extend to a more general case in which the two countries have independent business cycles.
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. They develop a simple model of a foreign firm that prices to market. In this model, 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.

In summary, the literature on macroeconomic fluctuations suggests that temporary trade barriers – AD, SG, CSG, and CVD – increase when (1) domestic GDP growth is weak (Bagwell and Staiger, 2003) and (2) foreign GDP growth is weak (Bagwell and Staiger, 2003; Crowley, 2010). An appreciation of the domestic currency relative to a trading partner’s currency implies more antidumping 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 pricing at fair value criterion.

.2 Empirical model

This section presents an empirical model of the number of imported products subject to 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 lagged values of domestic real GDP growth, bilateral real exchange rates, 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 importer in a quarter,
Empirically, the dependent variable is a non-negative count which exhibits over-dispersion. That is, the variance of the number of investigations per time period exceeds the mean (see Table 1).

Formally, we model temporary trade barriers as generated by a negative binomial distribution. 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,

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

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

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

We estimate the relationship between the number of products subject to investigations by an importing country (the US, Canada, EU, Korea or Australia) against country $i$ in quarter $t$ as a function of three lags of domestic GDP growth, foreign GDP growth, and the real exchange rate using maximum likelihood. The model for each importing country is identified off intertemporal variation in the frequency of trade restrictions over time and cross-sectional variation in the 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 a linear combination of the lags of the explanatory variables. That is, we report the ratio of counts predicted by the model when the lags of an explanatory variable of interest are one unit above their mean values and all other variables are at their means to the counts predicted when all variables are at their means.
To better quantify the results of our model, we also present the predicted counts that our model generates in response to one standard deviation shocks to each of the explanatory variables of interest.

.3 Data and variable construction

There are two main innovations to our key measures of import protection relative to the previous literature (Knetter and Prusa, 2003). The first is that we are able to construct a quarterly series of bilateral trade policy actions taken across policy-imposing economies at a commonly defined, 6-digit Harmonized System (HS–06) product level. The data derives from extremely detailed trade policy information found in the World Bank’s Temporary Trade Barriers Database (Bown, 2011b) that dates back to the 1980s. The second innovation is to include not only import protection under the antidumping policy, as has been the focus of the previous literature, but we also include what are 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 policies that were different from antidumping.

The dependent variable in our analysis is the count of HS–06 imported products that the government has agreed to initiate a temporary trade barrier investigation in quarter $t$. 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

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8 We consider a number of robustness checks to the definition of this dependent variable that are described in substantial detail in what follows; including focusing on counts of products under investigation that only ended in formal trade barriers being imposed, etc.
for redundancy. In robustness checks, we also include this variable constructed under the antidumping policy alone. Because the Harmonized System has been in place and utilized across countries since 1988, the time series dimension of our data begins in 1988:Q1 and ends in 2010:Q4.

The key macroeconomic determinants of import protection in our model are bilateral real exchange rates, domestic unemployment, and the foreign trading partner’s real GDP growth, with each of the variables also defined as year-over-year changes at the quarterly frequency. 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 currency. The domestic unemployment variable is defined in the level change in the domestic unemployment rate. Both it and the foreign real GDP growth variable are also presented at the quarterly frequency.

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9 At any point in time in the sample period under the HS 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 where 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 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).

10 We are forced to use year-over-year changes in these variables as opposed to quarter-over-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 all variables are defined as year-over-year changes.

11 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 real GDP and being subject to a common EU exchange rate are changing over time, which creates potential additional issues of measurement error.
We estimate the negative binomial regression model of the contemporaneous \((t=0)\) count of imported products subject to new import protection, as a function of the value that these 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. The Data Appendix 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 panel data set for each of five policy–imposing economies – the United States, European Union, South Korea, Australia and Canada – and their bilateral trade policy actions with respect to 15 of their top trading partners. The bilateral trade policy actions are defined as the count of new 6-digit Harmonized System (HS–06) imported products that the government has agreed to initiate a temporary trade barrier investigation 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 explanatory variable of interest, whereas a value statistically less than 1 is evidence of a negative effect. The table also reports \(t\)-statistics for whether the estimated IRR is statistically different from 1. The three macroeconomic variables of interest are the percent change in the bilateral real exchange rate, change in domestic unemployment rate, and foreign 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 exporters’ receipt of non–market economy status may affect its treatment 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 traditional literature), and a second that includes the broader definition of import protection inclusive of each of these

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

Consider the first column of Table 2 and the results examining the United States’ antidumping import policy response to these macroeconomic shocks. Each of the three key determinants for the United States has the expected impact. An IRR of 1.02 indicates that a real appreciation of US dollar is associated with increased import protection through the antidumping policy. The IRR of 1.75 on the change in domestic unemployment rate is also 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 this 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.\footnote{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 IRR for China is more than twice as large as that for the second–highest trading partner.} As has been well documented elsewhere (e.g., Bown, 2010), this phenomenon is pervasive across policy-imposing economies.

Our preferred specification for the United States is contained in the second column of Table 2. 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 these macroeconomic determinants –e.g., the US bilateral real exchange rate – can sometimes change 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 changes to import policy to include not only antidumping but also these other temporary trade barriers. This issue will be important to consider for a number of other policy-imposing economies as well.

Consider next an interpretation of the economic significance of the magnitudes of the results for the United States. Since understanding magnitudes of effects is notoriously difficult when focusing on IRRs, Figure 2 presents additional information on the economic significance of these macroeconomic determinants of import protection. We begin by computing the median of the model’s predicted estimates of import protection evaluated using the sample data; and we then introduce (one at a time) one standard deviation shocks to each of the macroeconomic determinants of interest, holding everything else constant.

The US panel of Figure 2 interprets estimates for impacts on both the antidumping policy alone as well as under the more expansive definition of import protection of all the temporary trade barriers policies. 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 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 shock to a trading partner’s real GDP growth in the form of an economic contraction is associated with a 43 percent increase in US antidumping protection against that partner and a 40
percent increase in the more expansive import protection measure. Furthermore, a one standard deviation increase in the change to the US unemployment rate – i.e., roughly two thirds of a percentage point (see again Table 1) – is associated with, per trading partner, a 33 percent increase in antidumping protection and a 25 percent increase under the more expansive measure of import protection.

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, the Table 2 estimates of the EU model are much more in line with the theory in the next column which considers the more expansive measure of import protection. The main contributor to the differential in the data across these 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 the magnitude of 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 is implies that import protection also increases when unemployment is rising at home. While this estimate is 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 real GDP growth is associated with 101 percent more imported products from that trading partner becoming subject 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. However, a first innovation relative to the prior literature is that a focus on antidumping alone (e.g., Knetter and Prusa, 2003) on this period’s data would 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 100 percent more 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.

A 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.

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

Thus far, our discussion has focused on 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 policy-imposing economies—South Korea, Australia, and Canada.
The Table 2 estimates for South Korea are mixed. Real appreciation of the 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 policies. However, periods of rising unemployment in Korea are not associated with more import protection – in fact, the IRRs for Korea are less than 1 (and statistically significant under the all TTB specification) and suggest that periods of a strong domestic economy were associated with episodes of greater import protection.

The next two columns of Table 2 document evidence that Australia’s use of these forms of import protection are associated with periods of rising domestic unemployment. 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. The first two of these columns present the same model specifications on the Canadian data that we have used for each of the other countries. There are no statistically robust results across models except for the higher frequency that China as a trading partner would face import protection. In the final specification for Canada, we introduce a new variable which is simply the count of imported products against which the United States initiated import protection policy actions against that trading partner 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, perhaps due to NAFTA.\textsuperscript{13} While purely speculative, such linkages could come through political–economic forces at the industry level that are common across countries (multinational firms, common union activity) or through the secondary impact on Canada of US shocks due to its heavy reliance on the US market for imports and exports.

To conclude this section, the approach of using higher frequency data against individual trading partners produces weak results for smaller industrialized economies such as South Korea, Australia and Canada. In addition to these economies being smaller and potentially susceptible to shocks through channels different from those we have modeled here, it is also important to note that these economies are much less frequent users of antidumping and these other TTB policies. The problem of zeros – i.e., the lack of sufficient intertemporal and trading partner variation – may contribute to the weak evidence for these economies regarding these macroeconomic determinants.

4 Import Protection During the Great Recession

4.1 Protectionist expectations

The early period of the Great Recession in 2008–9 led to substantial fear of a protectionist resurgence. As Figure 3 illustrates using data on Internet searches from Google Trends, the general public became much more aware of “Protectionism” (and the “Great Depression”) during this period. Furthermore, major multilateral institutions responded by establishing new trade policy surveillance initiatives in

\textsuperscript{13} There are a number of instances in Bown (2011b) in which the United States initiates a TTB investigation against a third country and Canada initiates a TTB investigation over the same product against the same country soon thereafter. For example, the United States initiated antidumping on certain hot-rolled steel products from Brazil in 1992:Q2, followed by a similar Canadian antidumping case on 13 of the same HS06 products from Brazil in 1992:Q3. Second, the United States initiates antidumping on steel concrete bar from Indonesia and Japan, Latvia, Moldova, Poland, and Ukraine 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.
order to monitor and report on national changes in policies that could impact international trade.\footnote{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. See also the G20 declaration of November 15, 2008 reproduced in the introduction.}

Figure 4 provides one explanation for the increased concern over “protectionism” and the associated international response. The left-hand panels of Figure 4 take the US and EU model estimates from Table 2 (which are 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 taking place beginning in 2009:Q2 and lasting through 2010:Q1, peaking in 2009:Q3.\footnote{To put the predicted count of imported products in Figure 4 into a longer-run 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. Under the model estimates of table 2, the median number of imported products per quarter against these 15 trading partners was 34. 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. Under the model estimates of table 2, the median number of imported products per quarter against these 15 trading partners was 26.}

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 – i.e., new import protection was historically associated with appreciating real exchange rates, rising unemployment, and economic contraction abroad – combined with the nature of the shocks that took place beginning in 2008 (see again Figure 1). The US saw a sharp appreciation of the US dollar, the EU also experienced an appreciation of the Euro during this period. Both economies experienced sharply rising unemployment. Finally, the simultaneity of the recession across the world implied that virtually every trading partner was also undergoing a sharp decline in real GDP during this period. These three factors combined to create a potential perfect storm of conditions for a massive government resort to 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 realized protectionist response for the United States was much different from that which was predicted from the 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, the US responded with 16 times fewer new products being covered by these trade barriers than the pre-crisis model predicted. Similarly, the EU responded with nearly 8 times fewer new products being covered by these trade barriers than the model predicted. Furthermore, the difference between the left panel and the solid line of the right panel also illustrates that the timing by which the EU’s shocks were manifest into new import protection may have been delayed by three quarters (from 2009:Q3 to 2010:Q2).

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. 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.

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.\textsuperscript{17} How did the US responsiveness to macroeconomic fluctuations change during 2008:Q4–2010:Q4? On average, the US no longer used these import restrictions against trading partners that were contracting. Whereas a pre-crisis IRR 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, in stark contrast during 2008:Q4–2010:Q4, the estimated IRR is 1.08. While this second IRR was not statistically greater than 1, the per-crisis and crisis IRRs are statistically different from one another, thus signaling a change in behavior. To the extent the United States used this form of import protection at all, it “switched” from its previous behavior and implemented import protection against those trading partners that were experiencing economic growth and not those that were contracting. This evidence consistent with a regime change for US policymakers 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 experiencing periods of severe economic contraction or weak economic growth during the Great Recession.

Returning to Figure 4, the grey solid line in the right panel illustrates the prediction of the model under the full sample of data and thus relying on these results from Table 3. For the United States, the model relying on the full sample of data continues to get correct the timing of the import protection spike vis-à-vis the realized events (2009:Q3), but interestingly it now considerably underpredicts the amount of import protection overall.

The second column of Table 3 presents an additional robustness check for the United States by including one additional explanatory variable, defined as the growth

\textsuperscript{17} 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 2010:Q4–2010:Q4 subperiods.
rate in bilateral imports.\textsuperscript{18} This variable is included to address the concern that import protection through TTBs is typically associated with surging imports; thus an explanation for the muted import protection response during 2008:Q4–2010:Q4 was because of the global collapse in trade flows that took place in 2008–9 (Baldwin and Evenett, 2009). Table 3 illustrates that controlling for this potential phenomenon does not affect either the qualitative nor quantitative nature of our results.

A final explanation for the lack of a major protectionist response by the United States during 2008:Q4–2010:Q4 is taken from the bilateral real exchange rate IRR estimate continuing to be greater than 1 combined with the US exchange rate data illustrated 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. A contributing explanation to the lack of a larger protectionist response during 2009–2010 was likely thus the factor that the US dollar was weakening vis-à-vis a number of major trading partners.

Table 4’s results for the EU share a number of qualitative similarities with the evidence from the United States. From the third and fourth columns of Table 3, like the United States, there is a differential estimated IRR on the foreign real GDP growth variable across the two periods. There is thus also evidence of a regime change by the EU to switch away from imposing import protection on trading partners that were contracting and toward those that were growing, as had been the historical pattern. With so many of the EU’s trading partners also experiencing weak economic growth during 2008:Q4–2010:Q4, the implication was less import protection overall.

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 was also less responsive during this period to any relative appreciations in the value of the Euro. Furthermore, as Figure 1 again illustrates, for much of the 2008–2010 period the

\textsuperscript{18} 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.
Euro is depreciating; based on historical EU evidence from Table 2 of exchange rate movements, this suggests a dampening effect on import protection as well.

A final interesting point for the European Union is the potential evidence of a delay in the new import protection relative to the historical model’s predictions. For the EU, the model predicted a run-up in new import protection in 2009:Q2 through 2009:Q4, and the new import protection spike in the EU did not arrive until 2010:Q2.

Finally, Table 3 also reports mixed evidence of potential differential responsiveness of import protection to macroeconomic shocks for Australia and Canada. The only relatively robust result is across the specifications for Canada; like the United States and the European Union, the pre-crisis 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.

5 Conclusion

This paper uses highly detailed, quarterly data for the United States, European Union, and three other industrialized economies to estimate the impact of macroeconomic fluctuations on import protection policies over 1988:Q1–2010:Q4. Estimates on a pre-Great Recession sample of data provide evidence of three key relationships for the US and EU. Increases in domestic unemployment rates and real appreciations in bilateral exchange rates lead to substantial increases in antidumping and related forms of import protection. We also provide evidence of a previously overlooked result that policy-imposing countries historically imposed such bilateral import restrictions on trading partners that were going through periods of weak economic growth.

19 We do not report Table 4 estimates for South Korea because it imposed so few new import restrictions during 2008:Q4–2010:Q4 that there was insufficient variation in the data to generate any results.
In a second exercise, we use estimates from the pre-Great Recession model to then show the expected protectionist 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.

Finally, we re-estimate the model on data from the Great Recession period in order to explain deviations to the realized protectionist response away from historical behavior. While exchange rate movements played an important role in limiting import protection, the US and EU also “switched” from their historical behavior during the Great Recession and shifted implementation of new import protection away from those trading partners that were contracting and toward those experiencing economic growth.
References


Data Appendix

**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, 2011) which is publicly available at [http://econ.worldbank.org/ttbd/](http://econ.worldbank.org/ttbd/).

**Bilateral real exchange rate series:** Source is the USDA’s Agricultural Exchange Rate Dataset. Annual bilateral real exchange rate series is constructed using the 12th month’s value, quarterly bilateral real exchange rate series is constructed using the last month of the quarter’s value. EURO/US$ is used for the European Union’s bilateral real exchange rate series.

**Real GDP growth** is annualized and generated from seasonally adjusted, quarterly real GDP data taken from the OECD and the IMF’s International Financial Statistics (IFS). Brazil, Germany, India, Indonesia, Japan, and Spain’s data is from Haver OECD MEI. Taiwan’s real GDP series is from its government website: [http://eng.stat.gov.tw/ct.asp?xItem=25763&CtNode=5347&mp=5](http://eng.stat.gov.tw/ct.asp?xItem=25763&CtNode=5347&mp=5). China’s real GDP series is constructed from its officially reported statistics. The EU’s real GDP series is based on EU12 constructed using data from the IFS. From the policy imposing countries, Argentina lacks seasonally adjusted quarterly real GDP series. Year data availability varies by country.

**Trading Partners:** For each of the five policy-imposing economies, 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 15 trading partners for each sample are:

- **USA (15):** China, European Union, Japan, Korea, Taiwan, Brazil, South Africa, Canada, India, Australia, Mexico, New Zealand, Turkey, Indonesia, Switzerland
• **EU (15):** China, Turkey, India, Korea, Brazil, United States, Japan, Taiwan, Norway, Indonesia, Switzerland, South Africa, Australia, New Zealand, Mexico

• **Korea (10):** United States, China, Japan, Indonesia, European Union, India, Canada, New Zealand, Taiwan, Switzerland

• **Australia (15):** European Union, China, Korea, Taiwan, United States, Indonesia, Japan, Brazil, Canada, India, South Africa, Israel, Mexico, Turkey, Norway

• **Canada (15):** United States, European Union, China, Brazil, Taiwan, New Zealand, Korea, South Africa, India, Japan, Turkey, Australia, Indonesia, Mexico, Switzerland
Table 1. Summary Statistics, Data for 1988:Q1–2010:Q4

<table>
<thead>
<tr>
<th>Variables</th>
<th>US</th>
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<th>AUS</th>
<th>CAN</th>
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<td>(0.24)</td>
<td>(0.92)</td>
<td>(0.94)</td>
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Notes: standard deviations in parentheses. ‡EU pre-crisis data for 1999:Q1–2008:Q3 only.

<table>
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<tr>
<th>Explanatory variables</th>
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<td>Time trend</td>
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<td>(5.89)</td>
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<td>US TTBs initiated in t-1</td>
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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

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<th>AUS</th>
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<td>(5.31) (5.08) (4.45) (4.26) (2.72) (2.65) (0.41) (0.43)</td>
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<td>(2.58) (3.29) (1.19) (1.96) (4.61) (4.56) (0.01) (0.11)</td>
<td>1.76&lt;sup&gt;b&lt;/sup&gt; 2.97&lt;sup&gt;b&lt;/sup&gt; 2.28&lt;sup&gt;b&lt;/sup&gt; 2.54 0.98 0.52 1.59 1.16</td>
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<td>[0.03] [0.56] [0.41]</td>
<td>[0.10] [1.52]</td>
<td>b</td>
<td>[0.26] [0.01]</td>
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<td>(2.62) (3.02) (2.46) (1.51) (0.90) (0.89) (1.47) (1.52)</td>
<td>1.08 1.04 1.09 1.06 0.99 1.03 1.21 1.25</td>
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<td><strong>Bilateral import growth, 2008:Q4–2010:Q4</strong></td>
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<td>(2.57) (4.10) (0.09) (0.43)</td>
<td>-- 1.05 -- 1.01 -- 0.97&lt;sup&gt;b&lt;/sup&gt; -- 0.98</td>
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<td>-- [3.41]&lt;sup&gt;c&lt;/sup&gt;</td>
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<th>Time trend included</th>
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<th>yes</th>
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<tbody>
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<td>All trading partner indicators</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Observations</td>
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<td>717</td>
<td>717</td>
<td>1124</td>
<td>1124</td>
<td>1180</td>
</tr>
</tbody>
</table>

Dependent variable: Count of products initiated under all temporary trade barrier policies in quarter t

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*Note: Values in parentheses are standard errors.*
| 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. 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.
Figure 1. Import Protection, Real Exchange Rates, and Unemployment, 1988:Q1–2010:Q4
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 Interest in the 'Great Depression' and 'Protectionism' 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, prediction from entire sample based on table 3 estimates.
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, prediction from entire sample based on table 3 estimates.