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

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30 November 2011

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Abstract

This paper uses highly detailed, quarterly data for five major 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 two key relationships. We confirm that appreciations in bilateral real exchange rates lead to substantial increases in antidumping and related forms of import protection: e.g., a 4 percent appreciation results in 60-90 percent more products being subject to 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 the model to then provide the first estimates that link macroeconomic fluctuations to a change in policy-imposing behavior during the Great Recession so as to explain the realized protectionist response. During the Great Recession, the US and other policy-imposing economies became less responsive to exchange rate appreciations. Furthermore, the US and other economies "switched" from their historical behavior and shifted implementing new import protection away from those trading partners that were contracting and toward those experiencing economic growth. In a final exercise, we document how the model's estimates imply that a 9-20 percent appreciation of China's real exchange rate vis-a-vis the US dollar during the sample period would allow for China's exporters to have received the "average" import protection treatment under antidumping that the US imposed against other countries.

JEL No. F13

Keywords: antidumping, safeguards, US, Canada, EU, Korea, Australia, China

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Thanks to Hiau Looi Kee and Aart Kraay for useful discussions and to Aksel Erbahar, Chrissy Ostrowski, and Jake Fabina for outstanding research assistance. Any opinions expressed in this paper are the authors' and should not be attributed to the World Bank or the Federal Reserve Bank of Chicago. All remaining errors are our own.

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]

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

[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.

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, recessions, and antidumping and related trade policies over the 1988-2010 period.

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.

[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.

Our results indicate that, prior to the crisis for these five economies, there was a strong empirical relationship between macroeconomic fluctuations and import protection policies. In particular, two results stand out as being important across a number of countries. First, appreciations in bilateral real exchange rates lead to substantial increases in antidumping and related forms of import protection. For example, a 4 percent appreciation in the bilateral real exchange rate relative to the mean level results in a policy-imposing country subjecting 60-90 percent more products to these 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. For example, for a number of countries, a one standard deviation fall in foreign real GDP growth relative to the mean level results in a policy-imposing country subjecting greater than 100 percent more products to these forms of import protection. 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. While we find that the historical models over-predict the amount of new import restrictions that the United States, Canada, and Korea actually implemented during 2008:Q4-2010:Q4, the models under-predict the import restrictions subsequently imposed by the European Union and Australia. Furthermore, our analysis of data at the quarterly frequency allows us to identify evidence of apparent "delays" in the initiation of new trade restrictions relative to the predictions based on the historical models. For example, while the United States model over-predicts import protection for the United States overall, much of the import protection that was expected to materialize early in the crisis (2008:Q4-2009:Q2) was pushed off until a surge in 2009:Q3. A similar pattern emerges for the EU – the model predicts a surge in import protection in 2009:Q1; and though this surge does not materialize in the data until

[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.

2010:Q2, it is actually larger than what was predicted by the historical models and the crisis-era macroeconomic shocks.

Our second exercise estimates the models on the longer time series of data through 2010:Q4 so as to identify changes in the responsiveness of import restrictions to macroeconomic fluctuations. First, we find evidence for the United States, Canada, and the EU that these economies were less responsive to exchange rate appreciations during the Great Recession. For the United States, there was a mild appreciation in the real value of the dollar during 2008:Q3-2009:Q1. The timing of new import barriers is associated with quarters in which the dollar had appreciated. Nevertheless, the responsiveness to an appreciation is estimated to be smaller during this period than it was in the pre-crisis period. Second, there is also 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.

Finally, because China is often viewed as a unique trading partner, our empirical analysis allows us to examine if there are China-specific differences in the responsiveness of import restricting policies to these macroeconomic determinants. First, the broad pattern of our results holds even when we impose additional, China-specific controls. Second, while we do not find a statistically significant differential impact in the responsiveness of US import protection to the bilateral real exchange rate with China (relative to the US bilateral real exchange with other trading partners), we do carefully interpret the magnitude of the estimates. Interestingly, the model predicts that, ceteris paribus, it would have taken only a 9%-20% appreciation of China's real exchange rate vis-a-vis the US dollar during the sample period for China to have received the "average" US treatment under antidumping and other temporary trade barrier policies imposed on its other trading partners.

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).[4] 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 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

[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.

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).

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

[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 Korea (Kang and Park, 2011). However, none of these studies examine the macroeconomic relationships or models that our approach emphasizes. Bown (2009) and Henn and McDonald (2011) also provide product-level estimates of the trade impact of import restrictions at various stages of the crisis.

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.

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

[6] Crowley (2010b) provides a recent survey.

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.

2.2 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, *t*. 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,

[7] Bagwell and Staiger (2003) also show that the central results of the international business cycle model extend

$y_{it} \mid x_{it}, u_{it} \sim Poisson(u_{it} m(x_{it}, \beta))$ 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 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.

2.3 Data and Variable Construction

There are two main innovations to our key measures of import protection relative to the previous literature. 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) product level. The data derives from extremely detailed trade policy information found in the World

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to a more general case in which the two countries have independent business cycles.

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 6-digit HS imported products subject to newly initiated investigations under one of these four import-restricting policies. This count variable is constructed for each policy-imposing country by trading partner and by quarter.[8] 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.

The key macroeconomic determinants of import protection in our model are bilateral real exchange rates, domestic real GDP growth and the foreign trading partner's real GDP growth, with each of the variables also defined at the quarterly frequency. We define the bilateral real exchange rate series for each partner as an index with a common base quarter of 100 at 1998:Q4. In the estimation, we take the log level of the quarterly value. An increase in this variable represents a real appreciation of the domestic currency belonging to the policy-imposing economy. The domestic real GDP growth and the foreign real GDP growth are presented in the quarterly data at annualized growth rates.

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 three lags (t=-1, t=-2, t=-3) of

[8] In reality, governments impose measures 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. Thus, 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).

each of the macroeconomic variables. Model selection tests using the Akaike information criterion (AIC) and Bayesian information criterion (BIC) most consistently prefer use of three lags. While there are instances in which two or four lags give slightly better results for a particular policy-imposing economy in a particular specification, we focus on three lags throughout for consistency.[9]

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 period 1988:Q1 - 2008:Q3. We consider a panel data set for each of five policy-imposing economies and their trade policy actions with respect to 15 of their top trading partners. As is common practice for negative binomial regression models, we report estimates for incidence rate ratios (IRRs). An estimated IRR with a value that is statistically greater than 1 is evidence of a positive effect of the explanatory variable of interest, whereas a value statistically less than 1 is evidence of a negative effect. The table also reports t-statistics for whether the estimated IRR is statistically different from 1. For each of the three variables of interest – the bilateral real exchange rate, domestic real GDP growth, and foreign real GDP growth – the model includes three lags, even though to conserve space Table 2 reports only the cumulative, long-run (3 quarter) effect of the estimates of the three lags taken together. 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 only, and a second that includes the broader definition of import protection inclusive of each of these relatively substitutable forms of temporary trade barriers – antidumping, countervailing duties, global safeguards, and China-specific safeguards.

Consider the first column of Table 2 and the results examining the United States' antidumping import policy response to these macroeconomic determinants. Each of the three determinants has the expected impact, though with varying degrees of statistical significance. Higher levels of the US

[9] AIC and BIC test statistics are unreported in the paper and are available from the authors upon request.

bilateral real exchange rate signal periods of relative appreciation of the US dollar; hence an IRR of 22.798 is evidence that an appreciating US dollar is associated with increased import protection through the antidumping policy. The IRR of 0.985 on domestic real GDP growth is less than 1 and indicates that import protection also increases when domestic growth is weak, though this IRR is not statistically significant in this specification. The statistically significant IRR of 0.942 on foreign real GDP growth is evidence that the US imposes additional import protection against trading partners that are going through their own periods of weak economic growth. Finally, the time trend estimate of 0.974 indicates that US import protection through this policy has been declining over this sample period.

Table 2's second column uses the same sample of data and model for the United States; the only innovation is to allow the dependent variable to reflect not only antidumping import protection but also the 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 and foreign real GDP growth – can sometimes change considerably. 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 a strong 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.

Before moving on to the Table 2 estimates of the other four policy-imposing economies, we next turn to 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 model's predicted estimates of import protection at the mean values of the data; and we allow that to determine the initial value of import protection at quarter Q0. We then consider the impact of a one standard deviation shock to each of these three determinants; Figure 2 plots the subsequent evolution of the policy response to the shock over the next three quarters (Q1, Q2, Q3), given the estimates of the model. Thus, Figure 2 illustrates both how the policy response to the shock evolves in the short run (one quarter) as well as its full long

run (three quarter) cumulative impact. The evolution is indexed from a base quarter value of the policy set to equal 100.

The first panel of Figure 2 corresponds to the first column of model estimates of Table 2 and thus the estimates for the United States and the antidumping policy. A one standard deviation appreciation of the US dollar bilateral real exchange rate in the quarterly data for this sample period (see Table 1) is roughly 4 percent. The first panel for Figure 2 illustrates that this 4 percent appreciation is associated with a 76 percent increase in antidumping protection in the long-run (3 quarters). The second panel for Figure 2, corresponding to the second column of estimates in Table 2, illustrates that this one standard deviation increase (4 percent appreciation) is associated with a 91 percent increase in US import protection in the long-run, under the more expansive definition of import protection.

The US estimates for shocks to foreign GDP growth are of similar economic magnitude. A one standard deviation shock to foreign real GDP growth in the form of an economic contraction – i.e., from the mean of 3.9 percent to -3.3 percent (see again Table 1) – is associated with a 54 percent increase in antidumping protection in the long-run (left panel of Figure 2) and a 106 percent increase in the more expansive import protection measure (right panel of Figure 2). Finally, though the IRRs for US real GDP growth in table 2 are not statistically different from 1, it is also worth noting that this is not solely the result of large standard errors – i.e., the point estimates are also relatively small. For example, a one standard deviation shock to domestic real GDP growth in the form of an economic contraction – i.e., from the mean of 2.5 percent to -0.2 percent (see again Table 1) - is associated in the long-run with only a 4 percent increase in antidumping protection (left panel of Figure 2) and a 22 percent increase under the more expansive measure of import protection (right panel of Figure 2).

Thus far, our discussion has focused on estimates of the US import policy response to these macroeconomic fluctuations. In the remaining columns of Table 2 and panels of Figure 2, we apply the same model and approach to the data of four other policy-imposing economies – Canada, the European Union, Korea, and Australia.

The estimates for Canada and Korea in Table 2 suggest a fairly similar pattern to that found for the United States. Real appreciation of the Canadian dollar and Korean won, respectively, as well as periods of weak foreign economic growth are associated with Canada and Korea applying more

import protection on trading partners through antidumping and related policies. The long-run magnitudes of the effects of such shocks (see Figure 2) are also similar to those estimated for the United States. However, periods of weak domestic economic growth in Canada and Korea are not associated with more import protection – in fact, the IRRs for Canada are statistically greater than 1 and suggest that periods of strong domestic economic growth were associated with episodes of greater import protection. Finally, like the United States, Canada's use of these forms of import protection was trending down during this period. On the other hand, Korea's use of these forms of import protection has been increasing over time.

Consider next the 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 for much of the European Union which began only in 1999.[10] The estimates for the EU are mixed – when considering only its import protection through its antidumping policy, the statistically significant IRR of 22.624 on its bilateral real exchange rate suggests a strong relationship between import protection and appreciation of the Euro – a result consistent with that found for the United States, Canada, and Korea. This result disappears when we consider the more expansive measure of import protection in the next column. The main contributor to the change in the responsiveness of the bilateral real exchange rate is because the EU also imposed an extensive set of import restrictions on steel products through its global safeguards policy in 2002 (see again Figure 1); a period of weak economic growth and a relatively weak value of the Euro. Because this was the only major instance in which the EU used its global safeguard policy during the period and that its stated public motive for the import restriction was due to concerns over "trade deflection," the rest of the empirical analysis below focuses on the EU's use of antidumping policy alone.[11]

[10] We treat the results for the EU with caution given a number of unique issues associated with variable construction for the EU over this time period. 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.

[11] A 25 March 2002 EU press release announcing its steel safeguard response to the US steel safeguard of 5 March noted that "[w]hilst US imports of steel have fallen by 33% since 1998, EU imports have risen by 18%. Given that worldwide there are 2 major steel markets (EU with 26.6 m tonnes of imports in 2001 and US with 27.6 m tonnes), this additional protection of the US steel market will inevitably result in gravitation of steel from

Finally, the last two columns of Table 2 document evidence that the most important macroeconomic determinant of Australia's use of these forms of import protection were periods of weakness in the domestic economy. Figure 2 indicates that a one standard deviation decline to domestic GDP growth (from 3.3 percent to 0.7 percent) was associated with a more than 40 percent increase in antidumping import protection. There is no statistically significant impact of movements for the real Australian bilateral exchange rate or its trading partners' real GDP growth. However, like the United States, Canada, and the EU, Australia's use of these forms of import protection has also trended down during 1988:Q1-2008:Q3.

To summarize, the evidence for the United States and a number of other major industrialized economies from the 1988:Q1-2008:Q3 period is that appreciations of the bilateral real exchange lead to substantial increases in antidumping and related forms of import protection. In particular, a 4 percent appreciation of the bilateral real exchange rate can result in 60 percent-91 percent more products being subject to these forms of import protection after three quarters. A second point worth highlighting is that the IRR for foreign GDP growth is frequently less than 1 throughout the estimates of Table 2.[12] Though this IRR is not always statistically different from 1, the evidence from 1988:Q1–2008:Q3 is that policy-imposing economies tended to impose new import protection on trading partners that were themselves undergoing a period of weak economic growth or an economic contraction. These two results will be important for understanding the differential government policy responses during the Great Recession, as we discuss in the next section.

4 Why Was There so Little Import Protection During the Great Recession?

Given the severity of macroeconomic shocks that took place during the Great Recession, two fundamental research questions are: what explains the import protection that did arise? And, why was there not more of it?

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the rest of the world to the EU. This diversion ['trade deflection'] is estimated to be as much as 15 m tonnes per year (56% of current import levels)." (European Union, 2002). For an empirical analysis of the EU concerns over potential trade deflection in this instance, see Bown and Crowley (2007).

[12] The exception is the Table 2 estimate for the EU; however even those IRR estimates are both very small economically (7 percent - 12 percent increase after 3 quarters) and not statistically different from 1.

To address these question systematically, we re-estimate the models from Table 2 on a time series of data that extends through the crisis period and thus 2010:Q4. We introduce pre-crisis (1988:Q1-2008:Q3) and crisis (2008:Q4-2010:Q4) dummy variables to interact with the three macroeconomic determinants so that we can test for whether governments responded to macroeconomic shocks differentially across the two sub-periods.[13] Table 3 presents summary statistics of the differences in the underlying data series across the two periods.

Table 4 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.[14] However, to motivate better an import protection question for the United States, we first pause to focus on the implications of the model's 1988:Q1-2008:Q3 period IRR estimates for the predicted US government import policy response during 2008:Q4-2010:Q4, based on the realized shocks observed in the macroeconomic data.

Figure 3 plots the predicted import protection response based on the model estimates for 1988:Q1-2008:Q3 and the actual fluctuations in the macroeconomic data during 2008:Q1-2010:Q4.[15] Specifically, the model predicts that if US policymakers had followed the same decision rule during this period as they had followed during the previous 20 years, the US would have imposed nearly 150 percent more import restrictions during 2008:Q4-2010:Q4 than it implemented in practice.[16]

[13] 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.

[14] The estimates for the 1988:Q1-2008:Q3 period in Table 4 are not identical to Table 2 because of the assumption that the impacts of the time trend and the trading partner-specific effects are the same across both the 1988:Q1-2008:Q3 and 2010:Q4-2010:Q4 subperiods in Table 4.

[15] The within-sample predictions for the period 2008:Q1-2008:Q3 are presented for aesthetics. The predictions of interest in Figure 3 are the out of sample predictions for 2008:Q4-2010:Q4.

[16] Specifically, the 1988:Q1-2008:Q3 IRRs evaluated against the 2008:Q4-2010:Q4 macroeconomic data predict (out of sample) 233 import restrictions against these 15 trading partners during the crisis period. In reality, the United States had only 94 import restrictions against these 15 trading partners during the crisis period.

How did the US government policy responsiveness to macroeconomic fluctuations *change* during 2008:Q4-2010:Q4? The estimates from the first column of Table 4 illustrate two main contributing causes. The first is evidence of a change in US responsiveness to a relative appreciation of the real US dollar exchange rate during this period. An IRR of 15.439 (and statistically different from 1) for the crisis period indicates that, within the 2008:Q4-2010:Q4 subsample, more protection was associated with quarters in which the dollar had appreciated. There was a mild appreciation in the real value of the dollar during 2008:Q3-2009:Q1. Nevertheless, the IRR of 15 is much smaller than the IRR of 32 estimated for the 1988:Q1-2008:Q3 subsample, and the two estimates are statistically different from one another. A likely contributing cause to the less responsive import protection policy response in the face of a real appreciation of the US dollar during 2008:Q3-2009:Q1 is because the *level* of the real US dollar exchange rate during the crisis period overall was low in historical terms (e.g., see again Figure 1), relative to the previous 20 years.

The first column of Table 4 makes evident a second important differential in US policy responsiveness 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 0.892 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 1.187 and is statistically *greater* than 1. Thus, 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.

A final interesting point from Figure 3 for the United States is the potential evidence of a delay in the new import protection relative to the historical model's predictions. For the United States, the model predicted a run-up in new import protection in 2008:Q4 and 2009:Q1, and the new import protection spike in the United States did not arrive until 2009:Q3. A similar pattern emerges for the European Union in Figure 3 – its historical model predicted a spike in 2009:Q1, and the major increase in EU import protection during this period did not arrive until 2010:Q2.

Table 4's results for Canada and the EU are quite similar qualitatively to the evidence from the United States. From the second and third columns of Table 4, the estimated IRRs for Canada's and the EU's bilateral real exchange rate for 2008:Q4-2010:Q4 are positive, and while the point estimates are not always statistically different from their bilateral real exchange rates for 1988:Q1-2008:Q3, the estimated IRRs from that period are smaller than Canada's and the EU's IRR estimate for the earlier period. Thus there is weak evidence that Canada and the EU were also less responsive during this period to relative appreciations in the value of the Canadian dollar and Euro, respectively. Furthermore, 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 Canadian and EU policymakers to switch toward imposing import protection on trading partners that were growing and not those that were contracting, as had been the historical pattern. With so many of Canada's and the EU's trading partners also experiencing weak economic growth during 2008:Q4-2010:Q4, the implication was less import protection overall. Indeed, as Figure 3 indicates, Canada's historical model also predicted more import protection during 2008:Q4-2010:Q4 than arose, whereas EU's historical model predicted slightly less.

Finally, there is no evidence of a regime change for Korea and Australia. The last two columns of Table 4 indicate no statistically different response to import protection of these macroeconomic determinants over the 2008:Q4-2010:Q4 subsample when compared to the 1988:Q1-2008:Q3 period. And in Figure 3, Korea's historical model predicted much more import protection than arose in practice, whereas Australia's historical model predicted less.

5 Import Protection, China, and Exchange Rates

Since China's accession to the WTO in 2001, its exporters have made up an increasingly sizeable share of antidumping and related import restrictions across the WTO membership.[17] For example, Bown

[17] There are two main forces behind this phenomenon. The first is simply China's export expansion in world markets – as it exports more, there is more trade with China to be subject to such import restrictions. The second stems from China's accession to the WTO in 2001 at which point existing WTO members had to give imports from China the same most-favored-nation (MFN) tariff treatment as was given to all other WTO members. Prior to its WTO accession, countries could discriminate against imports from China through their applied tariff policies or quantitative restrictions. After China's WTO entry, any desire to impose discriminatory

(2011a) creates a product-level measure of all of the antidumping barriers in effect and finds that the share of China's exporters in trading partner's "stock" of accumulated barriers in place by 2009 ranged from a low of 21 percent (United States) to a high of 44 percent (Australia), up from a range of only 8 percent (United States) to 20 percent (Korea) in 1997. Furthermore, the "flow" of new trade barriers under these policies has been even more increasingly concentrated toward China during this period. Given the potential magnitude of China's role in influencing the overall use of this form of import protection, as well as China's interventionist exchange rate policy seeking to maintain a stable relationship vis-à-vis the US dollar during this period, our final exercise is to examine any *differential* effects in macroeconomic determinants influencing import policy toward China.[18] Table 5 presents summary statistics of our variables of interest broken out by whether the foreign trading partner is China versus any alternative trading partners included in the sample.

Table 6 presents our set of estimates from the negative binomial regression model with each of our three macroeconomic determinants interacted with a dummy variable indicating whether the trading partner is "non-China" versus China. We present two different specifications for each policy-imposing economy; the first does not include trading partner-specific fixed effects, whereas the second specification includes them. First, the broad pattern of results from Table 2 and Table 4 also apply to the non-China estimates from Table 6: i.e., estimating the models on only non-China trading partner data leads to the same qualitative pattern of results and does not change our interpretation of how these macroeconomic fluctuations affect trade policy decisions. Furthermore, the only statistically significant differential effects for the non-China versus China estimates in Table 6 is the time trend – i.e., these forms of import protection are declining in use against non-China and increasing in use against China.

Nevertheless, given the policy discussions, it is worth examining potential differences in the magnitudes for the China versus non-China results for bilateral real exchange rates in particular. As such, begin with the first column of Table 6 and the estimates for the determinants of US policy response. For the bilateral real exchange rate, the estimated IRR for other trading partners is

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trade barriers toward China was legally required to be through potentially WTO-consistent policies such as antidumping, countervailing duties, or safeguards. For a discussion, see Bown (2010).

[18] For discussions of the economic impacts of China's currency interventions see, for example, Mattoo and Subramanian (2009) and Staiger and Sykes (2010).

economically and statistically significant at 46. On the other hand, the estimated IRR for China is economically and statistically significant at 14, though the test statistic suggests that this differential is (marginally) not statistically different from the IRR on other partners. Nevertheless, to interpret the relative magnitudes of the responsiveness of the US to the bilateral real exchange rates, we focus on the point estimates and consider an exercise similar to Section 3, by which we compare the predictions of the model under the mean values of the data and against "reasonably" sized shocks to the macroeconomic determinants of interest.

However, before undertaking such an exercise, it is important to recognize from Table 5 three fundamental distinctions between the US data for China and non-China trading partners in the sample. First, for all other trading partners, the mean count of products affected each quarter by new US import protection is three times smaller compared to China. Therefore, from a much larger baseline, the same level increase in import protection will suggest a smaller proportional effect for China. Second, the US-China real exchange rate is only half as volatile as the US bilateral real exchange rate with non-China trading partners during this period; i.e., a one standard deviation increase in the US-China real exchange rate corresponds to only a 1.9 percent appreciation, whereas a one standard deviation increase in the US real exchange rate with other trading partners corresponds to a 4 percent appreciation. Third, because there is so little volatility in the US-China real exchange rate over time, the IRR is more likely to be imprecisely estimated.

With these points in mind, consider the implications of the IRR estimates for the US bilateral real exchange rate variables from the first column of Table 6. An IRR of 46 is evidence that the long run impact (after 3 quarters) of a 4 percent appreciation of the dollar (a one standard deviation shock on the non-China sample) is a 50 percent increase in the import protection measure.[19] Furthermore, an IRR of 14 for China is evidence that the long run impact (after 3 quarters) of a 1.9 percent appreciation of the dollar (a one standard deviation shock on the China sample) is a 28 percent increase in the import protection measure; this is a still sizable number even though the shock is less than half as large a real exchange rate movement as a one standard deviation change for the non-China partners in the sample. Putting the thought experiment differently, a 4 percent appreciation in the US bilateral

[19] Specifically, a 4 percent appreciation of the bilateral real exchange rate for non-China increases the count of HS06 products against the average (non-China) trading partner filed per quarter from 1.4 to 2.8, or a doubling of 1.4 products per trading partner per quarter.

real exchange rate with respect to China – i.e., what is a one standard deviation change for the average "other" US trading partners in the sample – leads to a 72 percent increase in import protection relative to the model's predictions at the mean values of the data.[20]

As we have noted, there is a relative lack of intertemporal volatility in the US-China bilateral real exchange rate. The first column of Table 6 estimated the US model without any trading partner fixed effects and thus was able to exploit both cross-sectional and intertemporal variation in the data. In the second column, we re-estimate the model with trading partner fixed effects. When we force identification to be driven from only the intertemporal variation within the US-China bilateral real exchange rate series, the IRR estimate falls from 14 to 5, though even this latter estimate is so imprecisely estimated that it is not statistically different from the IRR on the non-China trading partners (77) in the sample.

Finally, an interesting thought experiment is to use the model to predict by how much China's currency would have to appreciate in real terms vis-a-vis the dollar to receive the "average" import protection treatment that the United States' other trading partners received during this period. The model implies that a 9-20 percent appreciation of the Chinese real exchange rate against the dollar during this period would reduce` the new import protection against China from the prediction at the means of the data to the prediction for the other countries at the means of that subsample of data.[21]

6 Conclusion

This paper estimates the impact of macroeconomic fluctuations on import protection policies over 1988:Q1-2010:Q4 for five major industrialized economies. We first provide "historical" estimates from the period prior to the Great Recession that highlight two main results. Appreciations of bilateral real

[20] Specifically, a 1.9 percent appreciation of the US bilateral real exchange rate toward China increases the count of HS06 products against China filed per quarter from 4.3 to 5.5, or roughly 1.2 per quarter. A 4 percent appreciation of the US bilateral real exchange rate toward China increases the count of HS06 products against China filed per quarter from 4.3 to 7.2, or roughly 2.9 per quarter.

[21] Specifically, the estimates from column 1 imply a 9 percent appreciation of the Chinese real exchange rate is required to shift the prediction from China at the means from 4.5 to 1.4 (the mean for non-China in the no fixed effects model). The estimates from column 2 imply a 20 percent appreciation of the Chinese real exchange rate is required to shift the prediction from China at the means from 4.5 to 1.1 (the mean for non-China in the fixed effects model).

exchange rates lead to substantial increases in antidumping and other relatively substitutable forms of import protection: e.g., a 4 percent appreciation results in 60-90 percent more products being subject to import protection. We also find evidence of a previously overlooked result that economies historically imposed such bilateral import restrictions on trading partners that were going through periods of weak economic growth.

Second, we use the models to then estimate the link between macroeconomic fluctuations and a change in policy-imposing behavior during the Great Recession so as to explain the realized import protectionist response of 2008-2010. The evidence for the United States and other policy-imposing economies suggests that their import protection policies became less responsive to exchange rate appreciations during this period. Furthermore, the US and other economies "switched" from their historical behavior and shifted implementing new import protection away from those trading partners that were contracting and toward those experiencing economic growth. Combined, these two results contribute to our understanding of the causes of the import protection response that did arise during the Great Recession, as well as why it was muted – relative to predictions based on the historical models and the realized macroeconomic shocks – for countries like the United States and Canada.

Finally, we use the model to better understand the magnitude of US-China bilateral real exchange rate movements on US import protection activity. In particular, our models' estimates imply that a 9-20 percent appreciation of China's real exchange rate vis-a-vis the US dollar during the sample period would allow for China's exporters to have received the "average" import protection treatment under antidumping that the US imposed against other countries.

References

Bagwell, Kyle and Robert W. Staiger (2003) "Protection and the Business Cycle," *Advances in Economic Analysis & Policy* 3(1): 1-43.

Bagwell, Kyle and Robert W. Staiger (2002) *The Economics of the World Trading System*. Cambridge, MA: The MIT Press.

Bagwell, Kyle and Robert W. Staiger (1990) "A Theory of Managed Trade," *American Economic Review* 80(4): 779-795.

Blonigen, Bruce A. and Thomas J. Prusa (2003) "Antidumping," in E. Kwan Choi and James Harrigan (eds.) *Handbook of International Trade* Oxford, UK: Blackwell Publishers.

Bown, Chad P. (2011a) "Taking Stock of Antidumping, Safeguards and Countervailing Duties, 1990-2009," *The World Economy*, forthcoming.

Bown, Chad P. (2011b) *Temporary Trade Barriers Database*, The World Bank. Available on line at http://econ.worldbank.org/ttbd/ .

Bown, Chad P. (2010) "China's WTO Entry: Antidumping, Safeguards, and Dispute Settlement," in Robert C. Feenstra and Shang-Jin Wei (eds.), *China's Growing Role in World Trade*, University of Chicago Press for the NBER, pp. 281-337

Bown, Chad P. (2009) "The Global Resort to Antidumping, Safeguards, and other Trade Remedies Amidst the Economic Crisis," in Simon J. Evenett, Bernard M. Hoekman and Olivier Cattaneo, editors, *Effective Crisis Response and Openness: Implications for the Trading System*, London, UK: CEPR and World Bank, pp. 91-118

Bown, Chad P. and Meredith A. Crowley (2007) "Trade Deflection and Trade Depression," *Journal of International Economics* 72(1): 176-201.

Brander, James and Paul Krugman (1983) "A 'Reciprocal Dumping' Model of International Trade," *Journal of International Economics* 15(3-4): 313-321

Crowley, Meredith A. (2011) "Cyclical Dumping and US Antidumping Protection: 1980-2001," *Federal Reserve Bank of Chicago Working Paper* (WP-2007-21).

Crowley, Meredith A. (2010a) "Split Decisions in Antidumping Cases," *B.E. Journal of Economic Analysis and Policy* 10(1), Article 68.

Crowley, Meredith A. (2010b) "Why Are Safeguards Needed in a Trade Agreement?" in George A. Bermann, Petros C. Mavroidis, and Kyle W. Bagwell editors, *Law and Economics of Contingent Protection in International Trade*, Cambridge, UK: Cambridge University Press.

Feinberg, Robert M. (1989) "Exchange Rates and Unfair Trade," *The Review of Economics and Statistics* 71 (4): 704–707.

Feinberg, Robert M. (2005) "U.S. Antidumping Enforcement and Macroeconomic Indicators Revisited: Do Petitioners Learn?" *Weltwirtschaftliches Archiv* 141(4): 612-622.

Gawande, Kishore, Bernard Hoekman, and Yue Cui (2011) “Determinants of Trade Policy Responses to the 2008 Financial Crisis,” World Bank Policy Research Working Paper Series No. 5862, October.

Hansen, Wendy and Thomas J. Prusa (1996) “Cumulation and ITC Decision-Making: The Sum of the Parts is Greater Than the Whole,” *Economic Inquiry* 34: 746-769

Henn, Christian and Brad McDonald (2011) “Protectionist Responses to the Crisis: Damage Observed in Product-Level Trade,” IMF Working Paper No. WP/11/139, June.

Irwin, Douglas A. (2011a) *Peddling Protectionism: Smoot-Hawley and the Great Depression*. Princeton, NJ: Princeton University Press

Irwin, Douglas A. (2011b) *Trade Policy Disaster: Lessons from the 1930s*. Cambridge, MA: The MIT Press.

Irwin, Douglas A. (2005) “The Rise of U.S. Antidumping Activity in Historical Perspective,” *The World Economy* 28: 651-668.

Kang, Moonsung and Soonchan Park (2011) “South Korea: Temporary Trade Barriers Before and During the Crisis,” in Chad P. Bown (ed.) *The Great Recession and Import Protection: The Role of Temporary Trade Barriers*. London, UK: CEPR and World Bank, pp. 163-197.

Kee, Hiau Looi, Cristina Neagu, and Alessandro Nicita (forthcoming) “Is Protectionism on the Rise? Assessing National Trade Policies During the Crisis of 2008,” *The Review of Economics and Statistics*.

Knetter, Michael M. and Thomas J. Prusa (2003) “Macroeconomic Factors and Antidumping Filings: Evidence from Four Countries,” *Journal of International Economics* 61(1): 1-17.

Ludema, Rodney D. and Anna Maria Mayda (2011) “Canada: No Place Like Home for Anti-Dumping,” in Chad P. Bown (ed.) *The Great Recession and Import Protection: The Role of Temporary Trade Barriers*. London, UK: CEPR and World Bank, pp. 131-161.

Mattoo, Aaditya and Arvind Subramanian (2009) “Currency Undervaluation and Sovereign Wealth Funds: A New Role for the World Trade Organization,” *The World Economy* 32(8): 1135–116

Prusa, Thomas J. (2011) "United States: Evolving Trends in Temporary Trade Barriers," in Chad P. Bown (ed.) *The Great Recession and Import Protection: The Role of Temporary Trade Barriers*. London, UK: CEPR and World Bank, pp. 53-83.

Staiger, Robert W. and Alan O. Sykes (2010) “’Currency Manipulation’ and World Trade,” *World Trade Review* 9(4): 583-627.

Vandenbussche, Hylke and Christian Viegelahn (2011) “European Union: No Protectionist Surprises,” in Chad P. Bown (ed.) *The Great Recession and Import Protection: The Role of Temporary Trade Barriers*. London, UK: CEPR and World Bank, pp. 85-129.

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/ .

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

- **EU (15):** China, Turkey, India, Korea, Brazil, United States, Japan, Taiwan, Norway, Indonesia, Switzerland, South Africa, Australia, New Zealand, Mexico
- **Korea (12):** United States, China, Japan, Indonesia, European Union, India, Canada, New Zealand, Taiwan, Switzerland, Australia, Turkey
- **Australia (15):** European Union, China, Korea, Taiwan, United States, Indonesia, Japan, Brazil, Canada, India, South Africa, Israel, Mexico, Turkey , Norway

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

	Policy-imposing economy…				
Variables	USA	CAN	EU‡	KOR	AUS
Antidumping initiations	1.765	0.560	0.503	0.257	0.318
	(6.04)	(2.88)	(1.68)	(1.59)	(0.83)
All trade policy initiations	2.597	0.585	1.757	0.338	0.326
	(9.89)	(2.88)	(8.39)	(1.73)	(0.84)
Bilateral real exchange rate	4.506	4.703	4.592	4.672	4.688
	(0.19)	(0.17)	(0.17)	(0.19)	(0.18)
Domestic real GDP growth	2.515	2.454	1.758	5.517	3.299
	(2.72)	(2.68)	(2.80)	(6.08)	(2.60)
Foreign real GDP growth	3.944	3.955	3.929	3.741	4.026
	(7.27)	(7.27)	(6.37)	(5.36)	(7.31)
Observations	1224	1224	717	957	1161
Number of trading partners	15	15	15	12	15

Notes: standard deviations in parentheses. ‡EU data for 1999:Q1-2008:Q3 only.

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

	Dependent variable: **Count of products initiated under either all temporary trade barrier policies or AD policy only**									
Explanatory variables	USA AD only	USA All policies	CAN AD only	CAN All policies	EU‡ AD only	EU‡ All policies	KOR AD only	KOR All policies	AUS AD only	AUS All policies
Bilateral real exchange rate	22.798***	34.556***	18.586*	15.749*	22.624***	1.070	21.768*	32.158**	0.902	0.885
	(4.93)	(5.64)	(1.82)	(1.92)	(2.94)	(0.06)	(1.92)	(2.28)	(0.19)	(0.23)
Domestic real GDP growth	0.985	0.921	1.264**	1.246**	1.019	0.340***	0.992	1.084	0.868***	0.870***
	(0.29)	(1.43)	(2.34)	(2.42)	(0.13)	(7.73)	(0.13)	(1.43)	(3.74)	(3.69)
Foreign real GDP growth	0.942**	0.904***	0.899*	0.917*	1.014	1.022	0.905	0.890	0.976	0.983
	(2.12)	(3.62)	(1.94)	(1.76)	(0.29)	(0.40)	(1.14)	(1.49)	(1.03)	(0.73)
Time trend	0.974***	0.972***	0.977***	0.991	0.959***	0.943***	1.040***	1.033***	0.977***	0.979***
	(5.61)	(6.09)	(2.62)	(1.17)	(3.26)	(4.13)	(4.16)	(3.61)	(6.55)	(5.93)
Foreign country effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1092	1092	1092	1092	585	585	852	852	1029	1029
Number of trading partners	15	15	15	15	15	15	12	12	15	15

Notes: Distributed lag model with three lags of quarterly data for each of the explanatory variables of interest. Incidence Rate Ratios (IRRs) of long-run effects reported in lieu of coefficient estimates, with t-statistics in parentheses. Model includes a constant term whose estimate is suppressed. ***, **, and * indicate statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. ‡EU data for 1999:Q1-2008:Q3 only.

Table 3. Summary Statistics, Before versus During the Great Recession

	Policy-imposing economy…				
Variables	USA	CAN	EU‡	KOR	AUS
Antidumping initiations, 1988:Q1-2008:Q3	1.905	0.610	0.533	0.285	0.326
	(6.31)	(3.03)	(1.73)	(1.68)	(0.81)
Antidumping initiations, 2008:Q4-2010:Q4	0.606	0.144	0.371	0.029	0.258
	(2.70)	(0.95)	(1.41)	(0.22)	(0.92)
All trade policy initiations, 1988:Q1-2008:Q3	2.835	0.638	2.021	0.376	0.335
	(10.40)	(3.03)	(9.25)	(1.82)	(0.82)
All trade policy initiations, 2008:Q4-2010:Q4	0.629	0.144	0.591	0.029	0.258
	(2.76)	(0.95)	(1.55)	(0.22)	(0.92)
Bilateral real exchange rate, 1988:Q1-2008:Q3	4.517	4.701	4.585	4.697	4.674
	(0.18)	(0.17)	(0.16)	(0.17)	(0.18)
Bilateral real exchange rate, 2008:Q4-2010:Q4	4.419	4.720	4.618	4.462	4.797
	(0.20)	(0.20)	(0.21)	(0.19)	(0.21)
Domestic real GDP growth, 1988:Q1-2008:Q3	2.800	2.692	2.253	5.814	3.471
	(2.25)	(2.29)	(1.51)	(5.62)	(2.57)
Domestic real GDP growth, 2008:Q4-2010:Q4	0.153	0.485	-0.433	3.105	1.957
	(4.56)	(4.36)	(5.17)	(8.66)	(2.44)
Foreign real GDP growth, 1988:Q1-2008:Q3	4.073	4.089	4.167	3.857	4.177
	(7.08)	(7.08)	(5.72)	(5.02)	(7.09)
Foreign real GDP growth, 2008:Q4-2010:Q4	2.858	2.835	2.859	2.787	2.827
	(8.68)	(8.69)	(8.65)	(7.58)	(8.83)
Observations	1224	1224	717	957	1161
Number of trading partners	15	15	15	12	15

Notes: standard deviations in parentheses. ‡EU pre-crisis data for 1999:Q1-2008:Q3 only.

Table 4. Differential Impacts on Policy Response during the Great Recession

Dependent variable: **Count of products initiated under all temporary trade barrier policies†**					
Explanatory Variables	USA	CAN	EU†,‡	KOR	AUS†
Bilateral real exchange rate, 1988:Q1-2008:Q3	32.046***	10.900*	8.964**	37.033**	0.603
	(5.63)	(1.74)	(2.21)	(2.40)	(0.94)
Bilateral real exchange rate, 2008:Q4-2010:Q4	15.439***	5.502	6.653*	1.083	0.568
	(4.17)	(1.22)	(1.87)	(0.02)	(1.01)
[Test statistic]	**[20.31]*** **	**[7.18]*** **	[2.32]	[0.80]	[0.13]
Domestic real GDP growth, 1988:Q1-2008:Q3	0.924	1.242**	1.036	1.084	0.866***
	(1.38)	(2.43)	(0.25)	(1.44)	(3.63)
Domestic real GDP growth, 2008:Q4-2010:Q4	0.727**	0.577	1.038	1.980	1.173
	(1.96)	(1.48)	(0.34)	(0.50)	(0.46)
[Test statistic]	[1.92]	**[3.96]** **	[0.00]	[0.20]	[0.75]
Foreign real GDP growth, 1988:Q1-2008:Q3	0.892***	0.913**	0.985	0.893	0.985
	(4.10)	(1.91)	(0.35)	(1.47)	(0.63)
Foreign real GDP growth, 2008:Q4-2010:Q4	1.187**	1.265	1.164	0.630	1.021
	(2.10)	(1.56)	(1.62)	(0.55)	(0.44)
[Test statistic]	**[11.81]*** **	**[4.64]** **	**[3.18]** **	[0.17]	[0.55]
Time trend	0.971***	0.990	0.964***	1.033***	0.977***
	(6.25)	(1.25)	(2.94)	(3.68)	(6.29)
Foreign country effects	yes	yes	yes	yes	yes
Observations	1224	1224	717	957	1161
Number of trading partners	15	15	15	12	15

Notes: Distributed lag model with three lags of quarterly data for each of the explanatory variables of interest. Incidence Rate Ratios (IRRs) of long-run effects reported in lieu of coefficient estimates, with t-statistics in parentheses. Model includes a constant term whose estimate is suppressed. ***, **, and * indicate statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. †AUS and EU estimates based on dependent variable of antidumping policy only. ‡EU pre-crisis data for 1999:Q1-2008:Q3 only.

Table 5. Summary Statistics, China versus Other Targets, 1988:Q1-2010:Q4

	Policy-imposing economy…				
Variables	USA	CAN	EU‡	KOR	AUS
Antidumping initiations, non-China	1.608	0.511	0.288	0.232	0.290
	(6.00)	(2.76)	(1.12)	(1.61)	(0.78)
Antidumping initiations, China	4.278	1.333	3.574	0.569	0.736
	(6.11)	(4.32)	(3.90)	(1.28)	(1.24)
All trade policy initiations, non-China	2.406	0.537	1.528	0.304	0.299
	(9.71)	(2.76)	(8.31)	(1.73)	(0.80)
All trade policy initiations, China	5.653	1.347	5.021	0.750	0.736
	(12.12)	(4.31)	(9.05)	(1.68)	(1.24)
Bilateral real exchange rate, non-China	4.497	4.697	4.585	4.662	4.680
	(0.19)	(0.17)	(0.17)	(0.18)	(0.18)
Bilateral real exchange rate, China	4.655	4.805	4.690	4.793	4.800
	(0.09)	(0.13)	(0.14)	(0.20)	(0.17)
Domestic real GDP growth, non-China	2.509	2.434	1.759	5.535	3.281
	(2.72)	(2.69)	(2.80)	(6.07)	(2.61)
Domestic real GDP growth, China	2.603	2.773	1.752	5.303	3.567
	(2.79)	(2.55)	(2.85)	(6.28)	(2.50)
Foreign real GDP growth, non-China	3.566	3.578	3.544	3.233	3.632
	(7.31)	(7.31)	(6.39)	(5.21)	(7.35)
Foreign real GDP growth, China	10.068	10.068	9.521	10.068	10.068
	(2.25)	(2.25)	(1.91)	(2.25)	(2.25)
Observations	1224	1224	717	957	1161
Number of trading partners	15	15	15	12	15

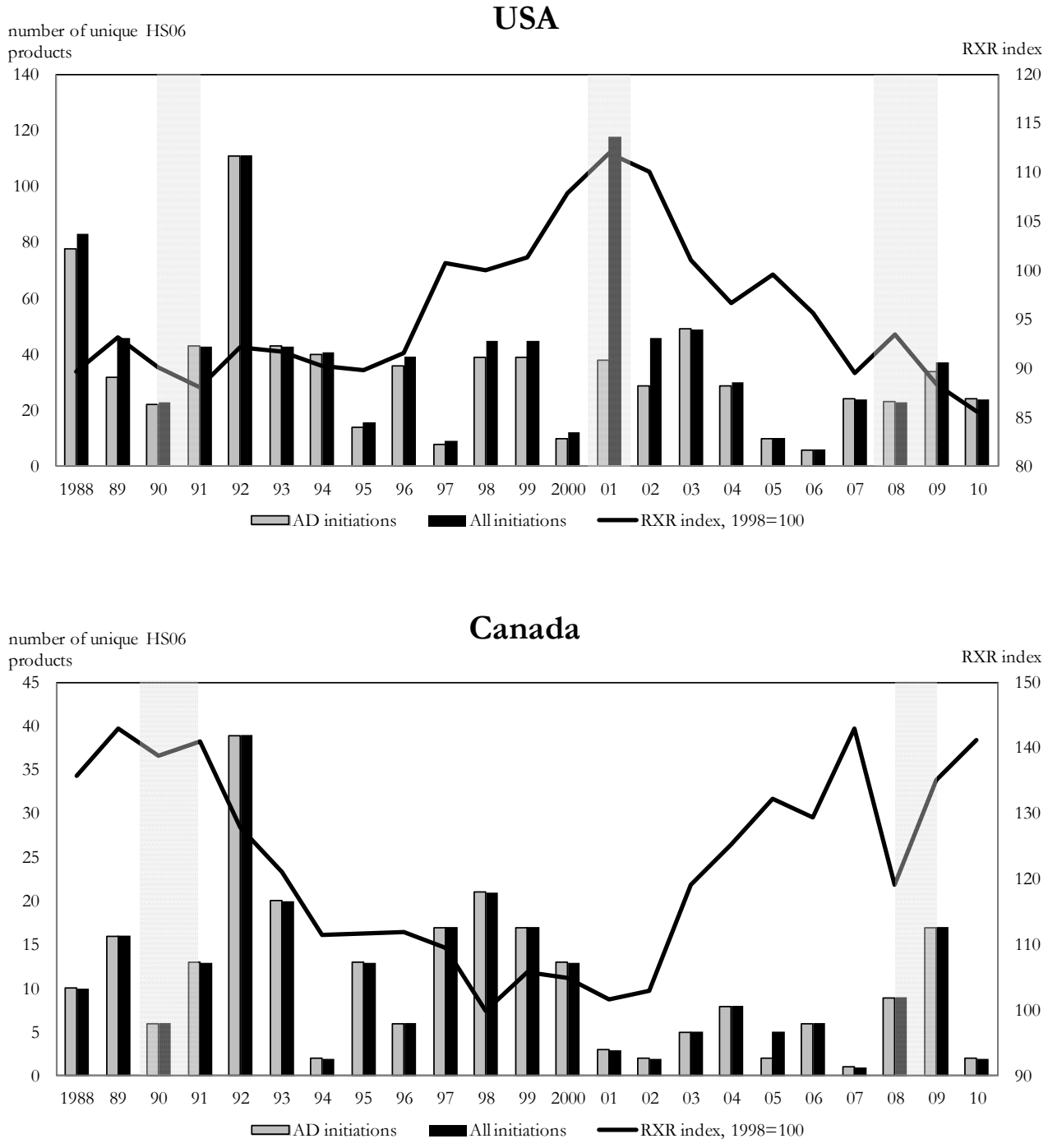
Notes: standard deviations in parentheses. “China” and “non-China” refers to observations in which China versus non-China are the trading partners in the sample. ‡EU data for 1999:Q1-2010:Q4 only.

Table 6. China versus Other Targets, 1988:Q1-2010:Q4

	Dependent variable: **Count of products initiated under all temporary trade barrier policies†**									
Explanatory Variables	USA	USA	CAN	CAN	EU†,‡	EU†,‡	KOR	KOR	AUS†	AUS†
Bilateral real exchange rate, non-China	45.706***	77.130***	19.465**	11.545*	2.396	1.673	68.954***	140.775***	0.788	0.929
	(6.93)	(7.18)	(2.35)	(1.78)	(1.13)	(0.53)	(3.70)	(2.94)	(0.50)	(0.13)
Bilateral real exchange rate, China	13.673***	4.672	2.510	0.000	2.089	23.003	135.406***	10077.27	0.629	3.136
	(2.78)	(0.33)	(0.35)	(0.65)	(0.35)	(0.80)	(2.79)	(1.55)	(0.43)	(0.52)
[Test statistic]	[2.20]	[0.35]	[0.93]	[0.65]	[0.00]	[0.42]	[0.29]	[0.48]	[0.06]	[0.29]
Domestic real GDP growth, non-China	0.939	0.934	1.352***	1.360***	1.014	1.105	1.054	1.090	0.865***	0.872***
	(1.40)	(1.51)	(3.39)	(3.63)	(0.18)	(1.24)	(0.93)	(1.48)	(3.39)	(3.58)
Domestic real GDP growth, China	0.863	0.863	1.105	1.079	0.711	0.776	1.031	1.031	0.721	0.763
	(0.87)	(0.92)	(0.32)	(0.27)	(1.16)	(1.01)	(0.16)	(0.17)	(1.33)	(1.48)
[Test statistic]	[0.23]	[0.22]	[0.40]	[0.61]	[1.39]	[1.80]	[0.01]	[0.09]	[0.53]	[0.51]
Foreign real GDP growth, non-China	0.955**	0.926***	0.941	0.931	1.095***	0.985	1.013	0.931	1.020	1.004
	(1.96)	(2.79)	(1.36)	(1.56)	(2.63)	(0.36)	(0.22)	(0.94)	(0.96)	(0.18)
Foreign real GDP growth, China	0.878	0.882	0.724	1.353	1.988	1.602	0.975	0.791	0.940	0.863
	(0.92)	(0.93)	(0.73)	(0.31)	(1.53)	(1.09)	(0.07)	(0.60)	(0.36)	(0.82)
[Test statistic]	[0.34]	[0.12]	[0.34]	[0.15]	[1.76]	[1.26]	[0.01]	[0.17]	[0.22]	[0.70]
Time trend, non-China	0.963***	0.962***	0.972***	0.978***	0.967***	0.971***	1.023***	1.024***	0.975***	0.979***
	(8.67)	(8.55)	(3.75)	(3.19)	(3.45)	(2.96)	(2.62)	(2.61)	(7.70)	(6.63)
Time trend, China	1.009	1.007	1.054	1.078	0.953	0.962	1.007	1.018	0.996	0.997
	(0.51)	(0.38)	(1.22)	(1.43)	(0.74)	(0.77)	(0.26)	(0.66)	(0.24)	(0.21)
[Test statistic]	**[6.41]****	**[5.78]****	**[3.38]***	**[3.37]***	[0.05]	[0.03]	[0.32]	[0.03]	[1.57]	[1.83]
Foreign country effects	no	yes	no	yes	no	yes	no	yes	no	yes
Observations	1224	1224	1224	1224	717	717	957	957	1161	1161
Trading partners	15	15	15	15	15	15	12	12	15	15

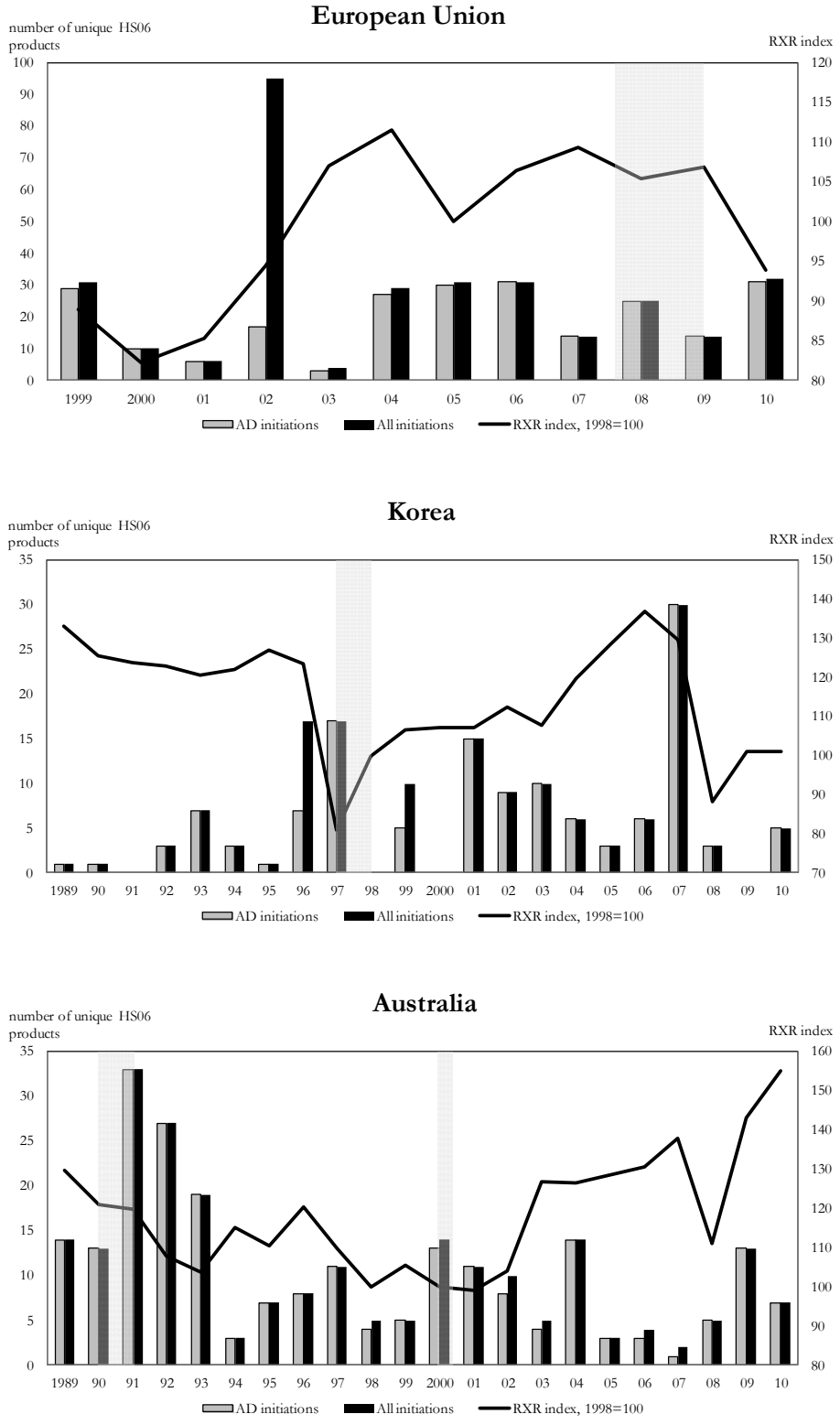
Notes: Distributed lag model with three lags of quarterly data for each of the explanatory variables of interest. Incidence Rate Ratios (IRRs) of long-run effects reported in lieu of coefficient estimates, with t-statistics in parentheses. Model includes a constant term whose estimate is suppressed. ***, **, and * indicate statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. †AUS and EU estimates based on dependent variable of antidumping policy only. ‡EU data for 1999:Q1-2010:Q4 only.

Figure 1. Import Protection, Real Exchange Rates, and Recessions, 1988-2010



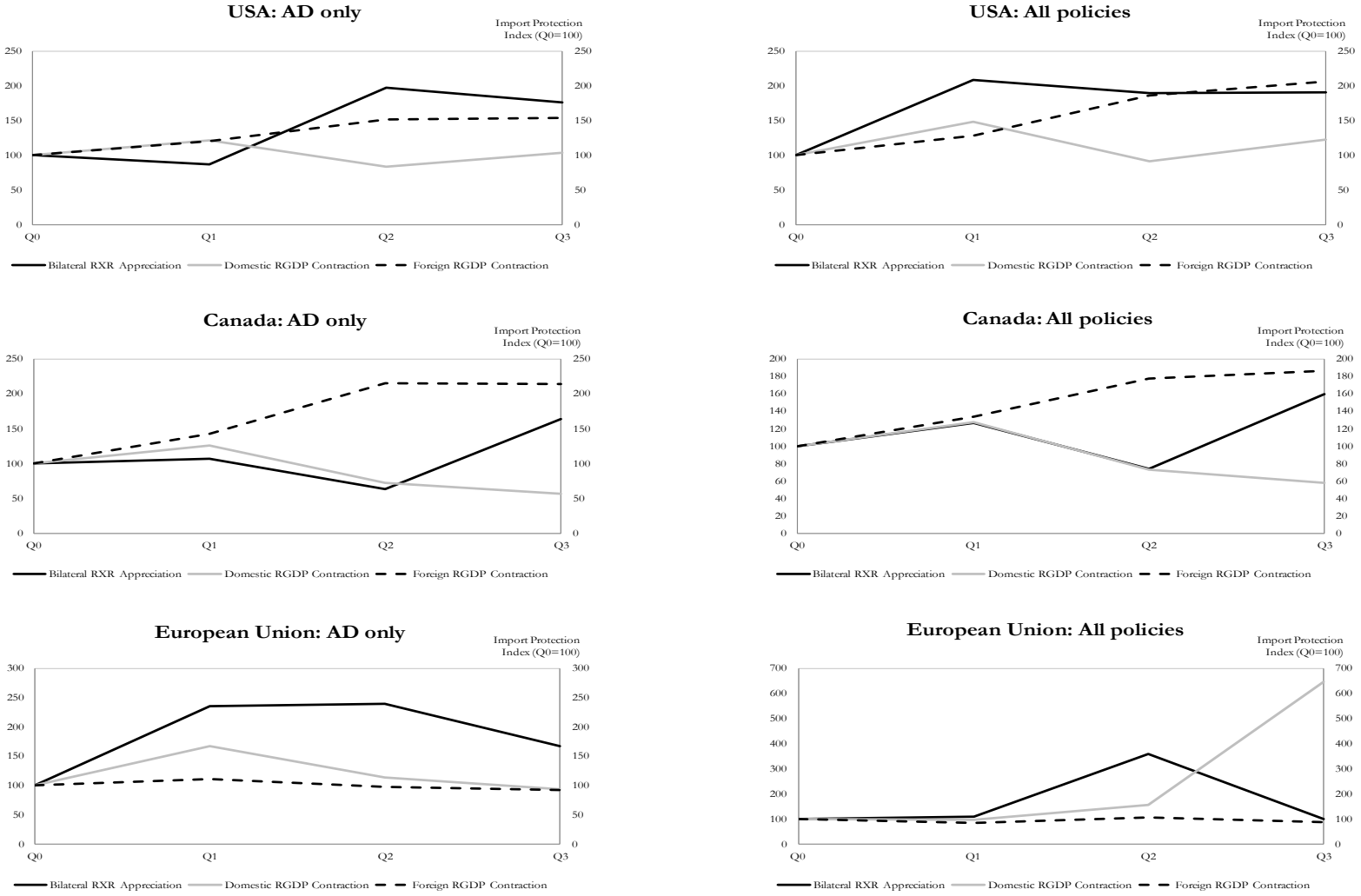
Notes: All data is annual frequency. Shading for "recessions" represents years in which domestic real GDP growth was negative for at least two out of three consecutive quarters. The real exchange rate index is constructed from bilateral real exchange rate series using import shares as weights and end of the year values.

Figure 1. Import Protection, Real Exchange Rates, and Recessions, 1988-2010 (cont)



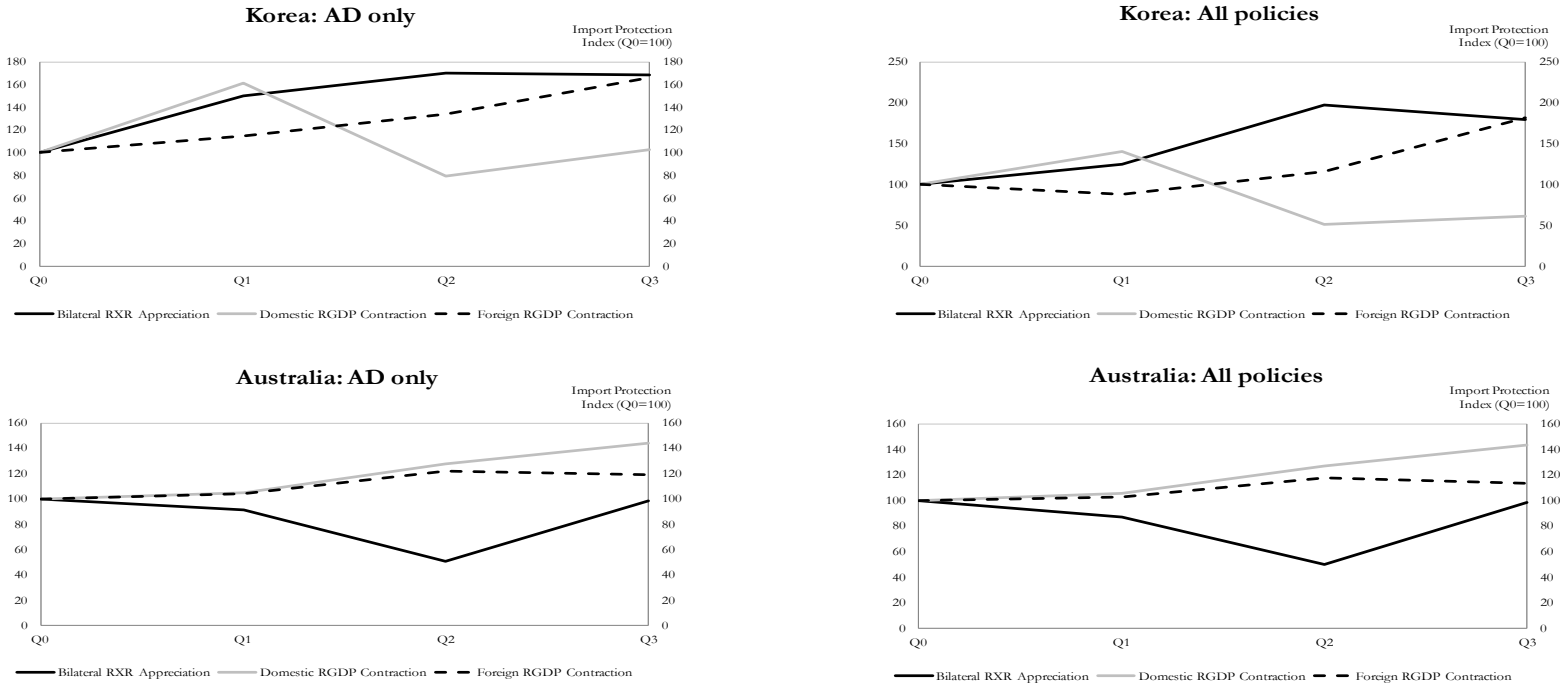
Notes: All data is annual frequency. Shading for "recessions" represents years in which domestic real GDP growth was negative for at least two out of three consecutive quarters. The real exchange rate index is constructed from bilateral real exchange rate series using import shares as weights and end of the year values.

Figure 2. Trade Policy Response to Shocks to Real Exchange Rates, Domestic GDP Growth, and Foreign GDP Growth



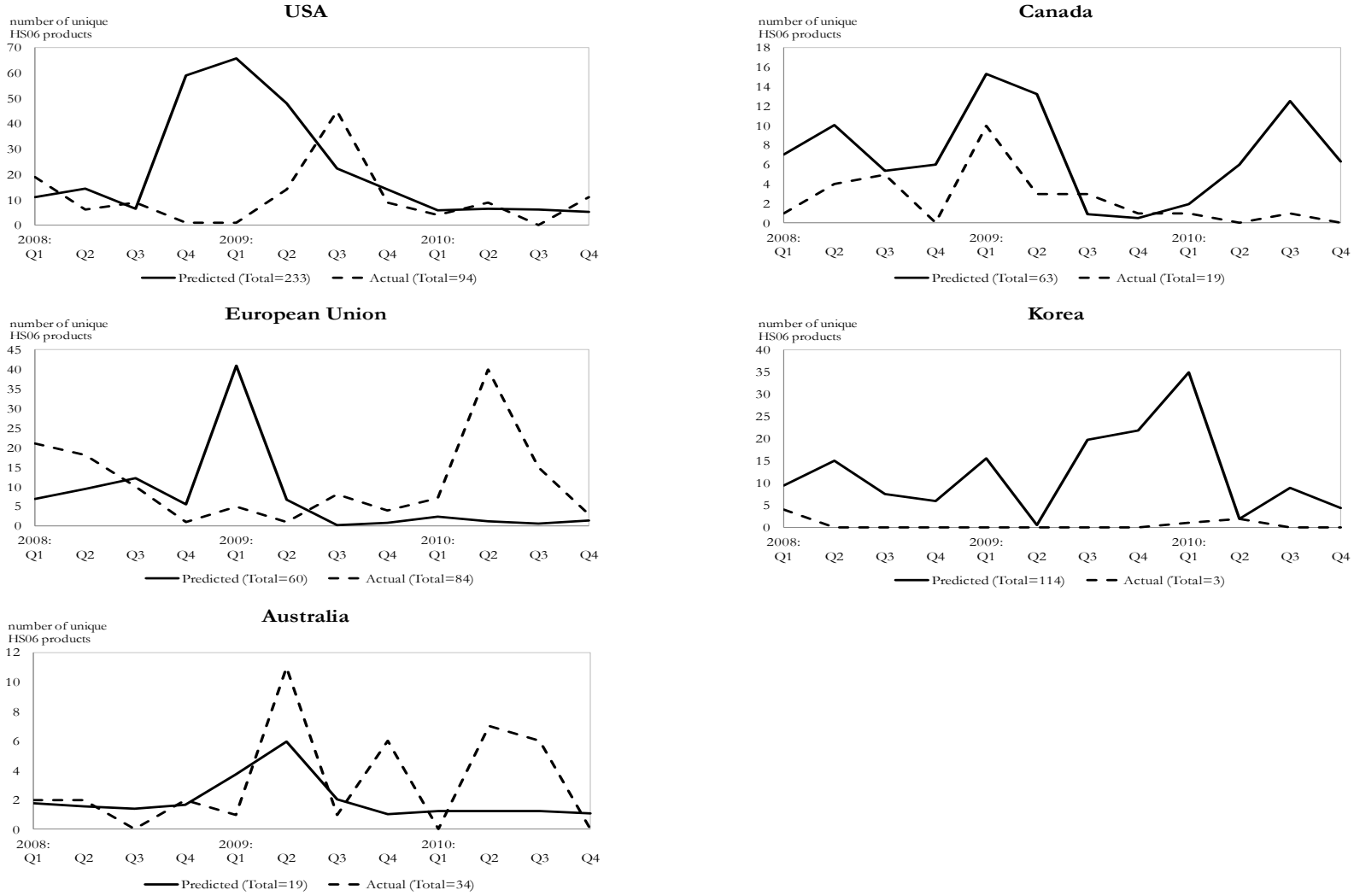
Notes: based on estimates from table 2. Trade policy responses are indexed so that the initial quarter of the shock takes on a value of 100. The figures then trace out the 3 quarter response to a one standard deviation shock to the bilateral real exchange rate, domestic real GDP growth, and foreign real GDP growth, respectively.

Figure 2. Trade Policy Response to Shocks to Real Exchange Rates, Domestic GDP Growth, and Foreign GDP Growth (cont)



Notes: based on estimates from table 2. Trade policy responses are indexed so that the initial quarter of the shock takes on a value of 100. The figures then trace out the 3 quarter response to a one standard deviation shock to the bilateral real exchange rate, domestic real GDP growth, and foreign real GDP growth, respectively.

Figure 3. Predicted versus Realized Trade Policy Response to Macroeconomic Shocks during the Great Recession



Notes: Predictions for 2008:Q1-2008:Q3 are within sample predictions, predictions for 2008:Q4-2010:Q4 are out-of-sample predictions based on the 1988:Q1-2008:Q3 model estimates in Table 4.