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Ties that Bind? Preferential Trade Agreements and Exchange Rate Policy Choice[1]

Mark S. Copelovitch and Jon C.W. Pevehouse
University of Wisconsin-Madison

This paper examines the question of whether a country's exchange rate policy choices are influenced by membership in preferential trade agreements (PTAs). We argue that PTAs, by constraining a government's ability to employ trade protection, increase its incentives to maintain monetary and fiscal autonomy in order to manipulate the domestic political economy. Consequently, we contend that countries are less likely to adopt or sustain a fixed exchange rate when they have signed a PTA with their "base" country—the country to whom they have traditionally fixed the currency or the major industrial country to whom they have the most extensive trade ties. Likewise, countries that have signed a "base" PTA also tend to have more depreciated/undervalued currencies, as measured by the level of the real exchange rate. Using data on 99 countries from 1975 to 2004, we find strong support for these hypotheses. These findings shed light on the complex relationship between different types of macroeconomic policies in the contemporary world economy. More broadly, they speak to the question of whether international agreements are credible commitment mechanisms when close policy substitutes exist at the domestic level.

The trade implications of exchange rate policy have long been an important topic of interest for both economists and scholars of international political economy (Frankel 1999; Rose 2000; Frieden and Broz 2001, 2006; Ghosh, Gulde, and Wolf 2002; Levy-Yeyati and Sturzenegger 2005). Indeed, the canonical literature in economics on exchange rates emphasizes the reduction in currency risk as one of the key reasons why countries choose fixed exchange rates over more flexible regimes (Mundell 1961; McKinnon 1962; Kenen 1969). Pegging the exchange rate reduces or eliminates exchange rate risk and facilitates cross-border trade and exchange. In contrast, currency volatility creates uncertainty about cross-border transactions, adding a risk premium to the price of traded goods and international assets (Frieden 2008). Thus, fixed exchange rates enable a government to enhance the credibility of its commitment to international integration, thereby encouraging greater trade and investment.

In addition to currency stability, the level of the exchange rate also has important trade-related implications, as it affects the relative price of traded goods in both domestic and foreign markets. Fluctuations in exchange rates can have substantial effects on domestic producers' competitiveness in world markets: "In the case of a real appreciation, domestic goods become more expensive relative to foreign goods; exports fall and imports rise as a result of the change in competitiveness. Real depreciation has the opposite effects, improving competitiveness" (Frieden and Broz 2001, 2006:331). Consequently, exchange rate movements have significant domestic distributional consequences. All else equal, exporters and import-competing industries lose from currency appreciation, while the nontradables sector and domestic consumers gain (Frieden 1991). Conversely, currency depreciations have the opposite effect, helping exporters and import-competing firms at the expense of consumers and the nontradables sector (Frieden and Broz 2001).

A variety of well-known historical and contemporary examples highlight these vital connections between trade and exchange rate policies. For example, the question of whether or not to adhere to the gold standard mobilized tradable goods producers and dominated political debates about economic policy in the United States and elsewhere during both the pre-1914 and interwar periods (Eichengreen 1992; Simmons 1994). Similarly, the United States' large current account deficits in the late 1960s and early 1970s, coupled with concerns of American exporters about the loss of competitiveness vis-à-vis Europe and Japan, heavily influenced the Nixon administration's decision to close the "gold window" and end the Bretton Woods era (Odell 1982; Gowa 1983). In the mid-1980s, the trade-related implications of the dollar's fifty percent appreciation relative to the German Deutsche Mark and Japanese yen were a major factor leading to the Plaza and Louvre Accords, in which G-7 central banks engaged in coordinated foreign exchange intervention to stabilize their exchange rates (Destler and Henning 1989).

Most recently, scholars and policymakers have hotly debated whether or not China's massive trade surplus with the United States is the result of the Chinese government's active intervention in foreign exchange markets to prevent any significant appreciation of its currency, the renminbi (Bergsten 2006). Although economists differ on the precise degree to which the RMB is undervalued, most analysts estimate that it would appreciate by 20–25% if China were to allow it to float freely (Bergsten 2010). As Fred Bergsten recently noted, China's exchange rate policy is tantamount to both a 20–25% export subsidy and a corresponding tariff on imports—a policy that "represents the largest protectionist measure maintained by any major economy since the Second World War."[2]

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[2] http://economix.blogs.nytimes.com/2010/10/08/biggest-protectionism-since-world-war-ii/.

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Yet while the trade implications of exchange rates are widely acknowledged, the empirical political economy literature offers surprisingly few tests of the relationship between countries' trade and exchange rate policy choices. Economists have focused, instead, on the effect of exchange rate regime choice on the level and volatility of trade flows (Rose 2000; Levy-Yeyati 2003, López-Córdova and Meissner 2003; Klein and Shambaugh 2006, 2009). Within political science, two strands of research have dominated the literature in recent years. The first emphasizes the effects of domestic interests and political institutions on exchange rate regime choice (Frieden 1991, 2002; Bernhard and Leblang 1999; Broz 2002; Bearce 2003; Walter 2008). In this view, countries' exchange rate regime choices depend on the size and trade orientation of different interest groups in the economy (for example, competitive exporters, nontradables producers), as well as the structure of electoral, legislative, and bureaucratic political institutions. The second focuses on the use of fixed exchange rates as a solution to the time inconsistency problem confronting monetary policymakers (Bernhard, Broz, and Roberts Clark 2002; Hallerberg 2002; Keefer and Stasavage 2003; Guisinger and Singer 2010). From this perspective, the choice of exchange rate regime depends on a government's incentives to tie its hands and import anti-inflationary credibility by pegging to a low-inflation currency.

To date, however, IPE scholars have largely overlooked the potential effects of international trade agreements on national exchange rate policies. In this paper, we seek to address this gap in the literature by focusing on the degree to which membership in preferential trade agreements (PTAs) influences a country's choice of exchange rate regime. We argue that countries are less likely to adopt a fixed exchange rate when they have signed a PTA with their "base" country—the country most likely to be their anchor currency based on current and past experiences with fixed exchange rates, regional proximity, and trade ties (Klein and Shambaugh 2006).[3]

The remainder of this paper proceeds as follows. First, we discuss the existing literature linking international trade and exchange rate policies. We then develop a set of hypotheses about the relationship between PTA commitments and exchange rate policy choice, which we subject to empirical testing in the third section of the paper using an original data set of up to 99 countries from 1975 to 2004. We conclude by offering some thoughts on the ways in which future research might enhance our understanding of the complex relationship between trade and exchange rate policies in the contemporary world economy.

Preferential Trade Agreements and Exchange Rate Regime Choice

The proliferation of PTAs is one of the defining characteristics of the contemporary world economy. PTAs are a broad class of international commercial agreements that include common markets, customs unions, and free trade areas. While nearly every country in the world now participates in at least one PTA, there is substantial cross-national variation, with some countries belonging to many agreements, others belonging to only one (Mansfield, Milner, and Pevehouse 2007). PTAs generally commit member states to more extensive free trade. Thus, international trade agreements restrict government's ability to use trade policy to alter the terms of trade. Moreover, many PTAs contain institutional mechanisms of various types (for example, dispute settlement mechanisms or arbitration procedures) to ensure that parties to the agreement do not overtly engage in trade policy behavior that undermines the agreement (Smith 2000).

How do PTAs influence a country's exchange rate policy choices? The answer to this question is not immediately obvious, since PTAs present governments with countervailing incentives. On the one hand, PTAs are "trade enhancing" (Krueger 1999): their express purpose is to (at least partially) lower barriers between countries, thereby increasing trade and exchange across international borders. Given that reducing currency risk in order to facilitate international trade and exchange is one of the primary economic rationales for adopting a currency peg (Mundell 1961; McKinnon 1962; Kenen 1969), trade openness (and, by extension, PTAs), and fixed exchange rates are generally viewed as complementary. From this perspective, the greater volatility and greater uncertainty about the level of the exchange rate under a floating regime directly undermines the goals of trade creation underlying a country's membership in PTAs. All else equal, governments that have pursued trade liberalization through membership in PTAs should be more likely to adopt a fixed exchange rate regime as a complement to their commitment to trade openness.[4]

On the other hand, PTAs are also "trade protecting": they increase international competition and frequently intensify demands for compensation from domestic producers now facing greater import competition. This heightened concern about international competitiveness also places a premium on domestic producers' concerns about the *level* of the exchange rate. As a result, governments that have tied their hands on trade policy through PTA commitments may face stronger domestic pressure to pursue a devaluation or depreciation. Since a 10% real depreciation is equivalent to both a 10% import tax and a 10% export subsidy (McKinnon and Fung 1993), such exchange rate policies amount to "exchange rate protection"—the manipulation of the exchange rate as a substitute for trade policies that are prohibited under the terms of government's PTA commitments (Corden 1982). Given the robust empirical evidence that more flexible exchange rate regimes are strongly associated with both nominal and real depreciation over the last three decades (IMF 1997:89; Frieden 2002:833; Blomberg, Frieden, and Stein 2005), this logic of exchange rate protection implies a correlation between PTA membership and more flexible exchange rate regimes.[5]

The idea that trade liberalization creates incentives for governments to substitute alternative policies that offset the effects of tariff reductions is not a new one. Indeed, the endogenous protection literature offers substantial support for this logic, which Jagdish Bhagwati famously termed the "law of constant protectionism" (Bhagwati

[3] We discuss the identification of individual base countries in greater detail below.

[4] This is not to suggest that trade stability is the only motivation for fixed exchanges rates. Indeed, some economies attempt to "import" low inflation by fixing to a low inflation currency (Giavazzi and Pagano 1988). We do not focus on that dynamic in this paper, but do control for it as a competing explanation in our empirical work below.

[5] Alternatively, governments seeking to engage in exchange rate protection as a substitute for trade protection may still choose to fix the exchange rate but do so at an undervalued level (as in the case of China today) in order to enhance exporters' competitiveness in global markets. We test for this alternative policy choice below.

1988:53). Past studies in this vein have found that governments frequently substitute nontariff barriers (NTBs) in place of tariffs that are no longer permitted as a result of liberalization under international trade agreements (Marvel and Ray 1983; Anderson and Schmitt 2003; Hiscox and Kastner unpublished data). We seek to extend this logic further by arguing that governments may not limit this policy substitution to trade policies per se. Rather, they may also alter their exchange rate policies to offset the effect of trade liberalization on the relative prices of imports and exports.

Existing political economy arguments on the origins of PTAs further support the logic of this argument. For example, one common explanation for the creation of reciprocal trade agreements is the internalization of terms-of-trade externalities (Bagwell and Staiger 1996, 1999). That is, states create reciprocity-inducing institutions, such as the GATT/WTO, to protect themselves from creating trade wars through rising tariffs. These same models (notably Bagwell and Staiger 1996), however, predict that these agreements will increase export subsidies in member states—a prediction that has not been borne out empirically (Maggi and Rodriguez-Clare 1998). But, as previously discussed, since currency devaluations act in part as *de facto* export subsidies, devaluations give policymakers a lever to assist domestic firms while continuing to meet the terms of their multilateral trade commitments. Similarly, related models of endogenous protection suggest that politicians benefit in their re-election prospects by offering protection "for sale" (Grossman and Helpman 1994). Thus, politicians will desire to keep some autonomy policy in order to maximize domestic political support from organized societal interests. If politicians completely tie their hands in trade agreements, they lose a potential source of financing for re-election campaigns.

Finally, even if a government that has tied its hands on trade policy through PTA commitments does not face direct pressure from societal interests to engage in exchange rate protection, it may simply be less willing to sacrifice further economic policy autonomy by fixing the exchange rate. As articulated in the Mundell–Fleming model, the workhorse framework for analyzing the political economy of exchange rates (Mundell 1960; Fleming 1962), countries can achieve only two of three policy goals simultaneously: a fixed exchange rate, full capital mobility, and domestic monetary autonomy—the ability to adjust interest rates in reaction to exogenous shocks or domestic economic downturns. Given the substantial degree of international capital mobility in the contemporary world economy, this logic implies that governments choosing to adopt a fixed exchange rate must sacrifice monetary policy autonomy. Moreover, while fixed exchange rates increase the short-run efficacy of fiscal policy when capital is mobile (Clark and Hallerberg 2000; Hallerberg 2002), persistent balance of payments deficits undermines the long-term credibility of a currency peg. Therefore, adherence to a fixed exchange also imposes constraints on a government's fiscal autonomy. Governments that have already sacrificed autonomy over trade policy by signing one or more PTAs may, therefore, be less willing to accept these additional constraints on their economic policy autonomy. Thus, while some degree of credible commitment to domestic and international actors may be desirable, there are limits on the degree to which policymakers will be willing to tie their own hands with respect to key economic policy levers.[6]

Ultimately, while the "trade enhancing" logic suggests that PTA commitments should reinforce a government's commitment to a fixed exchange rate, the "trade protecting" view suggests that leaders may want to protect their autonomy in policymaking in the face of intensifying political demands. And while our empirical test cannot distinguish between these candidate explanations for the origins of political preferences for autonomy, each points to the same empirical implication: a correlation between PTAs and more flexible exchange rate regime choices to allow policymakers access to another policy tool.

"Base" PTAs and Exchange Rates: The Key Case

In sum, while trade openness and fixed exchange rates are traditionally thought of as complements, the constraints that PTAs place on a government's ability to utilize trade policy create countervailing incentives to choose a more flexible exchange rate regime, either for reasons of exchange rate protection or simply to retain monetary and fiscal policy autonomy once the government has tied its hands on trade policy. When will these incentives to substitute exchange rate policy for trade protection outweigh the conventional incentives toward complementarity between free trade and fixed exchange rates? We argue that the incentives to opt for monetary autonomy and flexible exchange rates over openness and stability are most acute when the PTA in question is with the "base" country, the country to which a government has chosen to fix its exchange rate. In such cases, a depreciation or competitive devaluation *directly* substitutes for the government's inability to employ trade protection, since the direct effect of either depreciation or tariffs will be on the terms of trade with the base country. Indeed, exchange rate regime choice in the contemporary global economy is inherently bilateral: the decision to fix or float the currency is taken with respect to a specific base country (Klein and Shambaugh 2009).[7] Although there is some evidence that multilateral volatility is greater under more flexible exchange rate regimes, the primary effects of exchange rate regime choice on currency stability and volatility occur bilaterally (Ghosh et al. 2002; Husain, Mody, and Rogoff 2005; Klein and Shambaugh 2009). This is true even if a country is not currently pegging to its monetary base country; for example, the main impact of a depreciation of the Canadian dollar—a currency which has floated freely since 1970—is on the terms of trade with the United States, its monetary base and largest trading partner.

This (trade and exchange rate) substitution effect will be especially important to policymakers in the presence of a PTA with their monetary base country, as they consider exchange rate regime choices and/or attempts to influence the level of the currency. In these instances, we

[6] The willingness to sacrifice (or achieve) economic policy autonomy varies widely over time and across countries. In general, small, highly open economies find it more costly to adopt protectionist trade policies and more difficult to run an independent monetary policy. Similarly, developing countries generally find it more difficult to adopt truly floating exchange rates, given their greater susceptibility to speculative attacks and currency crises, as well as their frequent inability to borrow internationally in their own currency. This has led to the well-known phenomenon of "fear of floating" (Calvo and Reinhart 2002), in which countries adopt *de jure* floating exchange rates but *de facto* fixed regimes. Thus, even controlling for these factors, a government that has already tied its hands in one key economic policy area (trade policy) may be less willing to do so in a second (monetary/exchange rate policy).

[7] There are a handful of countries that peg to a basket of currencies (for example, Kuwait), but the vast majority of countries peg to a single currency.

expect the incentives to engage in exchange rate protection and/or to retain monetary and fiscal policy autonomy to "trump" the incentives to reduce volatility through the adoption of a currency peg. In other words, while exchange rate policy may be a close substitute for trade policy within a country-base pair of states, it does not necessarily allow governments to alter the terms of trade with their other PTA partners.

Table 1 illustrates the identity and distribution of monetary base countries from 1975 to 2004. As is evident, only a handful of countries enjoy monetary base status, with three countries—the United States, France, and Germany—playing a dominant role (90% of all observations) as anchor currency states.[8]

Although far less important on a global level, the remaining monetary base countries do play key roles as anchor currency states within particular regions or groups of countries (for example, Australia and Oceania, South Africa and its neighbors, the United Kingdom and its former colonies).

Drawing on the logic articulated above, our primary hypothesis about the relationship between base country PTAs and exchange rate policy choices concerns the choice of exchange rate regime:

- All else equal, countries that have signed a PTA with their monetary base country will be less likely to adopt a fixed exchange rate.

Likewise, since hand-tying on trade policy by entering a PTA with the monetary base country also intensifies concerns about the *level* of the exchange rate, we expect to find a correlation between base PTAs and the real exchange rate level, regardless of whether a government chooses to fix or float its currency:

- All else equal, countries that have signed a PTA with their monetary base country will have a more depreciated currency.

In sum, we expect that PTA commitments within country–monetary base dyads will be associated with both the adoption of flexible exchange rate regimes and a more depreciated currency, as governments seek to offset "hand-tying" on trade policy by retaining greater monetary and fiscal autonomy and/or actively engaging in exchange rate protection. We want to emphasize, however, that this effect of base PTAs on exchange rate policy choice is conceptually separate from the general tendency for countries to fix the exchange rate when they are more heavily dependent on trade with the base country. Indeed, we fully expect that the overall probability of fixing the exchange rate will be higher for countries for which trade with the monetary base country constitutes a larger share of total trade.

While our theory emphasizes the relationship between base country PTAs and governments' exchange rate policy choice, we note that our argument makes no concrete predictions about the relationship between non-base PTAs and exchange rate regime choice. As noted above, the indirect effect of exchange rate policies on the terms of trade with non-base countries is less clear, since the impact of floating or depreciating against the base country does not always translate into corresponding changes in the bilateral exchange rate with non-base states. Therefore, our prior is that more extensive non-base PTA ties will reinforce the complementarity between fixed exchange rates and trade agreements, as the benefits of reduced currency risk and volatility outweigh the less certain benefits of exchange rate protection and enhanced policy autonomy. Our primary concern is testing the direct effects of PTAs within the country-base dyad on exchange rate policies, whether or not these "third party" effects are present.[9]

Table 1. Monetary Base Countries, 1975–2004

Base Country	*Number of Observations*	*Percent*	*Sample Countries*
United States	3,493	64.89	Argentina, Brazil, Canada, Germany, Korea, Saudi Arabia
France	717	13.32	Algeria, Cameroon, Ivory Coast, Malta, Morocco, Tunisia
Germany*	626	11.63	Austria, Belgium, Czech Republic, France, Greece, Italy, Netherlands, Sweden
United Kingdom	125	2.32	Bangladesh, Gambia, India, Ireland, Mauritius
South Africa	117	2.17	Botswana, Lesotho, Namibia, Swaziland
India	68	1.26	Bhutan, Nepal, Sri Lanka
Australia	60	1.11	Kiribati, New Zealand, Papua New Guinea, Solomon Islands
Portugal	45	0.84	Angola, Cape Verde, Guinea-Bissau, Mozambique, Sao Tome & Principe
Malaysia	35	0.65	Singapore
Belgium	35	0.65	Luxembourg
New Zealand	28	0.52	Samoa
Singapore	21	0.39	Brunei
Italy	13	0.24	San Marino
Total	5,383	100	

(*Note.* *Includes countries for whom the Euro was the base country from 1999 to 2004.)

Empirical Analysis

In order to test our argument linking international trade agreements and exchange rate policy choices, we employ time-series/cross-sectional analysis of data of an original data set covering up to 99 countries from 1975 to 2004. Our unit of analysis is the country-year. We employ the following model to investigate the determinants of a country's exchange rate choices:

$$\begin{aligned}\text{ERPOLICY}_{i,t} = {} & \beta_0 + \beta_1 \text{Base PTA}_{i,t-1} + \beta_2 \text{Base Trade}_{i,t-1} \\ & + \beta_3 \#\text{Number PTAs}_{i,t-1} \\ & + \beta_4 \text{Non-base PTA Coverage}_{i,t-1} \\ & + \beta_5 \text{Trade Openness}_{i,t-1} + \beta_6 \text{Ag Exports}_{i,t-1} \\ & + \beta_7 \text{Mfg Exports}_{i,t-1} \\ & + \beta_8 \text{GDP}_{i,t-1} + \beta_9 \text{pcGDP}_{i,t-1} \\ & + \beta_{10} \text{Inflation}_{i,t-1} \\ & + \beta_{11} \text{Current Account/GDP}_{i,t-1} \\ & + \beta_{12} \text{Capital Open}_{i,t-1} + \beta_{13} \text{Regime Type}_{i,t-1} \\ & + \beta_{14} \text{EC/EU}_{i,t-1} + \beta_{15} \text{ERPOLICY}_{i,t-1} + \varepsilon_{i,t}\end{aligned}$$

[8] One hundred and twenty of the 626 country-years for Germany are actually post-1999 observations for countries that peg to the euro.

[9] We also note that GATT/WTO membership may, in theory, serve to constrain trade policy choice and influence exchange rate choice. Initial tests, however, showed no significant influence of GATT/WTO membership.

Dependent Variables

Our primary dependent variable is a country's choice of exchange rate regime. As is becoming commonplace in the literature, we focus on the new *de facto* measures of exchange rate behavior, since they more accurately capture governments' "deeds" rather than simply their "words." A number of different *de facto* exchange rate regime classifications are now in use (Reinhart and Rogoff (RR) (2004), Levy-Yeyati and Sturzenegger (LYS) (2005), Klein and Shambaugh (KS) (2006). Each differs in its methodology and yields quite different classifications across countries and over time. In our analysis, we primarily employ the classification developed by Reinhart and Rogoff (2004), who utilize deviations from official announcements, data on parallel (black market) and official dual exchange rates, reserve movements, and detailed country chronologies to code *de facto* exchange rate regimes from 1970–2007.[10]

In the analysis that follows, we employ the RR 5-point "coarse" classification as our primary dependent variable, with slight modifications based on recent work in the literature (Guisinger and Singer 2010).[11] Specifically, we exclude observations from the RR data set in which the exchange rate regime is classified as "freely falling," as well as those in which the dual market exchange rate data is missing; these correspond to the value of "5" of the 5-point RR scale. In addition, we exclude cases in which a country is experiencing hyper-inflation (annual inflation greater than 150%).[12] We also exclude countries that are members of a currency union, since such arrangements explicitly preclude the possibility of unilateral modifications of exchange rate policy. Using the remaining data, we employ both the 4-point ordered RR classification (1 = hard peg; 4 = free float) and two different binary classifications of the data. We also use the KS binary classification, as discussed further below, in our analysis of the duration of peg "spells."

Our second dependent variable is the level of the exchange rate, measured in two different ways. Our first measure, *REER*, is the natural log of a country's real effective exchange rate, coded either in the current year or as a 3-year moving average. These data are taken from the IMF's trade-weighted real effective exchange rate index, which is available through the World Bank's *World Development Indicators*. The index is scaled such that the value of the real effective exchange rate in 2000 for each country equals 100.[13] While changes in *REER* are less directly an indicator of active policy choice than the regime variables outlined above, movements in this variable may indicate government decisions to allow the currency to depreciate. Alternatively, a more depreciated real exchange rate may capture "Chinese-style" exchange rate protection, in which the government pegs the currency at an undervalued rate, rather than floating the currency in pursuit of a depreciation or competitive devaluation. In addition, a persistently undervalued exchange rate indicates that a government is pursuing economic policies designed to enhance international competitiveness, regardless of its *de facto* or *de jure* exchange rate regime choices.

As a measure of such behavior, the advantage of *REER* is that it is readily available and easily calculated based on nominal exchange rates and price levels. The disadvantage is that a particular value of *REER*, on its own, does not actually indicate whether a currency is over- or undervalued, either in absolute terms or relative to past levels of the country's real exchange rate. For example, while China's *REER* in 2007 was 105.1, this actually represented a depreciation from the 2005 level of 110.2. In order to control for this problem, we also calculate and employ a second measure of the real exchange rate, *Undervaluation*, which measures whether or not a country's currency is over- or undervalued based on deviations from long-run purchasing power parity (PPP). Following Rodrik (2008), we use data on nominal exchange rates (XR) and PPP conversion factors to calculate a country's "real" exchange rate:

$$\ln(\text{RER}_{it}) = \ln(\text{XR}_{it}/\text{PPP}_{it})$$

where i is an index for countries and t is an index for 5-year time periods. Both the nominal exchange rate and PPP are expressed as currency units per US dollar, with data taken from the Penn World Table 6.3 (Henson et al. 2009). In this formulation, a currency is undervalued relative to PPP when RER exceeds one. We then correct this real exchange rate variable for the Balassa–Samuelson effect—the fact that price levels vary with a country's level of development, since nontradable goods tend to be cheaper in poorer countries—by regressing it on real GDP per capita (Balassa 1964, Samuelson 1964):

$$\ln(\text{RER\_BS}_{it}) = \alpha + \beta(\ln \text{ RGDPPC}_{it}) + f_{it} + \mu_{it}$$

where f is a time period fixed effect and u is the error term. Finally, we take the difference between the actual real exchange rate and the Balassa–Samuelson-adjusted rate:

$$\ln(\text{Undervaluation}_{it}) = \ln(\text{RER}_{it}) - \ln(\text{RER\_BS}_{it})$$

These calculations enable us to compare values of *Undervaluation* across time and space. When the variable exceeds unity, the currency is undervalued, indicating that goods produced domestically are cheap in dollar terms. Conversely, when the variable is below unity, the currency is overvalued. Once again, the China example is illustrative: China's *Undervaluation* score in 2007 was 1.28, a slight increase in its undervaluation from 2005 (1.27), even though its REER had fallen. Thus, a country may score highly on *REER* even if its currency remains significantly undervalued below PPP. Consequently, as a robustness check on our *REER* results, we replicate each of our exchange rate level models below substituting *Undervaluation* as the dependent variable. As with *REER*, we test two different codings of *REER*: its natural log and the natural log of the 3-year moving average.

Independent Variables

In order to evaluate our hypotheses linking PTA commitments to exchange rate policies, we introduce four

[10] Using this data, RR create a 15-point scale of exchange rate regimes, which they then aggregate into a coarse 5-point scale (fixed, narrow crawling peg/band, wide band/managed floating, freely floating, freely falling). The classification is based on the conditional probability that the exchange rate stays within a given range over a rolling 5-year window. Thus, RR's index allows for a degree of depreciation/devaluation and monthly volatility within the same classification of exchange rate regimes.

[11] Data are available at http://terpconnect.umd.edu/~creinhar/Data/ERA-Annual%20coarse%20class.xls.

[12] The results presented below are substantively identical if we include the freely falling observations in the sample. RR themselves code cases in which monthly inflation exceeds 40% as "freely falling."

[13] We drop 34 severe outlier observations (those exceeding 3 standard deviations above or below the mean) and use the natural log of the REER in order to account for the highly-skewed distribution of the data.

independent variables.[14] First, we code our main variable of interest, *Base PTA*, which measures whether state *i* has a PTA with its monetary base country. We use Klein and Shambaugh's definition of a monetary base country to generate this and all subsequent variables relevant to base-country status.[15] For data on PTAs, we use updated data from Mansfield et al. (2007). *Base PTA* takes on a value of 1 if the state in question is currently in any type of reciprocal preferential trading arrangement with its base country.[16] If our hypothesis is correct, the presence of a PTA with the monetary base country should lead to a decline in the probability of a country adopting a fixed exchange rate, an increase in the probability of shifting to a more flexible regime, and a more depreciated level of the real exchange rate.

As noted above, however, this PTA effect is separate from a country's overall trade dependence on its base country. Therefore, we include a separate variable, *Base Trade*, which is the proportion of state *i*'s trade that takes place with the base state (regardless of whether a PTA exists).[17] In general, we expect this variable to be associated with more fixed exchange rate regimes and less depreciation: as trade increases with the current (or potential) peg country, a government will be more likely to pursue exchange rate stability in order to credibly commit to a stable trade environment. In short, the predicted effects of *PTA Base* and *Base Trade* on exchange rate policies point in opposite directions.

Finally, as a test to see if general PTA involvement (with any state) is more likely to influence the choice of exchange rate regime, we introduce *#PTA*, which counts the number of reciprocal PTAs with which state *i* is a member of in year *t*−1. We also introduce *Non-base PTA Coverage*, which is the percentage of trade for state *i* "covered" by PTAs with all countries except the monetary base state. To compute this variable, we subtract trade conducted with the base country (that is, the value of *Base Trade*) from the total value of trade conducted with state *i*'s PTA partners.[18] Thus, this variable will determine whether PTAs with major trading partners serve to influence exchange rate policy choice outside those agreements signed with a base country. We introduce this variable to ensure that any influence of PTA's and/or trade levels is specific to the monetary base country rather than a more general effect of trade levels.

Control Variables

In addition to our key independent variables measuring a country's international trade commitments, we include a series of controls for alternative economic and political determinants of exchange rate policy choices. First, we include *Trade Openness*, the ratio of state *i*'s trade (imports + exports) to GDP ratio in year *t*−1, in order to ensure that our PTA variables are not simply measuring the general trade openness of a particular country. The standard prediction in the economics literature suggests that more trade-dependent economies are likely to prefer fixed, stable exchange rates. If *Base Trade* or *PTA Coverage* proxies for a country's overall trade dependence, it could capture this general story rather than one involving trade institutions. In a similar vein, it is likely that trade-dependent economies will join PTAs to lock-in trade relationships with key partners. The data are taken from the World Bank's *World Development Indicators*.

Second, we include *Inflation*, the natural logarithm of annual inflation in state *i*, to control for credibility-based explanations of exchange rate policy. Drawing on the logic of dynamic inconsistency (Kydland and Prescott 1977), such explanations focus on the adoption of a fixed exchange as a way to "import" low inflation from a foreign central bank (Giavazzi and Giovannini 1989). Since pegging the currency ties the government's hands on monetary policy, a fixed exchange rate is a way for governments wrestling with high inflation to stabilize expectations and generate monetary credibility (Giavazzi and Pagano 1988; Canavan and Tommasi 1997; Bernhard et al. 2002). Data on inflation are from the World Bank's *World Development Indicators*, with missing data filled in using the IMF's *International Financial Statistics*.

Third, we include *Capital Open*, a policy measure of financial openness, to control for the influence of international financial integration on national exchange rate policy choices. As is thoroughly documented in the IPE literature, the Mundell–Fleming framework (Mundell 1960; Fleming 1962), with its emphasis on the "impossible trinity" of capital mobility, monetary policy autonomy, and fixed exchange rates, is the workhorse model for understanding the political economy of exchange rates (Frankel 1999; Bernhard et al. 2002; Frieden and Broz 2001, 2006; Bearce 2003, 2007; Singer 2010). In this framework, countries' exchange rate choices depend heavily on the degree of financial openness, since currency pegs and monetary policy autonomy (national deviations from world interest rates) are incompatible with capital mobility. Accordingly, we introduce *Capital Open*, the Chinn-Ito index measuring the extent to which a country employs capital controls (Chinn and Ito 2008). The index, which is drawn from the IMF's official data, measures four facets of capital account openness: the existence of multiple exchange rates; restrictions on current account transactions; restrictions on capital account transactions; and requirement of the surrender of export proceeds.

Fourth, we also control for country size and level of development, each of which has also been found to influence exchange rate policy choices. As our measure of size, we introduce *GDP*, the natural logarithm of the gross domestic product of state *i*. In general, larger economies are relatively less dependent on international trade and are therefore more likely to choose monetary policy autonomy over fixed exchange rates; nonetheless, obvious and notable exceptions (China, the eurozone countries)

[14] Unless otherwise indicated, all independent variables are measured in *t*−1 to lessen concerns about endogeneity.

[15] As described by Klein and Shambaugh (2006): "The base country is determined through the pegging history of a given country as well as through tests against a variety of countries, the declared intent of the country, and readings of various currency histories. For the purpose of comparative bilateral volatility tests, we need a "base" country for countries when they have a floating exchange rate. In these cases, the base is the country to which the country with the floating exchange rate pegged in the past, or a major industrial country with which it has a prominent economic relationship (for details see Shambaugh 2004)." Note that Klein and Shambaugh code base countries even for those states that do not historically fix their currencies. We exclude the United States from our analysis since it has no base country.

[16] We exclude non-reciprocal PTAs in our analysis, as they do not constrain a country's trade policy in the same way as reciprocal agreements.

[17] Trade data are taken from Barbieri, Keshk, and Pollins 2009.

[18] We assume that all trade within a dyad is covered by the PTA. In reality, there are often exceptions for some goods, but given a lack of data on these exceptions, we cannot accurately compute the true coverage variable.

exist in the contemporary global economy.[19] We measure development by introducing *pcGDP*, the natural logarithm of GDP per capita, in order to control for the general expectation that more developed economies are more likely to adopt floating exchange rates than developing countries. Since developing countries are generally more susceptible to currency crises (Caprio and Klingebiel 2003), they tend to place a greater premium on reducing currency volatility than developed countries.[20] Moreover, since most developing countries are subject to "original sin" (Eichengreen and Hausmann 1999)–an inability to borrow internationally in their own currency—depreciation or devaluation has the negative side effect of increasing a country's external debt obligations.[21]

In addition to these macroeconomic controls, we incorporate variables to account for the influence of political factors on exchange rate regime choice. In particular, we include two measures of the sectoral composition of a country's exports as proxies for the degree to which societal interest groups are sensitive to both the level and volatility of the exchange rate (Frieden 1991, 2002). Exporters whose prices respond rapidly to changes in currency values—that is, where "pass-through" of exchange rate movements from foreign producers to local consumers is high—are more sensitive to the level of the currency relative to its volatility (Valderrama 2004; Frieden and Broz 2006). Generally, pass-through is higher when goods are highly standardized and/or international competition is stronger—for example, in agricultural commodities, textiles, and simple manufacturing (Campa and Goldberg 2002).[22] In contrast, pass-through is less of a concern when goods are highly specialized or when products have strong brand or quality distinction. Measuring pass-through and its corresponding effects on exporters' concerns about the exchange rate level is notoriously difficult, as it depends on factors such as the extent to which firms rely on imported intermediate inputs and the degree to which products are highly differentiated (Goldberg and Knetter 1997; Frieden et al. 2001). Nevertheless, as rough proxies, we follow the existing literature in controlling for both the percentage of all exports that originate in the manufacturing sector, labeled *Mfg Exports*, and the percentage of exports that are from the agriculture or raw materials sector, labeled *Ag Exports* (Frieden et al. 2001; Frieden 2002). Both variables are taken from the World Bank's *World Development Indicators*.

Although these compositional measures of exports are admittedly imperfect, manufactured goods are generally less susceptible to pass-through than commodities and agricultural products. All else equal, we therefore expect countries whose exports consist of a larger share of manufactured goods to be *relatively less concerned* with the level of the exchange rate. Consequently, higher shares of manufactured exports should be associated with an increased probability of adopting a fixed exchange rate. The reverse argument then holds for the level of agricultural exports. At the same time, both manufactured and commodity exporters should have preferences for a more depreciated currency, as this enhances their competitiveness in global markets. All else equal, we therefore expect countries with larger shares of total exports in these sectors to have more depreciated currencies, as measured by the level of the real exchange rate.

Finally, we add two additional controls for the influence of domestic political institutions on exchange rate policy choices. Many scholars have noted the relationship between democracy and various types of democratic institutions with exchange rate regime choices (for example, Bernhard and Leblang 1999; Hallerberg 2002). Moreover, other scholars have noted the correlation between regime type and membership in PTAs (Mansfield, Milner, and Rosendorff 2002). To this end, we include *Regime Type,* which is the Polity score of state i in year $t-1$, although we do not have strong priors on its signs in the regressions given the mixed evidence in the existing empirical literature.[23] The second political control accounts for membership in the European Community/European Union (*EC/EU*). The variable is coded 1 if state i is a member of the European Union or its predecessor organizations. We include this "EU dummy" for two reasons. First, we need to control for the fact that the EU member states tend to have a disproportionately high PTA coverage, in terms of the share of overall trade, the number of agreements, and the frequency with which they have a "base" PTA.[24] Second, we also need to control for the extensive degree of monetary and exchange rate cooperation between the EU member states throughout the period in our data sample in the decades prior to the adoption of the euro.[25]

Results

PTAs and Exchange Rate Regime Choice

We begin our empirical analysis by exploring four models of exchange rate regime choice (Table 2, Models 1–4).[26] Models 1 and 2 are ordered logit specifications using both the aforementioned four-point Reinhart–Rogoff classification (Model 1) and a three-point classification that treats the two intermediate categories (soft peg/limited flexibility and managed float) as a single category (Model 2). In each of these specifications, we include a lagged dependent variable to control for the possibility of serial correlation. Ordinal models are widely used in the existing literature (for example, Singer 2010, Alesina and Wagner 2004), given the ordinal and discrete nature of the Reinhart–Rogoff data and other exchange rate classifications. The advantage of this approach is that it avoids the need to draw arbitrary distinctions about what is a "fix" or "float" and takes full advantage of the information provided in the various regime classifications about more fine-grained distinctions in regime choice across

[19] That said, the euro itself floats against other currencies.

[20] Calvo and Reinhart refer to this as "fear of floating" (2002). See fn. 8.

[21] Data for both variables are taken from the World Bank's *World Development Indicators* and are in constant 2000 dollars.

[22] Consequently, manufacturers in less developed countries tend to be more focused on the level of the exchange rate than those in advanced economies (Frieden, Ghezzi, and Stein 2001).

[23] Data are taken from Gleditsch's (2008) recoded Polity data.

[24] Indeed, since Germany is the base country for nearly all EU member states in the entire sample (the exceptions are Ireland before 1978 (UK as base) and Germany itself (US as base), *Base PTA* equals 1 for nearly all of these country-year observations.

[25] It is important to note that the results presented below are substantively identical if we exclude the EU countries.

[26] As noted above, we exclude the United States since it is the most frequent "target" (base country) of a peg, and because the United States itself has no monetary base country. We also exclude countries experiencing hyperinflation (annualized inflation greater than 150%) since these countries are highly likely to peg to stabilize their economies, independent of any other political or economic factors. Adding any of these observations to the estimation sample has no meaningful impact on our estimates.

TABLE 2. Estimates of the Determinants of Exchange Rate Regimes, 1975–2004

Model	*1*	*2*	*3*	*4*	*5*
Specification	*Ordered Probit*	*Ordered Probit*	*Conditional Logit*	*Conditional Logit*	*Cox PH, Exact Partial Likelihood*
Variable	*De Facto Regime, Reinhart-Rogoff (RR), 4- Point Scale (4 = float)*	*De Facto (RR, 3-Point Scale, 3 = Float)*	*De Facto (RR, 1 = Wide Band, Managed Float, or Float)*	*De Facto (RR, 1 = All but Hard Peg)*	*De Facto Peg Duration (Klein-Shambaugh)*
Base PTA	0.4189 (0.1713)**	0.4829 (0.2482)*	2.7130 (1.2356)**	2.1924 (1.0057)**	0.4849 (0.2662)*
Base trade (% of total trade)	−0.0092 (0.0034)***	−0.0125 (0.0051)**	−0.0201 (0.0288)	0.0621 (0.0354)*	−0.0179 (0.0046)***
PTA coverage (non-base)	−1.4424 (0.8345)*	−1.9765 (1.1685)*	−12.7323 (12.9286)	−7.9604 (4.7274)*	−5.6820 (1.4535)***
Number of PTAs (non-base)	−0.0314 (0.0329)	−0.0499 (0.0467)	−0.0116 (0.1382)	−0.1892 (0.1690)	0.0343 (0.0468)
Trade/GDP	−0.0031 (0.0019)	−0.0053 (0.0026)**	0.0084 (0.0132)	0.0218 (0.0165)	−0.0038 (0.0023)
Agricultural/raw material exports (share of total trade)	−0.0057 (0.0062)	−0.0055 (0.0078)	−0.0173 (0.0606)	0.1409 (0.0471)***	−0.0187 (0.0072)***
Manufactured exports (share of total trade)	−0.0019 (0.0027)	0.0016 (0.0039)	−0.0279 (0.0172)	−0.0540 (0.0358)	0.0037 (0.0031)
GDP (log)	0.1403 (0.0560)**	0.1796 (0.0808)**	−1.4760 (1.9057)	1.0877 (2.5428)	0.2436 (0.0597)***
GDP per capita (log)	0.0610 (0.0792)	0.0101 (0.1251)	2.0730 (1.7504)	−3.0953 (3.0821)	0.1470 (0.0971)
Inflation (%, log)	−0.2122 (0.0414)***	−0.1258 (0.0522)**	−0.6307 (0.1710)***	−0.9729 (0.3065)***	0.6068 (0.0780)***
Current account/GDP (%)	−0.0074 (0.0085)	−0.0075 (0.0091)	0.0171 (0.0456)	−0.0180 (0.0485)	−0.0119 (0.0117)
Capital account openness index (Chinn-Ito)	−0.0150 (0.0445)	0.0644 (0.0643)	−0.0457 (0.2023)	−0.1848 (0.3736)	0.0788 (0.0577)
POLITY2	0.0096 (0.0105)	0.0251 (0.0167)	−0.0103 (0.0402)	−0.0080 (0.0598)	0.0778 (0.0118)***
EC/EU member	−0.5936 (0.4219)	−1.0897 (0.5706)*	15.2547 (5.7882)***	−15.7769 (1.1294)***	0.1589 (0.5513)
Lagged dependent variable	1.7039 (0.1360)***	1.4050 (0.1512)***			
Years since last positive outcome (binary logit)			−2.8760 (0.4016)***	−1.3749 (0.1895)***	
Cut 1	4.5790 (1.0337)	4.1306 (1.5962)			
Cut 2	6.6232 (1.0960)	7.9361 (1.8038)			
Cut 3	9.3608 (1.1895)				
Cubic temporal spline 1			−0.0014 (0.0004)***	0.0020 (0.0009)**	
Cubic temporal spline 2			−0.1558 (0.0229)***	−0.0107 (0.0029)***	
Cubic temporal spline 3			0.0210 (0.0033)***		
Number of observations	1,407	1,407	785	622	1,383
Number of countries	99	99	42	34	95
Log-(pseudo)likelihood	−873.694	−608.744	−134.574	−99.925	−695.853
Pseudo R^2	0.496	0.447	0.626	0.636	–

(*Notes*. PTA, preferential trade agreements.
Robust standard errors in brackets (Models 1–4).
Exact partial likelihood Cox regression (Model 5).
*Significant at 10%; **significant at 5%; ***significant at 1%.)

time and space. The primary disadvantage is that ordered logit models are incompatible with the use of fixed effects (thereby raising concerns about omitted variable bias arising from unobserved heterogeneity). Moreover, in practice, the "cut points" between categories of the dependent variable are frequently insignificant in such specifications, suggesting the need to collapse the ordinal classification into fewer categories. As the results in Models 1 and 2 indicate, this problem exists in our data. Consequently, we present two alternative specifications using conditional logit models in Models 3 and 4, in which the Reinhart–Rogoff data are reclassified in a binary fix/float manner (0 = fix, 1 = float). In Model 3, a country is coded as fixing the exchange rate if the Reinhart–Rogoff classification is either a "1" (hard peg) or "2" (soft peg/limited flexibility). In Model 4, only hard pegs are classified as fixed, with the remaining three categories treated as "float." To account for temporal dependence in these models, we replace the lagged dependent variables from the ordered models with a counter (years since last "fix") and cubic splines as suggested by Beck, Katz, and Tucker (1998). These logit models also allow us to control for unobserved heterogeneity not controlled for in the ordinal models through the use of country fixed effects.

As is evident in the table, our results are consistent across all four specifications. In each model, *Base PTA* is positive and statistically significant, suggesting that countries that have signed PTAs with their monetary base country are more likely to adopt more flexible *de facto* exchange rate regimes. More importantly, the substantive impact of a base country PTA is very large. For example, in Model 3, the logit specification using the broader definition of a peg (fix = Reinhart–Rogoff classifications "1" and "2"), a base country PTA reduces the probability of fixing the exchange rate by nearly 60%. Similarly, in Model 4, the logit specification using the more restrictive version of a fixed exchange rate (fix=Reinhart–Rogoff classification "1"), a base country PTA reduces the probability of fixing by over 25%.

Thus, base PTA membership appears to significantly increase the likelihood that a government will choose to retain exchange rate flexibility and monetary autonomy. In contrast, when examining *Base Trade*—the actual level of trade ties with the monetary base country—we observe evidence in support of the conventional wisdom that trade openness and fixed exchange rates are complementary: higher levels of trade with the base country (independent of the presence of a PTA) lead to more fixity in exchange rate regime choice. However, this variable is statistically significant only in three of the four specifications and only at the 95% confidence level or greater in the ordered probit models. Furthermore, the effects of non-base PTA commitments on exchange rate regime choices contrast starkly with our finding of a strong correlation between *Base PTA* and more flexible regimes. The overall number of non-base PTAs (*#PTA*) is not significant in any of the four models, and *Non-base PTA Coverage* is weakly significant but *negative* in Models 1, 2, and 4. This latter result suggests that increased trade within PTAs (independent of the PTA trade coverage with the base country) encourages governments to adopt more fixed exchange rates. This is in line with traditional expectations about the complementary relationship between trade and fixed exchange rates.

Moving to the estimates of the control variables in Models 1–4, only *Inflation* is consistently significant (and negative) across the four models, providing support for the conventional wisdom that countries experiencing higher inflation are more likely to adopt fixed exchange rates as a nominal anchor for anti-inflationary monetary policy. The remaining control variables achieve statistical significance only intermittently: the estimate of *GDP* is positive and statistically significant in the ordered logit specifications but insignificant in the conditional logit models, and overall trade openness (*Trade Openness*) is negative and significant (indicating greater exchange rate fixity) in Model 2. In Model 4, *Ag Exports* is positive and significant, indicating an association between a larger agricultural/raw material sector and "hard" pegs, although none of the other three models suggests a correlation between the sectoral composition of the economy and exchange rate regime choice. Finally, the *EC/EU* dummy is significant in the two conditional logit models, albeit signed in opposite directions. Finally, in Model 3, EC/EU membership is associated with an increased probability of floating (defined broadly as "3" or "4" on the Reinhart–Rogoff index); in Model 4, however, EC/EU membership is associated with an increased probability of a hard peg (Reinhart–Rogoff = 1).

Robustness: PTAs and Peg Duration

The models in Table 2 provide strong support for our hypothesis that PTA commitments with one's monetary base country reduce the willingness of governments to adopt fixed exchange rates. To further probe this hypothesis, we turn to a different measure of exchange rate regimes coded by Klein and Shambaugh (2006). The Klein–Shambaugh (KS) classification is a binary coding, in which a country is deemed to have a fixed exchange rate in a given calendar year if its month-end official bilateral exchange rate with the monetary base country stays within a ±2% band during each month of the year, as well as over the course of that year. Since the coding is annual, the peg must last for at least a full calendar year for a country to be classified as pegged for that year; pegs that last less than a full year are classified as non-peg (floating) regimes. Thus, the KS classification more accurately measures the *duration* of a peg "spell" than the Reinhart–Rogoff coding, which we believe is preferable as an overall measure of exchange rate regime choice over time.[27] However, we use the KS classification here as a better measure of peg spell duration and a test of the robustness of our initial results.

Model 5 of Table 2 presents the results of the robustness analysis using the KS classification. Given the focus here on the duration of peg spells, the specification is a Cox proportional hazard model that estimates the influence of our covariates on the hazard rate that a country will end its spell of fixing the exchange rate. In such models, positive coefficients suggest a more rapid end to a peg spell, while negative estimates suggest longer spells of exchange rate pegs. Other than the new dependent

[27] Indeed, an important disadvantage of the KS classification relative to the RR coding is that its focus on yearly peg spells risks missing the "forest for the trees" when it comes to regime choice. For example, it might be the case that a country experiences temporary breaks in its peg spells (that is, single-month gaps within a year) that result in a coding of "float" for the year, even if it otherwise maintains its commitment to a fixed exchange rate over multi-year period. KS treat these cases as floats, even though they may not be indicative of purposeful and systematic changes in a government's exchange rate regime policy, whereas RR classifies such cases as a single continuous regime. For this reason, we believe the RR classification is preferable as an overall measure of exchange rate regime choice.

variable and new estimation technique, the specification of the model is the same as before. As shown in Model 5, these estimates turn out to be highly similar to our previous models, thereby reinforcing our confidence in the earlier findings. The estimate of *Base PTA* is positive and significant (though only at the 90% confidence level), suggesting that PTAs with base countries increase the probability that a government will drop its fixed exchange rate commitment more quickly, either to pursue exchange rate protection or to retain monetary and fiscal autonomy once it has tied its hands on trade policy vis-à-vis the base country. Once again, the estimate of *Base Trade* points in the opposite direction and remains statistically significant. In addition, *Non-base PTA Coverage* is also negative and significant, once again reinforcing the finding that fixed exchange rates and PTAs are complements. More trade-dependent economies (with the base country or with PTA members) are more likely to sustain a currency peg for longer periods of time.

The estimates of the control variables are also similar, although many of the control variables do not achieve statistical significance. The estimates of democracy are positive and significant, suggesting that more democratic states leave their pegs more quickly than their authoritarian counterparts. Inflation remains positive, once again illustrating the difficulty that states have in maintaining a fixed exchange rate under inflationary conditions. In addition, both *GDP* and *pcGDP* are positive and weakly significant in Model 5, suggesting that larger and wealthier countries are somewhat less likely to maintain currency pegs. Finally, our measure of agricultural composition of the export economy is negative, indicating that highly agriculturally dependent economies hold their pegs longer. In sum, these results, utilizing a different dependent variable coding scheme and an alternate estimation method, yield broadly similar results to our previous efforts.

Extension: Interaction Effects

While both the regime choice and peg duration models provide strong support for our argument linking base country PTAs to more flexible exchange rates, they also suggest the possibility of competing dynamics between *Base PTA* and *Base Trade*: the presence of a base PTA increases the propensity to a more flexible exchange rate, while higher levels of trade with the monetary base country increase the probability of adopting or sustaining a peg. These findings raise the question of whether the effect of *Base PTA* is conditional on the level of *Base Trade*—that is, whether the incentives to "float" created by signing a PTA with the monetary base country only exist at certain levels of *Base Trade*. On the one hand, it might be the case that a country engages in relatively little trade with the monetary base country, particularly if the exchange rate peg is adopted primarily for monetary credibility purposes. Indeed, many Middle Eastern, Latin American, and African countries peg to the dollar, despite the fact that trade with the United States is very small as a share of their total trade (for example, Jordan 2000: 1.9%; Kenya 2000: 3.5%; Uruguay 2000: 6.3%). In such cases, it is unlikely that a PTA with the base country would create strong incentives to engage in exchange rate protection by adopting a more flexible exchange rate regime or pursuing competitive depreciation. There are two reasons for this: (i) the balance-of-payments benefits of improving the terms of trade through a competitive depreciation are likely to be minimal if trade with the base country is limited; (ii) the degree to which a base PTA constraints a government's overall ability to use trade protection is limited if the PTA only covers a small share of trade. On the other hand, many countries are heavily trade-dependent on their monetary base country, as in the cases of Canada (2000: 73.5% of total trade with the United States), Honduras (2000: 67.2% United States), and Costa Rica (2000: 59.9% United States). In these latter cases, conversely, one would expect the negative effect of *Base PTA* on the adoption and duration of fixed exchange rates to be most pronounced and significant, since these are precisely the cases in which greater exchange rate flexibility and/or competitive depreciation may offset the constraints on trade policy imposed by the base country PTA.

In order to test for the possibility of this interactive relationship, we re-estimate each of the models in Table 2 with the inclusion of an interaction term, *Base PTA* x *Base Trade*. Table 3 presents these new results.

In these multiplicative interactive models, one cannot simply interpret the individual regression coefficients on the interaction terms and their components (Braumoeller 2004; Brambor et al. 2006). Rather, as Figure 1 illustrates, the coefficients on *Base PTA* must be assessed at different values of the modifying variable (*Base Trade*). Consequently, this chart graphs the marginal effect of *Base PTA*, along with 95% confidence intervals, as the *Base Trade* increases from its minimum to maximum values.

In this chart, along with the corresponding ones for the remaining models in Table 3, a clear and consistent pattern emerges.[28] At low levels of *Base Trade*—that is, in cases where trade with the monetary base country is approximately 30% or less of total trade, *Base PTA* has no significant effect on exchange rate regime choice or peg duration. When *Base Trade* exceeds this level, however, *Base PTA* becomes positive and significant, indicating an increased probability of adopting a more flexible exchange rate. Moreover, this marginal effect increases in magnitude as *Base Trade* approaches its maximum value in our sample (Dominican Republic 1995: 79.6% of trade with the United States). In other words, the data suggest that base PTAs create incentives to engage in exchange rate protection, but only when trade with the base country is sufficiently large that the PTA creates substantial constraints on the government's ability to employ trade protection. This result, we believe, indicates that the conventional wisdom viewing trade liberalization/openness and fixed exchange rates as complements is in need of substantial qualification and revision. While this complementary relationship may hold generally for levels of trade openness and for PTA commitments within most country dyads, the evidence is decidedly otherwise in cases of PTA tied to one's monetary base country. In short, our results suggest strongly that the relationship between international trade and monetary commitments is more conditional than previously thought.

PTAs and the Level of the Exchange Rate

Thus far, the empirical analysis offers robust support for our argument that governments are less likely to adopt or sustain fixed exchange rates when their hands are tied

[28] Figure 1 shows this result for Table 4, Model 3, the conditional logit specification. The corresponding figures for the remaining models in Table 4 are substantively similar.

Table 3. Estimates of the Determinants of Exchange Rate Regimes, 1975–2004 (Interactive Models)

Model Specification	*1* *Ordered Probit* *De Facto Regime, Reinhart-Rogoff (RR), 4- Point Scale (4 = Float)*	*2* *Ordered Probit* *De Facto (RR, 3-Point Scale, 3 = Float)*	*3* *Conditional Logit* *De facto (RR, 1 = Wide Band, Managed Float, or Float)*	*4* *Conditional Logit* *De Facto (RR, 1 = All but Hard Peg)*	*5* *Cox PH, Exact Partial Likelihood* *De facto Peg Duration (Klein-Shambaugh)*
Variable					
Base PTA	0.0913 (0.2424)	−0.0998 (0.4014)	0.2611 (1.3917)	−2.0484 (3.0414)	−0.6605 (0.4024)
Base trade (% of total trade)	−0.0128 (0.0044)***	−0.0180 (0.0065)***	−0.0334 (0.0291)	−0.0266 (0.0433)	−0.0286 (0.0054)***
Base PTA*Base trade	0.0101 (0.0066)	0.0174 (0.0094)*	0.0599 (0.0292)**	0.1365 (0.0586)**	0.0334 (0.0094)***
PTA coverage (non-base)	−1.5099 (0.8705)*	−1.9291 (1.2433)	−16.1433 (13.5031)	−9.7572 (6.8465)	−5.6118 (1.4823)***
Number of PTAs (non-base)	−0.0381 (0.0337)	−0.0607 (0.0485)	−0.0483 (0.1234)	−0.2116 (0.2272)	0.0221 (0.0479)
Trade/GDP	−0.0032 (0.0020)	−0.0055 (0.0026)**	0.0038 (0.0130)	0.0171 (0.0163)	−0.0045 (0.0024)*
Agricultural/raw material exports (share of total trade)	−0.0062 (0.0060)	−0.0065 (0.0076)	−0.0423 (0.0563)	0.1231 (0.0591)**	−0.0200 (0.0072)***
Manufactured exports (share of total trade)	−0.0020 (0.0027)	0.0015 (0.0039)	−0.0259 (0.0175)	−0.0444 (0.0405)	0.0042 (0.0031)
GDP (log)	0.1434 (0.0566)**	0.1835 (0.0815)**	−1.5777 (1.9433)	0.5817 (2.9131)	0.2482 (0.0607)***
GDP per capita (log)	0.0610 (0.0799)	0.0097 (0.1247)	2.2458 (1.7765)	−2.3175 (3.1413)	0.1634 (0.0978)*
Inflation (%, log)	−0.2066 (0.0420)***	−0.1190 (0.0529)**	−0.6135 (0.1702)***	−1.0091 (0.3313)***	0.6155 (0.0787)***
Current account/GDP (%)	−0.0064 (0.0084)	−0.0061 (0.0091)	0.0141 (0.0439)	−0.0052 (0.0493)	−0.0129 (0.0117)
Capital account openness index (Chinn-Ito)	−0.0112 (0.0459)	0.0715 (0.0656)	−0.1015 (0.2060)	−0.2208 (0.4201)	0.0939 (0.0581)
POLITY2	0.0108 (0.0106)	0.0269 (0.0171)	−0.0017 (0.0406)	−0.0124 (0.0561)	0.0805 (0.0119)***
EC/EU member	−0.4551 (0.4248)	−0.9005 (0.5749)	18.6597 (6.6763)***	−16.7239 (1.2045)***	0.5673 (0.5858)
Lagged dependent variable	1.6988 (0.1363)***	1.3975 (0.1518)***			
Years since last positive outcome (binary logit)			−2.8791 (0.4085)***	−1.4084 (0.2104)***	
Cut 1	4.5297 (1.0366)	4.0345 (1.5952)			
Cut 2	6.5812 (1.0982)	7.8628 (1.8121)			
Cut 3	9.3232 (1.1954)				
Cubic temporal spline 1			−0.0014 (0.0004)***	0.0019 (0.0008)**	
Cubic temporal spline 2			−0.1562 (0.0228)***	−0.0106 (0.0028)***	
Cubic temporal spline 3			0.0211 (0.0032)***		
Number of observations	1,407	1,407	785	622	1,383
Number of countries	99	99	42	34	95
Log-(pseudo)likelihood	−871.428	−604.261	−133.167	−95.191	−689.323
Pseudo R^2	0.497	0.4512	0.630	0.653	–

(*Notes*. Robust standard errors in brackets (Models 1–4).
Exact partial likelihood Cox regression (Model 5).
*Significant at 10%; **significant at 5%; ***significant at 1%.)

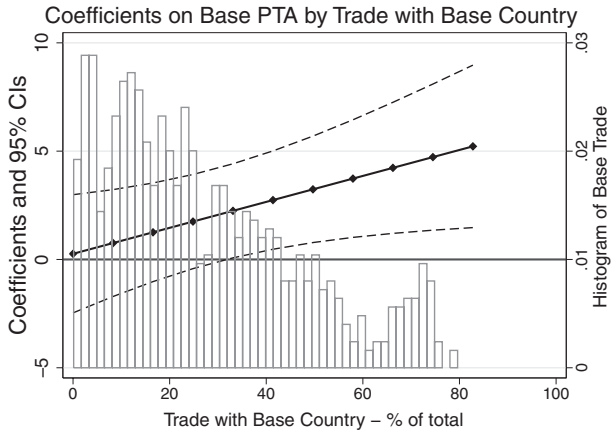

FIG 1. Effect of Base Preferential Trade Agreement on Exchange Rate Regime Choice (Reinhart–Rogoff*) by Base Trade, Conditional Logit (Model 3, Table 2). *Binary classification, 0 = "fix" (hard peg, narrow band); 1 = "float" (wide band/managed float, free float)

on trade policy as a result of PTA commitments to their monetary base country. In this section, we move on to consider the question of whether PTA commitments also affect the level of the exchange rate. In both the industrialized countries and the developing world, more flexible exchange rate regimes are strongly associated with both nominal and real depreciation over the last three decades (International Monetary Fund 1997:89; Frieden 2002:833; Blomberg et al. 2005). Consequently, the results above linking base country PTAs to more flexible regimes also imply a correlation between *Base PTA* and a more depreciated real exchange rate. At the same time, focusing on the exchange rate level allows us to test for an alternative method of exchange rate protection—namely the adoption of a currency pegs the currency at an undervalued rate, rather than floating in the hopes of a competitiveness-enhancing depreciation. As noted above, such a strategy is at the heart of the ongoing debate about the dollar–renminbi exchange rate and the accusations of US policymakers that China is engaging in currency manipulation.

In Table 4, we re-estimate our models using the two different measures of the level of the exchange rate described earlier: the trade-weighted real effective exchange rate index (*REER*) and the measure of undervaluation (*Undervalue*). For each of these variables, we test specifications using both the logged value and the log of the 3-year moving average as alternative dependent variables. Given the significance of the interaction terms in the regime choice models above, we also specify an interactive model here.

For these models, we employ OLS regression with country fixed effects, and given the strong degree of autocorrelation in the exchange rate level data, we specify the model in first differences. This addresses a series of potential problems, including unit roots and Nickell (1981) bias, associated with specifying the model in levels and including fixed effects and a lagged dependent variable.[29]

[29] See Wooldridge (2010) for an overview of the econometric analysis of panel data. Beck and Katz (2011) suggest that Nickell bias is relatively modest in most time-series cross-sectional data sets in IPE, since the bias is of the order 1/T. Accordingly, we find substantively similar results using a straightforward fixed effects/lagged dependent variable specification in levels.

Overall, the results here are less definitive but still offer some support for our argument. In Models 1 and 3, the specifications using the current year observations of *REER* and *Undervalue*, we find no significant effect of *Base PTA* at any value of *Base Trade*. In Models 2 and 4, however (the specifications using three-year moving averages of the dependent variables), we find clear and significant effects. As with the previous interactive models, interpretation of these effects is best done graphically. Consequently, in Figures 2 and 3, we graph the marginal effect of *ΔBase PTA* on changes in the level of the exchange rate, as the value of *ΔBase Trade* varies from its minimum to maximum. In Figure 2, the results indicate that a base PTA is associated with exchange rate appreciation when base trade is declining but depreciation when *Base Trade* is increasing. In Figure 3, we observe a similar result. Recalling that higher values of *Undervaluation* indicate a more depreciated currency, the graph flips directions: a decline in base trade decreases *Undervaluation* (that is, an appreciation), while an increase in *Base Trade* leads to an increase in undervaluation. Thus, adopting a base PTA is associated with depreciation/greater undervaluation, but only when *Base Trade* is increasing.

Our results suggest that signing a PTA with one's monetary base country affects the longer-term trajectory of the exchange rate level in ways that provide further support for the logic of exchange rate protection. Although these results are somewhat less robust than our models of regime choice, we attribute this to the "noisy" nature of our new dependent variable: given the many factors contributing to movements in exchange rate levels, it is far more difficult to identify changes in these levels as the result of intentional changes in government policies than in the case of exchange rate regimes. Nevertheless, we believe that the significant correlation between tied hands in trade and movement in exchange rates over the longer term in our analysis to be initial evidence that base PTAs do create some incentives for governments to engage in exchange rate protection.

Conclusions

Although scholars of international political economy have long recognized the importance of both the stability and level of the exchange rate for international trade, the literature to date has paid little attention to the relationship between international trade agreements and exchange rate policy choice. In this paper, we seek to address this gap in the literature by focusing on the degree to which membership in PTAs influences a country's choice of exchange rate regime. We argue that countries are less likely to adopt (and sustain) fixed exchange rates when they have signed a PTA with their "base" country—the country most likely to be their anchor currency based on current and past experiences with fixed exchange rates, regional proximity, and trade ties. Similarly, we argue that countries that have entered base PTAs will, all else equal, have more depreciated currencies, as measured by the level of the real exchange rate and the degree of currency undervaluation relative to long-run PPP.

We argue that this relationship between the flexibility and level of the exchange and a PTA with one's base country exists for two reasons. First, and most directly, a PTA with the base country constrains a government's ability to utilize trade protection to improve domestic producers' international competitiveness, thereby increasing its

Table 4. Estimates of the Determinants of Exchange Rate Levels, 1975–2004

Model	*1*	*2*	*3*	*4*
Specification	*OLS, Differences on Differences*	*OLS, Differences on Differences*	*OLS, Differences on Differences*	*OLS, Differences on Differences*
Variable	*ΔREER (log)*	*ΔREER (log, 3-Year Moving Average)*	*ΔUndervaluation (log)*	*ΔUndervaluation (3-Year Moving Average, log)*
Base PTA	0.0055 (0.0578)	−0.0412 (0.0312)	−0.0172 (0.0312)	−2.8957 (1.1969)**
Base trade (% of total trade)	0.0002 (0.0034)	−0.0010 (0.0010)	0.0000 (0.0009)	0.0081 (0.0122)
Base PTA*Base trade	−0.0254 (0.0203)	−0.0288 (0.0119)**	0.0035 (0.0047)	1.2718 (0.4146)***
PTA coverage (non-base)	−0.0439 (0.1430)	−0.1274 (0.0617)**	−0.2286 (0.1114)**	5.7187 (2.8959)*
Number of PTAs (non-base)	0.0037 (0.0051)	0.0041 (0.0034)	0.0049 (0.0063)	−0.1608 (0.0746)**
Trade/GDP	−0.0001 (0.0006)	−0.0017 (0.0004)***	−0.0003 (0.0006)	0.0276 (0.0082)***
Agricultural/raw material exports (share of total trade)	0.0008 (0.0019)	−0.0022 (0.0011)**	−0.0021 (0.0012)*	0.0069 (0.0164)
Manufactured exports (share of total trade)	−0.0001 (0.0007)	−0.0004 (0.0005)	−0.0011 (0.0007)	0.0192 (0.0089)**
GDP (log)	−1.1934 (0.4906)**	−1.0900 (0.2397)***	0.0594 (0.2512)	13.5267 (4.4391)***
GDP per capita (log)	1.0618 (0.4945)**	0.9090 (0.2041)***	−0.0278 (0.2380)	−13.9332 (4.2359)***
Inflation (%, log)	−0.0073 (0.0089)	−0.0085 (0.0030)***	0.0183 (0.0048)***	−0.1136 (0.0638)*
Current account/GDP (%)	−0.0034 (0.0019)*	−0.0043 (0.0020)**	−0.0028 (0.0019)	0.0422 (0.0296)
POLITY2	−0.0008 (0.0160)	−0.0071 (0.0057)	−0.0036 (0.0104)	0.1715 (0.0892)*
Capital account openness index (Chinn-Ito)	0.0015 (0.0018)	−0.0015 (0.0005)***	−0.0013 (0.0010)	0.0140 (0.0095)
EC/EU member	0.0248 (0.0160)	0.0601 (0.0135)***	0.0840 (0.0342)**	0.5198 (0.2559)**
Lagged dependent variable				
Constant	0.0092 (0.0061)	0.0124 (0.0045)***	−0.0048 (0.0049)	−4.6223 (0.1158)***
Number of observations	720	721	1,255	639
Number of countries	62	62	97	96
R^2	0.021	0.134	0.029	0.082

(*Notes.* Robust standard errors in brackets.
*Significant at 10%; **significant at 5%; ***significant at 1%.)

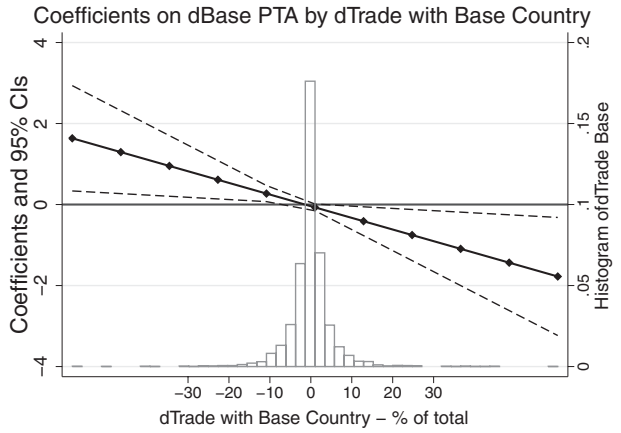

Fig 2. Effect of Base Preferential Trade Agreement on Real Exchange Rate Level (3-Year Moving Average) by Base Trade, First Differences Model (Model 2, Table 4)

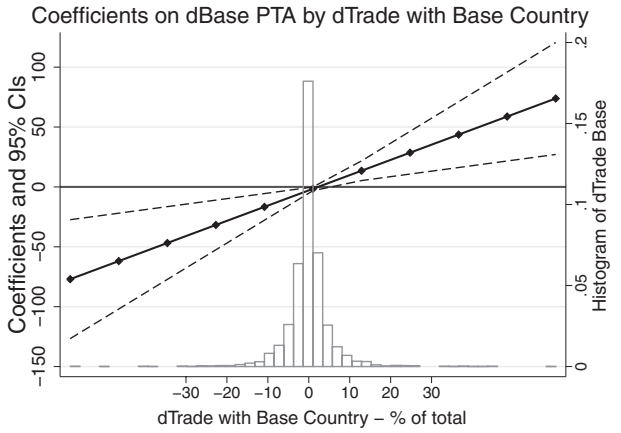

Fig 3. Effect of Base Preferential Trade Agreement on Undervaluation (3-Year Moving Average) by Base Trade, First Differences Model (Model 4, Table 4)

incentives to engage in exchange rate protection—the use of exchange rate policies as a lever to influence the terms of trade and enhance domestic producers' competitiveness in global markets. Second, and more broadly, tying one's hands, one trade policy raises the overall costs for a government of further constraining its economic policy autonomy. Thus, even if a government does not seek to actively manipulate the exchange rate for protectionist purposes, it may still be reluctant to relinquish its monetary and fiscal autonomy if it has already made a firm bilateral commitment to free trade with its key economic partner.

Using an original data set, we find strong evidence in support of these hypotheses. The results are robust to multiple specifications and estimation techniques. These findings shed substantial light on the complex relationship between trade and monetary commitments in the contemporary global economy. More broadly, our analysis has important implications for our understanding of international cooperation. Specifically, it suggests that state leaders desire to keep some economic policy autonomy while attempting to make credible commitments. In particular, when a state is in a PTA with its monetary base country, it is more likely to adopt or move to flexible

exchange rates and more likely to have a depreciated or undervalued currency.

In the larger picture, this result speaks to the question of whether governments truly live up to their international trade commitments in practice. Indeed, the results presented here suggest that—when alternative policies such as manipulating the exchange rate can offset or overturn the domestic consequences of international commitments—governments may find ways to circumvent the constraints created by international agreements such as PTAs. To the extent that this is the case, we should be concerned about the credibility of such commitments and explore more closely the possibility that many international economic agreements may not achieve their stated goals when policy substitutes remain domestically. In the context of international trade, we might therefore observe *de jure* free trade (that is, the reduction in tariffs and nontariff barriers) in tandem with *de facto* protection through exchange rate manipulation—an outcome that is unlikely to yield the expected economic benefits of trade liberalization but might be politically advantageous for domestic political reasons.

While our findings suggest that this type of behavior is possible in the realm of international trade, its prevalence in other issues areas remains an empirical puzzle in international relations. To the extent that governments do seek to circumvent international commitments through alternative means, however, the logic underlying exchange rate protection sheds light on compliance problems in international cooperation. In particular, it suggests that governments are less likely to comply with international agreements to the letter when they retain domestic autonomy over alternative policies that are close substitutes for the proscribed behavior. In these cases, we are likely to observe high levels of stated compliance but few meaningful effects on actual outcomes, as countries comply narrowly with the "letter of the law" while violating the spirit of international agreements by pursuing offsetting domestic policy substitutes. As such, future research that identifies the degree of "substitutability" between alternative government policies might lead to important new insights about the conditions under which international agreements actually have the intended effect on states' behavior in the contemporary world economy.

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