Rev Int Organ
DOI 10.1007/s11558-013-9177-x

Think globally, buy locally: International agreements and government procurement

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Abstract Do international treaties constrain national governments? The answer appears to be "yes" when it comes to the use of traditional barriers to trade, such as tariffs. Yet, while many governments have cut tariffs to comply with international agreements, they have often raised non-tariff barriers in their place. One increasingly prominent non-tariff barrier is discrimination in public procurement. Governments frequently discriminate against foreign suppliers in favor of domestic ones when buying goods and services. In an attempt to reduce procurement discrimination, international organizations, such as the World Trade Organization, have devoted ever more attention to members' procurement practices. Additionally, a growing number of preferential trade agreements seek to regulate public procurement. It remains unclear, however, whether international rules are effective in changing governments' purchasing behavior. Using original data, we find that neither multilateral nor preferential procurement agreements substantially reduce governments' propensity to "buy national." These results illustrate the difficulty of regulating non-transparent policy areas via international treaties.

Keywords Procurement · WTO · Government Procurement Agreement (GPA) · Preferential trade agreements · Transparency

JEL Codes H57 · F53 · F55 · F13 · F14

Electronic supplementary material The online version of this article (doi:10.1007/s11558-013-9177-x) contains supplementary material, which is available to authorized users.

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Published online: 05 October 2013

1 Introduction

Over the past several decades, international agreements have prompted substantial reductions in governments' use of traditional barriers to trade, such as tariffs. Yet as tariffs have fallen, many governments have implemented non-tariff barriers in their place to ensure continued protection for domestic producers. Non-tariff barriers are currently the principal form of trade protection in much of the world. Many non-tariff barriers occur "behind the border," which makes them especially difficult to monitor and regulate internationally.

One particularly contentious behind-the-border barrier to trade is discrimination in public procurement. Governments that discriminate in procurement systematically favor domestic producers over foreign ones when buying otherwise similar goods and services. A prominent example of explicitly discriminatory behavior by the United States government was the "Buy American" provisions included in the 2009 stimulus bill, which required that all stimulus-funded projects use only American-made iron and steel.

Home-biased government procurement is widely believed to be a pervasive phenomenon (Brülhart and Trionfetti 2004). Forty-six percent of businesses surveyed by the European Union believe that local preferences significantly influence the outcome of public procurement procedures (European Commission 2011). Ninety-nine percent of all local authority contracts in European Union countries are, in fact, awarded to domestic firms (Martin et al. 1999) – a figure that seems impossible to attribute to cost and quality differences alone.

In an attempt to open up procurement markets, international organizations, such as the World Trade Organization and the European Union, have devoted ever more attention to members' procurement practices. Public procurement is also regulated explicitly in an increasing number of preferential trade agreements. Yet, it remains unclear how effective international rules are in changing governments' purchasing behavior. One reason for this uncertainty is the difficulty of measuring discriminatory government procurement. Governments rarely discriminate overtly when purchasing goods and services, and consequently it is difficult to identify and quantify the "home bias" in government procurement. This in turn makes it hard to assess the efficacy of international procurement agreements.

The current study takes a first step toward systematically measuring the impact of international procurement rules, including, for example, the World Trade Organization's Government Procurement Agreement (GPA). We begin by estimating the elasticity of imports to procurement spending—controlling for other determinants of imports—in a large sample of countries and years. This elasticity is generally negative, implying that the transfer of purchasing power from the private to the public sector reduces imports. In other words, governments discriminate against foreign suppliers. We then estimate the impact of both multilateral and preferential procurement agreements on imports-procurement elasticities. We find that neither type of agreement significantly alters these elasticities, implying that international agreements have failed to reduce discrimination against foreign suppliers. This result is robust to numerous controls and sample changes, to the use of services trade as a dependent variable, and to the use of a procurement measure that captures only transactions that are legally bound by international rules. Our results thus provide strong evidence that international procurement agreements have failed to reduce procurement discrimination.

We argue that this institutional failure reflects the opacity of public procurement and the consequent difficulty of detecting and punishing treaty violations. Procurement discrimination is notoriously difficult to detect and prove, making it hard for international institutions to provide their usual informational and reputational functions. If this is true, our results point to a more general problem for future international trade agreements. As governments have reduced tariffs, quotas, and other traditional "at-the-border" barriers to trade, leaders have increasingly turned to behind-the-border barriers, including a wide range of product standards and other technical barriers to trade. These barriers, like procurement discrimination, are often difficult to condemn unambiguously as treaty violations. Hence, like procurement discrimination, they may be difficult to control via international agreements. Our results thus suggest, somewhat ironically, that the successful reduction of explicit trade barriers has pushed governments toward policies that are harder to control.

2 International procurement rules

Government procurement accounts for a large share of economic activity. On average, public procurement amounts to 15–20 % of GDP in developed countries (Lamy 2009; Anderson et al. 2011). Given the substantial size of procurement markets, it is not surprising that procurement has captured the attention of international trade negotiators. Discriminatory procurement practices exclude foreign suppliers from lucrative procurement markets (Lamy 2009). Additionally, the implementation of discriminatory measures in one country can engender pressures for the adoption of similar measures in other countries (Lamy 2009). Following the adoption of Buy American provisions in the 2009 stimulus bill, for example, China reinforced its own "Buy Chinese" regulations and in Canada, pressures grew for the adoption of "Buy Canadian" procurement measures (Lamy 2009).

Governments have tried to minimize procurement discrimination via rules negotiated within international organizations. A series of European Union procurement directives, for example, were designed to eradicate discriminatory public procurement within the Single European Market (Martin et al. 1999). Today, virtually all public procurement in EU Member countries is subject to EU rules that prohibit discriminatory purchasing policies (Martin et al. 1999, 387).[1] Similarly, a handful of GATT members signed a Government Procurement Code in 1981.[2] In 1996, the WTO passed the Agreement on Government Procurement (GPA), which expanded and strengthened certain provisions of the earlier Code. The current GPA embodies detailed provisions on various aspects of the procurement process in an attempt to ensure transparent and open competition for domestic and foreign firms.

Although the WTO's GPA is the main instrument regulating government procurement in the international economy, it has been considered by many to be of questionable efficacy for several reasons (Evenett 2002; Liang 2006). First, the GPA binds only a subset of the WTO's member governments. It is a plurilateral treaty. WTO members choose whether or not to sign the GPA and simply being a member of the

[1] The notable exception is the procurement of defence equipment.
[2] The 1981 Code applied to very few members and was widely deemed a failure (Liang 2006).

WTO does not necessitate agreeing to the GPA. Currently, the GPA has only 15 signatory parties: Armenia, Canada, the EU, Hong Kong, Iceland, Israel, Japan, Korea, Liechtenstein, the Netherlands with respect to Aruba, Norway, Singapore, Switzerland, Chinese Taipei, and the United States. Even for these 15 Contracting Parties, the GPA does not cover all public procurement. Only certain government entities are regulated by the Agreement and only purchases above a specified monetary value are subject to international regulation.

Doubts about the GPA's effectiveness have likely fuelled the rapid proliferation of procurement rules in preferential trade agreements (PTAs). Many recently concluded PTAs explicitly prohibit procurement practices that discriminate against foreign producers. This trend is evident in Table 1.

Table 1 reports the year in which PTAs with explicit procurement rules entered into force. To date, 43 PTAs stipulate explicit procurement rules. In theory, these rules commit signatories to open up their procurement markets to other PTA members. These PTAs, which are referred to in the current study as preferential procurement agreements (PPAs), have grown more popular over time, with over half entering into force since 2000. PPAs explicitly forbid some or all forms of discrimination in public procurement. Many PPAs forbid explicit "buy national" policies such as the 2009 Buy American provisions: Canada and Mexico, for example, are shielded from these provisions by rules in NAFTA's procurement chapter. Procurement agreements also tend to prohibit price discrimination (i.e., choosing higher priced domestic bids over lower priced but otherwise identical foreign bids). Beyond this, PPAs typically ban a range of other policies that favor domestic firms. For example, PPAs often outlaw local-content requirements, since local firms are much more likely to source their inputs domestically (Grier 1996).

The growing number of PPAs suggests that governments see international agreements as a fruitful forum for addressing procurement discrimination. However, firms competing for government contracts are less convinced about the efficacy of international procurement rules. A majority of EU businesses that have faced procurement discrimination believe that such discrimination would be better addressed through national legislation rather than international agreements (European Commission 2011). In short, the effectiveness of international procurement agreements remains unknown. Do such agreements actually discourage home-biased procurement by national governments? This question is the central focus of our study.

3 Incentives to discriminate

Governments have strong incentives to favor domestic firms over foreign ones when purchasing otherwise similar goods and services. Buying national shifts profits from foreign firms to domestic ones (Branco 1994; Vagstad 1995). Domestic firms may consequently reward politicians who discriminate in their favor by providing them with votes and/or campaign contributions. Conversely, if domestic bids are rejected in favor of foreign ones, domestic firms may make life difficult for vote-sensitive politicians (Martin et al. 1999, 390). For example, a recent decision by the British government to award a train-building contract to Siemens of Germany ahead of the UK based arm of Bombardier was widely criticized by opposition parties and national labor unions.

Table 1 PTAs with procurement coverage commitments

Year	Agreement
1983	Australia-New Zealand
1985	US-Israel
1994	European Community (EC)
1994	European Economic Area (EEA)
1994	North American Free Trade Agreement (NAFTA)
1995	Costa Rica-Mexico
1997	Canada-Israel
1998	Mexico-Nicaragua
1999	Chile-Mexico
2000	EC-Mexico
2000	Israel-Mexico
2001	European Free Trade Agreement (EFTA)-Mexico
2001	New Zealand-Singapore
2002	Chile-El Salvador
2002	Chile-Costa Rica
2003	Japan-Singapore
2003	EC-Chile
2003	EFTA-Singapore
2003	Panama-Costa Rica
2003	Panama-El Salvador
2003	Singapore-Australia
2004	Korea-Chile
2004	US-Singapore
2004	US-Chile
2005	EFTA-Chile
2005	Japan-Mexico
2005	US-Australia
2006	Central American Free Trade Agreement-Dominican Republic (CAFTA-DR)
2006	EFTA-South Korea
2006	South Korea-Singapore
2006	Panama-Singapore
2006	US-Bahrain
2006	US-Morocco
2007	Chile-Japan
2008	EC-Caribbean Forum of African, Caribbean and Pacific (CARIFORUM) States
2009	Australia-Chile
2009	Canada-EFTA
2009	Canada-Peru
2009	Chile-Colombia
2009	Japan-Switzerland
2009	Peru-Singapore
2009	US-Peru
2009	US-Oman

Although leaders have electoral incentives to favor domestic producers when awarding government contracts, they would also like their domestic firms to have access to foreign procurement markets. Governments may thus have prisoner's dilemma (PD) preferences: they want domestic protectionism and foreign liberalization, but they may prefer mutual liberalization to mutual protectionism. These PD incentives provide the rationale for international procurement agreements, which invariably require reciprocal access to signatories' procurement markets.

To overcome the prisoner's dilemma, international procurement agreements must be enforced. Moreover, in the absence of supranational enforcement mechanisms, such agreements must be enforced through the decentralized actions of member states (Downs et al. 1996). As Axelrod (1984) demonstrates, this can occur in an iterated PD game if governments pursue tit-for-tat strategies that reciprocate cooperation and defection. Mutual liberalization of procurement markets could thus be sustained if governments adopted reciprocal procurement policies. An important caveat to this claim, however, is that if information is imperfect, noncooperative or "cheating" behavior may be hard to observe (Keohane 1984). If cheating cannot be detected and punished, cooperation breaks down.

Keohane (1984) argues that international institutions may facilitate cooperation by providing the information needed to pursue reciprocal strategies. Institutions explicitly define cooperation and defection, which is a *sine qua non* for effective reciprocity. Additionally, institutions may publicize treaty violations, making them known to a broader audience than they would be in the treaty's absence (Keohane 1984; Mansfield et al. 2002). In both ways, institutions make cheating easier to detect and raise the reputational costs of noncompliance. High reputation costs make governments more like to comply with negotiated agreements; hence institutions offer governments a way out of the prisoner's dilemma. If international procurement agreements work in this way, then signatories should exhibit less discrimination against foreign suppliers than non-signatories, all else equal.

Empirical research on international institutions shows that reputational mechanisms have encouraged compliance with international trade agreements (Busch and Reinhardt 2000; Kono 2007; Baccini and Kim 2012) and international monetary law (Simmons 2000). Given this, we might expect procurement agreements to similarly constrain governments' purchasing behavior. However, the reputational mechanism can work only if governments are able to detect treaty violations. Although treaties exist in part to facilitate such detection, the presence of a treaty may not suffice to detect violations in opaque policy areas, such as public procurement.

Procurement is a notoriously non-transparent policy area and discrimination is exceeding difficult to spot. In an evaluation of the impact and effectiveness of EU procurement legislation, the European Commission concluded that, "discrimination in public procurement is very difficult to detect or prove" (European Commission 2011). Although 46 % of EU businesses reported that local preferences influence the outcome of public procurement procedures to a high extent, none could provide concrete evidence of discrimination (European Commission 2011). One reason for the lack of tangible evidence of discrimination is the fact that governments can

discriminate against foreign suppliers in myriad opaque ways. Governments can, for example, discriminate against foreign producers by tailoring technical requirements specifically to local suppliers (Beviglia-Zampetti 1997). In this case, discrimination would be exceedingly hard to prove. Moreover, as Vagstad (1995) observes, governments can always invoke "quality" as a reason to favor domestic bids over foreign ones.

The opacity of procurement makes it difficult to observe and prove violations of international rules. Consequently, governments may be able to discriminate against foreign bidders with impunity—even as signatories to international procurement agreements. If an agreement outlaws a multitude of explicitly discriminatory policies, signatory governments can always discriminate in new ways that are equally effective but less obviously protectionist. If such policy innovation is widespread, the prospects for enforcing procurement agreements are grim.

In sum, there are theoretical reasons to believe that international agreements might discourage procurement discrimination. However, the non-transparent nature of the procurement process provides considerable cause for doubt. Whether international agreements actually discourage discriminatory procurement is thus an empirical question.

4 Data and methodology

To date, only a handful of empirical studies investigate procurement discrimination and they typically focus on only a single country or year. The dearth of empirical research on home-biased government procurement is due largely to the difficulty of measuring procurement discrimination. Governments rarely discriminate overtly. There are a few notable examples of overt discrimination, including the "Buy American" provisions included in the 2009 stimulus bill. However, such flagrant discrimination is infrequent and statute law rarely reveals anything about the extent of de facto discrimination (Miyagiwa 1991).

Scholars attempting to measure discrimination have therefore focused on outcome-based measures. For example, Lowinger (1976) and Trionfetti (2000) compare the government's propensity to import with that of the private sector: the former is always lower than the latter, suggesting that governments discriminate in favor of domestic producers. However, this measurement strategy is viable for only a handful of wealthy countries with the requisite comprehensive data. In fact, both Lowinger (1976) and Trionfetti (2000) are able to construct such measures for only a single year. To investigate the effects of international procurement rules across a range of countries over time, a different measure is clearly needed. We employ a novel measurement strategy to shed new light on the effects international treaties have on governments' purchasing behavior.

To estimate the degree of procurement discrimination in a given country, we examine the elasticity of imports to procurement spending, controlling for other determinants of imports. Our dependent variable, $ln(Imports_{ijt})$, is the log of country i's imports from country j in year t in constant 2000 United States (US) dollars. Our key independent variable, $ln(Procurement_{it})$, is country i's contestable procurement

spending in year *t*, also in constant 2000 US dollars.[3] Following standard practice (European Commission 2000; Audet 2002), we measure contestable procurement spending as government spending on goods and services less compensation of employees and defense expenditures.[4] The procurement coefficient estimates the elasticity of imports to procurement spending, which, *ceteris paribus*, provides information about the degree of procurement discrimination.

Procurement spending is simply a transfer of purchasing power from private to public hands: the government takes money from the private sector via taxes and then spends the money itself. The key question is how this transfer affects domestic demand for imports. The answer depends on the degree of procurement discrimination. If the government is no more discriminatory than the private sector, then the transfer will have no effect on import demand: the government will simply buy imports that were previously purchased by the private sector. In this case, an increase in procurement spending will not affect imports and the procurement coefficient will be zero. Conversely, if the government is more discriminatory than the private sector, then procurement spending will lower import demand because the government buys fewer imports than the private sector. In this case, the procurement coefficient will be negative.

Previous research suggests that governments discriminate more against foreign suppliers than the private sector (Lowinger 1976; Mastanduno 1991; Hoekman and Mavroidis 1997; Trionfetti 2000). For example, the private sector imports more from abroad than the Japanese government in services categories (Shingal 2011, 545). Similarly, import penetration rates are approximately 22 % for EU economies as a whole, while the comparable figure for the public sector is only 2 % (Martin et al. 1999, 387). The import share of the government is smaller than the import share of the private economy in Germany, Spain, France, Italy and the United Kingdom (Trionfetti 2000). Given this evidence, we expect the procurement coefficient to be negatively signed because governments discriminate more against foreign suppliers than the private sector.

Do international agreements reduce discrimination against foreign suppliers? Given our research design, this amounts to asking whether international agreements alter the elasticity of imports to procurement spending. To answer this question, we include two interaction terms: $ln(Procurement_{it})*GPA_{ijt}$ and $ln(Procurement_{it})*PPA_{ijt}$. These are interactions, respectively, between procurement spending and dummy variables for joint membership in the WTO GPA and PPAs. Both dummies are coded 1 if countries *i* and *j* belong to the given procurement agreement and 0 otherwise.[5] If these agreements reduce discrimination, they should weaken the negative relationship between procurement spending and imports. In other words, the interaction terms

[3] Import data are from the International Monetary Fund's *Direction of Trade Statistics*. Spending data are from the World Bank's *World Development Indicators*. The spending data are all based on the IMF's latest accounting standard, which ensures longitudinal comparability but limits the sample to the post-1990 period.

[4] The latter two forms of spending are almost invariably domestic: government employees are generally residents, while military procurement tends to be domestically oriented for national-security reasons. Although this does reflect discrimination via immigration and national-security policy, these forms of discrimination lie outside the mainstream goods-and-services discrimination that procurement agreements seek to control.

[5] The dyadic coding is appropriate because both the GPA and PPAs are reciprocal agreements that bind members' actions only toward other members.

should be positively signed if international agreements reduce governments' propensity to "buy national." If international procurement agreements eliminate discrimination, then the negative procurement-imports relationship should vanish in the subset of dyads that have signed such agreements.

Measuring GPA membership is straightforward, as the WTO lists GPA members and their dates of accession on its website.[6] Table 2 lists signatories' date of accession to the GPA. However, measuring PPA membership is more involved. Only a subset of PTAs include explicit rules regarding government procurement.[7] We identify PTAs that include explicit rules regulating public procurement by examining the text of all PTAs notified to the WTO before 2010.[8] We refer to such agreements as preferential procurement agreements (PPAs). We coded agreements as PPAs only if the treaty included concrete, explicit commitments to liberalize procurement markets. This criterion excludes, for example, agreements that are merely aspirational in nature: for example, the European Community-Montenegro agreement states that "The Community and Montenegro consider the opening up of the award of public contracts on the basis of non-discrimination and reciprocity to be a desirable objective." However, no further mention of procurement is made in the agreement. Because such agreements do not explicitly require signatories to liberalize their procurement market, we do not treat them as PPAs.

Using this criterion, we identified 43 PPAs. As a reliability check, we compared our coding to that of Anderson et al. (2011), who coded PPAs for all PTAs notified to the WTO after 2000. Although our sample is larger—our coding extends through 2010—we find no discrepancies between our coding and theirs in cases where we examine the same PTAs. This gives us confidence in our measure's validity and reliability. A list of all PPAs in our sample and their dates of entry into force are provided in Table 1.[9]

[6] A list of these members and dates is provided in Table 2. http://www.wto.org/english/tratop_e/gproc_e/gp_gpa_e.htm. Armenia and Taiwan also joined recently but are not included in Table 1 because their accession post-dates our sample.

[7] These rules are often referred to as "coverage commitments" as they specify precisely what purchases will be subject to liberalization via the PTA.

[8] A list of PTAs notified to the GATT/WTO before 2010 can be found at http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx. The full texts of the agreements were sourced from McGill University's Database of Preferential Trade Agreements. When the full text was not available from McGill's database, it was sourced from the member government's web pages. For example, the full text of the CAFTA-DR agreement was sourced from the United States' Department of Agriculture web page (http://www.fas.usda.gov/itp/CAFTA/cafta.asp). The text of the agreement between Canada and Costa Rica was sourced from the Foreign Affairs and International Trade division of the Canadian Federal Government (http://www.international.gc.ca/trade-agreements-accords-commerciaux/agr-acc/costarica/Costa_Rica_toc.aspx?lang=en&menu_id=2&menu=R). In cases where the agreement text was not available in English, we refer to Anderson et al. (2011).

[9] Many agreements begin at the start of the year: for example, the North American Free Trade Agreement (NAFTA) entered into force on January 1, 1994. However, this is not always the case. For example, the European Free Trade Agreement (EFTA)-Chile agreement went into force on December 1, 2003. As a rule, we code the year of entry into force as t+1 when agreements come into force after 1 October in year t. We thus code the EFTA-Chile agreement as entering into force in 2004. This coding acknowledges that in such cases governments may continue discriminating for most of year t. A further complication arises from the fact that some PPA dyads are covered by both a goods agreement and a services agreement. In these cases, we code the PPA as entering into force along with the goods agreement because (1) the goods agreements invariably come into force before the services agreements, thus marking the start of procurement liberalization, and (2) our primary trade data—the IMF Direction of Trade Statistics—covers only trade in goods.

Table 2 GPA members by year of accession

Year	Members
1996	Canada, European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom), Israel, Japan, Norway, Switzerland, United States
1997	Hong Kong, South Korea, Liechtenstein, Singapore
2001	Iceland
2004	European Union (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia)
2007	European Union (Bulgaria, Romania)

We estimate the procurement-imports relationship using a gravity model of trade.[10] Specifically, we employ the following baseline model:

$$\begin{aligned} ln\left(Imports_{ijt}\right) = {} & \beta_0 + \beta_1 ln\left(Imports_{ijt-1}\right) + \beta_2 ln\left(Procurement_{it}\right) + \beta_3 GPA_{ijt} + \beta_4 PPA_{ijt} \\ & + \beta_5 ln\left(Procurement_{it}\right) * GPA_{ijt} + \beta_6 ln\left(Procurement_{it}\right) * PPA_{ijt} \\ & + \beta_7 ln\left(GDP_{it} * GDP_{jt}\right) + \beta_8 ln\left(Population_{it} * Population_{jt}\right) + \beta_9 Trade \\ & Taxes_{it} + \beta_{10} WTO_{ijt} + \beta_{11} Joint\ Democracy_{ijt} + \beta_{12} PTA_{ijt} + \beta_{13-28} Year_t + \varepsilon_{ijt}. \end{aligned}$$

$Ln(Imports_{ijt})$ is the log of country i's imports from country j in year t in constant 2000 US dollars. We include lagged imports on the right-hand side because, as Eichengreen and Irwin (1998) observe, trade flows exhibit hysteresis. $Ln(Procurement_{it})$, GPA_{ijt}, PPA_{ijt}, and the interactions between these variables are as described above.

The remaining variables are controls that previous research shows influence imports. $Ln(GDP_{it}*GDP_{jt})$ and $ln(Population_{it}*Population_{jt})$ are the logged products of i's and j's GDPs (in constant 2000 US dollars) and populations, respectively, and are standard gravity-model variables. $Trade\ Taxes_{it}$ is country i's taxes on trade as a percent of GDP. We include this variable because we wish to isolate the effects of procurement discrimination from the effects of other policies that might also impact trade. WTO_{ijt} is a dummy for joint membership in the WTO, which may promote trade (Tomz et al. 2007). $Joint\ Democracy_{ijt}$ is a dummy variable coded 1 when both dyad members are democracies, defined as a Polity IV score of 6 or above. We include this variable because previous research (Mansfield et al. 2000) shows that joint democracy promotes trade. PTA_{ijt} is a dummy for joint membership in a PTA, which controls for the possibility that PTA membership promotes trade. Finally, $Year_t$ is a dummy for year t, included to control for unobserved year-specific effects. When all variables are included, our sample includes 112 countries and 137,407 observations, with unbalanced panels ranging from 1990 to 2007.[11]

[10] For applications of the gravity model of trade, see, for example, Carrere (2006), Anderson and van Wincoop (2003) and Combes, Lafourcade and Mayer (2005).

[11] GDP, population, and trade tax data are from the World Bank's *World Development Indicators*. Polity IV data are available at http://www.systemicpeace.org/polity/polity4.htm (accessed December 28, 2009). Data on WTO membership are from Tomz, Goldstein and Rivers (2007).

We employ an optimal generalized method of moments (GMM) estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator eliminates unit fixed effects through first differencing and corrects for Nickell (1981) bias by instrumenting the lagged dependent variable with its own further lagged levels and first differences.[12] We employ Windmeijer (2005) robust standard errors. Although our gravity-model specification is conventional, our use of this estimator requires additional comment.

First, because we eliminate unit fixed effects, our results reveal the within-dyad or over-time relationship between procurement and imports. This is desirable, as we wish to determine, not whether GPA/PPA members discriminate less than non-members but rather whether joining such agreements cause members to reduce their discrimination against one another. Evidence of such a before-after effect would be particularly compelling because time-invariant country and dyad-specific factors are held constant. Such evidence would help to strengthen our confidence that procurement agreements actually affect discrimination.

Second, because the fixed-effects model eliminates cross-dyad variation, it is neither possible nor necessary to include time-invariant dyadic variables such as distance, contiguity, common language, and so on. We thus omit these standard gravity variables. Third, the dyad and year fixed effects help address endogeneity concerns. Procurement agreements are not exogenous random variables: countries self-select into them, which complicates efforts to estimate their effects. Although one could address this problem through instrumental-variable or selection models, Baier and Bergstrand (2004, 2007) argue forcefully against using such models because they are unreliable due to the paucity of suitable instruments. Baier and Bergstrand (2004, 2007) instead recommend using panel data with dyad and year fixed effects. They demonstrate that this approach permits strong, reliable inferences about the effects of international agreements. This approach is becoming standard practice—for example, Tomz, Goldstein and Rivers (2007) and Gowa and Hicks (2012) employ it to estimate the effects of GATT/WTO membership on trade—and thus we employ it here.

Finally, the use of dyad fixed effects at least partially addresses Anderson and Van Wincoop's (2003) concern about "multilateral resistance." The concern, in brief, is that trade costs with third parties affect bilateral trade: for example, an increase in country i's trade costs with country k will tend to increase i's trade with country j due to trade diversion. Failure to control for such multilateral resistance can lead to biased results. Dyad fixed effects ameliorate this problem by eliminating time-invariant differences in trade costs across dyads. Although this does not address over-time variation in dyadic trade costs, it should substantially reduce bias due to third-party effects.

Because our main independent variable (procurement) is a country-year level variable, we cannot employ country-year fixed effects, another common correction for multilateral resistance (Feenstra 2004). However, as an additional check, we employ a solution used by Hiscox and Kastner (2008) and Rose (2004): we include $Remoteness_{it}$, country i's average distance from all of its trading partners at time t.[13]

[12] We employ lags and first differences from years t-2 and t-3 to prevent the instrument matrix from becoming too large, as the use of too many instruments leads to poor finite-sample properties (Cameron and Trivedi 2009).

[13] Specifically, $Remoteness_{it}$ is calculated as $J / \sum_j \frac{Y_{jt}}{D_{ij}}$, where Y_{jt} is the log of country j's GDP, D_{ij} is the distance between i and j, and J is the number of i's trading partners.

This variable further controls for changes in country *i*'s propensity to trade with the rest of the world over time. Together with the dyad and year fixed effects, this should alleviate concerns about multilateral resistance.

5 Results

Results of the analysis are presented in Table 3. The first column shows the baseline model. As expected, the coefficient on procurement spending is negatively signed and statistically significant. This coefficient implies that an increase in procurement spending reduces demand for imports in non-PPA and non-GPA dyads, which in turn suggests that governments are more inclined than private consumers to discriminate against foreign producers. The negative coefficient on procurement reported in Table 3 is consistent with previously reported anecdotal evidence that governments discriminate against foreign suppliers (Lowinger 1976; Trionfetti 2000). Similarly, Crozet and Trionfetti (2002) find that public procurement has a negative impact on trade flows using intra-European trade data from 1975 to 1985.

The key variables of interest in the current study, namely the interactions between procurement and the PPA and WTO GPA dummies, are both statistically insignificant. This null result implies that the procurement-imports relationship is no different in PPA and GPA dyads than in the rest of the sample. In other words, neither preferential nor multilateral procurement agreements significantly reduce discrimination in public procurement.

Because we measure procurement discrimination indirectly—inferring it from the procurement-imports relationship—it is crucial to control for other factors that might affect imports. Although our baseline model controls for many such factors, we omitted a few likely suspects due to data limitations. First, previous research has found that both alliances and militarized interstate disputes (MIDs) affect trade (Mansfield and Bronson 1997). We omitted these variables from our baseline model because they are available only through 2001, so their inclusion eliminates roughly half our sample. As a robustness check, however, we estimate an augmented model with $Alliance_{ijt}$, a dummy for joint membership in a military alliance, and MID_{ijt}, a dummy for joint involvement in a militarized interstate dispute.[14]

Second, when estimating procurement discrimination, it is important to control for other types of trade barriers. For this reason, we include trade taxes in the baseline model. Trade taxes do not, however, capture various non-tariff barriers to trade. To account for non-tariff barriers, we include in our augmented model $Openness_{it}$, a dichotomous measure of trade policy developed by Sachs and Warner (1995) and extended by Wacziarg and Welch (2008). We omitted this variable from the baseline model because, like the MID data, it is only available through 2001. The S-W dummy codes countries as 1 if their trade policies are "open" and 0 if their policies are "closed,"

[14] Data on alliances and MIDs are available at http://www.correlatesofwar.org/Datasets.htm (Accessed December 28, 2009).

Table 3 Procurement, procurement agreements, and imports

Independent Variable	Baseline	S-W Openness, Alliances, MIDs	Individual PTAs
$\text{Ln(Procurement}_{it})$	−.082 (.035)*	−.130 (.042)**	−.082 (.032)**
$\text{Ln(Procurement}_{it})$*$\text{PPA}_{ijt}$	−.057 (.044)	−.062 (.302)	
$\text{Ln(Procurement}_{it})$*$\text{GPA}_{ijt}$	−.020 (.028)	.056 (.050)	.018 (.144)
$\text{Ln(Procurement}_{it})$*EEA PPA_{ijt}			−.156 (.232)
$\text{Ln(Procurement}_{it})$*EU-Bilateral PPA_{ijt}			.055 (.463)
$\text{Ln(Procurement}_{it})$*EFTA-Bilateral PPA_{ijt}			.086 (1.74)
$\text{Ln(Procurement}_{it})$*NAFTA PPA_{ijt}			−.083 (3.03)
$\text{Ln(Procurement}_{it})$*CAFTA PPA_{ijt}			−.016 (.256)
$\text{Ln(Procurement}_{it})$*Bilateral PPA_{ijt}			.016 (.328)
PPA_{ijt}	1.13 (.872)	.574 (6.44)	
GPA_{ijt}	.337 (.576)	−1.35 (1.10)	−.542 (3.24)
EEA PPA_{ijt}			3.31 (5.07)
EU-Bilateral PPA_{ijt}			−1.38 (10.0)
EFTA-Bilateral PPA_{ijt}			−1.97 (39.1)
NAFTA PPA_{ijt}			1.41 (69.1)
CAFTA PPA_{ijt}			.348 (5.36)
Bilateral PPA_{ijt}			−.471 (7.40)
WTO_{ijt}	.178 (.095)	.214 (.144)	.178 (.087)
$\text{Ln(GDP}_{it}\text{*GDP}_{jt})$	.704 (.084)**	1.06 (.141)**	.704 (.068)**
$\text{Ln(POP}_{it}\text{*POP}_{jt})$	−.482 (.223)*	−1.70 (.364)**	−.482 (.116)**
Trade Taxes_{it}	9.64 (2.59)**	1.07 (3.46)	9.63 (2.16)**
$\text{Joint Democracy}_{ijt}$	−.039 (.076)	−.183 (.136)	−.039 (.083)
PTA_{ijt}	−.158 (.082)	−.110 (.167)	−.155 (.140)
$\text{Sachs-Warner Openness}_{it}$		.121 (.188)	
Alliance_{ijt}		1.07 (.289)**	
MID_{ijt}		−.427 (.507)	
Remoteness_{it}	4.48 (9.79)	20.4 (12.5)	4.48 (6.45)
$\text{Ln(Imports}_{ijt-1})$	.237 (.008)**	.261 (.014)**	.237 (.004)**
Constant	−10.6 (8.37)	6.93 (12.5)	−10.7 (4.83)*
Observations	137,407	52,318	137,407
$P > \chi^2$	0.00	0.00	0.00

Dependent variable: $\text{Ln(Imports}_{ijt})$

Robust standard errors in parentheses, **p<.01, *p<.05

based on five different dimensions of trade policy.[15] Because it is multidimensional, this variable helps to control for non-tariff barriers that may not be captured by our original measure of trade taxes.

[15] A country is considered closed if it meets any one of five conditions: average tariff rates of 40 % or more OR core NTB coverage of 40 % or more OR a black-market exchange rate premium of 20 % or more OR a state monopoly on exports OR a socialist economy. A country is considered open if none of these conditions is met.

Results of the augmented model are shown in the second column of Table 3. Note that including the new control variables reduces our sample size by about 60 %, to 52,318 dyad-years. Nonetheless, neither the sample change nor the inclusion of the new controls significantly alters our results. Procurement remains negatively signed and significant, while the PPA and GPA interaction terms remain insignificant. The augmented model, like the baseline model, indicates that procurement discrimination is widespread and unaffected by international agreements.

Although neither the GPA nor the PPAs collectively reduce procurement discrimination, it remains possible that some PPAs matter while others do not. To see if this is the case, we disaggregate our PPA measure to examine the effects of individual PPAs. Specifically, we break PPAs down into six groups: the preferential procurement agreement among NAFTA members, the PPA among members of the Central American Free Trade Agreement (CAFTA), those between members of the European Economic Area (EEA), bilateral agreements between the EU and non-EEA countries, bilateral agreements between the European Free Trade Association (EFTA) and non-EEA countries, and purely bilateral PPAs that are not associated with any regional agreement.[16] We interact each PPA dummy with procurement spending. Results are shown in the third column of Table 3. These results are easily summarized: none of the individual PPAs significantly affects the elasticity of imports to procurement spending. We thus find no evidence that *any* PPAs reduce procurement discrimination.

Because procurement is interacted with two variables—GPA and PPA membership—a full understanding of the procurement-imports relationship requires a bit more analysis. The two interactions imply four conditional elasticities: in non-GPA dyads, both with and without PPA membership, and in GPA dyads, both with and without PPA membership. These conditional elasticities, for our baseline model, are shown in Table 4.

The first row shows the imports-procurement elasticity in non-GPA dyads, for both non-PPA dyads (C1) and PPA dyads (C2). The second row shows these elasticities for GPA dyads, again both without and with a PPA. Two points emerge from Table 4. First, the imports-procurement elasticity is negative and significant in all four cells, implying that governments discriminate whether they belong to the GPA, a PPA, neither, or both. Second, neither type of procurement agreement significantly affects the degree of discrimination. Row 3 (R3) presents a Wald test of the hypothesis that the GPA and non-GPA coefficients are identical, while column 3 (C3) presents an analogous test for the PPA and non-PPA coefficients. The p-values of 0.558 and 0.197, respectively, reveal no significant differences between GPA/PPA and non-GPA/PPA dyads.

These null effects are similar to results reported in other studies with more limited scope and coverage. In a study of Switzerland and Japan, for example, Shingal (2011) finds that the GPA has not been effective in increasing foreign access to procurement markets in either of these two countries. An analysis of local authority contract award data for EU member countries reveals that over 98 % of all awards were made to domestic firms in 1993 (Martin, Hartley and Cox 1997). Furthermore, Norway, a signatory to both the GPA and the EEA, awarded only 7 % of contracts to foreign suppliers in 2009.[17]

[16] We do not include the EU and EFTA themselves because together they constitute the EEA. The EU provides most of the EEA's membership; hence the correlation between the two groupings is over 0.9. If we instead drop the EEA and include the EU and EFTA separately, both are insignificant.

[17] Authors' own calculations from Norway's data notified to the WTO GPA.

Table 4 Conditional Elasticities of Imports to Procurement (Baseline)

	C1: No PPA	C2: PPA	C3: Wald Test H_0: C1 = C2
R1: No GPA	−.082* (.035)	−.138* (.056)	0.197
R2: GPA	−.102* (.041)	−.158** (.043)	
R3: Wald Test H_0: R1 = R2	0.558		

Dependent variable: Ln($Imports_{ijt}$)

Robust standard errors in parentheses, **p<.01, *p<.05

Our results strongly suggest that international procurement agreements have failed to reduce procurement discrimination. However, in the interest of giving such agreements a fair trial, Table 5 presents two additional tests. First, we repeat the analysis using imports of services as the dependent variable.[18] Our primary trade data source, the IMF's *Direction of Trade Statistics*, covers only goods trade. However, the omission of services could be significant, given that governments are large consumers of services such as consulting, construction, and transportation. We therefore analyze services trade and present these results in the first column of Table 5. Although the sample is much smaller (only 6,424 observations) due to limited services trade data, the results are strikingly similar to those found using goods trade: government procurement remains negatively signed and significant, while the GPA and PPA interactions remain insignificant. Our analysis suggests that governments discriminate similarly when purchasing goods and services and are unconstrained by international agreements when purchasing either.

It is possible that procurement agreements have no apparent effect because our analysis encompasses transactions that the agreements do not legally bind. International procurement rules generally do not apply to all transactions. The GPA rules, for example, do not apply to all government procurement undertaken by the signatory countries: they apply only to specific government entities, and—even for those entities—only to transactions that exceed a certain monetary value.[19] Our procurement measure, which includes all contestable government procurement, may thus be capturing the procurement-imports relationship for many transactions to which international procurement rules do not apply.

Addressing this issue is difficult, as governments generally do not provide transaction-level data that would allow us to drop the transactions exempt from international rules. GPA members are, however, required to report their procurement activities to the WTO and many countries report only those transactions that are

[18] Services trade data are from the United Nations Statistics Division (UNIDO 2001) and are available at http://unstats.un.org/unsd/tradeserv/default.htm.

[19] Thresholds differ depending on the type of procurement and on the level of government making the purchase. For central government entities, the standard GPA threshold values are 130,000 Special Drawing Rights (SDR) for goods and services and 5 million SDR for procurement of construction services. However, individual signatories can and do specify different thresholds. Thresholds for PPAs also vary but are in general quite similar to those used by the GPA.

Table 5 Additional tests

Independent Variable	Services Trade	Procurement > GPA Threshold
$\text{Ln(Procurement}_{it}\text{)}$	−.171** (.057)	−.613** (.146)
$\text{Ln(Procurement}_{it}\text{)*PPA}_{ijt}$	−.011 (.048)	.090 (.046)
$\text{Ln(Procurement}_{it}\text{)*GPA}_{ijt}$	.102 (.058)	.131 (.078)
PPA_{ijt}	.227 (1.06)	−2.35* (1.07)
GPA_{ijt}	−2.19 (1.26)	−3.02 (1.77)
WTO_{ijt}	1.95 (1.06)	.403 (.379)
$\text{Ln(GDP}_{it}\text{*GDP}_{jt}\text{)}$	.259* (.129)	1.58** (.282)
$\text{Ln(POP}_{it}\text{*POP}_{jt}\text{)}$	−.661** (.255)	−1.10 (1.16)
Trade Taxes_{it}	9.45 (8.07)	−658** (172)
$\text{Joint Democracy}_{ijt}$	.009 (.091)	.177 (.201)
PTA_{ijt}	.031 (.087)	.621 (.356)
$\text{Ln(Imports}_{ijt-1}\text{)}$	.491** (.071)	.188** (.031)
Remoteness_{it}	14.2** (2.99)	264* (107)
Constant	15.0 (10.5)	−111** (39.1)
Observations	6,424	15,815
$P > \chi^2$	0.00	0.00

Dependent variable: $\text{Ln(Imports}_{ijt}\text{)}$

Robust standard errors in parentheses, **p<.01, *p<.05

bound by GPA rules (i.e., those above the specified thresholds). Other countries report more transactions, but indicate which ones exceed GPA thresholds. Using these data, we are able to construct a country-specific measure of procurement spending subject to GPA rules. Although using this measure limits our sample considerably, it allows us to relate imports to a potentially more valid measure of government procurement. Results based on this new procurement measure are shown in the second column of Table 5.

Once again, the results are very similar to previous ones: procurement is negatively signed and significant, while the GPA and PPA interactions are insignificant. The new procurement measure, like the old one, thus indicates that international procurement agreements have failed to control procurement discrimination. This result is particularly striking when we consider that the "above threshold" spending data are self-reported by GPA signatories. Although GPA members are required to report on their procurement activities, only half make regular statistical submissions, while the other half report intermittently or not at all (Shingal 2011). Moreover, even when governments report their purchases, they may do so selectively: that is, they may under-report transactions where they have not complied with GPA rules. Given this, we would expect these self-reported procurement data to overstate the degree of compliance with international rules. That the interaction terms remain insignificant provides further evidence that neither multilateral nor preferential procurement agreements have significantly reduced discrimination in public procurement.

6 Discussion and implications

International procurement agreements fail to change significantly governments' propensity to "buy national." In theory, such agreements are expected to affect government behavior by raising the reputational costs of noncompliance—in this case, discrimination against foreign suppliers (Keohane 1984). Empirical evidence shows that such reputational effects have encouraged compliance with international trade and monetary law (Busch and Reinhardt 2000; Kono 2007; Simmons 2000). However, the reputational mechanism can work only if it is possible to observe violations of the agreement. Violations may be relatively easy to observe when it comes to current-account restrictions or conventional trade barriers, such as tariffs. However, observing and proving procurement discrimination is difficult because many aspects of procurement decisions are inherently non-transparent (Evenett 2002). Without overtly violating international rules, governments may, for example, split up large contracts so that the value of each of the constituent parts falls below the threshold stipulated in the procurement agreement.

The opacity of public procurement makes it difficult to prove violations of international rules. The European Commission recently concluded that, "discrimination in public procurement is very difficult to detect or prove," after an evaluation of the effectiveness of EU procurement legislation (European Commission 2011). Although 46 % of EU businesses reported that they believe local preferences influence the outcome of public procurement procedures to a "high extent," none could provide concrete evidence of discrimination (European Commission 2011). The difficultly of proving violations of international procurement rules may allow governments to discriminate in favor of domestic bidders with impunity—even as signatories to international treaties.

If international agreements are ineffective in reducing discrimination in public procurement, why are they negotiated? PPAs may offer governments a win-win situation. Governments can violate PPAs when it is in their interest to do so because such violations are difficult to identify. At the same time, governments can use PPAs as political cover when they want to award a contract to a foreign supplier, perhaps for reasons of cost, quality or technical expertise. The UK government recently awarded a train-building contract to Siemens of Germany ahead of the UK based arm of Bombardier. This decision was widely criticized. The government responded to criticisms of their decision by citing international procurement rules. For example, Minister Theresa Villiers stated in the House of Commons, that the Government was "legally bound by European law to judge bids on a completely blind basis." She went on to explain that, "Under EU law, domestic and overseas suppliers must be judged impartially and on a wholly equal footing." (House of Commons Debate 12 July 2011). This example suggest that governments might sign PPAs safe in the knowledge that they can violate them with little fear of reprisal when it is in their interest to do so and at the same time use the agreement as political cover when necessary. This flexibility may explain why an ever growing number of governments sign international procurement agreements, despite (or indeed because of) their apparent ineffectiveness.

The apparent ineffectiveness of international procurement agreements raises troubling questions about the future success of international trade negotiations. Current trade negotiations tend to focus on less transparent policies: not only public procurement but also competition policy, sanitary and phytosanitary standards, and other technical

barriers to trade. The results reported in the current study suggest that international treaties may have limited success in regulating the use of these non-transparent, "behind-the-border" barriers to trade.

Ironically, the historical success of international trade agreements may have created conditions in which subsequent agreements will enjoy much less success. As treaties have substantially reduced transparent trade barriers, such as tariffs, governments have increasingly resorted to less transparent measures. According to our results, these are precisely the policies that international agreements cannot effectively control. A pessimistic conclusion is that international negotiations may have gone as far as they can in liberalizing global markets.

Optimists might retort that the WTO continues to seek greater transparency in procurement and other new areas of trade policy conflict.[20] In fact, the Parties of the Government Procurement Agreement (GPA) reached an agreement on an updated set of procurement rules in December 2011.[21] A key feature of this updated agreement is increased transparency in procurement procedures and tender rules. Parties also agreed to initiate work on the collection and reporting of statistical data on public procurement. Our results suggest that such efforts are valuable, insofar as transparency is a *sine qua non* for treaty compliance.

In sum, the current study suggests an important qualification to theories of international commitments. Current theory stresses the role of international agreements in providing information and building reputations (Keohane 1984). Although empirical work shows that international agreements can play such a role, our results suggest that their ability to do so may depend on the transparency of the policy domain. In opaque policy areas, where treaty violations are difficult to observe and prove, international agreements are largely ineffective in constraining national governments.

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[20] http://www.wto.org/english/tratop_e/gproc_e/gptran_e.htm.

[21] Perhaps the increased attention to procurement liberalization in preferential trade agreements helped to engender support for multilateral procurement rules (Ornelas 2005).

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