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## Abstract

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JEL Classification: F13, F15, H57

Keywords: Trade agreements, commitment, public procurement, WTO, Government Procurement Agreement



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# The WTO Government Procurement Agreement as a Commitment Device: A First Appraisal*

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October 9, 2018

**Abstract**

This paper presents novel reduced form evidence on the association between international trade agreements that include disciplines on public procurement practices reflected in the WTO Agreement on Government Procurement (GPA) and preferential trade agreements (PTAs) and public sector imports following the 2008 financial crisis. The results are suggestive of such international disciplines acting as an effective commitment device: GPA membership is associated with a significantly higher import share following the 2008 financial crisis than is observed for countries that are not members. We also find evidence that the GPA and PTAs that cover public procurement are partial substitutes.

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# 1 Introduction

Public procurement constitutes a large market in all economies, comprising more than 10 percent of GDP in many countries (Djankov, Islam and Saliola, 2016). As has been documented extensively, governments generally source a smaller share of the goods and services they purchase from foreign countries and foreign firms than the private sector does (Breton and Salmon, 1995; Evenett and Hoekman, 2005; Shingal, 2015). This 'home bias' provides an incentive for countries to negotiate disciplines on public procurement in international trade agreements. Examples include the plurilateral WTO Agreement on Government Procurement (GPA), as well as, increasingly, bilateral or regional preferential trade agreements (PTAs). The inclusion of government procurement practices in trade agreements is relatively recent. Government procurement was excluded from the original General Agreement on Tariffs and Trade (GATT) in 1947. It was not until the late 1970s that the first iteration of the GPA was negotiated. This covered just a subset of GATT contracting parties, something that continues to be the case under the WTO. Inclusion of public procurement in PTAs is even more recent. Until the early 1990s, most PTAs did not cover procurement.

In this paper we assess the relationship between participation in international trade agreements that include government procurement disciplines and public sector imports following the 2008 financial crisis. Our focus is on the WTO GPA and the subset of PTAs that include public procurement provisions. We investigate whether countries that have made commitments on public procurement practices maintain higher levels of public sector openness after the 2008 financial crisis than countries that have not done so. Our hypothesis is that governments are likely to have greater incentives to steer public funds towards domestic economic operators following a major shock to aggregate demand. An implication is that we expect to observe a difference in the public procurement behavior of countries depending on whether they have signed binding (and enforceable) agreements not to discriminate against foreign companies when procuring products.

We find a statistically significant difference in the behavior of GPA members versus non-GPA signatories, with GPA countries maintaining higher levels of public sector openness in the post-crisis period. We also find indicative evidence that PTAs with procurement disciplines may partially act as a substitute for the GPA. To our knowledge this is the first empirical analysis of the role of the GPA as a commitment device and the first to consider the interaction between GPA membership and PTA-based mechanisms to discipline public procurement policies.

The existing policy literature on the relationship between trade agreements and public procurement focuses primarily on the extent which the GPA and PTAs provisions increase

access to procurement markets by evaluating the legal texts (coverage) of trade agreements. The limited empirical literature tends to explore whether negotiated commitments to reduce discrimination against foreign products lead to greater foreign sourcing. The basic finding is that although agreements have gradually increased the coverage of public procurement they do not appear to increase foreign sourcing (e.g.,Rickard and Kono, 2014).[1] A growing literature on international trade policy stresses the potential role of international agreements in curbing policy uncertainty and thereby facilitating international trade, especially in periods of economic distress (Carballo, Handley and Limão, 2018).[2] Curbing international policy uncertainty provides an alternative economic impact channel for the GPA.

The 2008 financial crisis constituted a major exogenous shock that permits analysis of the role, if any, played by inclusion of procurement-related disciplines in trade agreements. The shock generated pressures on governments to use fiscal policy to support domestic activity, including through government demand, and therefore can be expected to have increased the incentives for government agencies to allocate procurement expenditures to local firms to support local employment.[3] From the point of view of potential foreign bidders, this shift in home-bias potentially acts as an increase in uncertainty regarding the prospects of success in bidding for contracts. The post-crisis period therefore provides a natural experiment to assess whether countries that are members of the GPA and (or) that have signed PTAs with public procurement provisions (PP-PTAs) display different behavior from countries that are unconstrained by such agreements. More specifically, the crisis allows for a test of the commitment function of trade agreements.

We use data on aggregate public import shares constructed from the World Input Output database (WIOD) for the 2000-2014 period. The resulting public import penetration (PIP)

[1]One possible reason for this may be that procurement agreements do little to change actual applied policies but are used primarily to bind or 'lock-in' status quo policies. If so, they are unlikely to have substantial effects in increasing effective market access and thus drive changes in sourcing patterns. More generally, the impact of the GPA has been difficult to identify empirically because membership has largely been invariant over the time period for which data are available. Moreover, many of the countries that joined the GPA in the 1990s and 2000s were European, and signing the GPA was a corollary of accession to the European Union. This makes it very difficult if not impossible to distinguish the GPA effect from the broader regime shift that occurred for the countries concerned.

[2]Francois and Martin (2004) is an early contribution highlighting the role that policy commitments in trade agreements can play in influencing investment decisions of firms by reducing uncertainty. More recently, Handley (2014) and Handley and Limão (2015, 2017) provide estimates of the effects of such uncertainty reduction.

[3]Other papers in the procurement literature have found that home bias increases in recessions see e.g., Shingal (2015). Evenett and Shingal (2016) document a variety of measures taken by countries post-2008 to allocate more procurement expenditures to local firms.

measure is based on the public consumption category of final use in national accounts, disaggregated at the country-industry level. While the aggregate nature of the data imposes limitations, e.g. some elements of the flows are based on imputations, the data are internationally consistent and allow an initial investigation whether binding commitments on public procurement policies appear to be effective. We run a set of cross-country panel regressions with country fixed effects and a variety of controls. The results suggest that GPA membership is associated with less change in average PIP levels post-crisis, and significantly higher PIP levels. This finding is robust to controlling for the number and depth of PP-PTAs. While the results are not driven by exogenous variation, limiting the causal interpretability of the results, they lend some credence to the interpretation that the GPA was instrumental in sustaining levels of public sector openness. Given that comparable evidence is largely absent in the literature, we view the results as a useful first step in assessing the role that trade agreements can play as a policy commitment (uncertainty reduction) mechanism.

The plan of the paper is as follows. In Section 2 we discuss the extant literature on international policy agreements and the effects of the GPA. Section 3 describes the data used in the empirical analysis. Section 4 presents the methodology and presents the results. Section 5 concludes.

# 2 Background and Literature Review

In this Section, we briefly review some of the salient literature on trade policy, trade agreements and public procurement, the WTO GPA and the evolution of PP-PTAs.

## 2.1 Trade policy and trade agreements

Three broad rationales for trade agreements have been developed in the literature. One centers on market access as a mechanism to reduce terms of trade externalities created by national trade policies that are set non-cooperatively. The basic argument is that countries seek to negotiate away the negative terms-of-trade spillovers generated by the imposition of trade restrictions in partner countries (Bagwell and Staiger, 2002). Another strand of literature argues that trade agreements offer a mechanism (independent of terms-of-trade considerations) to governments that want to adopt policies that are not politically feasible to implement or maintain as a result of time inconsistency or credibility problems (e.g., Maggi and Rodriguez-Clare 1998). By committing to rules that constrain policy choice, governments can make policy reforms more credible. A third perspective stresses political economy drivers (e.g., Ethier, 2007) and the premise that governments seek to maximize political support. Assuming that governments put greater weight on prospective losses for groups in society than on the expected gains from liberalization (Deardorff, 1987), governments have incentives

to impose or maintain protection because this raises the incomes of the groups from which they derive political support. If foreign governments can be induced to liberalize, however, in the context of a trade agreement, that provides a direct gain for existing exporters and shift the balance of domestic political support towards liberalization.[4]

A corollary of all these potential rationales for a trade agreement is that they reduce policy uncertainty for firms and traders. This is because agreements entail binding commitments on current policies and future trade policy changes. If exporting entails sunk investment costs upon market entry, the exporting decision will have a dynamic component and the expected return will be a function of expected future trade policy. Even a commitment not to exceed a certain level of protection (as is the case with tariff bindings) that is well above actually applied protection has value by limiting the prospects of confronting high trade barriers in a future state of the world. Thus, trade agreements establish an upper bound on the downside risk confronted by traders and investors (Francois and Martin, 2004). By reducing the maximum *potential* level of protectionism, international agreements play a role in removing the option value of waiting to resolve policy uncertainty, which may trigger investment in tradable activities even in the absence of actual changes in policy.

The role of international agreements as a mechanism to lower policy uncertainty becomes especially salient during periods of economic distress, when governments are more prone to consider discrimination against foreign products. Recent research by Handley and Limão has demonstrated the empirical salience of this dimension of trade agreements. Investigating the impact of accession to the WTO by Australia in 1996, Handley (2014) finds that the accompanying reduction in trade policy uncertainty substantially reduced barriers to entry and that exporter product variety growth would have been 7% lower in the absence of the WTO tariff bindings. Handley and Limão (2015) investigate the effect of Portugal becoming a member of the European Community (EC) in a structural dynamic model with sunk export costs. Their model attributes a large fraction of the observed growth in Portuguese exporting firms to the removal of future policy uncertainty associated with adoption of the EC common commercial policy. Handley and Limão (2017) find large effects also for the US, following the accession by China to the WTO in 2001, taking into account general equilibrium effects on prices. Overall, an emerging body of evidence suggests that the effects of policy uncertainty on firms' investment decisions can be large, that international agreements can play an important role in reducing trade policy uncertainty, and that this is associated with substantial economic gains for the participating economies.

[4]The various theories that have been developed to explain the role of trade agreements are surveyed and summarized in Grossman (2016).

## 2.2 The GPA and PTAs with procurement provisions

Public procurement was excluded from the GATT and older vintage PTAs because it was regarded as a state activity as opposed to a commercial one. Procurement gradually came to be covered by trade agreements because of the magnitude of the associated markets. These motivated pursuit of reciprocal reductions in the incidence of explicit discriminatory policies that impede market access opportunities for foreign firms. The first version of the GATT GPA entered into force in 1981. It was revised several times subsequently to expand its coverage. At the time of writing, there are 19 parties to the agreement, counting the EU-28 as one, so that the GPA covers 47 WTO members.[5] The agreement is a so-called plurilateral agreement in that it binds only signatories. The benefits of membership are restricted to signatories (Evenett and Hoekman, 2005).

The main discipline imposed by the GPA is that covered government entities are prohibited from discriminating against or between foreign products and firms (bidders) in the award of procurement contracts that exceed certain value thresholds. The obligation extends not only to imports but also to subsidiaries of locally established foreign firms. As foreign direct investment (FDI) is an important channel for firms to contest procurement markets, this is an important feature of the GPA. The agreement has extensive provisions aimed at ensuring that firms can become aware of procurement opportunities, that the process is transparent, and that competitive procurement methods be used in selecting and awarding contracts. There are numerous provisions that aim to realize these objectives including that notices of intended or planned procurement are published, minimum time periods for bids, economic and technical requirements, terms of payment, etc.

Very few developing countries have joined the GPA, reflecting concerns that thwe GPA impedes the ability to pursue industrial policy objectives and that national firms only have limited ability to contest foreign procurement markets. These two factors significantly reduce the incentive to engage in reciprocal negotiations to open procurement markets. The lack of interest by many countries to join the GPA has led incumbent members to pursue efforts aimed at extending procurement disciplines through the negotiation of PTAs. Developing economies may be more willing to sign a PTA that includes procurement liberalization given that concessions may be offered in other areas. This is not possible in the GPA context given

[5]GPA membership spans Armenia, Austria, Belgium, Bulgaria, Canada, Chinese Taipei, Croatia, Cyprus, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hong Kong, China, Hungary, Iceland, Ireland, Israel, Japan, Korea, Rep., Latvia, Liechtenstein, Lithuania, Luxemburg, Malta, Moldova, Rep., Montenegro, Netherlands, Netherlands for Aruba, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Singapore, Spain, Sweden, Switzerland, Ukraine, United Kingdom, USA.

that the GPA deals only with public procurement.

Several efforts have been made to classify the scope and coverage of procurement in PTAs.[6] What follows briefly describes a recent effort by Shingal, Ereshchenko and Mattoo (2018) to assess the coverage of procurement provisions in PTAs. Of a total of 242 PTAs currently in force that include at least one non-GPA signatory, 127 (52 percent) include language on public procurement (Annex Table A1 lists the PTAs in the dataset and indicates which PTAs include provisions on procurement). Of these 127 PTAs, 64 (50 percent) specify in some detail what types of procurement are covered (Table 1). Most PP-PTAs are modelled to a greater or lesser extent on the GPA (Anderson et al. 2011). Few go beyond the GPA in terms of rules or coverage although some do. Thus, a little less than one-sixth include threshold values that are lower than those applying in the GPA, implying that applicable rules of the PTA apply to a larger share of calls for tender (Shingal et al. 2018).

Table 1: Depth of procurement commitments in PTAs with at least one non-GPA signatory

| Criterion | Frequency (%) |
|---|---|
| Government procurement coverage is detailed in the agreement | 49.6 |
| The agreement covers only central government entities | 8.5 |
| Threshold values for purchases of goods are lower than in the GPA | 14.7 |
| Procurement provisions are enforceable (incl. via domestic review) | 37.2 |

Note: Sample comprises 127 PTAs. See Annex Table A2.
Source: Shingal et al. (2018).

Of particular importance from the perspective of credibility of commitments is whether provisions are enforceable. A total of 48 of the 127 PTAs have a hard law dimension in the sense that at least some provisions can be invoked in formal dispute settlement procedures and through domestic review ('bid challenge') mechanisms that permit firms to contest ongoing procurement tenders and awards. These types of requirements are also a key feature of the GPA.[7] Provisions calling for tenders be published, that bids are opened in public, that procuring entities must award contracts to the lowest bid that satisfies the technical criteria, and so forth, are much less relevant to firms if there is no effective recourse if entities

[6]Examples include Anderson et al. (2011) and Ueno (2013), who conclude that non-GPA countries accept a level of procurement market access commitments in PTAs that are very similar to those that are contained in the GPA.

[7]Most of the PP-PTAs that include binding (i.e., enforceable) procurement provisions include one or more OECD member countries (see Annex Table A2). But there are also South-South PTAs involving Central American states, Chile, Colombia and Peru. In addition to PTAs with other OECD member countries, Chile, for example, has PP-PTAs with Costa Rica, Honduras, Guatemala, Nicaragua, and El Salvador. There are no PTAs with serious coverage of procurement in Africa, the Middle East, or South Asia.

do not follow the rules. Domestic review mechanisms are in practice the primary if not sole enforcement mechanism for firms, as State-to-State dispute resolution is slow and does not offer a prospect of meaningful remedies, as these are prospective in nature. Domestic review generally provides the possibility of compensation for tendering costs, damages and legal fees.[8]

## 2.3 Related literature

Evenett and Shingal (2006) and Shingal (2015) have used data reported by the few countries that provide statistics to the WTO on the national breakdown of winning tenders on contracts that are covered by the GPA, focusing on Japan and Switzerland. Evenett and Shingal (2006) conclude that a smaller share of contracts above the value thresholds established by Japan was awarded to foreign suppliers in 1998-99 upon signing the GPA than in 1990-91, prior to joining. Shingal (2015) analyzes the determinants of procurement sourcing over time in these two countries, controlling for factors that may affect sourcing from foreign firms such as the state of the business cycle and overall trade policy trends and trade costs. He finds that GPA membership has no independent effect on sourcing behavior. The same conclusion emerges from an analysis of the extension of the GPA in 1996 to include services procurement. Again using data reported to the WTO by Japan and Switzerland, Shingal (2011) finds that the share of services contracts awarded to foreign suppliers declined over time for both countries. Similarly, Rickard and Kono (2014), focusing on overall import penetration, conclude that GPA membership has no impact on the ratio of imports to government demand.

In contrast, Chen and Whalley (2011) find that the GPA has a positive impact on trade both among members and with third parties. However, they rely on self-reported public procurement trade notifications to the GPA committee which are of low quality for most countries. Tas, Dawar, Holmes and Togan (2018) focus on EU procurement. Using very detailed transaction-level data on procurement awards from the EU Tenders Electronic Database, they assess the effects of the GPA on procurement market openness of EU countries. They conclude that the GPA increases the probability of a contract being awarded to a foreign firm. They also find that the GPA reduces the risk of corruption by decreasing the number of contests with single bidders and the number of wins by a single firm. Identifying the independent effect of the GPA in the context of the EU is difficult given that EU procurement law and policy is both broader and deeper than the GPA.

There is even less empirical research on PTAs than there is on the GPA. Rickard and Kono

[8]Domestic review mechanisms take various forms. See World Bank (2016) for an overview of national public procurement regimes.

(2014) assess the effects of 43 PTAs that include procurement, focusing on overall import penetration and find that they have no impact on the ratio of imports to government demand. Using data from the US Federal Procurement Data System set for 1996–2010, Fronk (2015) finds a statistically significant positive effect of US agreements including procurement. Using a gravity regression framework and focusing on agreements negotiated by the US (including the GPA) that require national treatment of foreign bidders, Fronk (2015) finds that these result in a 150 percent rise in the number of contracts won annually by foreign bidders for tenders that exceed the value threshold of the relevant agreement. However, this is only equivalent to an additional 135 contracts reflecting the fact that the overwhelming majority of contracts (some 98 percent) is awarded to US firms. Thus, there is an effect, but because the baseline level of foreign awards is small, the magnitude of the impact is also quite small. Because US data on nationality of winning bidders only starts in the mid-1990s, this analysis cannot consider the fact that the countries that mostly win procurement bids in the US (Canada, EU, Japan) have been members of the GPA from the start (1981) and thus that much of the procurement that is analyzed was already subject to disciplines for a long period of time. It is therefore not necessarily the case that the positive sourcing effect attributed to the agreements is in fact due to them as opposed to other factors.

Gourdon and Messent (2017) combine annual bilateral import data from UN Comtrade covering 74 countries, 44 of which had signed PTAs with procurement provisions with at least one other country in their sample, and the EU Tenders Electronic Daily database for the period between 2009 and 2014 to analyze the determinants of EU procurement sourcing. They find that the GPA increases the probability that foreign firms from a GPA member win contracts in the EU. Gourdon and Messent (2017) also document that restrictive FDI policies may undercut the impact of the GPA in expanding foreign sourcing. They conclude that the GPA has an effect in reducing home bias in procurement awards.

A small number of papers use international input-output data of the type we use in our analysis. Aguiar et al. (2016) and Kutlina-Dimitrova (2017) work with GTAP 9 data on public procurement and calculate counter-factual scenarios that remove observed government home bias, finding large effects on GDP and economic welfare. Crespi and Guarascio (2017) use WIOD to calculate public procurement openness, following the definition of Messerlin and Miroudot (2012). They are concerned with measuring the effect of procurement internationalization on domestic innovative activity. Mulabdic and Rotunno (2017) similarly rely on the Messerlin and Miroudot (2012) methodology and use OECD TiVA data to estimate bilateral gravity models of private versus government sector openness. Their data comprise 5 year intervals between 1995 and 2009. They find that EU membership has strong positive effects on public procurement openness. PTAs do so as well but to a smaller extent, while the GPA has no effect on public procurement openness.

# 3 Openness of public procurement markets, the GPA and PTAs: Descriptive evidence

The extant empirical studies of the effects of the GPA and PTAs in reducing home bias in the award of procurement contracts come to ambiguous conclusions. Studies using detailed micro data tend to be country or EU-specific. Despite its large share of GDP, comparable disaggregated data on public procurement contracts and their allocation between national and foreign bidders (suppliers) is not available on a cross-country basis.[9]

For our analysis of the impact of GPA membership and other PTAs on public sector openness during the 2008 financial crisis we make use of data from WIOD. To the best of our knowledge, our study is the first to estimate the effect of the GPA on trade using government imports of *value added*. WIOD is one of a number of initiatives that have emerged integrating and linking national IO tables across countries to provide data on international economic linkages at the industry level. One advantage of using international IO tables for analyzing public sector imports is that imports are defined consistently across countries. The 2016 release of WIOD covers 43 countries from 2000 to 2014 and includes the majority of GPA member countries as well as the major emerging economies that are not GPA members.[10] The set of countries included cover 85-90 percent of world GDP over the sample period (Table 2). In earlier years GPA members make up most of the sample GDP. This share falls to 68 percent in 2014, due to strong economic growth of emerging economies that are not GPA members.

WIOD data on the country-industry decomposed share of imported products in total government consumption are constructed on the basis of overall imports of different types of goods as reflected in UN Comtrade statistics. Thus, they do not reflect actual reported imports by governments as such data are not collected in national accounts statistics. In the absence of detailed comparable data on actual procurement, WIOD offers a consistent and comparable set of proxies for government imports. Even though the specific figure for the share of government consumption in total national imports is unlikely to accurately reflect actual

[9]Some countries report detailed contract level data on public procurement awards, e.g., the European Union, Peru, Brazil, South Korea, Turkey and the US. With the exception of the EU and US, these countries are not GPA members. Papers using these data to assess the determinants and economic effects of contract awards include Kutlina-Dimitrova and Lakatos (2016), Hebous and Zimmerman (2016), Ferraz et al. (2015) and Lee (2017). For example, Onur, Ozcan and Tas (2012) analyze 90,000 government procurement tenders held in Turkey during the 200406 period. They find that the number of bidders significantly and negatively impacts on the prices paid and that opening tenders to foreign participation further lowers prices paid.

[10]Details on the construction of WIOD can be found in Timmer et al. (2015). We chose WIOD over the OECD ICIO database as the latter only has data through 2011.

Table 2: Share of included countries in global GDP

| | Share of Sample in World Output | | Share of GPA in Sample Output | |
|---|---|---|---|---|
| year | Gross output | Value added | Gross output | Value added |
| 2000 | 0.14 | 0.86 | 0.09 | 0.91 |
| 2001 | 0.14 | 0.86 | 0.09 | 0.91 |
| 2002 | 0.14 | 0.86 | 0.09 | 0.91 |
| 2003 | 0.14 | 0.86 | 0.09 | 0.91 |
| 2004 | 0.15 | 0.85 | 0.09 | 0.91 |
| 2005 | 0.17 | 0.83 | 0.10 | 0.90 |
| 2006 | 0.18 | 0.82 | 0.11 | 0.89 |
| 2007 | 0.21 | 0.79 | 0.12 | 0.88 |
| 2008 | 0.23 | 0.77 | 0.13 | 0.87 |
| 2009 | 0.24 | 0.76 | 0.12 | 0.88 |
| 2010 | 0.27 | 0.73 | 0.13 | 0.87 |
| 2011 | 0.29 | 0.71 | 0.14 | 0.86 |
| 2012 | 0.30 | 0.70 | 0.15 | 0.85 |
| 2013 | 0.32 | 0.68 | 0.15 | 0.85 |
| 2014 | 0.32 | 0.68 | 0.14 | 0.86 |

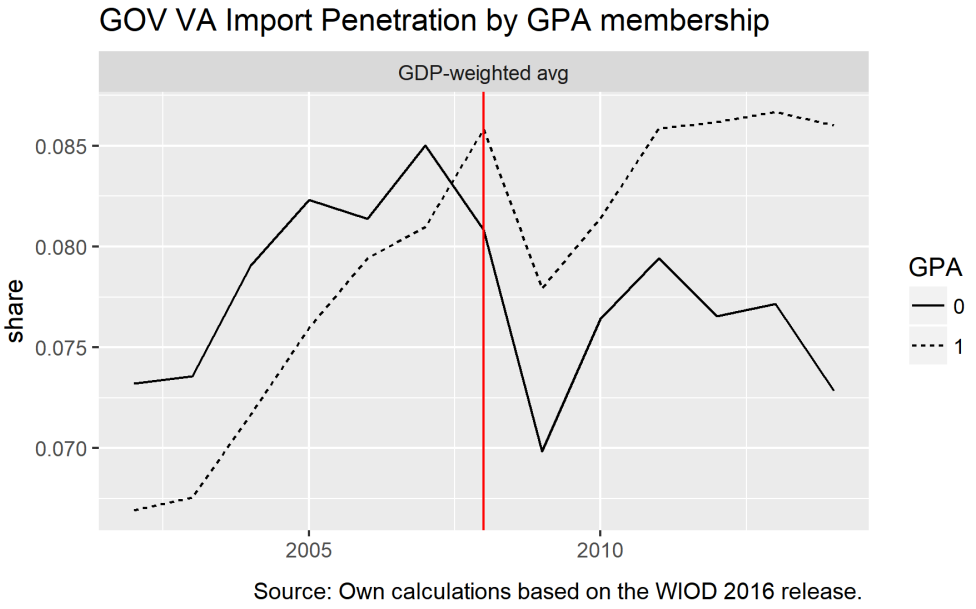
Source: Own calculations based on WIOD 2016 database.

procurement patterns in the country concerned, because the WIOD data are constructed on a consistent basis in the same way for all countries, they nonetheless permit an assessment of differences across countries in government imports at a point in time as well as trends over time.

To motivate the subsequent empirical analysis, Figure 1 plots the average PIP for GPA member and non-member countries over time. Two patterns stand out: First, in the pre-2008 period, public import shares of GPA members and non-members follow similar trends. For both groups, public import shares are rising. Second, PIP evolves differently between the two groups following the 2008 financial crisis. While initially PIP experiences a substantial drop in 2009 for both groups, it recovers for GPA member countries and remains high through the end of the sample period (2014). For non-GPA member countries on the other hand, the drop in PIP is bigger, the immediate rebound of the import share is less pronounced and the average public import share declines after 2010, reversing the pre-crisis positive trend. Furthermore, while non-members average PIP was higher pre-crisis than for GPA members this pattern is reversed after 2008.

Table 3 provides more texture, reporting PIP ratios for selected countries for three time

Figure 1: Public Import Penetration by GPA membership over time




periods, 2000-02, 2007-09 and 2012-14. The countries selected are large, given a presumption that small countries will generally display higher PIPs as they have fewer opportunities to source nationally from globally efficient firms. The data indicate that the PIP ratios for the EU28 are some 10 percent higher than those of the US,[11] and both import less than the simple world average (7 percent) which is to be expected given that large economies will be better able to source domestically.

The non-GPA members included in Table 3 source more from abroad than the GPA members during the first two periods: 6.2 vs. 5.7 in the 2000-02 period. This changes over the course of the decade: In 2007-09 the PIP ratios for the two groups are roughly the same, and by 2012-14 the GPA countries have higher PIP ratios than the selected non-GPA members (6.5 percent vs. 5.6 percent). However, the selected countries in both groups source less from the rest of the world than the world average - presumably reflecting their above average size. There are large differences across countries, with Brazil only sourcing 2.9 percent from abroad, as compared to Korea at 11.6 percent in 2012-14. Some of the larger non-GPA countries appear to have been shifting steadily away from foreign sourcing since 2000. This is the case for India, Turkey and China (post-2008). On average, GPA members see a more rapid increase in foreign sourcing during the 2000-14 period, resulting in convergence over time towards the average level of 'openness' of the world as a whole, confirming the unweighted results from Figure 1.

[11]Extra-EU in Table 3 measures the import content from non-EU countries, i.e., it excludes intra-EU sourcing by the public sector.

Table 3: Government consumption (import penetration ratios, selected countries)

| | avg. 2000-02 | avg. 2007-09 | avg. 2012-14 | % Δ 2000-08 | % Δ 2008-14 |
|---|---|---|---|---|---|
| *Non-GPA-members:* | | | | | |
| Australia | 6.1 | 5.9 | 5.5 | -4.2 | -6.7 |
| Brazil | 2.2 | 2.5 | 2.9 | 11.7 | 18.9 |
| China | 3.7 | 4.8 | 4.0 | 31.7 | -17.0 |
| India | 4.0 | 5.5 | 5.5 | 35.1 | -0.1 |
| Indonesia | 10.2 | 7.0 | 6.4 | -31.5 | -7.8 |
| Mexico | 5.8 | 6.1 | 6.6 | 4.5 | 8.3 |
| Turkey | 11.2 | 8.1 | 6.2 | -27.7 | -23.8 |
| Average | 6.2 | 5.7 | 5.3 | -8.0 | -6.8 |
| *GPA members:* | | | | | |
| Canada | 4.7 | 5.2 | 5.1 | 10.6 | -1.8 |
| Extra-EU | 3.7 | 4.6 | 4.8 | 23.8 | 6.2 |
| Japan | 2.2 | 4.4 | 6.6 | 103.8 | 50.8 |
| Korea | 8.7 | 9.6 | 11.6 | 11.3 | 20.2 |
| US | 3.3 | 4.1 | 4.1 | 26.4 | -1.2 |
| Average | 4.5 | 5.6 | 6.5 | 24.3 | 15.4 |
| World | 5.7 | 7.0 | 7.0 | 21.9 | 0.8 |
| Memo: Intra-EU | 3.8 | 4.6 | 4.8 | 22.0 | 2.7 |

Note: Averages are simple country averages.
Source: WIOD 2016 database.

Table 4 reports the results of a simple OLS regression of PIP by country across time, distinguishing between GPA members and non-GPA members, as follows:

$$PIP_t = \beta_0 + \beta_1 GPA + \beta_2 Trend + \beta_3 GPA \times Trend + u_t$$

where PIP is defined as imports of value added in government consumption final demand, GPA is a dummy variable equal to 1 if a country is a GPA member and Trend is a linear annual trend variable equal to 1 in the base year 2000.[12] This model is estimated using data on all countries included in WIOD (43 countries plus a residual rest of the world variable). GPA members show a larger share of foreign sourcing over the period covered when conditioning on GPA membership exclusively (column 1), but this is something that occurred for all countries over the time period (column 2). Column 3 reports the results including the interaction effect between GPA membership and the time trend. While non-GPA members show no signs of

[12]The construction of PIP is discussed in greater detail in the next section.

growth in PIP over the sample period, GPA members exhibit a significantly positive trend in PIP between 2000 and 2014. We take these simple regression results as suggestive that GPA membership may play a role in sustaining public sector openness.

Table 4: PIP trends over time by GPA membership

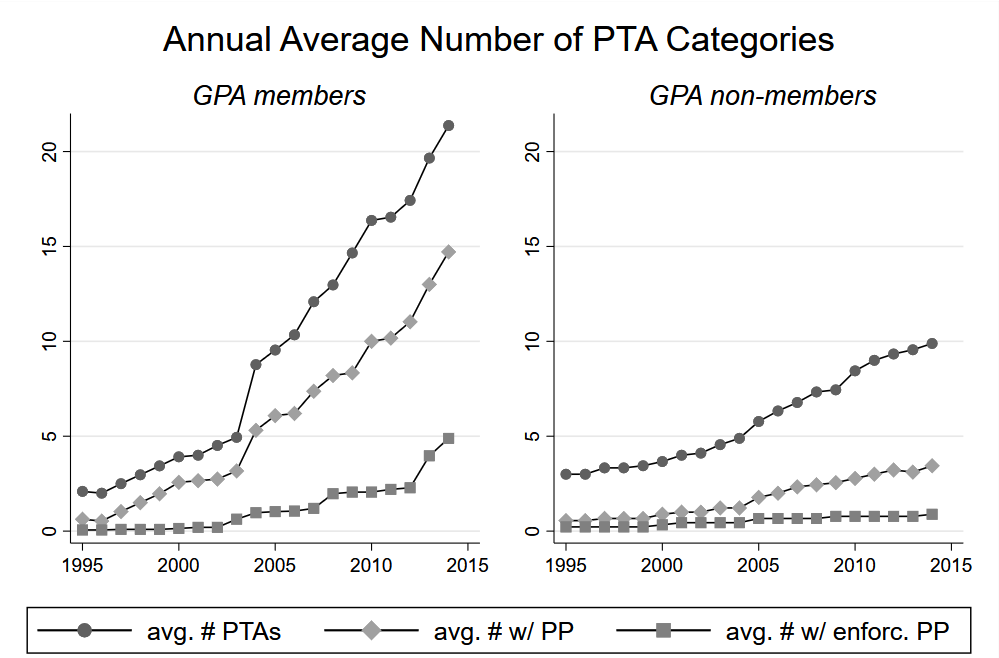
| | (1) | (2) | (3) |
|---|---|---|---|
| GPA countries | 0.0461*** | | 0.0218** |
| | (0.0030) | | (0.0071) |
| Trend | | 0.0015*** | -0.0009 |
| | | (0.0004) | (0.0006) |
| GPA*Trend | | | 0.0030*** |
| | | | (0.0007) |
| Constant | 0.0606*** | 0.0854*** | 0.0681*** |
| | (0.0025) | (0.0032) | (0.0062) |
| Observations | 660 | 660 | 660 |

Note: $^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$. Robust standard errors in parentheses.

Figure 2 plots the evolution of procurement coverage of PTAs over time, which we use as an additional explanatory variable in the empirical analysis. The underlying data span all agreements included in Shingal, Ereshchenko and Mattoo (2018) that have at least one participating country from the WIOD sample. Figure 2 plots the trend in the simple annual average number of three categories of PTAs (any PTA, those including text on public procurement, and those that have enforceable provisions), differentiating between GPA members and non-GPA members. Two features are worth noting. First, the growth in the number of PTAs since the 2000s is primarily driven by GPA member countries. Up to the early 2000s, the overall number of agreements is similar for member and non-member countries. Since then it has grown substantially for GPA member countries, while the increase has been much more modest for non-GPA members.[13] Second, the increase in the number of PTAs is driven by an increase in PTAs that include public procurement provisions. While the number of PTAs with enforceable procurement provisions has been growing more slowly, it has accelerated during the last decade.

[13]The pronounced jump from 2003 to 2004 is driven by the 2004 EU enlargement.

Figure 2: Evolution of Public Procurement Provisions in PTAs




Plots the unweighted annual average of Shingal and Ereshchenko (2018) PTA categories per country by GPA membership for WIOD 2016 sample.

# 4 Empirical analysis

Both the trends in aggregate PIP for the countries included in Figure 1 and the post-crisis differentials in openness suggested by Table 3 suggest that GPA membership may have played a role in sustaining public sector openness following the 2008 financial crisis. In this Section we use the panel structure of our data to investigate the impact of GPA membership empirically. While this does not permit a causal interpretation, the aim is to assess whether GPA membership is associated with patterns of foreign sourcing during and after the 2008 financial crisis and how GPA membership interacts with alternative sources of international procurement discipline, i.e., PP-PTAs. We also explore the robustness of the results to inclusion of a variety of alternative determinants of PIP, including country size, level of development and the general level of restrictiveness of trade and investment policies.

We regress PIP by country over the 2000-14 period on GPA membership status, the number of PTAs and the type of PTA, distinguishing between PTAs that have procurement provisions and those that are enforceable. We use a fixed effects methodology, employing country-level fixed effects. This precludes direct estimation of the effects of GPA membership on PIP, as it is collinear with the fixed effects because GPA membership is a variable that is constant during the time period considered for practically all countries in the sample. However, the approach does allow for assessment of the effect of GPA membership in the post crisis period by including an interaction effect between GPA membership status and the crisis. This is

our variable of interest.

The model we estimate is:

$$PIP_t = \beta_1 Crisis_t + \beta_2 GPA_i + \beta_3 Crisis_t \times GPA_i + \beta_C Controls_{it} + \alpha_i + u_{it}. \quad (1)$$

$PIP$ is defined as imports of value added in the government consumption final demand category of WIOD. Following Koopman et al. (2014) country-industry value added contained in government final consumption demand $VA(FD_{gov})$ is computed as

$$VA(FD_{gov}) = \hat{V} \cdot B \cdot FD_{gov}$$

where $B = (I - A)^{-1}$ is the country-industry Leontief inverse, $FD_{gov}$ is a country-industry $\times$ country matrix including country-industry dollar flows into the government final consumption demand of the respective country and $\hat{V}$ is a country-industry diagonal matrix with country-industry domestic value added shares on the main diagonal. Value added import shares are then obtained by summing country-industry value added imports and dividing by total value added absorbed by government final consumption demand.

$Crisis$ is a dummy variable equal to 1 for all years from 2008 onwards. $GPA$ is a dummy variable equal to 1 for GPA members. $Controls$ include trade and FDI policies, country size and level of development. $Avg.Tariff$ is the weighted average tariff rate imposed on merchandise imports for a respective country and year. It is obtained from the World Integrated Trade Solution (WITS).[14] $FDIRI$ is an index of the degree of restrictiveness of policies towards FDI compiled by the OECD and described in Kalinova et al. (2010).[15] This is available for 1997, 2003, 2006 and on an annual basis for the post 2010 period. It is interpolated linearly for years in which the index is not reported. $No.PTAs$; $No.PTAs\,w/\,PP$; and $No.PTAs\,w/\,enforceable\,PP$ measure the number of PTAs a given country is a member of in the respective year, those that have public procurement provisions (PP); and those with PP that are binding i.e., can be enforced. These three variables are obtained from Shingal et al. (2018). All PTAs that include at least one country in our WIOD sample are counted. Enforceability refers to the PTA requiring domestic review mechanisms and permitting parties to invoke dispute settlement procedures on procurement matters. $GDP$ and $GDP\,per\,capita$ is measured in 2010 US$ and is sourced from the World Bank Development Indicators database.

We do not include time fixed effects as this renders the $Crisis$ indicator collinear. This is problematic in our context, since the $Crisis$ indicator measures the baseline impact of

[14] Available at `http://wits.worldbank.org`.

[15] FDIRRI data are available at `https://stats.oecd.org/Index.aspx?datasetcode=FDIINDEX#`.

the crisis for GPA non-members, against which we want to compare the $Crisis \times GPA$ interaction. Moreover, including time fixed effects absorbs changes in the $PTA$ controls, since accession to a PTA is associated with a one-time jump in the associated variable. As we are interested in the relationship between PTAs and GPA membership, their number and changes therein are a key control variable.[16] We report two sets of regression results. The first focuses on the interaction between GPA membership and the number and characteristics of PTAs (Table 5). The second investigates the robustness of the results to the inclusion of the controls mentioned above (Table 6).

Column 1 in Table 5 reports results without any PTA controls. The crisis interaction with GPA membership is strongly statistically significant and positive, implying that GPA members have a higher PIP in the post crisis years compared to non-GPA countries. Columns 2 - 4 explore the effect of controlling for the number of PTAs per country, the number of PP-PTAs and the number of PP-PTAs with enforceable procurement provisions, respectively. Column 2 estimates the effect of an additional PTA, regardless of whether it includes PP provisions of any kind or not. Column 3 estimates the effect of an additional PTA with PP provisions, deep or shallow, and Column 4 estimates the effect of an additional PTA with *deep* (that is, enforceable) PP provisions on PIP.

The estimated coefficient increases in moving from Column 2 through Column 4, indicating that the number and depth of PP provisions in PTAs is indeed associated with higher government sector import shares. The significance level and magnitude of the estimated $GPA * Crisis$ interaction coefficient declines slightly but remains sizable and highly significant throughout.[17] Controlling for the overall number of PTAs and the inclusion of public procurement provisions (models (2) and (3)), yields marginally significant effects. However, once we control exclusively for PTAs that have binding public procurement disciplines (column (4)), the estimated coefficient increases substantially, both quantitatively and in statistical significance.

To sum up the results from Table 5, the $GPA * Crisis$ interaction effect is robust to the inclusion of alternative sources of international public procurement discipline (PTAs), and is almost constant quantitatively. This seems to be the case primarily for PP-PTAs that are enforceable and thus constitute more credible commitments to sustaining public sector

[16]If we estimate the model including time fixed effects we nonetheless obtain Crisis*GPA interaction coefficients comparable in size and significance to our main specification. Results are available on request.

[17]All results presented are based on the model presented in Equation (1). However, as noted previously, the GPA membership indicator $GPA_i$ is dropped throughout due to collinearity problems. For our sample period, GPA membership is constant for almost all countries in the sample, with exception of the countries accessing the EU during this period. This implies that GPA membership is not identified separately from the country fixed effect $\alpha_i$.

Table 5: GPA and PTA Provisions

| *Dependent variable:* | Public Consumption Value Added Import Share | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Crisis | −0.5585 | −0.7307 | −0.6545 | −0.6054 |
| | (0.3801) | (0.4082) | (0.3917) | (0.3771) |
| No. PTA | | 0.0465* | | |
| | | (0.0196) | | |
| No. PTA w/ PP | | | 0.0638* | |
| | | | (0.0295) | |
| No. PTA, enforc. PP | | | | 0.1777*** |
| | | | | (0.0475) |
| Crisis*GPA | 1.6694*** | 1.3886** | 1.3660** | 1.3437** |
| | (0.4515) | (0.4747) | (0.4663) | (0.4398) |
| Country FE | Yes | Yes | Yes | Yes |
| Observations | 660 | 660 | 660 | 660 |
| $R^2$ | 0.1582 | 0.1766 | 0.1731 | 0.1720 |
| Adjusted $R^2$ | 0.0965 | 0.1148 | 0.1111 | 0.1098 |

Note: $^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$. Robust standard errors in parentheses.

openness. These results indicate that both GPA and PTAs are associated with high PIP and their effects potentially interact.

Table 6 reports results with controls for additional explanatory variables. Column 2 includes the OECD FDI Restrictiveness Index (FDIRI) and the weighted average applied tariff on merchandise imports. These are included to control for general policies towards openness. As public procurement projects are often complex and regulation-intensive establishing a foreign affiliate is a common way to compete for contracts. To control for barriers to this indirect form of imports, we therefore include the FDIRI in addition to tariff rates on direct imports. Larger and more developed countries generally feature different levels of openness. GPA member countries are on average richer than non-members in the WIOD sample, which could potentially drive our results. A second set of controls in Column 3 controls for country size and development, proxied by real GDP and real GDP per capita.

The coefficient on direct tariff barriers is negative but insignificant throughout. This is what we would expect, since the public sector effectively does not pay tariffs. The GPA*Crisis interaction slightly decreases in size, but continues to be highly significant. A similar picture arises for GDP per capita. While the effect is quantitatively small, it also carries the expected, positive sign. When including all the controls and number of PTAs, the interaction coefficient

Table 6: GPA membership: additional controls

| *Dependent variable:* | Public Consumption Value Added Import Share | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Crisis | −0.5585 | −0.6887 | −1.1117* | −0.7801 | −0.8944 |
| | (0.3801) | (0.5211) | (0.4570) | (0.5395) | (0.5412) |
| FDIRI | | 2.9005 | | 4.1451 | 6.1542 |
| | | (4.1216) | | (4.4874) | (4.1917) |
| Avg. Tariff | | −0.0868 | | −0.0684 | −0.0746 |
| | | (0.0480) | | (0.0489) | (0.0487) |
| GDP | | | 0.0001 | | 0.0002 |
| | | | (0.0001) | | (0.0001) |
| GDP/capita | | | 0.0001*** | | 0.0001* |
| | | | (0.00004) | | (0.00004) |
| No. PTAs | | | | 0.0616** | 0.0380 |
| | | | | (0.0195) | (0.0209) |
| Crisis*GPA | 1.6694*** | 1.8070*** | 1.8708*** | 1.3939** | 1.5031** |
| | (0.4515) | (0.5044) | (0.4995) | (0.5356) | (0.5338) |
| Country FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 660 | 538 | 630 | 538 | 538 |
| $R^2$ | 0.1582 | 0.1866 | 0.1958 | 0.2098 | 0.2327 |
| Adjusted $R^2$ | 0.0965 | 0.1194 | 0.1339 | 0.1427 | 0.1643 |

Note: $^*p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$. Robust standard errors in parentheses.

of interest declines slightly in both size and significance but remains overall robust. We interpret this as an additional support for the hypothesis that international procurement disciplines matter and interact.

Overall, the results from the panel regression suggest that GPA membership during the crisis is associated with a higher public sector openness compared to non-member countries. This conclusion is robust to general measures of trade protectionism and country size and development. GPA membership continues to be significant also when including alternative measures of international procurement discipline such as the number and characteristics of PTAs. The reduced coefficient size and significance level suggest that the GPA and PP-PTAs are partial substitutes in sustaining public sector openness.

## 4.1 Placebo regression results

The results presented in the preceding sections are indicative of GPA membership playing a role in sustaining public sector openness following the 2008 crisis. However, the nature of our question and data prevents us from relying on controlled and exogenous variation in order to draw robust causal inference. To corroborate our results, we conduct a placebo regression exercise. This involves a replication of our main specification with an alternative outcome variable that is expected on theoretical grounds not be affected by our main explanatory variable, GPA membership. If the nature of our mechanism is causal, GPA membership should not affect the alternative outcome variable. In our case, a promising candidate as placebo outcome variable arises naturally from the fact that the GPA covers public sector imports exclusively. Accordingly, private sector imports do not fall under the GPA by definition and should be unaffected by GPA membership.

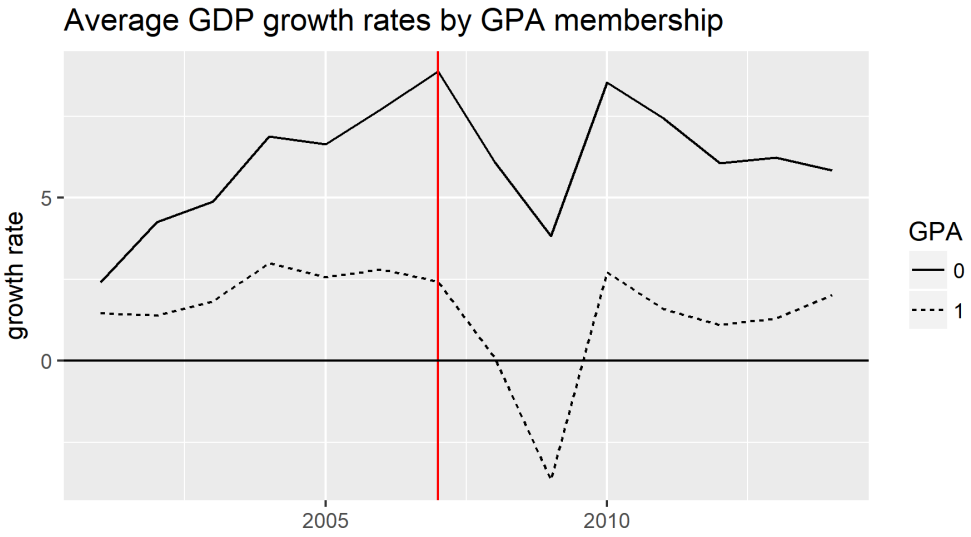
One possibility invalidating private consumption imports as placebo outcome is if there is a potential interaction between the crisis and GPA membership. As discussed previously, the GPA member countries are on average richer than non-member countries. As the crisis originated in the U.S and the EU, it may have affected developed economies in a systematically different way than emerging economies. This would invalidate our choice of private consumption imports as placebo outcome, insofar as GPA membership would mask the differential impact of the crisis because of the characteristics of the underlying economies.

To shed light on this, Figures 3 and 4 plot average GDP growth rates and private consumption import growth rates for GPA member and non-member countries, weighted by GDP. While the GDP growth rates differ between GPA members and non-members as expected, both show a comparable decline during the crisis. Similarly, average private consumption import shares seem similarly affected by the crisis. We view this as supporting the validity of our choice of private consumption import share as placebo outcome variable.

Results from the placebo regression are reported in Tables 7 and 8. Column 1 replicates the regression on the crisis and GPA interaction effect. Not controlling for other covariates, the measured impact of GPA membership is statistically significant and sizable for private consumption import shares. However, this changes once we take into account the number of PTAs in Columns 2 to 4, suggesting the GPA-crisis variable is picking up the effects of trade policy disciplines more generally. Since PTAs by definition seek to improve access to markets and reduce policy uncertainty for the private sector, the positive and significant coefficient is what we would expect. The magnitude of the estimate increases as the relevant PTAs become deeper, which is consistent with deeper PTAs providing greater security of market access conditions. In the final model that includes only the subset of PP-PTAs with enforceable procurement provisions (column 4) the crisis-GDP interaction effect becomes marginally

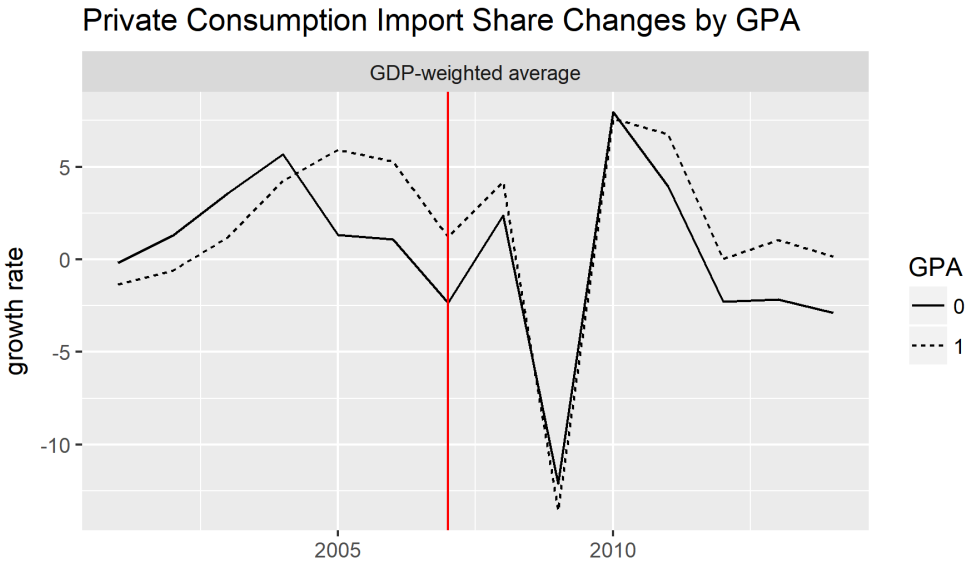
significant again. This is not inconsistent with our hypothesis, as in this regression we omit other PTAs which target overall (private) imports. Given that PTAs with enforceable PP provisions also feature more extensive coverage and commitments in a variety of other policy areas that are salient for the private sector, this will be picked up by our measure in Column 4 and lead to a spurious correlation with our PP-PTA measure.

Figure 3




Note: Growth rates of real GDP in 2010 USD. Growth rates are GDP-weighted country averages. Source: World Bank national accounts data and OECD national accounts data.

Figure 4




Source: Own calculations based on WIOD 2016 release.

Table 8 reports results for the replication of the regression including additional controls. The covariate coefficients generally behave as expected. Coefficients of trade restrictions, both

for direct imports and for foreign investment are negative and significant. GDP per capita is positively associated with private consumption imports and larger countries tend to import less, although this effect is only marginally significant. Controlling for per-capita income, which is correlated with GPA membership status, the $Crisis \times GPA$ effect weakens and once the number of PTAs is controlled for, the effect becomes completely insignificant, as we would expect.

Table 7: GPA and PTA Provisions

| *Dependent variable:* | Private Consumption Value Added Import Share | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Crisis | 0.2654 | −0.4711 | −0.1846 | 0.1362 |
| | (0.4042) | (0.4485) | (0.3681) | (0.4036) |
| No. PTA | | 0.1990*** | | |
| | | (0.0441) | | |
| No. PTA w/ PP | | | 0.2988*** | |
| | | | (0.0665) | |
| No. PTA, enforc. PP | | | | 0.4896*** |
| | | | | (0.1434) |
| Crisis*GPA | 2.1030*** | 0.9019 | 0.6811 | 1.2056* |
| | (0.5547) | (0.5628) | (0.5418) | (0.5556) |
| Country FE | Yes | Yes | Yes | Yes |
| Observations | 660 | 660 | 660 | 660 |
| $R^2$ | 0.2440 | 0.3652 | 0.3619 | 0.2817 |
| Adjusted $R^2$ | 0.1886 | 0.3176 | 0.3141 | 0.2278 |

Note: $^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$. Robust standard errors in parentheses.

Overall, we take the results from the placebo exercise as additional confirmation for the hypothesis that the GPA, an agreement that entails binding, enforceable commitments to procure goods on a nondiscriminatory basis, served to back-stop public sector openness in the aftermath of the 2008 financial crisis.

Finally, Annex Table A-3 presents the results from a Mundlak (1978) correction regression that includes country-averages of all time-varying control variables in the estimation of a random effects model. The means of GDP, GDP per Capita and average tariffs are all significant, while the means of FDIRI and No. of PTAs are not. The latter two variables are less time-varying than the former three, which might explain this pattern. We take the results as supporting the use of fixed effects in the main specifications.

Table 8: Placebo GPA and additional controls

| *Dependent variable:* | Private Consumption Value Added Import Share | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Crisis | 0.2654 | −0.6859 | −0.4129 | −1.0055 | −0.9543 |
| | (0.4042) | (0.6359) | (0.6174) | (0.6985) | (0.6731) |
| FDIRI | | −8.3104** | | −3.9564 | 0.2764 |
| | | (3.0903) | | (4.4056) | (3.6503) |
| Avg. Tariff | | −0.1508** | | −0.0863* | −0.1198*** |
| | | (0.0510) | | (0.0338) | (0.0364) |
| GDP | | | −0.0003 | | −0.0003* |
| | | | (0.0002) | | (0.0002) |
| GDP/capita | | | 0.0005*** | | 0.0003*** |
| | | | (0.0001) | | (0.0001) |
| No. PTAs | | | | 0.2157*** | 0.1532** |
| | | | | (0.0475) | (0.0509) |
| Crisis*GPA | 2.1030*** | 2.6484*** | 1.7190* | 1.2033 | 1.1455 |
| | (0.5547) | (0.6975) | (0.6869) | (0.8556) | (0.8091) |
| Country FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 660 | 538 | 630 | 538 | 538 |
| $R^2$ | 0.2440 | 0.2997 | 0.3917 | 0.4129 | 0.4783 |
| Adjusted $R^2$ | 0.1886 | 0.2418 | 0.3448 | 0.3631 | 0.4317 |

Note: $^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$. Robust standard errors in parentheses.

# 5 Concluding remarks

In this paper we investigate the association between commitments in trade agreements not to discriminate in the award of public procurement contracts and public sector openness following the 2008 financial crisis. We view our findings as a first attempt to explore the role of trade agreements as devices to discipline public procurement policies. To date, arguments regarding the role of the GPA and PTAs that include procurement provisions have mostly been conceptual and normative in nature. There has been very little empirical research on the relative contribution of the GPA and PTAs as commitment mechanisms or on their interaction. To the best of our knowledge, this paper is the first effort to analyze empirically the possible commitment role of the GPA using a cross-country panel dataset.

Our analysis complements previous empirical work on this subject, which has tended to focus on whether the GPA or PTAs result in greater foreign sourcing. The empirical literature on the effect of the trade agreements finds only weak or no evidence that they are associated

with a subsequent increase in the share of government procurement allocated to foreign firms/products.[18] The data we use in this paper suggest that whatever the market access-increasing effects of the GPA and PTAs with enforceable public procurement provisions (that is, taking as given the level of PIP at a point in time) the GPA may serve to constrain backsliding into protectionism when economic times are bad, and that the GPA and PP-PTAs function as partial substitutes in sustaining public sector openness.

The potential role of trade agreements as a commitment device is particularly important for public procurement. As documented by Shingal (2015), home bias increases in recessions. Evenett and Shingal (2016) note that many governments sought to allocate greater funding after 2008 to domestic firms through the procurement process. The post-crisis period therefore provides further evidence confirming previous research that governments have incentives (confront significant pressures) to increase home bias in recessions. This is reflected in the decrease in openness of procurement observed in non-GPA members after 2008. The fact that trends in PIP for GPA and non-GPA member countries were similar before the crisis (towards increased openness) is important in this regard. The divergence in PIP trends after 2008 suggests that commitments by governments not to discriminate against trading partners may have played a role in constraining a greater procurement protectionism. The finding that this relationship is observed most strongly for agreements that are binding and enforceable supports this interpretation.

That the GPA may have served as a device that helped to prevent back-sliding in the post-crisis period is corroborated both by our main regression results controlling for public procurement provisions in bilateral PTAs and by the placebo regression exercise. While the cross-country panel regression analysis does not permit strict causal interpretation, the placebo regression results provide additional support for the robustness of the results. We do not observe that the GPA has a similar association with (changes in) private sector consumption import shares. These are by definition exogenous to GPA provisions, which only cover the public sector. For the private sector PTAs should matter of course, as PTAs as such should promote trade. Once this general role of PTAs is controlled for, there is no relationship between GPA*Crisis and private consumption import shares. Whether the patterns observed in the data will continue to be observed in the future is an open question. Data spanning a longer period of time after 2008 will provide additional evidence.

[18]Examples include Evenett and Shingal (2006), Shingal (2011; 2015), Rickard and Kono (2013) and Kutlina-Dimitrova and Lakatos (2016).

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# Appendix

Table A-1: PTAs with and without public procurement provisions

| w/o procurement provisions | w/ procurement provisions |
|---|---|
| APTA | Australia-Chile |
| APTA-Accession of China | Australia-China |
| ASEAN - India | Australia-NZ |
| ASEAN - Japan | Brunei-Darussalam-Japan |
| ASEAN FTA | CAFTA-DR |
| ASEAN- Australia/New Zealand | CEFTA |
| ASEAN-Korea | Commonwealth of Independent States (CIS) |
| ASEANChina | Canada - Costa Rica |
| Agadir Agreement | Canada-Chile |
| Andean Community | Canada-Colombia |
| Armenia-Kazakhstan | Canada-Honduras |
| Armenia-Turkmenistan | Canada-Panama |
| Central American Common Market | Canada-Peru |
| CARICOM | Chile - China |
| CEMAC | Chile - Costa Rica |
| Common Economic Zone (UKR, BLR, KAZ, RUS) | Chile-Colombia |
| COMESA | Chile-El Salvador |
| Canada-Jordan | Chile-Guatemala |
| Chile - India | Chile-Honduras |
| Chile - Vietnam | Chile-Japan |
| Chile-Malaysia | Chile-Nicaragua |
| Chile-Mexico | China-Korea |
| Chile-Vietnam | China-Switzerland |
| China  New Zealand | Colombia-Northern Triangle |
| China-Hong Kong | Costa Rica - Singapore |
| China-Macau | Costa Rica-Colombia |
| Colombia-Mexico | Costa Rica-Peru |
| Costa Rica-China | Eurasian Economic Union (EAEU) |
| East African Community (EAC) | EFTA - Albania |
| EAC-Burundi/Rwanda | EFTA - Jordan |
| Eurasian Economic Community | EFTA - Lebanon |
| EAEU-Armenia | EFTA - SACU |
| EAEU-Kyrgyzstan | EFTA - Serbia |
| Economic Cooperation Organization FTA | EFTA - Tunisia |
| ECOWAS | EFTA -Morocco |
| EU - Albania | EFTA-Bosnia and Herzegovina |
| EU - Cote d'Ivoire | EFTA-Central America |
| EU - Lebanon | EFTA-Chile |
| EU - San Marino | EFTA-Colombia |
| EU-Andorra | EFTA-Macedonia |
| EU-FYR Macedonia | EFTA-Mexico |
| EU-Faroe islands | EFTA-Palestinian Authority |
| EU-NZ-Malaysia | EFTA-Peru |
| EU-Papua New Guinea-Fiji | EFTA-Turkey |
| EU-Syria | EU - Algeria |
| El Salvador Honduras | EU - Bosnia and Herzegovina |
| El Salvador-Cuba | EU - Cameroon |
| Gulf Cooperation Council | EU - Central America |
| Global System of Trade Preferences Agreement | EU - Jordan |
| Georgia - Armenia | EU - Montenegro |
| Georgia - Kazakhstan | EU - Serbia |

Georgia - Turkmenistan
Georgia-Azerbaijan
Georgia-Russia
Georgia-Ukraine
Guatemala- Chinese Taipei
India - Afghanistan
India  Bhutan
India  Malaysia
India  Nepal
India  Singapore
India - Sri Lanka
Japan - Indonesia
Japan- Malaysia
Korea-India
Korea-Turkey
Korea-Vietnam
Kyrgyz Republic - Armenia
Kyrgyz Republic Uzbekistan
Kyrgyz Republic-Kazakhstan
Kyrgyz Republic-Ukraine
Kyrgyz republic-Moldova
LAIA-ALADI
Lao-Thailand
MERCOSUR
MERCOSUR - India
Malaysia-Australia
Mauritius-Pakistan
Mexico-Uruguay
Mexico-Panama
Mexico-Peru
Nicaragua-Chinese Taipei
Pan-Arab FTA
Papua New Guinea-Australia
Pakistan - Malaysia
Pakistan - Sri Lanka
Panama - Chinese Taipei
Panama-Chile
Panama-DR
Panama-Nicaragua
Peru - China
Peru-Chile
Russia-Azerbaijan
Russia-Belarus-KZ
Russia-Serbia
Russia-Tajikistan
Russia-Turkmenistan
Russia-Uzbekistan
SACU
SADC
SADC-Seychelles
SAFTA
SAFTA-Afghanistan
SAARC Preferential Trading Arrangement
South Pacific Regional Trade & Econ. Coop. Agreement
Thailand-NZ
Turkey - Albania
Turkey - Chile
EU -Tunisia
EU- Egypt
EU- Georgia
EU- Morocco
EU-CARIFORUM
EU-Chile
EU-Colombia and Peru
EU-Eastern and Southern Africa
EU-Mexico
EU-Palestinian authority
EU-South Africa
EU-Turkey
Egypt  EFTA
Egypt  Turkey
Faroe Island - Norway
Faroe Islands-Switzerland
GCC-Singapore
HK China-Chile
Iceland - Faroe Islands
Iceland-China
India- Japan
Israeli-Mexico
Japan - Australia
Japan - Philippines
Japan - Thailand
Japan - Vietnam
Japan-Mexico
Japan-Mongolia
Japan-Peru
Jordan  Singapore
Korea-Australia
Korea-Chile
Korea-Colombia
Korea-Singapore
Melanesian Spearhead Group
Mexico-Central America
NAFTA
Pacific Island Countries Trade Agreement
Pacific Alliance
Pakistan - China
Panama-Central America
Panama-El Salvador
Panama-Guatemala
Panama-Honduras
Panama-Peru
Panama-SGP
Peru-Korea
Peru-SGP
SGP-Australia
TPP
Thailand - Australia
Trans-Pacific Strategic Economic Partnership
Turkey  Bosnia/Herzegovina
Turkey - Jordan
Turkey - Montenegro
Turkey - Morocco
Turkey - Palestine

| | |
|---|---|
| Turkey-Mauritius | Turkey - Serbia |
| Ukraine - Azerbaijan | Turkey - Syria |
| Ukraine - Belarus | Turkey Israel |
| Ukraine - Kazakhstan | Turkey- Georgia |
| Ukraine - Tajikistan | Turkey-Macedonia |
| Ukraine - Turkmenistan | Turkey-Tunisia |
| Ukraine - Uzbekistan | US- Jordan |
| | US-Australia |
| | US-Bahrain |
| | US-CAFTA-DR |
| | US-Chile |
| | US-Colombia |
| | US-Morocco |
| | US-Oman |
| | US-Panama |
| | US-Peru |
| | Ukraine - FYR Macedonia |
| | Ukraine - Moldova |
| | WAEMU |

Table A-2: Subset of PTAs including procurement language/provisions

| w/o enforceable provisions | w/ enforceable provisions |
|---|---|
| Australia-China | Australia-Chile |
| Australia-NZ | Canada-Chile |
| Brunei-Japan | Canada-Colombia |
| CAFTA-DR | Canada-Honduras |
| Central European Free Trade Agreement | Canada-Panama |
| CIS | Canada-Peru |
| Canada - Costa Rica | Chile - Costa Rica |
| Chile - China | Chile-El Salvador |
| Chile-Colombia | Chile-Guatemala |
| China-Korea | Chile-Honduras |
| China-Switzerland | Chile-Japan |
| Colombia-Northern Triangle | Chile-Nicaragua |
| Costa Rica-Colombia | Costa Rica - Singapore |
| Costa Rica-Peru | EAEU |
| EFTA - Albania | EFTA-Central America |
| EFTA - Jordan | EFTA-Chile |
| EFTA - Lebanon | EFTA-Colombia |
| EFTA - SACU | EFTA-Mexico |
| EFTA - Serbia | EFTA-Peru |
| EFTA - Tunisia | EU - Central America |
| EFTA -Morocco | EU- Georgia |
| EFTA-Bosnia and Herzegovina | EU-CARIFORUM |
| EFTA-Macedonia | EU-Chile |
| EFTA-Palestinian Authority | EU-Colombia and Peru |
| EFTA-Turkey | Faroe Island - Norway |
| EU - Algeria | Faroe Islands-Switzerland |
| EU - Bosnia and Herzegovina | GCC-Singapore |
| EU - Cameroon | HK China-Chile |
| EU - Jordan | Israeli-Mexico |
| EU - Montenegro | Japan - Australia |
| EU - Serbia | Japan-Mexico |
| EU -Tunisia | Japan-Peru |
| EU- Egypt | Korea-Australia |
| EU- Morocco | Korea-Chile |
| EU-Eastern & Southern Africa | Korea-Colombia |
| EU-Mexico | NAFTA |
| EU-Palestinian authority | Panama-SGP |
| EU-South Africa | Peru-Korea |
| EU-Turkey | Peru-SGP |
| Egypt - EFTA | Trans Pacific Economic Partnership |
| Egypt - Turkey | US-Australia |
| Iceland - Faroe Islands | US-Bahrain |
| Iceland-China | US-Chile |
| India- Japan | US-Colombia |
| Japan - Philippines | US-Oman |
| Japan - Thailand | US-Panama |
| Japan - Vietnam | US-Peru |
| Japan-Mongolia | Australia-Chile |
| Jordan - Singapore | Canada-Chile |
| Korea-Singapore | Canada-Colombia |
| Melanesian Spearhead Group | Canada-Honduras |
| Mexico-Central America | Canada-Panama |
| Pacific Island Countries Trade Agreement | Canada-Peru |

| | |
|---|---|
| Pacific Alliance | Chile - Costa Rica |
| Pakistan - China | Chile-El Salvador |
| Panama-Central America | Chile-Guatemala |
| Panama-El Salvador | Chile-Honduras |
| Panama-Guatemala | Chile-Japan |
| Panama-Honduras | Chile-Nicaragua |
| Panama-Peru | Costa Rica - Singapore |
| Singapore-Australia | Eurasian Economic Union |
| Thailand - Australia | EFTA-Central America |
| Turkey  Bosnia/Herzegovina | EFTA-Chile |
| Turkey - Jordan | EFTA-Colombia |
| Turkey - Montenegro | EFTA-Mexico |
| Turkey - Morocco | EFTA-Peru |
| Turkey - Palestine | EU - Central America |
| Turkey - Serbia | EU- Georgia |
| Turkey - Syria | EU-CARIFORUM |
| Turkey Israel | EU-Chile |
| Turkey- Georgia | EU-Colombia and Peru |
| Turkey-Macedonia | Faroe Island - Norway |
| Turkey-Tunisia | Faroe Islands-Switzerland |
| US- Jordan | GCC-Singapore |
| US-CAFTA-DR | HK China-Chile |
| US-Morocco | Israeli-Mexico |
| Ukraine - FYR Macedonia | Japan - Australia |
| Ukraine - Moldova | Japan-Mexico |
| WAEMU | Japan-Peru |
| | Korea-Australia |
| | Korea-Chile |
| | Korea-Colombia |
| | NAFTA |
| | Panama-SGP |
| | Peru-Korea |
| | Peru-SGP |
| | CPTPP |
| | Trans Pacific Economic Partnership |
| | US-Australia |
| | US-Bahrain |
| | US-Chile |
| | US-Colombia |
| | US-Oman |
| | US-Panama |
| | US-Peru |

Table A-3: Mundlak correction regression results

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| GPA | 2.9491 | 0.2323 | 4.0039** | 0.1484 | 1.5034 |
| | (1.6268) | (1.7397) | (1.5296) | (1.6401) | (1.7796) |
| Crisis | -0.5585 | -0.6908 | -1.1117* | -0.7842 | -0.8964 |
| | (0.3806) | (0.5236) | (0.4584) | (0.5431) | (0.5456) |
| GPA*Crisis | 1.6694*** | 1.8130*** | 1.8708*** | 1.3929** | 1.5017** |
| | (0.4522) | (0.5068) | (0.5011) | (0.5391) | (0.5380) |
| FDIRI | | 2.9076 | | 4.1790 | 6.1776 |
| | | (4.1334) | | (4.5108) | (4.2213) |
| Tariff | | -0.0868 | | -0.0680 | -0.0745 |
| | | (0.0482) | | (0.0492) | (0.0491) |
| GDP | | | 0.0001 | | 0.0002 |
| | | | (0.0001) | | (0.0001) |
| GDP/Capita | | | 0.0001*** | | 0.0001* |
| | | | (0.0000) | | (0.0000) |
| No. PTAs | | | | 0.0628** | 0.0389 |
| | | | | (0.0196) | (0.0211) |
| Avg FDIRI | | -7.9432 | | -4.9917 | -4.2315 |
| | | (9.4620) | | (8.3390) | (9.6724) |
| Avg Tariff | | -0.4946* | | -0.4664* | -0.5451** |
| | | (0.2230) | | (0.1942) | (0.1889) |
| Avg GDP | | | -0.0010*** | | -0.0010*** |
| | | | (0.0003) | | (0.0003) |
| Avg GDP/Capita | | | -0.0002** | | -0.0001* |
| | | | (0.0001) | | (0.0001) |
| Avg No. PTAs | | | | 0.1952 | -0.0062 |
| | | | | (0.2068) | (0.1644) |
| Constant | 9.5197*** | 13.4687*** | 10.2262*** | 10.1773*** | 13.2172*** |
| | (1.4710) | (2.0449) | (1.3685) | (3.0227) | (2.5097) |
| Observations | 660 | 538 | 630 | 538 | 538 |

Note: $^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$. Standard errors in parentheses.