Policy Research Working Paper 9598

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WORLD BANK GROUP
Development Economics
Development Research Group
&
Macroeconomics, Trade and Investment Global Practice
March 2021

Policy Research Working Paper 9598

Abstract

How does trade affect the design of preferential trade agreements (PTAs)? What is the role of global value chains (GVCs)? The authors answer these questions by empirically investigating the causal impact of gross and value-added trade on the depth of PTAs. To solve the critical issue of endogeneity of trade flows for trade policy, the identification strategy exploits a recent transportation shock: the sharp increase in the maximum size of container ships, which has more than tripled between 1995 and 2007. The key variation in our instrument hinges on the fact that only deep-water ports can accommodate new larger ships. The strategy is flexible enough to generate excludable instruments for different value-added components of exports. This allows us to assess how the design (depth) of PTAs is affected not only by gross exports but more specifically by GVC-trade as captured by indicators of trade in domestic and foreign value added. The authors find that trade occurring through GVCs increases the probability of forming deep PTAs, i.e., agreements that include provisions that go beyond the coverage of the WTO. These GVC-trade effects are larger than those of gross exports, which include flows that are unrelated to GVCs. The results indicate that GVCs are one important driver of deep preferential liberalization.

This paper is a product of the Development Research Group, Development Economics and the Macroeconomics, Trade and Investment Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at leonardo.baccini@gmail.com, Matteo.Fiorini@eui.eu, bernard.hoekman@eui.eu, carlo.altomonte@unibocconi.it and italo.colantone@unibocconi.it.

Global Value Chains and Deep Integration*

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When this paper was written, the researchers wereworking as short-term consultants for the World Bank under a project on deep trade agreements jointly implemented by the Development Research Group, Development Economics (project RA-P168366-RESE-TF0A8655 "International Trade Cooperation", TTL: Ana Margarida Fernandes) and the Macroeconomics, Trade and Investment Global Practice (project AA-P172238-GAD-TF0B1129, TTLs: Nadia Rocha and Michele Ruta).

Keywords: deep trade agreements; international trade; global value chains. **JEL Classi ication:** F13, F14, F15, F23, F51.

*Without implicating them, the authors thank Peter Egger and Daria Taglioni for their valuable comments as well as Alberto Osnago, Michele Ruta and Ana Fernades for helpful conversations and assistance. The authors also thank the organizers of and participants to the World Bank seminar series on The Economics of Deep Trade Agreements. Financial support from the World Bank is gratefully acknowledged. Miguel Alquezar-Yus provided excellent research assistance. All errors are attributable solely to the authors.

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1 Introduction

The post-1990 period has seen a proliferation of preferential trade agreements (PTAs). Some 700 PTAs are currently in force, compared to a little more than 100 PTAs before 1990.[1] Both developed and developing countries are deeply involved in preferential trade liberalization. While tariff reductions on a preferential basis are a central feature of all bilateral and regional trade agreements, the inclusion of provisions that do not pertain directly to merchandise trade policies – e.g., provisions liberalizing and protecting foreign investment (FDI) and opening access to services markets – have become increasingly common in PTAs. As a result many PTAs regulate trade-related issues more extensively and more stringently than the World Trade Organization (WTO). Simply put, PTAs have become the main instrument used by countries to deepen trade policy cooperation, not the WTO. A consequence is that deeper integration of markets is piecemeal, pertaining only to subsets of countries that have made reciprocal commitments to open their respective markets to two-way flows on trade and investment on a preferential basis.

In parallel to the expansion in the number and depth of PTAs the structure of global trade has become more fragmented, reflecting increasing specialization by firms. Increasingly production of goods and services occurs through global value chains and internatonal production networks managed by lead firms. Such production involves the organization of activities dispersed across several, often many, countries. The management of the associated cross-border flows of investment, technology, and production tasks and distribution activities is affected by a range of idiosyncratic country-specific regulatory regimes. These influence the feasibility and profitability of organizing cross-border production to capture economies of scale and reduce overall production costs (World Bank, 2020).

Assessing the causes of (deep) PTAs is important for understanding globalization and trade governance. The conjunction of the growth in GVC-production and proliferation of deep(er) PTAs raises questions regarding the relationship between the two trends. Is there a causal link? Some have argued that deep PTAs are needed to support GVCs, i.e., deep integation drives value chain investment and production. Others point out that GVCs have expanded in periods and regions where the main countries involved did not have deep PTAs with each other, arguing that unilateral trade opening, technological changes and export-oriented development strategies drove the rise of GVCs. The two views are not inconsistent: autonomous market opening may boost trade up to a point but then require international cooperation to reduce policy uncertainty and the costs of regulatory heterogenity.

In this paper we ask how trade affects the design of PTAs. What is the role of global

[1] Many more trade agreements have been concluded than are reported by the WTO. Cite source of data and the Hathaway, Bradley and Goldsmith Harvard Law Review paper noting that US government does not know precisiely how many trade agreements are in force.

value chains (GVCs)? Building on a burgeoning literature claiming that deep PTAs reflect the needs and interests of multinational enterprises (MNEs) (Mattli, 1999; Chase, 2003; Manger, 2009; Blanchard and Matschke, 2015; Rodrik, 2018; Blanga-Gubbay et al., 2020), we empirically investigate the *causal* impact of gross and value-added trade on the design of PTAs over the period 1995-2007. To solve the critical issue of endogeneity of trade flows for trade policy, we apply a novel instrument for trade based on Altomonte et al. (2018). The identification strategy exploits a recent transportation shock: the sharp increase in the maximum size of container ships, which has more than tripled between 1995 and 2007. The key variation in our instrument hinges on the fact that only deep-water ports can accommodate new larger ships. Our strategy is flexible enough to generate excludable instruments for different value-added components of exports. This allows us to assess how the design of PTAs is affected not only by gross exports but also by trade through GVCs as captured by indicators of trade in domestic and foreign value added.

Armed with this identification strategy, we estimate the causal effects of gross and value-added trade on a synthetic indicator of PTA depth as well as on many dimensions of PTA design, including services liberalization, investment provisions, and the presence of binding dispute settlement mechanisms. Moreover, we build outcome variables capturing whether PTAs include 'WTO-plus' or 'WTO-extra' provisions (Horn et al., 2010), which go beyond what is regulated in the WTO through the General Agreement on Tariffs and Trade (GATT), the General Agreement on Trade in Services (GATS) and the Agreement on Trade-related Intellectual Property Rights (TRIPS). To build a broad and comprehensive portfolio of outcome variables, we merge two key datasets on the content of trade agreements. First, the DESTA database which offers synthetic indicators of PTAs' depth as well as more specific indicators capturing the presence of trade-related provisions. Second, the more recent World Bank database, which contains information on a broader set of specific provisions in PTAs. This second dataset allows us to identify the aforementioned 'WTO-plus' and 'WTO-extra' dimensions of PTAs.[2]

We find that trade through GVCs and in particular the foreign value added component of exports increases PTAs' depth. Our results also reveal that gross trade and trade through GVCs has heterogeneous effects on the probability of including broadly identified chapters across different issue areas. However, we find that trade associated with GVCs systematically increases the probability of inclusion of a number of narrowly defined 'WTO-plus' and 'WTO-extra' provisions. Finally, we show that when looking at specific provisions the effect of trade through GVCs tends to be larger than the effect of gross exports, which also include activities unrelated to global production.

[2]As discussed further in Section 3, in contrast to DESTA the World Bank dataset does not provide researchers with an aggregate measure of depth. It also has more limited coverage of extant trade agreements. See Section 3 below.

The size of our estimated causal effect is remarkable. When we take our most conservative estimate, moving the foreign value added component of bilateral exports in any sector by two standard deviations increases the level of depth in the bilateral trade policy relationship by 35% of the average depth in our sample. This effect roughly corresponds to going from the level of depth of the EC-Jordan Euro-Med Association Agreement (at the 67th percentile in the unconditional distribution of depth considering all agreements coded in DESTA) to that of the EC Europe Agreements with Estonia, Latvia and Lithuania (between the 78th and 81st percentile). These agreements were all signed during the second half of the 1990s but the difference between them is significant: Europe Agreements are much deeper and more comprehensive as they were seen as paving the way for accession to the European Union while the EC-Jordan Association Agreement does not cover regulatory areas, does not address important issues such as government procurement nor introduces any significant level of commitment in services and investment liberalization.

Our paper speaks to three streams of research. First, we contribute to the literature claiming that preferential liberalization moves hand in hand with and responds to the growing importance of FDI, offshoring and GVCs (Mattli, 1999; Chase, 2003; Blanchard, 2007; Manger, 2009; Blanchard, 2010; Baldwin, 2011; Antràs and Staiger, 2012; Blanchard and Matschke, 2015; Baccini et al., 2017; Blanchard et al., 2017; Bown et al., 2020). To the best our knowledge, ours is the first study showing that trade through GVCs has a causal effect on the depth of PTAs and on the inclusion of specific provisions that facilitate global production activities.

Second, our paper is related to a large body of research assessing the effect of PTAs on trade and FDI. With few exceptions (Rose, 2004), this literature has found that PTAs have a large effect on trade flows between partner countries (Baier and Bergstrand, 2007; Büthe and Milner, 2008; Mansfield and Reinhardt, 2008; Baier et al., 2014; Büthe and Milner, 2014; Dür et al., 2014; Egger and Nigai, 2015; Osnago et al., 2017; Miroudot and Rigo, 2019; Laget et al., 2020; Kox and Rojas-Romagosa, 2020). Our results warn scholars that reverse causality is at play, leading to potentially *overestimating* the impact of preferential liberalization on trade activities.

Third, and more generally, this paper contributes to the literature on the legalization and rational design of international institutions (Abbott et al., 2000; Koremenos et al., 2001). We find empirical support for the hypothesis that the design of trade agreements responds to the preferences and interests of economic actors involved in shaping the structure of GVC trade, including in particular MNEs. Our results suggests that interest groups with stakes in GVC trade have a large influence not only on whether we observe cooperation between countries, but also on the type of cooperation that we observe, e.g. deep or shallow integration. This finding is not specific to trade cooperation, as it has been found to hold in other issue areas, including human rights (Vreeland, 2008; Simmons,

2009), capital flows (Allee and Peinhardt, 2014; Arias et al., 2018), and the environment (Tingley and Tomz, 2014).

The rest of the paper is organized as follows. Section 2 reviews some key mechanisms that inform our expectations on the effect of trade and GVCs activities on PTA design. Section 3 presents the data and our empirical strategy. Estimation results are discussed in Sections 4 and 5. Section 6 concludes.

2 Conceptual framework

Why do countries engage in preferential liberalization? In the international trade and political economy literature, there is growing consensus that the activities of MNEs involved in GVCs such as offshoring and vertical FDI and the resulting splintering of production and value added trade are the main driver of the formation of deep PTAs (Mattli, 1999; Baldwin, 2011; Antràs and Staiger, 2012; Rodrik, 2018). There are several reasons why deep PTAs are appealing for economic actors involved in GVCs.

First, preferential liberalization cuts tariffs on intermediate goods, which make the core of vertical foreign direct investment, i.e. intra-firm trade. In doing so, PTAs reduce production costs for MNEs, which move parts and components from one country to another in an effort to exploit locational advantages. There is convincing empirical evidence supporting this mechanism (Chase, 2003; Blanchard and Matschke, 2015).

Second, the new generation of deeper PTAs includes a large number of investment-related provisions, which protect MNEs' assets in host markets. More recent vintage PTAs also include provisions that liberalize the services sector, allowing large companies operating in sectors such as banking, insurance, telecommunications or logistics to enter foreign markets and enhancing the ability of lead firms in GVCs to move key personnel across borders and (out)source the services needed to support the operation of GVCs. Manger (2009) documents qualitatively how MNEs from major (North) countries advocate for the negotiation of PTAs including investment and services provisions with important host (South) economies in order to gain an edge on direct competitors.

Third, the new generation of PTAs includes stronger dispute settlement mechanisms through which PTA commitments can be enforced. Building on (Maggi and Rodriguez-Clare, 1998) and the earlier political economy literature, Mattli (1999) argues that PTAs help governments to credibly commit to liberalization and investment protection through the *pacta sunt servanda* mechanism embodied in trade agreements. The inclusion of enforceable commitments is valuable to MNEs involved in GVC activities, given they are the economic actors facing the highest risks of direct and indirect expropriation. Kim (2012) shows that the presence of GVCs correlates with the inclusion of strong dispute

settlement mechanisms.

Building on previous studies, we argue that countries heavily involved in trade occuring through GVCs have greater incentives to form deep PTAs than other countries, and that these incentives reflect the interests and preferences of MNEs, which can influence public policy through their lobbying activities. Recent studies show that corporations involved in global production lobby in favor of preferential liberalization during PTA negotiations and substantially outspend import-competing firms and sectors that oppose deeper trade liberalization (Bombardini, 2008; Rönnbäck, 2015; Osgood, 2018; Baccini et al., 2019; Blanga-Gubbay et al., 2020).[3]

In sum, we expect that trade through GVCs makes the formation of deep PTAs more likely. We expect that the effect of GVC-trade is always larger than the effect of gross exports, which also include transactions that do not involve global production activities. Moreover, we expect to see substantial heterogeneity in the effects of trade and GVC activities on narrowly defined dimensions of PTA depth, reflecting the preferences of the major economic actors involved.

While arguments linking interests of multinationals to preferential liberalization are straightforward, the empirical literature has so far struggled to show the causal effect of GVC activities on the formation and the design of trade agreements. Below, we describe our empirical strategy to correctly identify the effect of trade through GVCs on the formation and the design of PTAs, distinguishing it from gross exports and from potential confounders.

3 Data and Empirical Strategy

The first treatment variable in our empirical exercise is a measure of sector specific gross exports from an origin country i to a destination j in sector z at time t (Total exports). We also use two standard measures of GVC activity: the domestic and foreign content of i's total exports to j. Drawing on the work of Wang et al. (2013) and using the terminology of Altomonte et al. (2018), we define domestic content of gross exports (Domestic value) as the sum of domestic value added (DVA), returned domestic value added (RDV) and the domestic component of pure double counting (DDC). The foreign content or vertical specialization (Foreign value - VS) is given instead by the sum of foreign value added (FVA), and the foreign component of pure double counting (FDC). Trade data are sourced from the 2013 release of the World Input Output Database (WIOD) which

[3]Our argument is compatible with the claim that, in the case of large-scale trade involving GVCs, deep trade agreements are optimal policies implemented by a welfare-maximizing central planner. In so far as deep trade agreements lock-in and expand GVCs, multinationals' gains from trade translate into higher productivity, larger volumes of exports, and lower prices for consumers, all of which would boost economic growth. We do not address the distributional effects of trade agreements in this paper.

provides bilateral gross and value added trade flows for 40 countries and 35 sectors during the period 1995-2011. Tables A-1 and A-2 in the Appendix list the countries and sectors included in the WIOD dataset which comprises the country and sector coverage of our estimation sample.

Our outcome variables consist of indicators capturing relevant dimensions of the trade policy regime involving i and j as potential signatories of one or more PTAs active at time t. We start our analysis using a synthetic measure of the depth of PTAs sourced from the DESTA database. This corresponds to the continuous indicator constructed by Dür et al. (2014) through latent trait analysis of almost 50 specific variables that are theoretically related to the depth of an agreement. We rescale the original indicator to have its minimum value over the distribution of all agreements recorded in DESTA equal to 0. Due to the country and time coverage of our econometric exercise (see below) the shallowest agreement considered in our estimation sample has a value of the rescaled DESTA indicator that is strictly bigger than 0. For each country pair ij at each point in time t, we define Depth_{ijt} as the max between 0 and the value of the rescaled DESTA continuous indicator of the most recent PTAs whose signatories include countries i and j and that is active at time t.

The resulting set of specifications used to study the effects of trade and GVCs on PTA depth is given by

$$\text{Depth}_{ijt} = \beta X_{ijtz} + \gamma_{itz} + \gamma_{jtz} + \gamma_{ijz} + \varepsilon_{ijtz} \tag{1}$$

for each variable X_{ijtz} among Total exports_{ijtz} ; Domestic value_{ijtz} ; Foreign value - VS_{ijtz}}. The terms γ_{itz}, γ_{jtz} and γ_{ijz} denote respectively exporter-time-sector, importer-time-sector and exporter-importer-sector fixed effects; ε_{ijtz} is the error term.

As a second step in our empirical exercise we unpack the synthetic indicator of depth and study the effect of trade and GVCs on chapter- and provision-specific dimensions of PTA design. We source detailed information at the chapter and provision level from the World Bank Deep Trade Agreement dataset (Mattoo et al., 2020). We introduce a set of chapter-level outcome variables that are functions of dichotomous indicators for PTAs including a chapter on services, on investment, and on State Owned Enterprises (SOEs). We complement these three dimensions of depth with a fourth one that identifies PTAs with a specific chapter on dispute settlement.[4]

Nine additional outcome variables capture provision-specific dimensions of PTAs, sourced from the World Bank Deep Trade Agreement dataset. This set of dependent variables comprise binary indicators that are functions of specific provisions. We organize them in terms of the relationship of each provision with the multilateral trade policy regime

[4]For this fourth dimension we source information from the DESTA database as the World Bank Deep Trade Agreement database does not code the existence of a dispute settlement chapter across PTAs.

embodied in the WTO. More precisely, we classify them in three categories: 'WTO-same', when the content of the provision perfectly overlaps with extant WTO disciplines; 'WTO-plus', when the provision builds on a WTO policy issue, but goes substantially further in defining applicable disciplines; and 'WTO-extra', when the provision addresses a policy area that is not covered by the WTO. Table 1 reports the nine provisions – taken from the Services, Investment and SOEs chapters of (Mattoo et al., 2020) – from which we derive our last set of outcome variables.

Table 1: Provisions

Category	Chapter	Provision
	Services	Does the services chapter contain an MFN provision?
WTO-same	Services	Does the PTA follow a positive list approach for scheduling/reservations?
	SOEs	Does the PTA cover state trading enterprises?
	Services	Does the PTA follow a negative list approach for scheduling/reservations?
WTO-plus	Services	Does the PTA contain provisions to discipline monopolies?
	SOEs	Does the PTA provide for an obligation [for SOEs] to accord fair and equitable treatment?
	Investment	Does the PTA provide for NT in the investment establishment/acquisition phase?
WTO-extra	Investment	Does the PTA provide for MFN treatment in the investment establishment/acquisition phase?
	SOEs	Does the PTA requires transparency of ownership, governance and financial information?

Notes: Descriptions of the relevant provisions are adapted from Mattoo et al. (2020).

The analytical focus on four specific chapters reflects the conceptual framework discussed in Section 2, where the design of PTAs is seen as a function of the needs and interests of economic actors involved in GVCs, notably MNEs. Following that discussion we select chapters that are particularly relevant for the GVC operations of MNEs: trade in services, investment policies, behavior of SOEs and enforceability of commitments (dispute settlement). While many other features of PTA design, such as public procurement or non-trade issues such as labour rights or environmental protection, might also be very pertinent to MNEs, the four chapters chosen for the empirical analysis represent a parsimonious selection of what the literature suggests are policy areas of first-order importance to MNEs that operate GVCs. Given our aim of providing a first, tractable set of provisions for each of the three categories 'WTO-same', 'WTO-plus' and 'WTO-extra' we limit our selection of individual provisions of the services, investment and SOE chapters of PTAs to three provisions per chapter. A more comprehensive mapping between categories (chapters) and the vast population of provisions coded in the World Bank handbook data is left for future research.

Each chapter- or provision-specific binary indicator Y takes value one for a country pair ij at time t, if there is at least a PTA signed by both i and j which is active at t and that includes the relevant chapter or provision. For each of those outcome variables Y, we fit a set of linear probability models given by the following equations:

$$\mathrm{Y}_{ijt} = \beta X_{ijtz} + \gamma_{itz} + \gamma_{jtz} + \gamma_{ijz} + \varepsilon_{ijtz} \tag{2}$$

for each $X_{ijtz} \in \{\text{Total exports}_{ijtz}\ \ \text{Domestic value}_{ijtz}\ \ \text{Foreign value - VS}_{ijtz}\}$, where γ_{itz},

γ_{jtz}, γ_{ijz} and ε_{ijtz} are defined as in Equation 1 above.

3.1 Instrumental variable identification strategy

Both set of specifications 1 and 2 are affected by endogeneity of the trade and GVC performance variables. We address this problem by instrumenting gross exports and its value added components with the respective flows predicted through a gravity model augmented with three triple interactions. Th first two elements of each interaction term are always the same and consist of the maximum size of container ships operating in a given year, and the number of ports that are present in the destination country capable of accommodating the largest ship in the whole sample period (normalized by the number of kilometers of its coast). The third factor in the interactions is in turn one of three dyadic controls normally included in the gravity specification, i.e., the logarithm of bilateral distance, a dummy for contiguity, and one for land-lockedness. The rationale of this approach consists of generating – for each endogenous trade variable – a corresponding instrument whose variation, adequately cleansed of all sources of confounding heterogeneity, would only reflect drivers of trade performance which are completely exogenous to the design of trade agreements.

Formally, for each $X_{ijtz} \in \{\text{Total exports}_{ijtz} \quad \text{Domestic value}_{ijtz} \quad \text{Foreign value - VS}_{ijtz}\}$ we construct the respective instrument as the predicted values $\hat{X}_{ijtz}$ from a gravity specification estimated with Poisson-Pseudo-maximum-Likeliohood (PPML) where X_{ijtz} is the dependent variable and the right-hand-side features exporter-time-sector (itz), importer-time-sector (jtz), and exporter-importer-sector (ijz) fixed effects and the column vector $\mathbf{Z}_{ijt}$ defined as follows

$$\mathbf{Z}_{ijt} = DWP_j \times \log MaxSize_t \begin{bmatrix} Distance_{ij} \\ Contiguity_{ij} \\ Landlocked_{ij} \end{bmatrix} \tag{3}$$

The data required for the construction of the instruments are taken from different sources. The standard gravity bilateral variables (Distance, Contiguity and Landlocked) are sourced from the CEPII database (Head et al., 2010). The variables $MaxSize_t$ and DWP_j are from Altomonte et al. (2018).[5] $MaxSize_t$ is the maximum size of container ships expressed in TEU.[6] The sharp increase in this variable from 5,000 to 15,500 TEU from 1995 to 2007 is the key exogenous variation for our identification strategy. Altomonte et al. (2018) show that the new larger ships were widely adopted by market operators during

[5]Estimation results from the gravity exercise are reported in Table B-1.

[6]TEU stands for Twenty-foot Equivalent Unit which is unit of cargo capacity generally used to describe the capacity of container ships and container terminals. 1 TEU corresponds to the capacity to accommodate one standard intermodal container which is 6.1 meters (20 ft) long and 2.44 meters (8 ft) wide. No precise standard exists on height, although the most common measure is 2.59 meters (8.6 ft), so as to fit into railway tunnels.

the same period allowing this technological innovation to have an immediate effect on trade flows. Among the many technical features of larger container ships one is particularly relevant for our purposes: the increasing depth of the ships' maximum drafts (i.e. the distance between the waterline and the lowest point of the keel). Larger ships have deeper maximum drafts and therefore they can only access ports where the water is deep enough.

The variable DWP_j is equal to the number of ports in partner country j that had a water depth of at least 16 meters since 1995 and that were also endowed with a container terminal, divided by the length in kilometers of country j's coastline.[7] A relevant water depth of at least 16 meters and the presence of a container terminal are the necessary and sufficient conditions for a port to accommodate, load and unload all the new container ships introduced between 1995 and 2007.[8] Altomonte et al. (2018) collected the raw data on 3,528 ports in the 40 countries covered in WIOD using multiple sources and techniques, including text analysis of the website `worldportsource.com` and email and phone interviews. This data collection exercise led to the identification of 47 deep-water ports meeting the two identification criteria – i.e., depth of at least 16 meters and presence of a container terminal – for the whole sample period.[9] We refers the reader to Altomonte et al. (2018) for further details and descriptives on the construction of the instrument.

The term $DWP_j \times \log MaxSize_t$ in equation 3 reflects the main intuition informing bour identification strategy: the adoption of new larger ships decreases transportation costs; however exports increase relatively more towards partner countries that are endowed with more deep-water ports. Identification thus relies on the exogenous shock to transportation cost embedded in the composition of two factors: the presence of DWPs in partner countries and the increase in the size of container ships over time. The vector of dyadic variables used in the construction of $\mathbf{Z}_{ijt}$ serves the purpose of allowing this shock in transportation technology to shape bilateral gross and value added trade flows differently depending on the bilateral distance, contiguity, and land-lockedness of each pair of trading

[7]For a port to be counted in, the depth has to be at least 16 meters both at the quays where ships get loaded/unloaded and at the canal that must be used to access the quays.

[8]The largest series of ships introduced during our sample period, with Emma Maersk being the first produced in 2006, have a maximum draft of 15.5 meters.

[9]Relevant for identification is the fact that only 4 ports in WIOD countries satisfied the identification criteria only few years after 1995 but before 2007: Manzanillo in Mexico, where artificial dredging above 16 meters has happened in the early 2000s; and Ambarli in Turkey; Marsaxlokk in Malta; and Sines in Portugal, where water depth was always greater than 16 meters, but a container terminal was only added over the sample period, after 2002. These ports are excluded from the analysis. After 2010 many US ports (and a number of ports in developing countries) have been artificially deepened through dredging, potentially creating problems with the exclusion restriction on a sample period covering more recent years (see discussion below in the main text). This and the difficulties to instrument trade flows during the Global Financial Crisis of 2008 and 2009 are two reasons behind the decision to limit the sample period to 2007. Moreover, while the maximum size of containerships increases to 18,000 and 21,000 TEU between 2013 and 2018, the maximum draft attained in 2006 remains constant at 15.5/16m even for the larger ships, hence the number of ports satisfying the identification criteria from 1995 to 2018 remains constant.

partners. The main effect of these variables on PTA design is subsumed in the fixed effects and therefore does not pose any threat to the exclusion restriction. The variation given by these triple interactions is the one ultimately used for identification. The excludability of the resulting instrumental variables rests on the assumption that, conditional on controls (including fixed effects subsuming observable and unobservable heterogeneity at the it, jt and ij level), the composition of the three factors in each element of $\mathbf{Z}_{ijt}$ only affects the design of PTAs through their impact on gross and value added trade flows.

We are confident that this is the case. Assume for instance the case where the investment required for the construction of a DWP in country j came largely from country i. Given that we only focus on DWPs that are operational throughout the sample period of our exercise, this case would create an ij-specific tension such that the pre-sample investment of i into j's DWP could potentially shape the incentives to deepen the investment dimension in ij bilateral policy relationship through trade agreements, thus making the number of DWP in j endogenous to the depth of PTAs between i and j. This is not an issue for our identification as the ij-specific tension is controlled for by the dyadic fixed effects. Another concern arises from potential linkages among PTAs. It might be case that the depth of a PTA signed during the sample period is a function of the design of previous PTAs with the legal property of constraining the negotiating space of one or more of the signatory parties in the new agreement. Therefore, the fact that new PTAs are deep(er) than the average agreement may be rooted in a period prior to the shock conferring exogenous variation to our instrument. We deal with this potential concern through a demanding battery of fixed effects: our identification strategy allows to control for any i or j or even ij idiosyncratic constraints in negotiating new agreements coming from the pre-sample period and therefore addresses this type of endogeneity concern.

3.2 Estimation sample

Combining all data sources to fit our regression equations we obtain a panel of 637,455 observations featuring 40 reporting and partner countries, and up to 35 sectors for the period 1995-2007.[10] Given this sample, the information on trade policy used to construct our dependent variables comes from those agreements signed until 2007 where at least two signatories belong to the sample of 40 WIOD countries. These amount to 160 agreements in the DESTA data (20% of all agreements in DESTA signed until 2007) and to 24 PTAs in the World Bank Deep Trade Agreements database (12.5% of all agreements in the World Bank data signed up to 2007). Appendix Table A-3 reports summary statistics for the main variables used in the regression analysis.

[10]WIOD has a few missing sectoral trade flows for certain country pairs especially in the first years of the sample.

4 Trade, GVCs and Depth

We start by presenting our estimation results from the exercise that investigates the causal effect of trade and GVC intensity on the broad and comprehensive indicator of depth available in the DESTA database.

4.1 Baseline results

Table 2 reports the 2SLS estimated coefficients of equation 1 specified for each of the three treatments of interest – Total exports, Domestic value and Foreign value-VS – instrumented with their augmented gravity predicted values as illustrated in Section 3.1. The results reveal a positive and statistically significant causal effect of Foreign value on depth (column 3). To get a better sense of the economic meaning of this point estimate, consider increasing the foreign value added component of bilateral exports in any sector by two standard deviations. This equals a change of roughly half a billion USD, the difference between the average foreign value added content of French sector-level exports to Germany over our sample period and that of Lithuanian exports to South Korea. According to our estimate, the effect of this rise in GVC- activity would be an increase in the level of PTA depth by 35% of the sample average. This effect roughly corresponds to moving from the depth of the EC-Jordan Euro-Med Association Agreement (at the 67th percentile in the unconditional distribution of depth considering all agreements coded in DESTA) to that of the EC Europe Agreements with Estonia, Latvia and Lithuania (between the 78th and 81st percentile). As noted above, this increase in depth is a significant one: the EC-Jordan Association Agreement does not incorporate commitments on services trade and investment liberalization of the type found in the Europe Agreements, which were a stepping stone for accession to the European Union and thus engage more deeply and comprehensively with many trade related issue areas (Hoekman and Djankov, 1997).

Table 2: Trade, GVCs and Depth - Baseline estimates

Outcome variable	Depth		
	(1)	(2)	(3)
Total exports	-0.0661		
	(0.3342)		
Domestic value		-2.8760	
		(2.2799)	
Foreign value-VS			0.7044***
			(0.2379)
Observations	637,455	637,455	637,455
ITZ FEs	YES	YES	YES
JTZ FEs	YES	YES	YES
IJZ FEs	YES	YES	YES
$\hat{X}$	-0.238	-0.0425	-0.385
KL F-stat	16.37	2.917	84.58
KP LM underid.	18.87	3.341	101.5

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

No effect is found for Domestic value, suggesting that foreign value added embedded in

gross exports is the key dimension of GVC performance shaping the broad and comprehensive value of PTAs' depth. This is consistent with the idea that the foreign value added embedded in gross exports from i to j directly reflects incentives of economic actors active in GVCs beyond the bilateral trade relationship at stake (such as foreign suppliers to, or vertically integrated multinationals active in the exporting country) and therefore captures additional pressures for deeper integration. Moreover, from the perspective of economic actors in the importing country j, high foreign value added embedded in i's exports to j reveals i's role as a hub for foreign value added ultimately reaching j's market and therefore potentially incentivizing stronger incentives for deep integration with i. Gross exports seem to exert no causal effect on the broad and comprehensive Depth indicator, which reinforces the notion that GVC activities such as offshoring and vertical FDI are the main trade dimensions impacting on the incentives to negotiate deeper PTAs.

4.2 Robustness tests

We now test the baseline results presented above with a number of robustness checks. First Table 3 reports estimates derived by replicating equation 1 only using trade data for the top one or top two most traded sectors within each country pair on average over time. Foreign value-VS remains the only trade variable to have a positive causal effect on Depth. The magnitude of the effect also substantially increases, by a factor of 9 when using only the first most traded sector,b and by a factor of 5 when using the top two traded sectors. While confirming the general patterns, these results highlight how the effect of GVC activities is driven by sectors that are most important for a given trade relationship.

Table 3: Trade, GVCs and Depth - Highest trade sectors

Outcome variable	Depth					
Sectors	1st traded sector			1st and 2nd traded sectors		
	(1)	(2)	(3)	(4)	(5)	(6)
Total exports	3.4653			0.9844		
	(2.8019)			(0.7193)		
Domestic value		6.3119			1.2858	
		(6.6978)			(1.0389)	
Foreign value-VS			6.1495*			3.8842**
			(3.6529)			(1.9367)
Observations	19,951	19,951	19,951	38,417	38,417	38,417
ITZ FEs	YES	YES	YES	YES	YES	YES
JTZ FEs	YES	YES	YES	YES	YES	YES
IJZ FEs	YES	YES	YES	YES	YES	YES
$\hat{X}$	0.0808	0.0490	0.0362	0.324	0.273	0.0685
KL F-stat	2.013	1.005	7.248	2.259	1.775	6.224
KP LM underid.	2.429	1.197	8.928	2.635	2.068	7.258

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In a second exercise we replicate the baseline specification after removing all country pairs that include China from the estimation sample. Results reported in Table 4 strongly

confirm the baseline patterns reassuring that our findings are not driven by the rapid rise of Chinese trade during our sample period.

Table 4: Trade, GVCs and Depth - Removing China

Outcome variable	Depth		
	(1)	(2)	(3)
Total exports	1.5221		
	(1.1190)		
Domestic value		0.5817	
		(3.0864)	
Foreign value-VS			1.0603***
			(0.3045)
Observations	607,839	607,839	607,839
ITZ FEs	YES	YES	YES
JTZ FEs	YES	YES	YES
IJZ FEs	YES	YES	YES
Linear Prediction	-0.102	0.0222	-0.347
KL F-stat	3.918	0.980	68.14
KP LM underid.	4.526	1.132	81.91

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Moreover, our baseline results are consistent with the causal effects estimated preserving variation across the ijz dimension for identification. Those estimates are reported in Appendix Table C-1 and reveal a strong, positive and statistically significant effect for all three trade and GVC regressors. According to those estimates, a one standard deviation increase in a sector's gross exports or Domestic value would lead to an increase in Depth by approximately 160% of its sample average. Instead, adding one standard deviation to any sector's Foreign value-VS would increase depth by 200% of its sample average. While we regard these results as supportive of the baseline finding in Table 2, we consider the specifications without ijz fixed effects prone to potential endogeneity issues as discussed in Section 3.1 and thus possible overestimation of the effect of trade and GVCs on depth. We retain the results presented in Table 2 as our preferred set of estimates.

Finally, our baseline findings are not altered when the inference on the point estimates is conducted using standard errors clustered at the ijz level. Results are reported in Appendix Table C-2.

5 Unpacking depth: from DESTA to the World Bank DTA data

GVCs have a positive causal effect on PTAs' depth as measured by the synthetic and comprehensive indicator available in DESTA. We now turn to unpacking the notion of depth and investigate the effect of trade and GVC intensity on the set of chapter- and provision-specific indicators as discussed in Section 3.

Table 5 reports the 2SLS estimates for specification 2 where the dependent variables take value one when there is at least one PTA active between two countries that includes a

chapter on dispute settlement (columns 1-3), on services liberalization (columns 4-6), on investment (7-9), and on SOEs (10-12). These results introduce heterogeneity in the effects of trade and GVC performance across narrowly defined dimensions of PTA design. The foreign value added embedded in gross exports has a positive and statistically significant effect on the probability of having a PTA featuring a dispute settlement provision or an investment provision, while it has a negative and significant effect when we turn to the services and SOEs chapters. The probability that a country pair has an active PTA featuring an investment provision is positively affected by bilateral gross exports as well as by their domestic value added component. With the exception of total exports in the SOE chapter specification (column 10), these two treatments never reach statistical significance.

Table 5: Trade, GVCs and Specific Chapters

Outcome variable	Dispute settlement			Services			Investment			SOEs		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total exports	0.2391			-0.0013			0.0978***			-0.7942***		
	(0.1578)			(0.0152)			(0.0079)			(0.0608)		
Domestic value		0.0274			-6.0593			0.1940*			-4.6159	
		(0.6429)			(3.7199)			(0.1165)			(2.9237)	
Foreign value-VS			0.2876***			-0.6316***			0.1529***			-3.3747***
			(0.1097)			(0.1474)			(0.0176)			(0.3801)
Observations	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455
ITZ FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
JTZ FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
IJZ FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
KL F-stat	16.37	2.917	84.58	193.8	2.917	84.58	193.8	2.917	84.58	193.8	2.917	84.58
KP LM underid.	18.87	3.341	101.5	228	3.341	101.5	228	3.341	101.5	228	3.341	101.5

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Further heterogeneity emerges when we estimate the effect of trade and GVC performance on the probability of having a PTA featuring a specific provision. The provision-level analysis allows us to better organize these heterogeneous effects and to propose an empirically supported economic explanation to rationalize our findings in terms of the relationship between the content of PTAs and the multilateral trade policy regime embodied in the WTO (see discussion in Section 3).

Estimates reported in Table 6 reveal that GVC performance as captured by the foreign value added in gross exports has a positive and statistically significant effect on the probability to have a PTA featuring a 'WTO-plus' or 'WTO-extra' provision while it has a statistically significant negative impact on the probability to have a PTA featuring a 'WTO-same' type provisions. In other words, more GVC-intensive trade between two countries tends to increase the probability that deep PTA-based integration between the partners involved goes in the direction of extending and complementing the WTO regime. Conversely, weaker GVC activities are associated with a type of deep integration that locks in or confirms the existing multilateral trade policy disciplines found in the WTO.

Moreover, these results show that the Total exports variable has a similar positive and statistically significant effect on the probability that a bilateral trade policy relationship is

Table 6: Trade, GVCs and Specific Provisions

Panel A: WTO-same									
Chapter	Services			Services			SOEs		
Provision	MFN provision			Positive list (as in GATS)			Coverage of STEs		
Total exports	-0.0161			-0.0313**			0.0279***		
	(0.0125)			(0.0130)			(0.0092)		
Domestic value		-0.4449			-0.7100*			-5.0174	
		(0.2767)			(0.4254)			(3.1436)	
Foreign value-VS			-0.0974***			-0.1544***			-0.3748***
			(0.0270)			(0.0301)			(0.1364)
Panel B: WTO-plus									
Chapter	Services			Services			SOEs		
Provision	Negative list (as in NAFTA)			Provisions to discipline monopolies			Oblig. to accord fair treatment		
Total exports	0.0631***			0.1448***			0.0234***		
	(0.0053)			(0.0139)			(0.0026)		
Domestic value		0.1445*			2.7092*			-0.0050	
		(0.0859)			(1.6384)			(0.0138)	
Foreign value-VS			0.1023***			0.6549***			0.0283***
			(0.0121)			(0.0891)			(0.0042)
Panel C: WTO-extra									
Chapter	Investment			Investment			SOEs		
Provision	NT in establishment/acquisition			MFN in establishment/acquisition			Transparency of governance		
Total exports	0.0989***			0.1223***			0.0354***		
	(0.0082)			(0.0099)			(0.0035)		
Domestic value		0.0835			0.0784			0.0346	
		(0.0601)			(0.0254)			(0.0376)	
Foreign value-VS			0.1415***			0.1699***			0.0517***
			(0.0166)			(0.0197)			(0.0069)
Observations	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455	637,455
ITZ FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES
JTZ FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES
IJZ FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: The provisions drawn from Mattoo et al. (2020) are as follows. From the services chapter: 'MFN provision' stands for 'Does the agreement/services chapter contain an MFN provision?'; 'Positive list (as in GATS)' for 'Approach followed in the case of disciplines subject to scheduling/reservations : Positive list (as in GATS)'; 'Negative list (as in NAFTA)' for 'Approach followed in the case of disciplines subject to scheduling/reservations : Negative list (as in NAFTA)'; 'Provision to discipline monopolies' for 'Does the agreement contain provisions to discipline monopolies?'. From the SOEs chapter: 'Coverage of STEs' stands for 'Does the agreement cover state trading enterprises?'; 'Oblig. to accord fair treatment' for 'Does the agreement provide for an obligation [for state enterprises] to accord fair and equitable treatment?'; 'Transparency of governance' for 'Does the agreement requires transparency of ownership, governance and financial information?'. From the investment chapter: 'NT (MFN) in establishment/acquisition' stands for 'Does the agreement provide for NT (MFN treatment) in the establishment/acquisition phase of the investment?'. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

characterized by PTAs featuring 'WTO-plus' or 'WTO-extra' provisions. This sheds new light on the causal relationship between trade and PTAs design which our exercise looking at the Depth indicator failed to identify. The effect of gross exports on provisions that go beyond the WTO might be driven by the value added component embedded in the gross measure but also by additional mechanisms. While the discussion of such mechanisms and the decomposition of the estimated effect of gross esports lay outside the scope of the paper we stress the empirical finding of a causal linkage from trade flows to these important features of PTAs' design.

The chapter level results presented in Table 5 are largely consistent with the empirical regularity of a positive effect of trade and GVCs on 'WTO-plus' and 'WTO-extra' dimensions of PTAs design as illustrated by the analysis across specific provisions. Indeed the positive and significant effects in Table 5 are concentrated on the Investment chapter which is an inherently 'WTO-extra' dimension of PTAs' integration. Negative estimates are present instead for the services and SOEs chapters where many provisions usually included in PTAs do not go beyond the WTO.

6 Conclusion

This paper explores the causal effect of GVCs on the design of trade agreements. We find that GVC-based trade, and in particular the foreign value added component of exports increases the depth of PTAs. Our results also show that trade and GVC intensity have heterogeneous effects on the probability of including broadly identified chapters across different issue areas. However, we find that trade through GVCs systematically increases the probability of including a number of narrowly defined 'WTO-plus' and 'WTO-extra' provisions in PTAs. Finally, we show that when looking at specific provisions the effect of GVC trade intensity tends to be larger than the effect of gross exports, which also include activities unrelated to global production.

Our analysis can be extended along many dimensions. First of all, widening the country and time coverage of the empirical framework presented in this paper or complementing it with a focus on a different set of countries or time period, would allow to test the external validity of our exercise. Moreover, while the choice of specific elements of PTA design used in the empirical analysis reflects a deliberate parsimonious approach, investigating the effect of GVC-based trade on a broader set of design features represents a promising avenue for future research. In particular, looking at the impact on non-trade issues such as labour rights and environmental sustainability could shed new light on the incentives of GVC actors to use trade agreements to achieve non-trade objectives. Finally, the GVC literature, both at the sectoral and at the firm level, offers a broad set of potential measures to characterize the activities of economic actors in GVCs. Tackling the research question addressed in this paper with different empirical tools can offer complementary perspectives and potentially a more granular understanding of the drivers of deeper trade agreements.

The implications of our findings are important and timely. PTAs have become deeper and deeper over time, a trend that appeared impossible to reverse or even to stop. However, our findings show that – for the period under analysis – this trend has been affected by the expansion of GVCs. Protectionist policies implemented by populist parties and the COVID-19 pandemic are likely to contract GVCs at least for the near future. If this is the case, the GVC related incentives to pursue deep PTAs might be reduced in the future.

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Appendix

A Data and summary statistics

Table A-1: List of countries

Australia	Estonia	Japan	Romania
Austria	Finland	Korea	Russian Federation
Belgium	France	Latvia	Slovakia
Brazil	Germany	Lithuania	Slovenia
Bulgaria	Greece	Luxembourg	Spain
Canada	Hungary	Malta	Sweden
China	India	Mexico	Taiwan
Cyprus	Indonesia	Netherlands	Turkey
Czechia	Ireland	Poland	UK
Denmark	Italy	Portugal	US

Notes: The table reports the list of countries included in the WIOD sample.

Table A-2: List of sectors

WIOD code	Description	WIOD code	Description
c01	Agriculture; Hunting; Forestry and Fishing	c19	Sale, Maint. and Repair of Motor V.; Retail Sale of Fuel
c02	Mining and Quarrying	c20	Wholesale Trade and Commission Trade except Motor V.
c03	Food, Beverages and Tobacco	c21	Retail Trade except Motor V.; Repair of HH Goods
c04	Textiles and Textile Products	c22	Hotels and Restaurants
c05	Leather, Leather and Footwear	c23	Inland Transport
c06	Wood and Products of Wood and Cork	c24	Water Transport
c07	Pulp, Paper, Printing and Publishing	c25	Air Transport
c08	Coke, Refined Petroleum and Nuclear Fuel	c26	Other Supporting and Auxiliary Transport Activ.
c09	Chemicals and Chemical Products	c27	Post and Telecommunications
c10	Rubber and Plastics	c28	Financial Intermediation
c11	Other Non-Metallic Mineral	c29	Real Estate Activities
c12	Basic Metals and Fabricated Metal	c30	Renting of M&Eq and Other Business Activities
c13	Machinery, Nec	c31	Public Admin and Defence; Compulsory Social Security
c14	Electrical and Optical Equipment	c32	Education
c15	Transport Equipment	c33	Health and Social Work
c16	Manufacturing, Nec; Recycling	c34	Other Community, Social and Personal Services
c17	Electricity, Gas and Water Supply	c35	Private Households With Employed Persons
c18	Construction		

Notes: The table reports the list of industries included in the WIOD sample.

Table A-3: Variables' sources and summary statistics on estimation sample

Variable	mean	p50	sd	min	max
Trade policy data from DESTA					
Depth	1.039	0.000	1.171	0	3.611
Dispute settlement chapter	0.449	0.000	0.497	0	1
Trade policy data from WB DTA					
Services chapter	0.031	0.000	0.173	0	1
MFN provision	0.029	0.000	0.167	0	1
Positive list (as in GATS)	0.024	0.000	0.154	0	1
Negative list (as in NAFTA)	0.005	0.000	0.070	0	1
Provisions to discipline monopolies	0.007	0.000	0.086	0	1
Investment chapter	0.005	0.000	0.073	0	1
NT in establishment/acquisition	0.005	0.000	0.072	0	1
MFN in establishment/acquisition	0.006	0.000	0.074	0	1
SOEs chapter	0.317	0.000	0.465	0	1
Coverage of STEs	0.028	0.000	0.165	0	1
Oblig. to accord fair treatment	0.000	0.000	0.018	0	1
Transparency of governance	0.001	0.000	0.023	0	1
Gross and VA trade from WIOD					
Total exports	11.143	0.190	86.223	0	12872.019
Domestic value	8.590	0.145	64.293	0	8403.706
Foreign value-VS	2.553	0.033	26.299	0	4468.312

Notes: Trade variables are reported in this table in USD tens million while their unit of measure in regressions is USD billion. Longer descriptions of the provisions included in the table as reported by the in Mattoo et al. (2020) are as follows. From the services chapter: 'MFN provision' stands for 'Does the agreement/services chapter contain an MFN provision?'; 'Positive list (as in GATS)' for 'Approach followed in the case of disciplines subject to scheduling/reservations : Positive list (as in GATS)'; 'Negative list (as in NAFTA)' for 'Approach followed in the case of disciplines subject to scheduling/reservations : Negative list (as in NAFTA)'; 'Provision to discipline monopolies' for 'Does the agreement contain provisions to discipline monopolies?'. From the SOEs chapter: 'Coverage of STEs' stands for 'Does the agreement cover state trading enterprises?'; 'Oblig. to accord fair treatment' for 'Does the agreement provide for an obligation [for state enterprises] to accord fair and equitable treatment?'; 'Transparency of governance' for 'Does the agreement requires transparency of ownership, governance and financial information?'. From the investment chapter: 'NT (MFN) in establishment/acquisition' stands for 'Does the agreement provide for NT (MFN treatment) in the establishment/acquisition phase of the investment?'.

B Construction of the instrument

Table B-1: Gravity estimates

Outcome variable	Total exports		Domestic value		Foreign value - VS	
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	-0.6899***		-0.6757***		-0.7369***	
	(0.0043)		(0.0043)		(0.0050)	
Distance* Part. DWPs * ln(MaxSize)	0.3342***	-1.3153	0.3911***	-1.6014	0.0788	-0.0867
	(0.0878)	(1.2360)	(0.0873)	(1.2929)	(0.1023)	(1.1945)
Contiguity	0.5302***		0.5384***		0.5127***	
	(0.0113)		(0.0114)		(0.0130)	
Contiguity * Part. DWPs * ln(MaxSize)	-1.4398***	-8.9296**	-1.3136***	-9.1468**	-2.1592***	-8.8424**
	(0.3086)	(3.5796)	(0.3156)	(3.7688)	(0.3463)	(3.4525)
Landlocked	-0.0949***		-0.1407***		0.0273	
	(0.0302)		(0.0275)		(0.0371)	
Landlocked * Part. DWPs * ln(MaxSize)	2.6158***	-13.4035***	2.7547***	-17.7389***	1.9650***	-9.1515**
	(0.2255)	(4.3769)	(0.2259)	(4.4471)	(0.2469)	(3.7720)
Observations	637,588	637,455	637,588	637,455	635,550	635,437
ITZ FEs	YES	YES	YES	YES	YES	YES
JTZ FEs	YES	YES	YES	YES	YES	YES
IJZ FEs	NO	YES	NO	YES	NO	YES

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

C Other robustness tests

Table C-1: Removing ijz fixed effects

Outcome variable	Depth		
	(1)	(2)	(3)
Total exports	1.9187***		
	(0.0442)		
Domestic value		2.5392***	
		(0.0547)	
Foreign value-VS			7.8532***
			(0.2600)
Observations	637,455	637,455	637,455
ITZ FEs	YES	YES	YES
JTZ FEs	YES	YES	YES
IJZ FEs	NO	NO	NO
Linear Prediction	0.277	0.210	0.0656
KL F-stat	1760	1985	888.2
KP LM underidentification	1752	1961	912.1

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C-2: Clustering standard errors at the ijz level

Outcome variable	Depth		
	(1)	(2)	(3)
Total exports	-0.0661		
	(0.3864)		
Domestic value		-2.8760	
		(3.6048)	
Foreign value-VS			0.7044**
			(0.3107)
Observations	637,455	637,455	637,455
ITZ FEs	YES	YES	YES
JTZ FEs	YES	YES	YES
IJZ FEs	YES	YES	YES
Linear Prediction	-0.238	-0.0425	-0.385
KL F-stat	4.840	0.856	26.61
KP LM underidentification	5.127	0.901	29.30

Notes: Standard errors in parentheses are clustered at the ijz level. *** p<0.01, ** p<0.05, * p<0.1