HOW FAR HAS GLOBALIZATION GONE? A TALE OF TWO REGIONS

2023

BANCO DE ESPAÑA
Eurosistema

Documentos de Trabajo
N.º 2329

Rodolfo Campos, Samuel Pienknagura and Jacopo Timini

HOW FAR HAS GLOBALIZATION GONE? A TALE OF TWO REGIONS (*)

Rodolfo Campos

BANCO DE ESPAÑA

Samuel Pienknagura

INTERNATIONAL MONETARY FUND

Jacopo Timini

BANCO DE ESPAÑA

(*) The views expressed in this paper are those of the authors and do not necessarily represent the views of the Banco de España or the Eurosystem, nor those of the International Monetary Fund (IMF). We thank Gustavo Adler, Luciana Juvenal, Rafael Machado Parente, an anonymous referee, and participants at the Research Seminar at the Banco de España and IMF Western Hemisphere Department Seminar for their comments.

https://doi.org/10.53479/34612

Documentos de Trabajo. N.º 2329

October 2023

The Working Paper Series seeks to disseminate original research in economics and finance. All papers have been anonymously refereed. By publishing these papers, the Banco de España aims to contribute to economic analysis and, in particular, to knowledge of the Spanish economy and its international environment.

The opinions and analyses in the Working Paper Series are the responsibility of the authors and, therefore, do not necessarily coincide with those of the Banco de España or the Eurosystem.

The Banco de España disseminates its main reports and most of its publications via the Internet at the following website: http://www.bde.es.

ISSN: 1579-8666 (on line)

Abstract

We study the globalization of trade in Latin America and Asia over the past 25 years and quantify its economic impact. Employing structural gravity models, we first estimate a proxy of trade globalization that captures the ease of trading internationally with respect to trading domestically. The results indicate similar trade globalization patterns in the two regions, albeit with a high degree of heterogeneity within them. Trade globalization has been particularly strong in agriculture, mining and manufacturing, but has lagged in services. Within-region heterogeneity is associated with a set of trade policy instruments, including tariffs, non-tariff measures, WTO membership and trade agreements. Next, we quantify the economic implications of the estimated globalization trends. Simulations of a multi-sector trade model point to heterogeneous long-term impacts of globalization on GDP (some countries exhibiting substantial gains and others experiencing large losses), with no single sector playing a predominant role.

Keywords: trade, globalization, structural gravity, Latin America, Asia.

JEL classification: F13, F14, F15.

Resumen

En este documento estudiamos la evolución de la globalización comercial en América Latina y Asia durante los últimos 25 años y cuantificamos su impacto económico. Basándonos en modelos de gravedad estructural, estimamos un *proxy* de la globalización del comercio que captura la facilidad de comerciar a escala internacional con respecto a comerciar a escala nacional. Los resultados indican patrones similares de globalización del comercio entre las dos regiones, pero un alto grado de heterogeneidad dentro de ellas. La globalización del comercio ha sido particularmente fuerte en la agricultura, la minería y las manufacturas, pero se ha rezagado en los servicios. La heterogeneidad dentro de la región está asociada a un conjunto de instrumentos de política comercial, incluidos los aranceles, las medidas no arancelarias, la membresía en la Organización Mundial del Comercio y los acuerdos comerciales. A continuación, cuantificamos las implicaciones económicas de las tendencias de globalización estimadas. Las simulaciones de un modelo de comercio multisectorial apuntan a impactos heterogéneos a largo plazo de la globalización en el PIB (algunos países muestran ganancias sustanciales y otros experimentan grandes pérdidas), sin que ningún sector desempeñe un papel preponderante.

Palabras clave: comercio, globalización, modelos de gravedad estructural, América Latina, Asia.

Códigos JEL: F13, F14, F15.

1. INTRODUCTION

How far has trade globalization gone and how large are its economic benefits? In light of the weak global trade growth experienced since the financial crisis of 2008, a growing body of literature studying a phenomenon often referred to as "deglobalization" or "slowbalization" has emerged (see, e.g., Cabrillac et al., 2016; Irwin, 2020; and Antras, 2020). However, Baldwin (2022) and Kataryniuk et al. (2021) recently argued that rather than stalling, globalization is changing, from trade in goods to trade in services, and moving along different geographies – something hidden in aggregate statistics. In parallel, recent contributions have assessed the heterogenous gains from trade globalization. Costinot and Rodriguez-Clare (2014, 2018) argue that the implied gains from globalization stemming from empirical trade models vary substantially depending on the underlying assumptions of the model. Looking at micro-data, Artuc, Rijkers and Porto (2019) find heterogenous gains from trade along the income distribution.

In this paper we study two regions that devoted great efforts to increase their integration in the world economy, Asia and Latin America, and examine the similarities and differences of such processes in the recent period, comparing both *between and within* regions, and across sectors. We then assess how these globalization patterns impact aggregate income; a key question given stark differences in economic performance between and within the two regions.

Between the 1980s and the mid-1990s, Asia and Latin America – in line with most advanced and emerging countries – implemented important reductions in a variety of trade barriers, e.g. tariffs, quantitative export restrictions, foreign exchange limitations, currency overvaluation, etc. (Irwin, 2022). Since then, both regions renewed their efforts for increasing their participation in world trade, with far-reaching changes in their unilateral, bilateral/regional, and multilateral trade policies. However, differences arise – both between and within regions – in the pace, sequencing, and content of the trade reforms proposed and implemented. Unilateral liberalization has been an important factor in both regions. However, Asian countries took a more gradual approach to trade liberalization, starting from targeted tariff cuts coupled with important efforts in streamlining non-tariff measures, whereas many Latin American countries did the opposite, executing rapid generalized tariff cuts, but maintaining relatively stable non-tariff measures. In certain occasions, these actions have been largely complementary to multilateral actions: many Latin American countries enacted unilateral trade reforms ahead of the World Trade Organization Uruguay Round (1986-1993), whereas most of Asian countries concentrated trade reforms in the decade following the Round. Most importantly, drastic changes in multilateral trade policy occurred when countries joined the WTO during these years (e.g. Ecuador in 1996, China in 2001, and Vietnam in 2006), with the WTO accession implying substantial reductions in tariff and non-tariff barriers. Regional and bilateral trade policy reforms, mostly in the form of trade agreements altering intra and extra-regional preferential market access, tend to be more recent, particularly for Asia (Duran et al., 2008).

In this paper we revisit the evolution of overall and sector-level (agriculture, mining, manufacturing, and services) trade globalization in Asia and Latin America, exploiting the latest advances in structural gravity models (Anderson and van Wincoop, 2003; Head and Mayer, 2014; Bergstrand et al., 2015; Yotov et al., 2016; Heid et al, 2021). We apply a theory-consistent version of gravity models, that uses both domestic *and* international trade flows for estimation, and estimate a time-varying indicator, called *border thickness* (Bergstrand et al., 2015), that captures the cost of trading internationally relative to the costs of trading domestically. We interpret this measure as an indicator of the evolution of trade globalization. Using our border thickness estimates, we then simulate a multi-sector general equilibrium model developed by Caliendo and Parro (2015) to quantify the country-specific long-term impact of globalization on GDP and study the contribution of different sectors.

Our results show that, in broad terms, the experiences of Asia and Latin America are relatively homogeneous: on average, the two regions went through similar trade integration processes during the last three decades. While the point estimates of our baseline exercise imply a sharper decline in the point estimate of “border thickness” in Latin America compared to Asia, yielding a larger increase in international trade (relative to domestic trade), differences are not statistically significant. A conservative interpretation of the estimates is that trade globalization increased between 1995 and 2018 across the world – growing with particular impetus before the global financial crisis and largely stalling thereafter – and that Asia and Latin America did not lag behind.

The seemingly homogeneous globalization processes observed *between* regions stands in contrast to the heterogeneous patterns of trade integration seen *within* regions. In Asia, trade globalization was particularly rapid in China, Vietnam, Cambodia (these three countries perform well mostly in manufacturing and agriculture), and India (who performs well in services instead). In Latin America, Mexico and Peru performed particularly well, with Mexico standing out in agriculture and manufacturing and the Peru in mining, whereas Brazil shows some signs of increasing trade globalization in agriculture. Further, we show that differences in border thickness in Latin America and Asia are correlated to different dimensions of trade policy, such as tariffs, non-tariff measures, trade agreements, and WTO membership.

Turning to the results of the multi-sector trade model’s simulations, we find that the globalization process has had a significant impact on countries' GDP—mostly due to country-specific deviations from the common trend—but that the role of globalization in each sector varies across countries. For some countries, such as Mexico and Costa Rica in Latin America, and Cambodia, China and Vietnam in Asia, most of the positive impact on their GDP is explained by increased globalization in manufacturing. For other countries, notably Argentina, the decline in international integration of its agricultural sector has had a negative impact on GDP. Globalization in the mining sector tends to play a positive role in Latin America and a more negative role in Asia, while services do not play a large role in Latin America but explain an important part of the relative increase in GDP due to globalization of Singapore and the decrease in Hong Kong.

The contribution of the paper is threefold. First, it extends the analysis of the evolution of trade globalization outside manufacturing, by including agriculture, mining and services. Second, it provides a broader view on the processes of trade integration in Asia and Latin America, by analyzing a wide set of policies associated to the evolution of trade globalization between and within these two regions. Third, it quantifies the differential impact that trade integration has had in Asia and Latin America.

The remainder of the paper is organized as follows: Section 2 reviews the relevant literature; Section 3 describes the empirical strategy and the data used; Section 4 discusses the results; and Section 5 concludes.

2. LITERATURE REVIEW

In a recent paper, Irwin (2022) analyzes the rapid decline in barriers to global trade that happened between 1985 and 1995, a period characterized by a widespread transformation in economic and trade policies. In this period, the world witnessed the elimination of currency pegs at overvalued levels and of quantitative import restriction mechanisms, as well as reductions in the mandatory disposition of foreign exchange for trade purposes, import tariffs, and other non-tariff measures, particularly for emerging and developing countries – at the time including most Asian and Latin American countries.

Most papers studying the period since 1995 analyze the role of different factors in promoting or hindering international trade in the two regions, but generally leave aside a quantification of how trade globalization evolved overall. Earlier studies found that trade policies have been an important factor promoting international trade in the two regions.[1] Examples of trade policies studied for this period include signing and implementing bilateral and multilateral trade agreements (e.g. Lee and Park, 2005; Baier et al., 2007; Kohl, 2014; Hannan, 2017; Baier et al., 2019; El-Dahrawy Sánchez-Albornoz and Timini, 2021; Campos and Timini, 2022), or reducing tariffs and non-tariff barriers (Manchin and Pelkmans-Balaoing, 2007; Mesquita Moreira, 2018; Merchán and Mesquita Moreira, 2019) – for example, by improving the functioning of rules of origin.

In this paper, we exploit the latest advances in gravity models to analyze the evolution of trade globalization in Asia and Latin America by sector (agriculture, mining, manufacturing, and services). Since McCallum's (1995) seminal paper, unveiling that Canadian provinces were trading far more between themselves than with bordering US states, the effect of international borders on trade has been considered within the gravity framework. A key advance in the recent literature on

[1] Camarero et al. (2016) confirm the positive link between trade openness and income for Asia and Latin America.

international trade is the use of domestic data in the estimation. Early empirical applications of gravity models failed to find evidence of a globalization process. These results were so striking that the term "missing globalization puzzle" was coined, with some authors asserting that "globalization is everywhere but in estimated gravity models" (Coe et al., 2002, cited in Yotov, 2012). Yotov (2012) and Borchert and Yotov (2017) solve this puzzle,[2] and show that with the use not only of international but also domestic trade in the estimation, as trade theory prescribes, gravity models are indeed able to capture the "globalization effect", i.e., a reduction in trade costs over time. Bergstrand et al. (2015) apply this approach and confirm that theory-consistent gravity models detect an increasing trend in "globalization" in manufacturing goods that is consistent across narrower subsectors within manufacturing.[3]

3. EMPIRICAL STRATEGY, DATA, AND SIMULATION

To assess how Asian and Latin American trade globalization changed over time, we estimate the evolution of the regions' and countries' *relative border thickness*. In its modern and theory-consistent form, and coherent with the latest advances in structural gravity models, *border thickness* is defined in Bergstrand et al. (2015) as an indicator capturing the costs of trading internationally relative to the costs of trading domestically.

Correspondingly, we estimate an equation of the form:

$$X_{ijt}^{k} = \exp\left(\gamma_t^k b_{ij} + \sum_c \delta_{ct}^k b_{ij} \times I_{i\in c \vee j\in c} + \vartheta_{it}^k + \varphi_{jt}^k + \omega_{ij}^k\right) + \varepsilon_{ijt}^k \qquad (1)$$

The dependent variable X_{ijt}^{k} identifies nominal gross bilateral trade flows between the exporter *i* and the importer *j* in year t, and k identifies sectors.[4] These bilateral trade flows include both international (*i≠j*) and domestic trade (the special case *i=j*). In addition to our variables of interest, i.e. the border variables, the equation includes sector specific exporter-time (ϑ_{it}^k) and importer-time fixed effects (φ_{jt}^k). These terms absorb all country-year characteristics (e.g., GDP, GDP per capita, population), and serve as controls for all country-sector-year characteristics too (e.g., industry size). These terms are also the preferred way to capture price effects incorporated in nominal terms

[2] See Yotov (2022) for a summary of the main results.

[3] The methodology used by Bergstrand et al. (2015) and extended in Anderson et al. (2018) which is described in detail in the next section, differs from alternative approaches (Kee et al., 2009; Estefania-Flores et al. 2022) in that it delivers a summary of trade restrictions without requiring data-intensive procedures.

[4] We perform separate regressions for each of the four broad sectors: agriculture, mining, manufacturing, and services; and for their aggregate. Following Egger et al. (2022), we estimate gravity equations using consecutive-year data (instead of interval or averaged data), because this practice improves the efficiency of estimates (as it relies on more data points), and captures better the distribution of trade policy events across years. Breinlich et al. (2022) suggest that in certain cases – when trade cost regressors vary at the sector level – the level of sectoral aggregation chosen for trade data may matter, although only slightly, for parameter estimates.

(Baldwin and Taglioni, 2006).[5] Importantly, these terms correspond to the theory-consistent way of controlling for "multilateral trade resistances", i.e., the ease of accessing exporter *i*'s and importer *j*'s market. The equation also includes sector specific directional pair fixed effects (ω_{ij}^{k}), capturing time-invariant asymmetric trade costs.[6] Finally, ε_{ijt}^{k} is an error term in the estimation.

The variable b_{ij} is a dummy variable that distinguishes international trade flows (b_{ij}=1) from domestic trade flows (b_{ij}=0). We follow Bergstrand et al. (2015) in interpreting the coefficient related to the border dummy (b_{ij}) as the semi-elasticity of bilateral trade flows to crossing an international border. Therefore, γ_t^k represents the evolution of this elasticity over time. Given the inclusion of pair fixed effects (ω_{ij}^{k}) in the regression, γ_t^k does not depict an absolute level of trade globalization, but *relative* to a reference year, i.e., the excluded category in the regression. We exclude 1995, the first year of the sample. Therefore, the coefficients γ_t^k are expected to be positive – indicating an increase in globalization during the sample period with respect to 1995 – and can be interpreted as the increase in the ease of trading internationally (instead of trading domestically) with respect to the beginning of the sample.

We also include interactions between the border dummy variable and an indicator of whether a certain country or region *c* is either the exporter or the importer. The coefficient δ_{ct}^{k} therefore tracks the *relative border thickness* of country (or region) *c* with respect to the rest of the world, i.e., how much or less country *c* borders hinder international trade (with respect to domestic trade). In the simplest version of the equation, *c* corresponds to either "Asia" or "Latin America". We later separately identify the *relative border thickness* of each Asian and Latin American country included in the database, by letting *c* identify individual countries. In the rest of the paper we will use increases in globalization and reductions in border thickness interchangeably.

We estimate Equation (1) by employing a Poisson pseudo-maximum likelihood (PPML) estimator, a standard approach in the trade literature (Santos Silva and Tenreyro, 2006). This properly addresses the "zeros of trade" (i.e., countries that do not trade with each other, and therefore have a value of zero in their bilateral trade statistics) and heteroskedasticity, two distinctive features of trade data. We use three-way clustering techniques (Egger and Tarlea, 2015).

The *border thickness* approach is strictly related to the trade cost measure calculated and used by Jacks et al. (2008), Jacks et al. (2010), and Jacks et al. (2011) in their studies on the globalization (since the 19th century onwards). However, while the two methods share some key features, such as the modelling framework to obtain a measure of trade costs (gravity models), they also have a number of differences, relevant for our research question. First, as we include directional pair fixed effects in the estimation, our *border thickness* measure is net of bilateral factors that affect trade but do not change over time. For example, features such as distance between countries or sharing a common

[5] Baldwin and Taglioni (2006) suggest that using real trade values – i.e. deflating nominal values using a price index (usually the US CPI, given that trade data are in dollars) – may create "biases via spurious correlation".

[6] Directional means that we allow $\omega_{ij} \neq \omega_{ji}$ rather than imposing $\omega_{ij} = \omega_{ji}$.

language are levelled out. In this sense, our measure focuses on the variation rather than on the level. In other words, we can take as given the level of integration in 1995, and concentrate on the process of trade globalization during the 1995-2018 period. Second, our *border thickness* measure is the result of an estimation procedure, and not a calibration method. Therefore, the *border thickness* measure can be used for econometric inference.

Data on gross exports of goods (agriculture, mining, and manufacturing) and services are from the OECD Trade in Value-Added (TiVA) database. The TiVA database provides economic information on 66 economies between 1995 and 2018, corresponding to more than 90% of world exports of goods and services, including data on sector-level international trade between two countries, i.e., bilateral trade. Domestic trade is not directly available. We follow an approach widely used in the literature – e.g. Borchert et al. (2021) and Yotov (2022) – and construct domestic trade flows as the difference between gross production and total exports.[7]

MFN tariffs come from WDI and are the average MFN tariff applied by each country between 1995 and 2018. Data on non-tariff measures are from Estefania-Flores et al. (2022), who construct an empirical measure of how restrictive official government policy is towards the international flow of goods and services constructed form the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), which they label the Measure of Aggregate Trade Restrictiveness (MATR). Finally, data on WTO membership and trade agreements come from CEPII's gravity database (see Conte et al., 2022).

We use our estimates of border thickness to quantify the impact of globalization in GDP using a multi-country multi-sector trade model. Specifically, we use a version of the quantitative model of Caliendo and Parro (2015) adapted to four sectors: agriculture, mining, manufacturing, and services. It is well-known that this model implies the existence of an empirical gravity equation like the one we estimated, so there is a direct mapping from our border thickness estimates to trade costs in the model. Our model includes the 66 countries used in the empirical analysis and an aggregate for the rest of the world. The sectors are defined in the same way as in the previous empirical analysis. We calibrate the model for the year 2018 using the input-output linkages and value-added measures from the OECD Inter-Country Input-Output (ICIO) tables. This database is also the primary source from which the trade data in the TiVA database are derived. We use the same trade elasticities as Caliendo and Parro (2015) for agriculture and mining, and an average of their elasticities for manufacturing. Since they do not report a trade elasticity for services, we follow Felbermayr et al. (2022) and set the trade elasticity for services to 5, as implied by Egger et al.'s (2012) calculations.

[7] Campos et al. (2021) show that the typical empirical estimations of trade policy effects on trade are robust to how domestic trade is calculated.

We use the model to simulate the level of GDP in counterfactual scenarios in which globalization did not occur and then calculate the difference between actual GDP and GDP in these counterfactual scenarios. We take countries one by one and modify international trade costs for imports and exports of each particular country to replicate a border thickness that the country had in 1995. The border thickness measure we estimate is a composite of tariff and non-tariff components, with unknown weights. For the simulations, we assume that most of the change is due to the non-tariff component and therefore treat changes in trade costs as if they were entirely due to changes in non-tariff barriers. This implies that the simulations disregard the potential effect of changes in tariff revenue on country GDP. In the context of the model, and because we have normalized $\gamma_{1995}^{k} = \delta_{i1995}^{k} = 0$, the ratio of trade costs at their counterfactual 1995 level relative to their current level ($\kappa'^{k}_{ij}/\kappa^{k}_{ij}$) is given by

$$\kappa'^{k}_{ij}/\kappa^{k}_{ij} = \left[\exp\left(-\gamma_{2018}^{k} - \delta_{i2018}^{k}\right)\right]^{-1/\theta^{k}}$$

where θ^{k} is the trade elasticity of sector k and $i \neq j$. These changes in trade costs are then fed into the usual algorithm used to solve the Caliendo and Parro model. As explained by Caliendo and Parro (2022), there are various ways to deal with the level of aggregate trade deficits, which are exogenous to the model. We follow the approach by Felbermayr et al. (2022) and assume that trade deficits are a constant share of income.

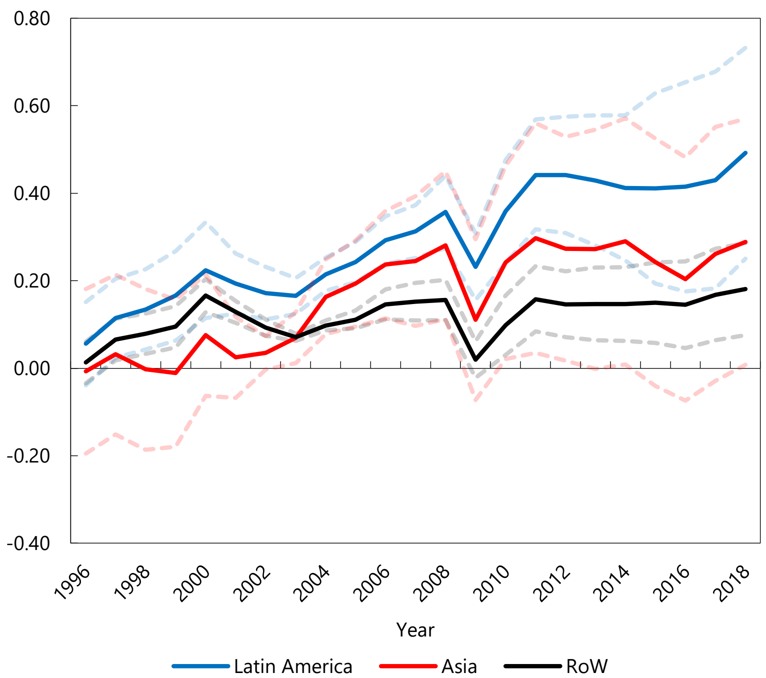
4. RESULTS

In this section, we show the evolution of trade globalization in Latin America and Asia, explore whether it is associated with different trade policy instruments, and quantify the impact it has had on GDP.

4.1. THE EVOLUTION OF TRADE GLOBALIZATION IN LATIN AMERICA AND ASIA

Figure 1 reports the estimates of the evolution of Asia, Latin America, and the Rest of the World (RoW) trade globalization for aggregate bilateral trade. These are derived from the structural gravity model described in Equation (1). For Asia and Latin America they are the sum of the globalization trend common to all countries (captured by $\hat{\gamma}$) and the globalization trend specific to each region (captured by $\hat{\delta}$). The plotted lines for Asia (red), Latin America (blue), and RoW (black) all have a positive trend: this means that trade globalization – measured as the ease of trading internationally with respect to trading domestically – has been on the rise throughout the world, at least since 1995, the beginning of our sample. Specifically, the $\hat{\gamma}_{2018}^{aggregate\ trade}$ point estimate of 0.181 indicates that the RoW's declining "border thickness" has increased international trade (relative to domestic trade) by ≈20% over two decades (1995-2018; =$100 \times [e^{0.181} - 1]$). This is similar to, although slightly lower than, what Bergstrand et al. (2015) found for the period 1990-2002.[8] The difference is likely to depend on the sample period: the early nineties (included in their sample but not in ours) witnessed a strong decline in barriers to global trade (Irwin, 2022). Point estimates for Asia ($\hat{\gamma}_{2018}^{aggregate\ trade} + \hat{\delta}_{Asia\ 2018}^{aggregate\ trade}$) and Latin America ($\hat{\gamma}_{2018}^{aggregate\ trade} + \hat{\delta}_{Latin\ America\ 2018}^{aggregate\ trade}$) are larger. The coefficients imply that the declining "border thickness" has increased international trade (relative to domestic trade) by ≈34% in Asia, and by 64% in Latin America. However, a word of caution is needed, given that Figure 2 also shows that the three confidence intervals overlap over the time span of our study, indicating that these estimates are not significantly different in a statistical sense. A more conservative view of the estimates is that they indicate that trade globalization has increased between 1995 and 2018 across the world – growing with particular impetus before the global financial crisis (GFC) and largely stalling thereafter – and that Asia and Latin America did not lag behind.

Figure 1: Comparing the increase in trade globalization in Asia and Latin America

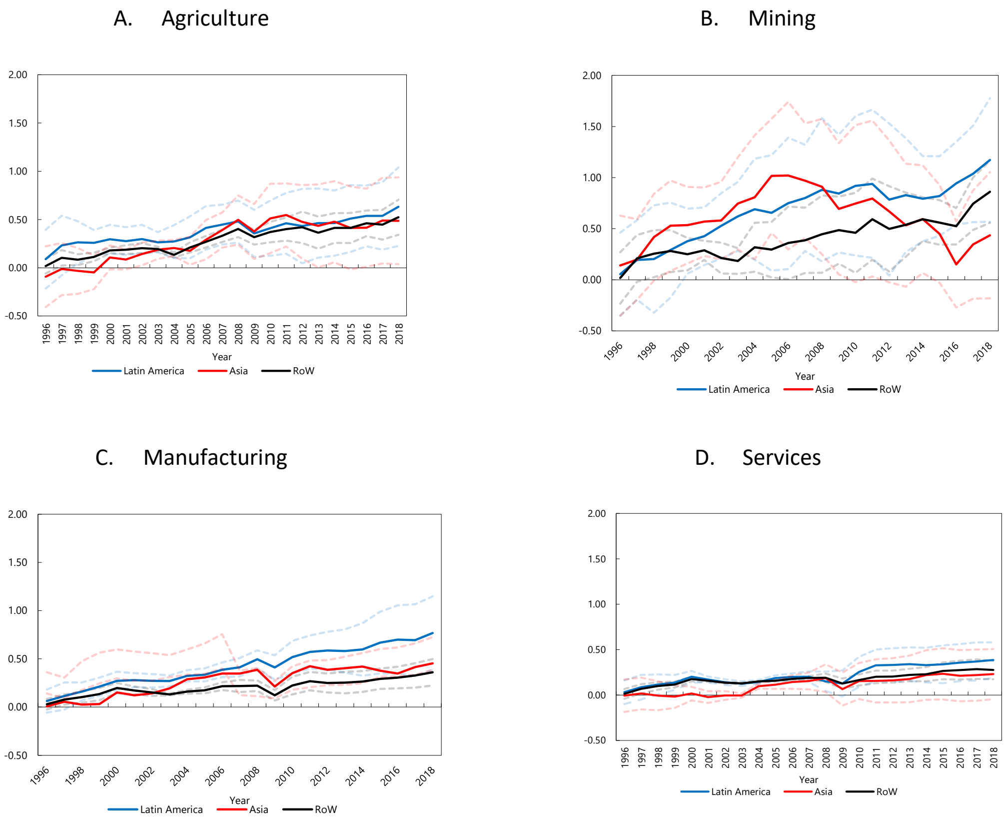


Notes: The figure plots estimates obtained from Equation (1), where k=aggregate bilateral trade. The grey line plots the point estimates of the coefficient $\hat{\gamma}_t^k$; the blue line plots the sum of the point estimates of the coefficients $\hat{\gamma}_t^k$ and $\hat{\delta}_{Latin\ America\ t}^k$, the orange line plots the sum of the point estimates of the coefficients $\hat{\gamma}_t^k$ and $\hat{\delta}_{Asia\ t}^k$. Therefore, each line identifies the ease of trading internationally (with respect to trading domestically) vis-à-vis the reference year in the estimation (1995) for any given region. RoW: Rest of the World.

[8] The authors estimate an international coefficient equal to 0.29, which implies a 33 percent in international trade between 1990 and 2002. The larger coefficient obtained by Bergstrand et al. (2015) and our estimate may be due to differences in the period and countries analyzed.

Figure 2 reports the results for the same exercise performed separately for trade in agriculture, mining, manufacturing, and services. Overall, the estimates indicate that trade integration has increased over time in each of these four broad sectors, but they also provide evidence of a "two-speed" trade globalization, faster for goods, and with services lagging behind. As suggested by Ariu (2022), lower levels of trade integration in the services sector may – at least partially – reflect the fact that an important proportion of trade in services are directly sold in foreign markets by foreign affiliates – i.e. with direct commercial presence – and are often not reported in trade statistics.

FIGURE 2: The increase in trade globalization in Asia and Latin America, by sector

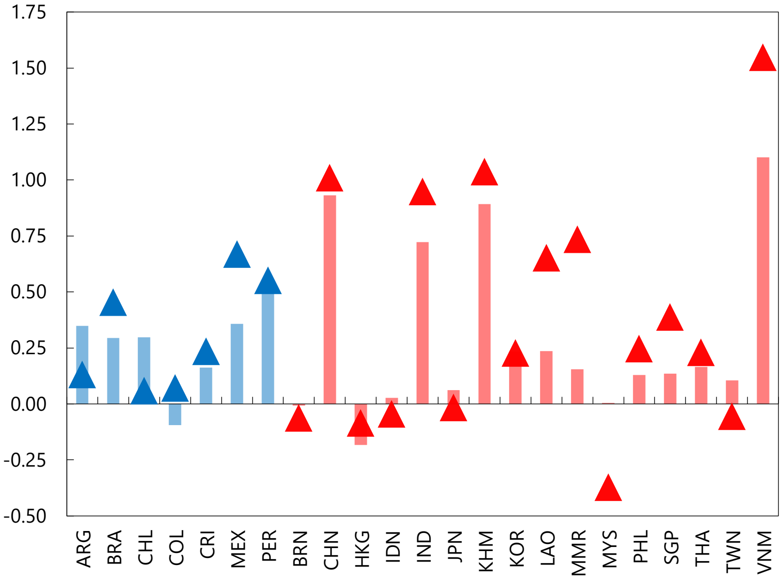


Notes: The figure plots estimates obtained from Equation (1), where k={"agriculture"; "mining"; "manufacturing"; "services"} bilateral trade. The grey line plots the point estimates of the coefficient $\hat{\gamma}_t^k$; the blue line plots the sum of the point estimates of the coefficients $\hat{\gamma}_t^k$ and $\hat{\delta}_{Latin\ America\ t}^k$, the orange line plots the sum of the point estimates of the coefficients $\hat{\gamma}_t^k$ and $\hat{\delta}_{Asia\ t}^k$. Therefore, each line identifies the ease of trading internationally (with respect to trading domestically) vis-à-vis the reference year in the estimation (1995) for any given region. RoW: Rest of the World.

Again, the figures portraying our estimates do not seem to support the existence of any systematic difference among the two regions, Asia and Latin America, and the rest of the world. However, these estimates capture regional averages, and as trade globalization and its evolution often depends on country-level characteristics and choices, they can hide important differences within regions. Thus, in our second set of estimates, we allow for country-level heterogeneity. The results of these estimates are reported in Figure 3 and Figure 4, where we plot $\hat{\gamma}_{2007}^k + \hat{\delta}_{c2007}^k$ (bars) and $\hat{\gamma}_{2018}^k + \hat{\delta}_{c2018}^k$ (triangles), for any Asian or Latin American country *c*. These coefficients identify the evolution of trade globalization in 2007 and in 2018, respectively, in each country with respect to its own level of trade globalization in 1995. Therefore, if bars and triangles are above the zero line, this means that the ease of trading internationally for country *c* increased during the period 1995-2007 and 1995-2018, respectively. If the triangle is above the bar, it means that country *c* continued to increase the ease of trading internationally in the period 2007-2018, i.e., after the global financial crisis. The information contained in Figure 3 indicates that – for aggregate trade flows – countries that experienced the fastest increase in trade globalization between 1995 and 2018 are Vietnam, China, Cambodia, and India in Asia, and Mexico and Peru in Latin America. However, this picture varies strongly across sectors. In agriculture, Vietnam is the Asian country that increased the most its ease of trading internationally, possibly capturing its role as one of the world's largest rice producer and exporter (Thuong, 2018), followed by Laos and China. In Latin America Mexico and Brazil stand out. Mexico signed and implemented the North American Free Trade Agreement (NAFTA) in 1994, boosting Mexican trade in agriculture (Steinberg, 2020). During the period of analysis, Brazil experimented large increases in productivity and trade flows of several agricultural products, most notably soybeans (Pellegrina, 2022). In mining, Vietnam in Asia, and Chile and Peru in Latin America stand out in 2018 (with respect to 1995), mostly reflecting the growing importance of the copper industry in the two Latin American economies (Monfort, 2008; Loayza and Rigolini, 2016). In manufacturing our estimates point to Vietnam, China, Laos and Cambodia in Asia, and Mexico, Peru, and Costa Rica in Latin America. These results for the Asian economies can be rationalized by the rise of China as the "world factory" after joining the World Trade Organization (WTO), and the consequent incorporation of its neighbors to global value chains (GVCs). These effects have mostly occurred in labor-intensive sectors (Hanson, 2020), e.g., the textile and garment industry (Hill, 2000; Rasiah, 2009; Rasiah et al., 2013). In Latin America instead, results may be related to the strengthening of the economic ties with the US during this period. NAFTA is also very likely to be one of the main drivers for the evolution of Mexican manufacturing exports (Caliendo and Parro, 2015). Costa Rica implemented a set of policies, including a trade agreement with the US,[9] that sought to attract FDI and boost exports. These consolidated and further expanded GVCs, reinforcing the presence of multinational enterprises in the country – particularly in high-tech manufacturing industries such as electronics and medical devices – with spillover effects to domestic suppliers (Gereffi et al., 2019; Alfaro-Ureña et al., 2022). Peru has progressively been more involved in GVCs, in sectors such as high-quality cotton textile and wearing apparel (Fernandez-Stark et al., 2016; Pierola et al., 2018). Finally, in services, Myanmar, Cambodia, and India in Asia are those standing out. These developments may be possibly explained by the strong opening up of the former two to tourism, after decades of political instability (ADB, 2017), and the rapidly growing ICT sector of the latter (Sedik, 2018).

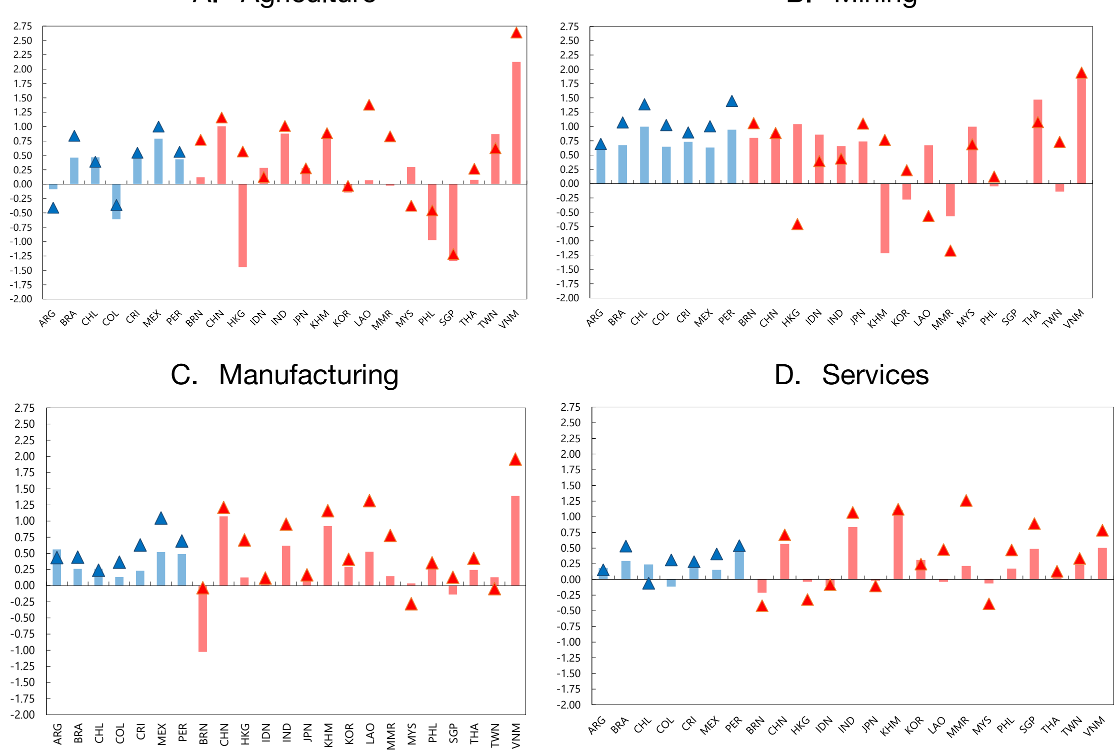
[9] This is the Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR FTA), whose members are the United States, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua.

FIGURE 3: Comparing the increase in trade globalization within Asia and Latin America



Notes: The figure plots estimates obtained from Equation (1), where k=aggregate bilateral trade. Bars plot the sum of the point estimates of the coefficients $\hat{\gamma}_{2007}^{k}$ and $\hat{\delta}_{c2007}^{k}$; triangles plot the sum of the point estimates of the coefficients $\hat{\gamma}_{2018}^{k}$ and $\hat{\delta}_{c2018}^{k}$. The former identifies – for each country c – the ease of trading internationally (with respect to trading domestically) in 2007 vis-à-vis the reference year in the estimation (1995). The latter identifies – for each country c – the ease of trading internationally (with respect to trading domestically) in 2018 vis-à-vis the reference year in the estimation (1995). Orange (blue) bars and triangles represent Asian (Latin American) countries.

FIGURE 4: Comparing the increase in trade globalization within Asia and Latin America, by sector



Notes: The figure plots estimates obtained from Equation (1), where k={“agriculture”; “mining”; “manufacturing”; “services”}. Bars plot the sum of the point estimates of the coefficients $\hat{\gamma}_{2007}^{k}$ and $\hat{\delta}_{c2007}^{k}$; triangles plot the sum of the point estimates of the coefficients $\hat{\gamma}_{2018}^{k}$ and $\hat{\delta}_{c2018}^{k}$. The former identifies – for each country c – the ease of trading internationally (with respect to trading domestically) in 2007 vis-à-vis the reference year in the estimation (1995). The latter identifies – for each country c – the ease of trading internationally (with respect to trading domestically) in 2018 vis-à-vis the reference year in the estimation (1995). Orange (blue) bars and triangles represent Asian (Latin American) countries.

4.2. DECOMPOSING TRADE GLOBALIZATION IN LATIN AMERICA AND IN ASIA: THE ROLE OF TRADE POLICY

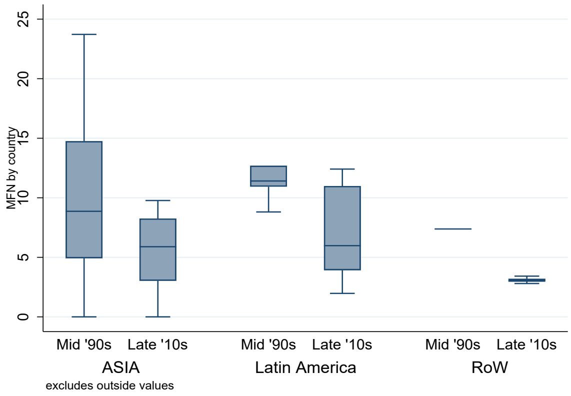
Figures 3 and 4 show a very heterogeneous evolution of trade globalization across countries in Asia and Latin America. In this subsection, we explore this heterogeneity further, and explore whether our border thickness estimates are associated to a set of trade policy factors, theoretically linked to reductions in trade costs.

Particularly, we focus on four variables that entail a broad range of possible policy instruments: tariffs, non-tariff barriers, WTO membership, and trade agreements. Figure 5 shows some common patterns: since 1995, tariffs decreased and trade agreements increased in both regions, while various Asian countries joined the WTO (all Latin American countries in our sample were already WTO members in 1995. Changes in non-tariff restrictions to trade have been more modest. However, Figure 5 also indicates the existence of substantial heterogeneity both across and within regions: some countries have preferential agreements with a relatively small share of trading partners and still have MFN tariffs at levels comparable to those of the mid-1990s.

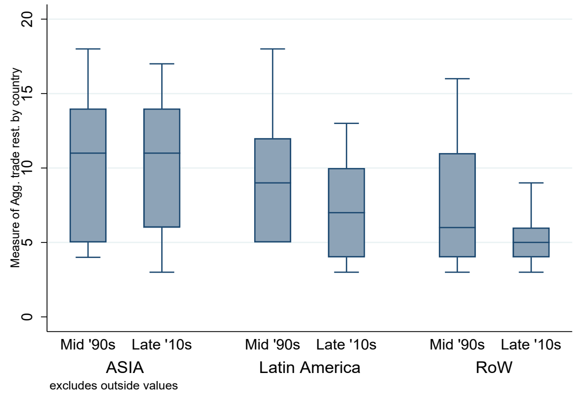
We report the results of a more formal analysis in Table 1, showing a strong association between the estimated aggregate trade globalization effect for Latin America and Asian countries and most trade policy variables. Columns (1) through (4) present the estimated correlation of border thickness with each of the four trade policy variables we study. As expected, border thickness is lower in countries that pursue policies geared towards reducing trade costs or aimed at fostering international integration. However, the correlation between relative border thickness is not statistically significant for non-tariff restrictions. Similar conclusions are reached when we estimate a regression that controls simultaneously for all trade policy variables (Column 5), and this is also consistent with the variance decomposition exercise presented in Annex 1.

FIGURE 5: The Evolution of Trade Policy in Latin America and Asia

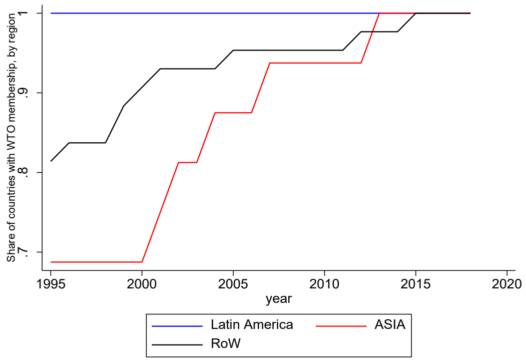
A. Distribution of MFN tariffs Within Regions, 1995 vs. 2018



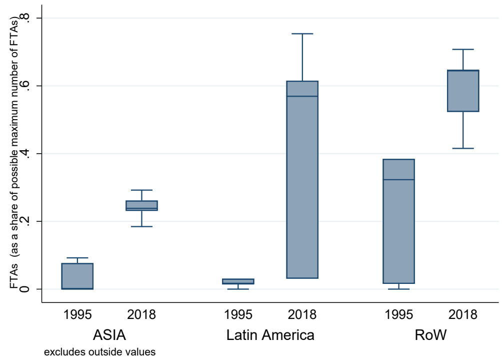
B. Distribution of MATR Within Regions, 1995 vs. 2018



C. Share of Countries with WTO Membership, by year



D. Distribution of FTA Within Regions, 1995 vs. 2018



Notes: Distributions are calculated for countries in our sample. For MFN tariffs, the distribution for the mid-1990s considers only countries with non-missing information for any year between 1995 and 1997. The distribution for the late 2010s takes the last value for each country. MATR refers to the measure of aggregate trade restrictions excluding tariffs.

Table 1.: Correlates of Aggregate Estimates of Globalization in Latin America and Asia

	(1)	(2)	(3)	(4)	(5)
MFN tariffs (standardized)	-0.269***				-0.211***
	(0.0478)				(0.0436)
MATR (standardized)		-0.0330			-0.0141
		(0.0216)			(0.0207)
WTO dummy			0.397***		0.302***
			(0.0475)		(0.0527)
PTA count (standardized)				0.0519***	0.0477**
				(0.0180)	(0.0186)
Constant	0.0798	0.202**	0.394***	-0.272***	0.0968
	(0.0534)	(0.0922)	(0.0639)	(0.0639)	(0.126)
Observations	447	447	447	447	447
Adjusted R-squared	0.769	0.767	0.824	0.811	0.847

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

Notes: Each column presents results of the following regression: $\delta_{ct} = \alpha + \beta P_{i,t} + \tau_t + \sigma_i + \varepsilon_{jt}$ where δ_{ct} is the border thickness estimate for aggregate bilateral trade for country *c,* at time t, $P_{i,t}$ is the set of policies we study, and τ_t , σ_c are time and year fixed effects, respectively. Country coverage varies by year depending on availability of trade policy variables. MATR refers to the measure of aggregate trade restrictions excluding tariffs.

Table 2 provides a finer look at the role of trade policy variables by studying their impact on sectoral border thickness estimates. Results for manufacturing are closely aligned with those for aggregate flows (column 3). More precisely, increased globalization in manufacturing (lower border thickness) is associated to lower tariffs, being a WTO member, and the number of trade agreements. For agriculture (column 1), there is a statistically significant link between multilateral trade policy variables (MFN tariffs and WTO membership) and the border thickness estimate. Moreover, in both cases, the correlations go in the expected direction. Globalization in mining (column 2) appears to be favored by trade agreements, by low MFN tariffs. In the case of services, reductions in trade costs stemming from reductions in multilateral trade barriers (including non-tariff ones) are associated with lower border thickness. Trade agreements, on the other hand, do not appear to have a statistically significant effect.

Table 2.: Correlates of Estimates of Globalization in Latin America and Asia, by sector

Sectors:	Agriculture	Mining	Manufacturing	Services
	(1)	(2)	(3)	(4)
MFN tariffs (standardized)	-0.223***	-0.190***	-0.187***	-0.145***
	(0.0558)	(0.0542)	(0.0408)	(0.0472)
MATR (standardized)	0.0109	0.118**	-0.00287	-0.0640**
	(0.0475)	(0.0589)	(0.0313)	(0.0266)
WTO dummy	0.467***	-0.0786	0.422***	0.203***
	(0.102)	(0.0997)	(0.0649)	(0.0508)
PTA count (standardized)	0.0397	0.230***	0.0503**	0.0108
	(0.0358)	(0.0524)	(0.0229)	(0.0222)
Constant	-0.256	0.0187	-0.0513	0.265*
	(0.249)	(0.271)	(0.151)	(0.148)
Observations	447	419	447	447
Adjusted R-squared	0.813	0.620	0.811	0.732

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

Notes: Each column presents results from the following regression: $\delta_{ct}^{k} = \alpha + \beta P_{i,t} + \tau_t^k + \sigma_i^k + \varepsilon_{jt}^k$ where δ_{ct}^{k} is the border thickness estimate for bilateral trade in sector *k for* country *c,* at time *t*, $P_{i,t}$ is the set of policies we study, and τ_t^k, σ_c^k are time and year fixed effects, respectively. Country coverage varies by year depending on availability of trade policy variables. MATR refers to the measure of aggregate trade restrictions excluding tariffs.

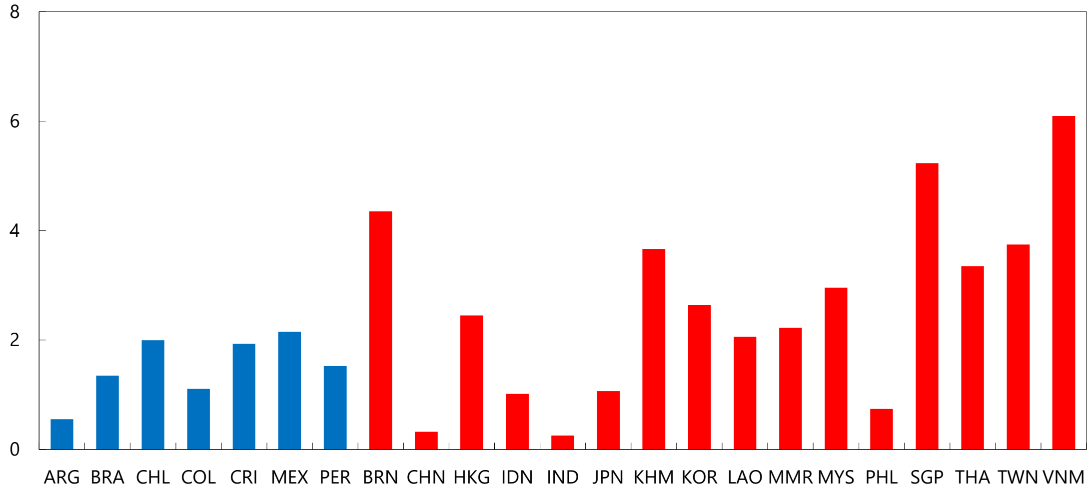
4.3. ON THE EFFECTS OF TRADE GLOBALIZATION

In this section, we use a general equilibrium model to calculate the gains from trade implied by the globalization process in Latin America and Asia. In our simulations, we take each country individually and solve for the general equilibrium effects of that country returning to its 1995 level of globalization. We report the change in GDP that can be attributed to globalization according to the model, measured as how much higher GDP was in 2018 relative to the level that GDP would have been in the same year if trade costs had been the same as in 1995.

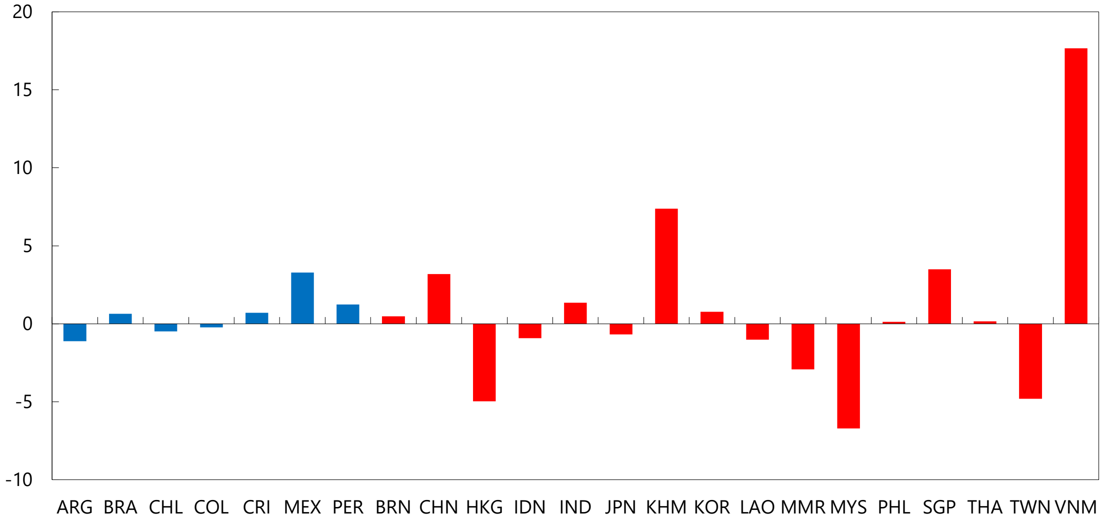
The results are shown in Figure 6, where we decompose the overall effect of globalization into the role played by the common globalization trend (captured by the coefficient γ in our estimates) and each country's idiosyncratic deviation from this common trend (captured by the coefficient δ). The results in panel A show the impact of the common globalization trend on GDP. Although the change in trade costs implied by the common globalization trend is the same for all countries, the impact on each country's GDP is different because countries differ in terms of sector size, linkages between sectors within each country, trade openness and linkages between countries, the share of value added in output in each sector, and the size of the country relative to the rest of the world. The figure shows that the impact is more homogeneous - but lower on average - in Latin America and more heterogeneous in Asia. In Asia, there are a few countries that benefit disproportionately from the common globalization trend, such as Brunei, Cambodia, Singapore and Vietnam, while China and India benefit less from this common trend.

FIGURE 6: The effect of globalization on GDP

A. COMMON GLOBALIZATION TREND



B. IDIOSYNCRATIC DEVIATION FROM THE COMMON GLOBALIZATION TREND



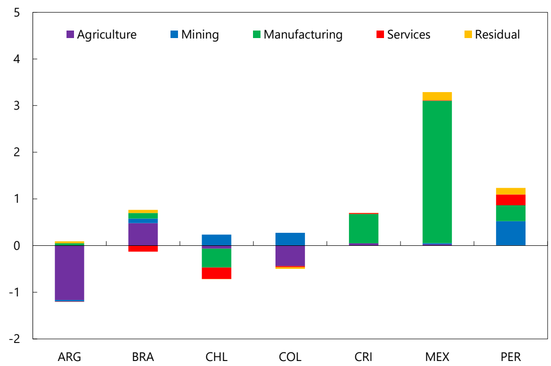
Notes: The simulations use a quantitative trade model similar to the one used by Caliendo and Parro (2015). The model includes 66 countries and four aggregate sectors. The simulations change the international trade costs of one country at a time, leaving all other trade costs unchanged. In the counterfactual scenario, trade costs are set to their 1995 level. The results show the percentage change in GDP from a situation with high trade costs (the counterfactual) to one with low trade costs (the baseline). Panel A shows the results of country-specific simulations in which trade costs change according to the common globalization trend. Panel B shows the results of country-specific simulations in which trade costs change according to each country's idiosyncratic deviation from the common globalization trend.

Panel B of the figure shows the effect of the idiosyncratic component of globalization, which tends to dominate quantitatively (note the change in the vertical axis in the figure). Among Latin American countries, Mexico and Peru benefited more from their country-specific globalization process. Among Asian countries, China, Cambodia, Singapore and Vietnam stand out as the countries where country-specific globalization led to the best outcome in terms of GDP. For other countries, such as Hong Kong, Malaysia, and Taiwan, the effect of their idiosyncratic globalization process goes in the opposite direction.

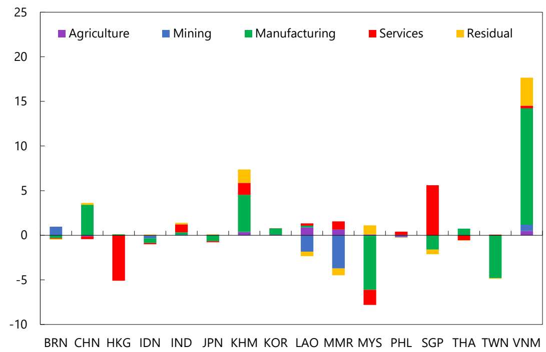
The impact of the idiosyncratic component varies considerably across countries. This raises the question of which sectors drove these movements for each country. To answer this question, we repeat our simulations but modify the idiosyncratic component of trade costs in each of the four sectors, one at a time. The results are shown in Figure 7. In Latin America, the decomposition shows that the positive impact on GDP in Mexico and Costa Rica is almost entirely explained by globalization in manufacturing. In Peru, most of the benefits are explained by globalization in mining. In Argentina, on the other hand, the decline in globalization is explained by less globalization in agriculture. This last result is consistent with policy changes in Argentina, which raised barriers to the export of agricultural products on several occasions during the period considered. Services seem to play a relatively minor role in the idiosyncratic globalization process of Latin American countries.

FIGURE 7: The role of each sector in explaining the impact of country-specific globalization on GDP

A. LATIN AMERICA



B. ASIA



Notes: The simulations use a quantitative trade model similar to the one used by Caliendo and Parro (2015). The model includes 66 countries and four aggregate sectors. Trade costs change according to each country's idiosyncratic deviation from the common globalization trend. The simulations change the international trade costs of one country, and on sector at a time, leaving all other trade costs unchanged. In the counterfactual scenario, trade costs are set to their 1995 level. The results show the percentage change in GDP from a situation with high trade costs (the counterfactual) to one with low trade costs (the baseline).

In Asia, a more globalized manufacturing sector explains almost all of the gains for China and Vietnam and most of the gains for Cambodia. Less globalized manufacturing also explains the decline in overall globalization for Malaysia and Taiwan. The contribution of mining is negative for most countries in Asia, in contrast to the generally positive effect in Latin America. The services sector, which does not play a major role in Latin America, is the main driver of the increase in GDP due to globalization in Singapore and of the decrease in Hong Kong. This result is also consistent with the anecdotal historical evidence of a transfer of internationally-integrated firms in the service sector out of Hong

Kong. Agriculture, on the other hand, does not seem to have played a major role in Asia, although in the few cases where an effect can be detected, it seems to have been positive.

5. CONCLUSIONS

In this paper we use a structural gravity model to estimate the aggregate and sector-level evolution of trade globalization in Asia and Latin America. We use a theory-consistent approach, by using both domestic and international trade flows, and estimate an indicator, called *border thickness* that captures the cost of trading internationally relative to the costs of trading domestically. We interpret this measure as an indicator of the evolution of trade globalization. We then perform a set of association exercises to suggest possible factors related to its intensity. Finally, we quantify the impact of globalization on long-run GDP using a multi-sector multi-country quantitative trade model.

Our results show that, during the last three decades, on average, the evolution of trade globalization in the two regions followed similar paths: trade globalization has increased between 1995 and 2018 across the world – growing with particular impetus before the global financial crisis (GFC) and largely stalling thereafter – and that Asia and Latin America did not lag behind. However, the aggregate picture hides heterogeneous developments at the country and sector level. In Asia, growing trade globalization was concentrated in China, Vietnam, Cambodia mostly in manufacturing and agriculture, and in India in services. In Latin America, the ease of trading internationally gained tractions in Mexico (agriculture and manufacturing), Chile and Peru (mining). Brazil shows some signs of increasing trade globalization in agriculture.

We show that differences in border thickness in Latin America and Asia are associated to different dimensions of trade policy, with policies that reduce trade costs leading to lower border thickness. More specifically, we find that lower MFN tariffs and WTO membership are associated with higher globalization across sectors, while the impact of other policies (non-tariff measures and trade agreements) is sector-dependent.

Our quantification of the impact of globalization on long-run GDP using a multi-sector trade model shows that the globalization process has had a significant impact on countries' GDP. There is no single sector that explains the variation across countries. Many countries, such as Mexico, Costa Rica, Cambodia, China and Vietnam in Asia, experienced a positive differential impact on their GDP, driven by increased globalization in manufacturing. The agricultural sector has played a smaller role overall, but is crucial in explaining Argentina's relative decline in international integration and the consequent negative impact on GDP of this lower integration. Globalization in mining tends to have a more positive impact in Latin America than in Asia, and differential globalization in services is important in explaining the relative increase in globalization of Singapore and the decrease in Hong Kong.

Finally, our evidence – in support of strong, but very heterogeneous, increase in trade globalization in the two regions – does not shed light on firm-level effects, nor on the political economy dynamics related to the evolution of trade globalization. These issues deserve further research and consideration within the Asian and Latin American context.

References

Alfaro-Ureña, Alonso, Isabela Manelici and Jose P. Vasquez. (2022). "The effects of joining multinational supply chains: New evidence from firm-to-firm linkages". *The Quarterly Journal of Economics,* 137(3), pp. 1495-1552. https://doi.org/10.1093/qje/qjac006

Anderson, James E., Ingo Borchert, Aaditya Mattoo and Yoto V. Yotov. (2018). "Dark costs, missing data: Shedding some light on services trade". *European Economic Review,* 105, pp. 193-214.

Anderson, James E., and Eric Van Wincoop. (2003). "Gravity with gravitas: A solution to the border puzzle". *American Economic Review,* 93(1), pp. 170-192.

Ariu, Andrea. (2022). *On the mystery of the missing trade in services.* Mimeo.

Artuc, Erhan, Guido Porto and Bob Rijkers. (2019). "Trading off the income gains and the inequality costs of trade policy". *Journal of International Economics,* 120, pp. 1-45.

Asian Development Bank. (2017). *Tourism Sector Assessment, Strategy, and Road Map for Cambodia, Lao PDR, Myanmar, and Viet Nam (2016-2018).*

Baier, Scott L., Jeffrey H. Bergstrand and Erika Vidal. (2007). "Free trade agreements in the Americas: Are the trade effects larger than anticipated?". *World Economy,* 30(9), pp. 1347-1377.

Baier, Scott L., Yoto V. Yotov and Thomas Zylkin. (2019). "On the widely differing effects of free trade agreements: Lessons from twenty years of trade integration". *Journal of International Economics,* 116, pp. 206-226.

Baldwin, Richard. (2022). "Globotics and macroeconomics: Globalisation and automation of the service sector". NBER Working Paper Series, 30317, National Bureau of Economic Research.

Baldwin, Richard, and Daria Taglioni. (2006). "Gravity for dummies and dummies for gravity equations". NBER Working Paper Series, 12516, National Bureau of Economic Research.

Bergstrand, Jeffrey H., Mario Larch and Yoto V. Yotov. (2015). "Economic integration agreements, border effects, and distance elasticities in the gravity equation". *European Economic Review,* 78, pp. 307-327.

Borchert, Ingo, Mario Larch, Serge Shikher and Yoto V. Yotov. (2021). "The International Trade and Production Database for Estimation (ITPD-E)". *International Economics,* 166, pp. 140-166.

Borchert, Ingo, and Yoto V. Yotov. (2017). "Distance, globalization, and international trade". *Economics Letters,* 153, pp. 32-38.

Breinlich, Holger, Dennis Novy and J. M. C. Santos Silva. (2022). "Trade, gravity and aggregation". *Review of Economics and Statistics,* pp. 1-29.

Cabrillac, Bruno, Alexander Al-Haschimi, Oxana Babecká Kucharčuková, Alessandro Borin, Matthieu Bussière, Raphael Cezar, Alexis Derviz, Dimitra Dimitropoulou and Laurent Ferrara. (2016). "Understanding the weakness in global trade. What is the new normal?". Occasional Paper Series, 178, European Central Bank. https://ideas.repec.org/p/ecb/ecbops/2016178.html

Caliendo, Lorenzo, and Fernando Parro. (2015). "Estimates of the trade and welfare effects of NAFTA". *The Review of Economic Studies,* 82(1), pp. 1-44.

Caliendo, Lorenzo, and Fernando Parro. (2022). “Trade policy”. In Gita Gopinath, Elhanan Helpman and Kenneth Rogoff (eds.), *Handbook of International Economics.* Elsevier, Vol. 5, pp. 219-295.

Camarero, Mariam, Inmaculada Martínez-Zarzoso, Felicitas Nowak-Lehmann and Cecilio Tamarit. (2016). “Trade openness and income: A tale of two regions”. *The World Economy,* 39(3), pp. 386-408.

Campos, Rodolfo G., and Jacopo Timini. (2022). “Unequal trade, unequal gains: the heterogeneous impact of MERCOSUR”. *Applied Economics,* 54(49), pp. 5655-5669.

Campos, Rodolfo G., Jacopo Timini and Elena Vidal. (2021). “Structural gravity and trade agreements: Does the measurement of domestic trade matter?”. *Economics Letters,* 208, p. 110080.

Costinot, Arnaud, and Andrés Rodríguez-Clare. (2014). “Trade theory with numbers: Quantifying the consequences of globalization”. In Gita Gopinath, Elhanan Helpman and Kenneth Rogoff (eds.), *Handbook of International Economics.* Elsevier, Vol. 4, pp. 197-261. https://doi.org/10.1016/B978-0-444-54314-1.00004-5

Costinot, Arnaud, and Andrés Rodríguez-Clare. (2018). “The US gains from trade: Valuation using the demand for foreign factor services”. *Journal of Economic Perspectives,* 32(2), pp. 3-24.

Duran, Jose, Nanno Mulder and Osamu Onodera. (2008). “Trade liberalisation and economic performance: Latin America versus East Asia 1970-2006”. Tech. Rep., 70, OECD.

Egger, Peter H., Mario Larch and Kevin E. Staub. (2012). “Trade preferences and bilateral trade in goods and services: A structural approach”. Discussion Paper Series, DP9051, CEPR.

Egger, Peter H., Mario Larch and Yoto V. Yotov. (2022). “Gravity estimations with interval data: Revisiting the impact of free trade agreements”. *Economica,* 89(353), pp. 44-61.

Egger, Peter H., and Filip Tarlea. (2015). “Multi-way clustering estimation of standard errors in gravity models”. *Economics Letters,* 134, pp. 144-147.

El Dahrawy Sánchez-Albornoz, Ayman, and Jacopo Timini. (2021). “Trade agreements and Latin American trade (creation and diversion) and welfare”. *The World Economy,* 44(7), pp. 2004-2040.

Estefania-Flores, Julia, Davide Furceri, Swarnali A. Hannan, Jonathan David Ostry and Andrew K. Rose. (2022). “A measurement of aggregate trade restrictions and their economic effects”. Tech. Rep., 16919, International Monetary Fund.

Felbermayr, Gabriel, Jasmin Groeschl and Inga Heiland. (2022). “Complex Europe: Quantifying the cost of disintegration”. *Journal of International Economics,* 138, p. 103647.

Felbermayr, Gabriel, and Yoto V. Yotov. (2021). “From theory to policy with gravitas: A solution to the mystery of the excess trade balances”. *European Economic Review,* 139, p. 103875.

Fernandez-Stark, Karina, Penny Bamber and Gary Gereffi. (2016). *Peru in the high quality cotton textile and apparel global value chain: Opportunities for upgrading.*

Gereffi, Gary, Stacey Frederick and Penny Bamber. (2019). “Diverse paths of upgrading in high-tech manufacturing: Costa Rica in the electronics and medical devices global value chains”. *Transnational Corporations,* 26(1), pp. 1-29.

Hannan, Swarnali Ahmed. (2017). “The impact of trade agreements in Latin America using the synthetic control method”. Tech. Rep., WP/17/45, International Monetary Fund.

Hanson, Gordon H. (2021). "Who will fill China's shoes? The global evolution of labor-intensive manufacturing". Tech. Rep., 28313, National Bureau of Economic Research.

Head, Keith, and Thierry Mayer. (2014). "Chapter 3 - Gravity equations: Workhorse, toolkit, and cookbook". In Gita Gopinath, Elhanan Helpman and Kenneth Rogoff (eds.), *Handbook of International Economics.* Elsevier, Vol. 4, pp. 131-195. https://doi.org/10.1016/B978-0-444-54314-1.00003-3

Heid, Benedikt, Mario Larch and Yoto V. Yotov. (2021). "Estimating the effects of non-discriminatory trade policies within structural gravity models". *Canadian Journal of Economics/Revue canadienne d'économique,* 54(1), pp. 376-409.

Hill, Hal. (2000). "Export success against the odds: a Vietnamese case study". *World Development,* 28(2), pp. 283-300.

Irwin, Douglas. (2020). "The pandemic adds momentum to the deglobalisation trend". VoxEU, https://voxeu.org/article/pandemic-adds-momentum-deglobalisation-trend

Irwin, Douglas A. (2022). "The trade reform wave of 1985–1995". In *AEA Papers and Proceedings.* American Economic Association, Vol. 112, pp. 244-251.

Jacks, David S., Christopher M. Meissner and Dennis Novy. (2008). "Trade costs, 1870–2000". *American Economic Review,* 98(2), pp. 529-534.

Jacks, David S., Christopher M. Meissner and Dennis Novy. (2010). "Trade costs in the first wave of globalization". *Explorations in Economic History,* 47(2), pp. 127-141.

Jacks, David S., Christopher M. Meissner and Dennis Novy. (2011). "Trade booms, trade busts, and trade costs". *Journal of International Economics,* 83(2), pp. 185-201.

Kataryniuk, Iván, Javier Pérez and Francesca Viani. (2021). "(De-)Globalisation of trade and regionalisation: a survey of the facts and arguments". Documentos Ocasionales, 2124, Banco de España. https://repositorio.bde.es/bitstream/123456789/19073/1/do2124e.pdf

Kohl, Tristan. (2014). "Do we really know that trade agreements increase trade?". *Review of World Economics,* 150, pp. 443-469.

Lee, Jong-Wha, and Innwon Park. (2005). "Free Trade Areas in East Asia: Discriminatory or Non-discriminatory?". *The World Economy,* 28(1), pp. 21-48. https://doi.org/10.1111/j.1467-9701.2005.00673.x

Loayza, Norman, and Jamele Rigolini. (2016). "The Local Impact of Mining on Poverty and Inequality: Evidence from the Commodity Boom in Peru". *World Development,* 84(C), pp. 219-234. https://doi.org/10.1016/j.worlddev.2016.03.005

Looi Kee, Hiau, Alessandro Nicita and Marcelo Olarreaga. (2009). "Estimating trade restrictiveness indices". *The Economic Journal,* 119(534), pp. 172-199.

Manchin, Miriam, and Annette O. Pelkmans-Balaoing. (2007). "Rules of origin and the web of East Asian free trade agreements". Policy Research Working Paper Series, 4273, The World Bank. https://ideas.repec.org/p/wbk/wbrwps/4273.html

McCallum, John. (1995). "National Borders Matter: Canada-U.S. Regional Trade Patterns". *American Economic Review*, 85(3), pp. 615-623. https://ideas.repec.org/a/aea/aecrev/v85y1995i3p615-23.html

Merchán, Federico, and Mauricio Mesquita Moreira. (2019). "Effects of lowering tariffs on extensive and intensive margins in Latin America, 1990-2015". Technical Note, IDB-TN-1828, IADB.

Mesquita Moreira, Mauricio, Juan Blyde, Paolo Giordano, Marisol Rodriguez Chatruc, Kun Li, Jeremy Harris and Krista Lucenti. (2018). "Connecting the Dots: A Road Map for Better Integration in Latin America and the Caribbean". MPRA Paper, 102289, University Library of Munich. https://ideas.repec.org/p/pra/mprapa/102289.html

Monfort, Brieuc. (2008). "Chile: Trade Performance, Trade Liberalization, and Competitiveness". IMF Working Papers, 2008/128, International Monetary Fund. https://ideas.repec.org/p/imf/imfwpa/2008-128.html

Pellegrina, Heitor S. (2022). "Trade, productivity, and the spatial organization of agriculture: Evidence from Brazil". *Journal of Development Economics*, 156(C). https://doi.org/10.1016/j.jdeveco.2021.102816

Pierola, Martha Denisse, Ana Margarida Fernandes and Thomas Farole. (2018). "The role of imports for exporter performance in Peru". *The World Economy*, 41(2), pp. 550-572. https://doi.org/10.1111/twec.12524

Rasiah, Rajah. (2009). "Garment manufacturing in Cambodia and Laos". *Journal of the Asia Pacific Economy*, 14(2), pp. 150-161. https://doi.org/10.1080/13547860902785989

Rasiah, Rajah, Vignes Gopal and Puvanesvaran Sanjivee. (2013). "Export and innovation in Cambodian clothing manufacturing firms". *Asian Journal of Technology Innovation*, 21(2), pp. 305-316. https://doi.org/10.1080/19761597.2013.866312

Santos Silva, João, and Silvana Tenreyro. (2006). "The log of gravity". *The Review of Economics and Statistics*, 88(4), pp. 641-658. https://EconPapers.repec.org/RePEc:tpr:restat:v:88:y:2006:i:4:p:641-658

Sedik, Tahsin Saadi. (2018). "Asia's digital revolution". *Finance & Development*, 55(3), pp. 31-33.

Steinberg, Joseph B. (2020). "The macroeconomic impact of NAFTA termination". *Canadian Journal of Economics/Revue canadienne d'économique*, 53(2), pp. 821-865. https://doi.org/10.1111/caje.12445

Thuong, Nguyen Thi Thu. (2018). "The effect of sanitary and phytosanitary measures on Vietnam's rice exports". *EconomiA*, 19(2), pp. 251-265. https://doi.org/10.1016/j.econ.2017.12.001

Yotov, Yoto V. (2012). "A simple solution to the distance puzzle in international trade". *Economics Letters*, 117(3), pp. 794-798. https://doi.org/10.1016/j.econlet.2012.08.032

Yotov, Yoto V. (2022). "On the role of domestic trade flows for estimating the gravity model of trade". *Contemporary Economic Policy*, 40(3), pp. 526-540. https://doi.org/10.1111/coep.12567

Yotov, Yoto V., Roberta Piermartini, José-Antonio Monteiro and Mario Larch. (2016). *An advanced guide to trade policy analysis: The structural gravity model.* World Trade Organization.

ANNEX 1. VARIANCE DECOMPOSITION EXERCISE

This Annex further investigates the role of trade policy variables in explaining differences in relative border thickness in LATAM and Asia. It presents results of a variance decomposition exercise where we group trade policies into bilateral policies (trade agreements), trade-related multilateral policies (WTO membership and MFN tariffs) and non-tariff restrictions. Following Felbermeyer and Yotov (2021), we run regressions of the border thickness estimates on different combinations of policy variables and construct predicted values. In a second stage, we run a regression of the predicted border thickness on the original border thickness estimate from (1). The coefficient of the border thickness estimate for each of these regressions, a gauge of the fraction of the border thickness estimate variability captured by different combinations of trade policies, is presented in Table 3. As a benchmark, we include the coefficients for the regressions using the predicted values from a first stage that only controls for country and time fixed effects (no trade policy variables).

Table A1.: Decomposing border thickness estimates—the role of trade policies

	(1)	(2)	(3)	(4)	(5)	(6)
	baseline (country and time FEs)	multilateral (WTO dum + MFN)	bilateral (RTAs)	non-traiff barriers	multilateral +MATR	All
Aggregate trade	0.790***	0.861***	0.792***	0.790***	0.861***	0.863***
	(0.0193)	(0.0164)	(0.0192)	(0.0193)	(0.0164)	(0.0163)
Agriculture	0.807***	0.832***	0.807***	0.807***	0.832***	0.833***
	(0.0187)	(0.0177)	(0.0187)	(0.0187)	(0.0177)	(0.0177)
Mining	0.641***	0.650***	0.653***	0.641***	0.650***	0.660***
	(0.0235)	(0.0234)	(0.0233)	(0.0235)	(0.0234)	(0.0232)
Manufacturing	0.775***	0.829***	0.776***	0.776***	0.829***	0.831***
	(0.0198)	(0.0178)	(0.0197)	(0.0198)	(0.0178)	(0.0178)
Services	0.720***	0.757***	0.721***	0.726***	0.762***	0.762***
	(0.0213)	(0.0203)	(0.0213)	(0.0211)	(0.0202)	(0.0202)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Each column presents results of a regression of predicted border thickness on border thickness estimates obtained from (1), where k={"aggregate trade"; "agriculture"; "mining"; "manufacturing"; "services"}. Predicted border thickness is constructed from a first stage that regresses border thickness estimates obtained from Equation (1) on different combinations of trade policy variables (as described in columns) and country and year fixed effects. Country coverage varies by year depending on availability of trade policy variables.

Results confirm the important role of multilateral policy variables in explaining differences in border thickness estimates in LATAM and Asian countries, especially for aggregate trade and manufacturing, and to a lesser extent agriculture and services. These findings are in line with the fact that for a long period the GATT/WTO concentrated tariff reductions in manufacturing. The coefficient of the second stage regression described earlier for the model that includes only trade agreements is roughly the same as that of the baseline model for all flows except mining. By contrast, the predicted values stemming from the model that controls from multilateral variables increases the coefficient (and R-squared of the regression) by 2 to 7 percentage points, depending on the flow.

BANCO DE ESPAÑA PUBLICATIONS

WORKING PAPERS

2215 JOSÉ MANUEL CARBÓ and SERGIO GORJÓN: Application of machine learning models and interpretability techniques to identify the determinants of the price of bitcoin.

2216 LUIS GUIROLA and MARÍA SÁNCHEZ-DOMÍNGUEZ: Childcare constraints on immigrant integration.

2217 ADRIÁN CARRO, MARC HINTERSCHWEIGER, ARZU ULUC and J. DOYNE FARMER: Heterogeneous effects and spillovers of macroprudential policy in an agent-based model of the UK housing market.

2218 STÉPHANE DUPRAZ, HERVÉ LE BIHAN and JULIEN MATHERON: Make-up strategies with finite planning horizons but forward-looking asset prices.

2219 LAURA ÁLVAREZ, MIGUEL GARCÍA-POSADA and SERGIO MAYORDOMO: Distressed firms, zombie firms and zombie lending: a taxonomy.

2220 BLANCA JIMÉNEZ-GARCÍA and JULIO RODRÍGUEZ: A quantification of the evolution of bilateral trade flows once bilateral RTAs are implemented.

2221 SALOMÓN GARCÍA: Mortgage securitization and information frictions in general equilibrium.

2222 ANDRÉS ALONSO and JOSÉ MANUEL CARBÓ: Accuracy of explanations of machine learning models for credit decisions.

2223 JAMES COSTAIN, GALO NUÑO and CARLOS THOMAS: The term structure of interest rates in a heterogeneous monetary union.

2224 ANTOINE BERTHEAU, EDOARDO MARIA ACABBI, CRISTINA BARCELÓ, ANDREAS GULYAS, STEFANO LOMBARDI and RAFFAELE SAGGIO: The Unequal Consequences of Job Loss across Countries.

2225 ERWAN GAUTIER, CRISTINA CONFLITTI, RIEMER P. FABER, BRIAN FABO, LUDMILA FADEJEVA, VALENTIN JOUVANCEAU, JAN-OLIVER MENZ, TERESA MESSNER, PAVLOS PETROULAS, PAU ROLDAN-BLANCO, FABIO RUMLER, SERGIO SANTORO, ELISABETH WIELAND and HÉLÈNE ZIMMER. New facts on consumer price rigidity in the euro area.

2226 MARIO BAJO and EMILIO RODRÍGUEZ: Integrating the carbon footprint into the construction of corporate bond portfolios.

2227 FEDERICO CARRIL-CACCIA, JORDI PANIAGUA and MARTA SUÁREZ-VARELA: Forced migration and food crises.

2228 CARLOS MORENO PÉREZ and MARCO MINOZZO: Natural Language Processing and Financial Markets: Semi-supervised Modelling of Coronavirus and Economic News.

2229 CARLOS MORENO PÉREZ and MARCO MINOZZO: Monetary Policy Uncertainty in Mexico: An Unsupervised Approach.

2230 ADRIAN CARRO: Could Spain be less different? Exploring the effects of macroprudential policy on the house price cycle.

2231 DANIEL SANTABÁRBARA and MARTA SUÁREZ-VARELA: Carbon pricing and inflation volatility.

2232 MARINA DIAKONOVA, LUIS MOLINA, HANNES MUELLER, JAVIER J. PÉREZ and CRISTOPHER RAUH: The information content of conflict, social unrest and policy uncertainty measures for macroeconomic forecasting.

2233 JULIAN DI GIOVANNI, MANUEL GARCÍA-SANTANA, PRIIT JEENAS, ENRIQUE MORAL-BENITO and JOSEP PIJOAN-MAS: Government Procurement and Access to Credit: Firm Dynamics and Aggregate Implications.

2234 PETER PAZ: Bank capitalization heterogeneity and monetary policy.

2235 ERIK ANDRES-ESCAYOLA, CORINNA GHIRELLI, LUIS MOLINA, JAVIER J. PÉREZ and ELENA VIDAL: Using newspapers for textual indicators: which and how many?

2236 MARÍA ALEJANDRA AMADO: Macroprudential FX regulations: sacrificing small firms for stability?

2237 LUIS GUIROLA and GONZALO RIVERO: Polarization contaminates the link with partisan and independent institutions: evidence from 138 cabinet shifts.

2238 MIGUEL DURO, GERMÁN LÓPEZ-ESPINOSA, SERGIO MAYORDOMO, GAIZKA ORMAZABAL and MARÍA RODRÍGUEZ-MORENO: Enforcing mandatory reporting on private firms: the role of banks.

2239 LUIS J. ÁLVAREZ and FLORENS ODENDAHL: Data outliers and Bayesian VARs in the Euro Area.

2240 CARLOS MORENO PÉREZ and MARCO MINOZZO: “Making text talk”: The minutes of the Central Bank of Brazil and the real economy.

2241 JULIO GÁLVEZ and GONZALO PAZ-PARDO: Richer earnings dynamics, consumption and portfolio choice over the life cycle.

2242 MARINA DIAKONOVA, CORINNA GHIRELLI, LUIS MOLINA and JAVIER J. PÉREZ: The economic impact of conflict-related and policy uncertainty shocks: the case of Russia.

2243 CARMEN BROTO, LUIS FERNÁNDEZ LAFUERZA and MARIYA MELNYCHUK: Do buffer requirements for European systemically important banks make them less systemic?

2244 GERGELY GANICS and MARÍA RODRÍGUEZ-MORENO: A house price-at-risk model to monitor the downside risk for the Spanish housing market.