Effective Trade Barriers and the Current Account: An Empirical Analysis *

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Abstract

A recent popular view is that the height of trade barriers in prime export sectors have a strong effect on current account balances: countries specializing in sectors that face relatively high trade costs, such as services, tend to run current account deficits, and similarly, countries specializing in low trade cost sectors, such as manufacturing, tend to run current account surpluses. We test this view using data on sectoral bilateral trade flows. Imposing a parsimonious structure of trade, we infer comparative advantage and trade barriers by sector for a large sample of countries covering 1970-2014. We then construct *effective trade costs*—trade costs weighted by sectoral comparative advantage—to gauge the height of a country's overall trade barriers. Results reveal that, while higher effective exporting costs are associated with lower current account balances, their impact is quantitatively limited. Effective costs of importing often have no statistically significant effect. These findings are consistent with theories that suggest limited transitional effects and support the view that the current account is primarily a macroeconomic phenomenon.

Keywords: Current Account, Global Imbalances, Trade Costs, Gravity Models, Comparative Advantage, Trade Restrictiveness.

JEL Classification: F13, F14, F32, F41

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1 Introduction

The height of trade barriers and its potential impact on countries' external balances have recently become a popular subject in policy and academic circles. Bringing in considerations of specialization patterns, an important observation in this debate is that some major economies that specialize in sectors facing relatively high trade costs, such as services, tend to run current account (CA) deficits, while countries that specialize in low trade cost sectors, tend to run CA surpluses.[1] For example, for the world's five largest economies, Figure I reveals a negative correlation between services trade and CA balances, both measured as a share of GDP. Motivated by this observation, some posit a causal relationship between trade costs in prime export sectors and current account balances (Joy et al. 2018).[2] According to this view, the rise in global imbalances starting in the early 2000s could have resulted from a faster reduction in trade costs for manufacturing than for services. A following policy conclusion is that global imbalances would shrink if trade costs became more closely aligned across sectors, either through lower costs for services or higher costs for manufacturing.

The predictions of theory on the impact of trade barriers are, however, largely context-specific. The earlier literature aiming to understand the macroeconomic effects of tariffs argues that under flexible exchange rates the effect of a tariff increase would be offset by an exchange appreciation (Mundell 1961) and may even lead to an overall contraction in output and exports (Krugman 1982; Ostry and Rose 1992; Obstfeld 2016). An ensuing literature considers more elaborate frameworks and quantify the transitional effects of trade costs on CA outcomes. The magnitude of the effects depend on the model and calibration specifics (Joy et al. 2018; Reyes-Heroles 2016; Barattieri 2014).[3]

What are the effects of trade barriers, especially as they apply to countries' prime export sectors, on CA outcomes? Are they quantitatively significant? Has the evolution of trade costs, over time and across countries, contributed to the global imbalances observed in the last two decades? We employ an empirical approach to answer these questions. By doing so, our analysis not only sheds light on the past patterns, but it can also help inform the debate on the potential consequences of the recent wave of protectionist policies.

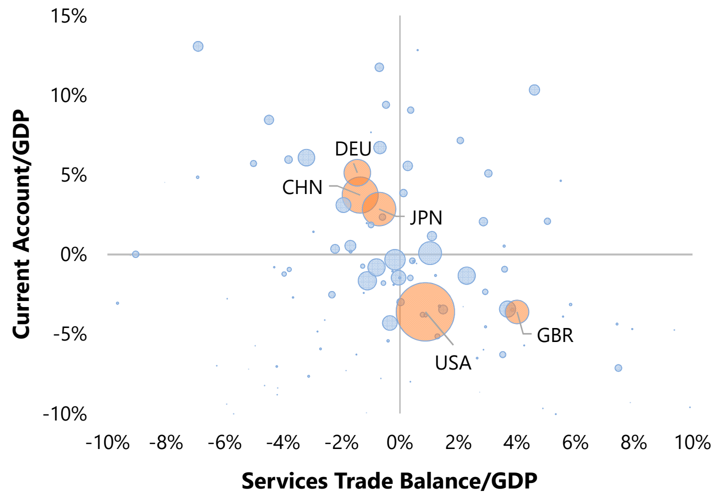
Against this background, we study a globally representative sample of countries over 4.5 decades to empirically quantify the effects of trade barriers on CA outcomes, taking into account special-

[1] International trade in services is generally associated with higher costs than manufacturing trade because it is more sensitive to natural inhibiting factors such as geographical distance and cultural differences, and also can face high policy-related barriers, including regulatory requirements (Miroudot, Sauvage and Shepherd 2013).

[2] For instance, Governor Carney of the Bank of England stated that "*One cause of global imbalances is the uneven playing field between trade in goods and services, with barriers to services trade currently up to three times higher... Most of the world's major surplus economies, like Germany and China, are net exporters of goods and benefit from this asymmetry. Conversely countries with comparative advantage in services, like US and UK, are more likely to run current account deficits.*" "A Fine Balance, speech at the Mansion House, London, June 20, 2017.

[3] While in a limiting case with prohibitively high world tariffs, a country (assuming no external assets and liabilities) would run a balanced CA, that case is not useful in understanding whether observed fluctuations in trade costs around their actual levels have been significant determinants of CA balances.

Figure I: Current Account and Services Trade Balances, 2001-2017



Source: IMF World Economic Outlook Database.

Note: Each bubble represents a country with bubble sizes proportional to countries' average USD GDP over 2001-17.

ization patterns. Such quantification faces three important challenges: measuring disaggregated trade barriers; postulating a notion of comparative advantage and measuring it; aggregating trade barriers across trading partners and sectors to obtain overall country-specific restrictiveness measures to be able to relate them to CA balances. We utilize a standard structural gravity framework to overcome these challenges.

We infer the height of disaggregated bilateral trade costs using data on bilateral trade flows in agriculture, manufacturing and services, and the multi-sector Ricardian trade model of Eaton and Kortum (2002). By estimating separately for different years and sectors, we allow the trade barriers and their relationship with trade flows to vary over time and across sectors. This variation is especially important for our analysis, which examines a period of close to five decades characterized by significant improvements in shipping and information technologies for sectors with heterogeneous tradability.

Our trade cost measures include non-tariff barriers that are difficult to quantify but potentially pervasive. Broadly speaking, trade barriers include all costs incurred in moving goods or services from the producer to a final user in a different country, which include both relatively easy-to-measure expenses for tariffs and goods shipment that most of the literature focuses on, but also non-tariff barriers that are either hard to quantify (e.g. quotas) or not directly observed (e.g. information costs, contract enforcement costs, legal and regulatory costs), particularly in the case of services (Anderson and Wincoop, 2004). Direct measures of service trade barriers are in the form of indices and limited in their country and time series coverage. In the case of goods trade, data on non-tariff barriers are also sparse and incomprehensive.

We allow the bilateral trade costs to be asymmetric between importers and exporters. To do so, we estimate an importer-specific component of trade barriers as in Eaton and Kortum (2002). A country's overall imports from a given sector could be low either because its production costs are low in that sector, making it more competitive than its trading partners, or because it imposes relatively high *nondiscriminatory* import barriers. The framework separates these two effects by bringing in additional information about exports, such that if low imports are coupled with high exports, it infers that the country has low production costs in that sector. If both imports and exports are low vis-à-vis all trading partners, the framework identifies the presence of nondiscriminatory import barriers.

The difficulty of measuring comparative advantage is that it requires characterizing the differences between world prices and the domestic prices that would have prevailed under autarky. However, the counterfactual relative prices are not observed, and therefore, comparative advantage must somehow be inferred from observed post-trade outcomes. We follow Hanson et al. (2018) to extract a measure of each country's sectoral export capability inferred using the gravity equation and then apply a double normalization to get comparative advantage. The first normalization is relative to the world average of the log export capability and yields absolute advantage for each country-sector. We then normalize absolute advantage with its country-wide average across sectors to remove the effects of domestic aggregate growth. The resulting measure of comparative advantage reflects differences in countries' technology adjusted for input costs. Importantly, it strips away the effects of the importer-specific factors and bilateral trade costs, and in that sense is more refined than the traditional Balassa revealed comparative advantage calculated simply using gross trade flows.

Armed with these estimates, we compute *aggregate effective trade costs* to capture the height of net barriers to countries' natural exports and natural imports. Our estimated trade barriers are by country pair, sector and year. To obtain country-year measures of trade costs, we need to aggregate across trading partners and sectors. We aggregate across trading partners in two different ways. First, we employ a commonly used approach to use *lagged* trade weights. Lagged weights help alleviate the endogeneity problem associated with using trade weights but most likely do not fully resolve it. Hence, as an alternative, our second approach relies on counterfactual frictionless trade flows given by setting the iceberg trade costs to zero in the partial equilibrium version of the gravity framework. This approach is akin to the idea of using free-trade weights to measure overall trade restrictiveness (Anderson and Neary 2005; Loveday 1931; Leamer 1974).[4] To aggregate across sectors, we use sectoral comparative advantages as weights, guided by our objective to capture barriers as they apply to prime export sectors.

Introducing the estimates of aggregate effective trade costs, separately for both export and import sides, to an empirical model of CA determination, similar to those of Chinn and Prasad

[4]Anderson and Neary (2005) explain that the choice between frictionless trade weights and actual trade weights is identical to that between Laspeyres and Paasche price indices where the former relies on a fixed basket while the latter fully reflects the substitution that takes place after a price change.

(2003) and Lee et al. (2008), reveals that countries facing higher export costs in their comparative advantage sectors have modestly lower CA balances. Specifically, for the sample period 1986 to 2009, a 10-percentage point unilateral reduction in aggregate effective export costs for an average country is associated with a CA balance improvement equivalent to 0.5-0.8 percent of GDP depending on the aggregation scheme. Estimates based on a sample spanning 2001-14 yield effects that are about half the size of those for the earlier period. Effective costs to import have small and generally statistically insignificant effects. Decomposing global imbalances into those explained by effective trade costs and by other factors suggests that the contribution of effective trade costs to global imbalances has been limited.

We find these results to be robust to considering a number of alternative assumptions and specifications. Most importantly, we check whether our results hinge on the trade costs having an importer-specific component. In particular, our estimates for the nondiscriminatory import costs might confound importer-specific barriers (e.g. tariffs) and exporter-specific barriers (e.g. export subsidies), and thus, lead to mismeasurement of sectoral competitiveness and trade costs. For example, the joint observation of low imports and low exports can be consistent with a nondiscriminatory import barrier or a nondiscriminatory export tax. Although we cannot simultaneously identify the importer- and exporter-specific barriers with our existing dataset, we bring in the bilateral tariff data, and estimate a gravity equation with the alternative assumption that trade costs have an exporter-specific component in one extension. We find that our main conclusion regarding the limited effects of trade barriers on CA outcomes remains unchanged. In addition, we correlate our estimated nondiscriminatory import barriers with observables from the importer side such as import tariffs (for agriculture and manufacturing sectors), trade restriction indices (for services), infrastructure quality, and real effective exchange rates, and generally find statistically significant coefficients with the expected signs. These results suggest that the nondiscriminatory costs may be more prominent on the import side than on the export side.

Our empirical findings are consistent with theories that generate transitional effects of trade costs on CA balances. In standard open economy models, the long-run CA is pinned down by macroeconomic fundamentals and domestic policies (chapter 2 of Obstfeld and Rogoff, 1996). Thus, trade impediments reduce spending and income commensurately and may contribute little to the long-run CA balance. On the other hand, recent quantitative studies have introduced mechanisms that generate transitional effects of trade costs on the CA, depending on the extent to which the shocks tilt the expected future profile of intertemporal prices and income—central macroeconomic determinants of saving and investment (Joy et al. 2018; Reyes-Heroles, 2016; Eaton, Kortum and Neiman 2016; Barattieri, 2014). The reported quantitative effects in these papers are most likely strengthened by their assumption of perfect foresight regarding the future path of trade costs. Similarly, a temporary tariff hike could induce agents to defer consumption until the tariffs expire, and thereby affect output, the exchange rate, and the trade balance (IMF 2017; Erceg et al., 2017).

This paper is particularly related to two recent studies that consider the asymmetries in trade costs across sectors, the configuration of countries' comparative advantages, and their implications for the CA balances. In his empirical explorations, similar to our work, Barattieri (2014) estimates a gravity equation to quantify the height of trade barriers for goods and services separately. Differently from us, however, it proceeds to construct a home bias index a la Andreson and Yotov (2010) and aggregates these indices to the world level with the goal of feeding them into a two-country model. We, on the other hand, rely on an Eaton and Kortum (2002) type framework to measure trade barriers and utilize the cross-country heterogeneity of these barriers in our empirical tests. This is crucial because we find substantial heterogeneity across countries in terms of both the level and evolution of barriers.

The second closely related study is Joy et al. (2018), which quantifies the impact of the interaction between country-specific revealed comparative advantage in goods and world average tariffs on CA balances. The study finds a strong negative relationship. However, this result is difficult to interpret because the decline in the world average tariff does not differentiate between exporting and importing costs but these interpretations could have different implications on a country's CA. The study also relates Services Trade Restriction Indices from the OECD to the CA balances but this data is available only for 2014-16 and Joy et al. (2018) assume that these indices remained since the 90s. Finally, both Barattieri (2014) and Joy et al. (2018) rely on the Balassa revealed comparative advantage measure which confounds the effects of trade barriers and importer-specific factors.[5]

2 Measurement and Aggregation

In this section, we first provide the details of the theoretical framework that guides our measurement and partly the aggregation exercises. We then describe our dataset and proceed to discussing the results of the gravity estimation, and finally, lay out the stylized facts regarding the estimated measures of comparative advantage and trade barriers in turn.

2.1 Theoretical Framework

This section lays out the structural framework used for the estimation of sectoral comparative advantages and trade costs. It follows a multi-sector generalization of Eaton and Kortum (2002; henceforth, EK) as in Caliendo and Parro (2009) and Levchenko and Zhang (2016). We drop the time subscripts except when necessary for clarity.

[5] Another related strand of literature focuses on understanding the barriers to trade in services. For example, Gervais et al. (2013) and Anderson et al. (2014) based on services trade within the U.S. and between U.S. and Canada, respectively, find that geographical distance alone is a very important impediment. Similar to us, Anderson et al. (2015) estimate a structural gravity equation with detailed data on services trade and production.

As in EK, output in sector j of country i is produced using a constant elasticity of substitution (CES) production function aggregating a continuum of varieties. Each variety q is produced by a firm with productivity $z_i^j(q)$. That is, producing one unit of variety q requires $1/z_i^j(q)$ unit of the input bundle, which combines labor, capital and intermediate inputs from all sectors. The cost of producing one unit of variety q in sector j country i is then given by $c_i^j/z_i^j(q)$, where the cost of input bundle c_i^j depends on the local wage, rental rate of capital and cost of intermediate inputs. As in Caliendo and Parro (2014), sectoral linkages imply that c_i^j depends on wage and capital costs in other sectors and countries. Both product and factor markets are perfectly competitive.

The productivity of a firm in source-country i is drawn randomly from a Freche distribution with a cumulative density function $F_i^j(z) = \exp(-T_i^j z^{-\theta^j})$. The location parameter $T_i^j > 0$ determines the average productivity level of a firm in sector j, country i, and the shape parameter $\theta^j > 1$ governs the dispersion of productivities across firms in the same sector. A lower value of θ^j implies a higher dispersion of firms and a higher probability that two countries will have different productivities in producing the same good and hence greater incentives to trade. Although θ^j can vary across sectors, we assume them to be common across countries since rich and poor countries do not seem to differ in their estimated elasticities (Waugh, 2010).

As in EK, normalizing the domestic trade costs to one in each country-sector, cross-border trade is subject to an ad-valorem trade costs $d_{ni}^j \geq 1$. Given perfect competition in the goods market, the market price at destination country n of a good supplied by country i equals

$$p_{ni}^j(q) = \frac{c_i^j}{z_i^j(q)} d_{ni}^j. \tag{1}$$

Without home bias in preferences, consumers shop around globally for the cheapest source for each variety and thus the prevailing price of the good in country n is given by $p_n^j(q) = \min_i\{p_{ni}^j(q)\}$.[6]

Given the source country's productivity distribution and equation (1), the distribution of prices that country i quotes for country n in sector j follows $G_{ni}^j(p) = 1 - \exp(-T_i^j(c_i^j d_{ni}^j)^{-\theta} p^{\theta})$. Let π_{ni}^j denote the probability that country i supplies a sector-j good at the lowest price in country n. It follows that

$$\pi_{ni}^j = \frac{T_i^j(c_i^j d_{ni}^j)^{-\theta^j}}{\sum_k T_k^j(c_k^j d_{nk}^j)^{-\theta^j}}. \tag{2}$$

With the assumption of a continuum of varieties, this probability equals the fraction of goods that country n sources from country i sector j. Let X_{ni}^j denote country n's spending on country i goods in sector j, and X_n^j denote country n's total expenditures on sector j goods. We then have

$$X_{ni}^j = \frac{T_i^j(c_i^j d_{ni}^j)^{-\theta^j}}{\sum_k T_k^j(c_k^j d_{nk}^j)^{-\theta^j}} X_n^j. \tag{3}$$

[6]If there is home bias for a product, that bias would appear in the source country-specific variables (such as c_i^j or z_i^j).

Dividing both sides of the above equation with country n's expenditure on domestically produced goods in sector j, X_{nn}^j, yields

$$\frac{X_{ni}^j}{X_{nn}^j} = \frac{T_i^j (c_i^j d_{ni}^j)^{-\theta^j}}{T_n^j (c_n^j)^{-\theta^j}}. \tag{4}$$

The above normalization removes aggregate demand effects from both sides of Equation (3). This way, the higher the average productivity (T_i) and the lower the cost of production (c_i) or trade costs (d_{ni}) a country has, the higher will be its share in other countries' imports.

Let $\tilde{X}_{ni}^j = \frac{X_{ni}^j}{X_{nn}^j}$ denote the normalized exports of country i to country n in sector j. Taking logs of both sides of Equation (4) results in the familiar gravity equation for bilateral trade flows:

$$\ln \ \tilde{X}_{ni}^j = \ln \left(T_i^j (c_i^j)^{-\theta^j} \right) - \ln \left(T_n^j \left(c_n^j \right)^{-\theta^j} \right) - \theta^j \ln d_{ni}^j. \tag{5}$$

Each term in the above gravity equation has an intuitive interpretation. The first term, $T_i^j (c_i^j)^{-\theta^j}$, captures the exporting country i's *export capability* in sector j, which increases with the country's average productivity (T_i^j) in that sector, the dispersion of productivity across firms ($1/\theta^j$) and decreases with the unit production cost (c_i^j). The second term, $T_n^j (c_n^j)^{-\theta}$, is a measure of the toughness of industry competition in the importing country n. Again, higher average productivity in sector j or lower unit production cost increases importing country's competitiveness and makes it more difficult for foreign suppliers to penetrate. Any factor that reduces domestic production costs including lower domestic transportation costs improves a country's competitiveness. The third term, d_{ni}^j is the bilateral trade cost.

Both natural and man-made factors can deflect trade, and should enter as components of trade costs, d_{ni}^j. As is standard in the gravity literature, natural factors include geographic distance, and whether or not a country pair shares a common border, language and colonial relationship. Man-made factors comprise the presence of a currency union or trade agreement between trading partners, tariffs and non-tariff barriers such as institutional and regulatory costs. Importantly, we assume that bilateral trade barriers include an importer-specific nondiscriminatory component (im_n^j). This assumption follows Eaton and Kortum (2002) and is crucial in allowing for asymmetric bilateral trade costs in absence of other bilateral directional observables in the gravity estimation.[7]

Formally, trade barriers can be written as:

$$\ln d_{ni}^j = D_{ni}^j + B_{ni}^j + L_{ni}^j + Col_{ni}^j + CU_{ni}^j + RTA_{ni}^j + im_n^j. \tag{6}$$

where the dummy variable associated with each factor has been suppressed to simplify notation. $D_{ni,k}^j$ is the contribution to trade costs of the geographic distance between country n and i falling in the k^{th} interval (in miles), with the intervals defined as [0,350], [350, 750], [750, 1500], [1500, 3000], [3000, 6000], [6000, maximum). Other controls include dummies for the presence of a common

[7] We include directional observables directly in the gravity estimation later in Section 3.2.

border, B^j_{ni}, common currency CU^j_{ni}, common colonial or once in a colonial relationship Col^j_{ni}, and regional trade agreement, RTA^j_{ni}, between country n and country i.

For each sector-year, we take to the data the following gravity equation saturated with exporter (k^j_i) and importer fixed effects (m^j_n):

$$\begin{aligned} \ln\ \tilde{X}^j_{ni} &= \underbrace{\left[\ln\left(T^j_i\,(c^j_i)^{-\theta^j}\right)\right]}_{\text{Exporter FE, } k^j_i} - \underbrace{\left[\ln\left(T^j_n\,\left(c^j_n\right)^{-\theta^j}\right) + \theta^j im^j_n\right]}_{\text{Importer FE, } m^j_n} \\ &- \theta^j \underbrace{\left(D^j_{ni} + B^j_{ni} + L^j_{ni} + Col^j_{ni} + CU^j_{ni} + RTA^j_{ni}\right)}_{\text{Bilateral observables}}. \end{aligned} \tag{7}$$

Since a considerable fraction of bilateral trade flows is zero, especially when working with sectoral data, we estimate the gravity equation using the Pseudo Poisson Maximum Likelihood method to deal with the heteroskedasticity associated with log-linearized models (Silva and Tenreyro, 2006).[8] We assume $\theta^j = 8.28$ for all sectors for the most part of our exercise. For robustness, we also consider the alternative value of $\theta^j = 4$. The estimated values of fixed effects, k^j_i, m^j_i and d^j_{ni} are then used to measure comparative advantage of each country in each sector and bilateral sectoral trade costs.

Comparative Advantage. Following Costinot et al. (2012), French (2017) and Hanson et al. (2018), we use our estimated exporter fixed effects to measure a country's export capability in a sector. In fact, EK also consider the exporter fixed effects to be measures of "competitiveness," which are essentially exporter productivity adjusted for labor and intermediate input costs. Following Hanson et al. (2018), export capability of a country in a sector expressed as its deviation from the global average for that sector ($\sum_{i=1}^N \exp(k^j_i)/N$, where N is the number of exporting countries in the world) gives its *absolute advantage*:

$$A^j_i = \frac{\exp(\hat{k}^j_i)}{\frac{1}{N}\sum_{i=1}^N \exp(\hat{k}^j_i)}. \tag{8}$$

This normalization thus nets out shocks that are sector-specific but common across countries. Built on the Ricardian tradition, *comparative advantage* is then the absolute advantage of country i in sector j relative to the county's absolute advantage averaged across sectors:

$$C^j_i = \frac{A^j_i}{\frac{1}{J}\sum_{j=1}^J A^j_i}, \tag{9}$$

where J is the total number of sectors. As shown by French (2017), under the EK assumption that all sectors use inputs in the same proportions, the second normalization would eliminate the effects

[8]Since we use Pseudo Poisson Maximum Likelihood, our comparative advantage estimates would be closer to that proposed by French (2017) than Costinot et al. (2012).

of labor and intermediate input costs, leaving only the differences in relative productivity.

Bilateral Trade Barriers. We estimate the bilateral trade barriers, d^j_{ni}, using Equation (6). Its nondiscriminatory component, im^j_n, is given by the difference between estimated exporter and importer fixed effects for a given country:

$$im^j_n = \frac{m^j_n - k^j_n}{\theta^j}. \tag{10}$$

An important remark at this point is that several studies in the literature, such as Waugh (2010) and Levchenko and Zhang (2016) consider the difference between importer and exporter fixed effects to reflect export subsidies instead of import barriers. As we explain in Section 3.2, in a more general case where both import barriers and export subsidies are allowed, the left-hand-side of the above equation would have been replaced by their total. Thus, the two cannot be identified separately without bringing in additional data. In our baseline, we follow Eaton and Kortum (2002) to focus on the overall destination effect by assuming that the trade costs vary across trading partners contingent upon the importer. Our analysis in Section 4 that correlates the inferred nondiscriminatory component with a number of observables provides some empirical backing to this choice. In addition, our robustness checks in Section 3.2 suggest that the empirical relationship between effective trade costs and the CA does not hinge on this assumption.

Aggregating Trade Barriers Across Trading Partners. Armed with estimates for sectoral bilateral trade barriers, d^j_{ni}, we first aggregate across trading partners to construct country-sector level barriers. Throughout, we differentiate between barriers that apply to exports and those that apply to imports. They are calculated, respectively, as:

$$DX^j_i = \sum_n w^j_{ni} d^j_{ni} \quad \text{and} \quad DM^j_i = \sum_n w^j_{in} d^j_{in}.$$

We consider two alternatives for the weights, w^j_{ni}: lagged trade shares and "frictionless trade" weights, as we explain below.

Lagged trade shares are simply given by one-year lagged shares of countries in their trading partners' nominal exports and imports for each sector. This weighting scheme is commonly used because of its simplicity and its potential to alleviate the biases introduced when using contemporaneous trade shares. Since exports and imports respond to trade costs, weighing bilateral trade costs by contemporaneous trade shares would introduce a downward bias to the potential effects of overall trade costs.

We characterize a frictionless trade counterfactual assuming $d_{ni} = 1$ and considering a partial equilibrium version of EK. The latter assumption allows us to solve for this counterfactual without resorting to a structural estimation and to derive simple and intuitive expressions that flesh out how this weighting scheme relates to countries' export capability. More specifically, we can show analytically that with this approach, the weights to aggregate importing costs are given by source countries' absolute advantage, as defined by Hanson et al. (2018), while the weights for exporting costs are determined by countries' shares in gross spending for each sector.

The normalized trade shares in the frictionless trade counterfactual are given by the difference between the trading partners' exporter fixed effects:

$$\ln \tilde{X}_{ni}^{j} = \ln[T_i^j (c_i^j)^{-\theta}] - \ln[T_n^j (c_n^j)^{-\theta}] = k_i^j - k_n^j. \tag{11}$$

The level of trade flows is then simply:

$$X_{ni}^{j} = \exp(k_i^j - k_n^j) X_{nn}^{j}, \tag{12}$$

which forms the basis of this weighting scheme. The frictionless trade weights to aggregate across source countries for a given importer i, DM_i^j, are

$$w_{in}^{j} = \frac{X_{in}^{j}}{\sum_n X_{in}^{j}} = \frac{\exp(k_n^j - k_i^j) X_{ii}^{j}}{\sum_n \exp(k_n^j - k_i^j) X_{ii}^{j}} = \frac{\exp(k_n^j)}{\sum_n \exp(k_n^j)} = A_n^j N. \tag{13}$$

The above expression reveals that the weights correspond to the source countries' absolute advantage A_n^j, as defined earlier in Equation (8). Using the same counterfactual trade flows, the weights to calculate country-sector level export costs for a given eporter i, DX_i^j, are

$$w_{ni}^{j} = \frac{X_{ni}^{j}}{\sum_n X_{ni}^{j}} = \frac{\exp(k_i^j - k_n^j) X_{nn}^{j}}{\sum_n \exp(k_i^j - k_n^j) X_{nn}^{j}}. \tag{14}$$

in which, under frictionless trade and according to Equation (3), X_{nn}^j can be rewritten as

$$X_{nn}^{j} = \frac{T_n^j (c_n^j)^{-\theta}}{\sum_h T_h^j (c_h^j)^{-\theta}} X_n^j = \frac{\exp(k_n^j)}{\sum_h \exp(k_h^j)} X_n^j. \tag{15}$$

Substituting (15) back to the above expression for w_{ni} yields

$$w_{ni}^{j} = \frac{X_n^j}{\sum_n X_n^j}. \tag{16}$$

Intuitively, the frictionless trade weights for weighting export barriers are simply the partners' shares in world gross expenditures for each sector. These weights do not vary across exporters, thus, destination countries get the same weight regardless of the exporter whose trade barriers are being aggregated. Countries with higher expenditures globally constitute larger potential markets and correspondingly, get larger weights.

Aggregate Effective Trade Barriers. We construct comparative advantage weighted exporting and importing barriers as follows:

$$DXC_i = \frac{1}{J}\sum_j \left(DX_i^j \times C_i^j\right) \quad \text{and} \quad DMC_i = \frac{1}{J}\sum_j \left(DM_i^j \times C_i^j\right). \tag{17}$$

This final step aggregates across sectors using countries' comparative advantage in each sector as weights (as $\frac{1}{J}\sum_j C_i^j = 1, \forall i$ by construction) and delivers a measure of aggregate effective trade barriers.

2.2 Data Description

Bilateral Sectoral Trade Flows. We obtain bilateral trade data for three sectors–agriculture, manufacturing and services—from two sources: Johnson and Noguera (2017) (JN) and the 2016 release of the World Input-Output Database (WIOD). Johnson and Noguera (2017) assemble a balanced panel of sectoral bilateral trade flows between 37 countries for 1970-2009 agriculture, manufacturing, services and non-manufacturing industry. Since the non-manufacturing industry includes commodities, whose trade may have particularly low elasticities of demand and supply as argued by Fally and Sayre (2018), we exclude it from our analysis. Since bilateral services trade data are limited, especially going back in time, Johnson and Noguera (2017) impute bilateral service trade flows by applying bilateral trade shares for goods to multilateral data on services. This is motivated by the observation that goods and services trade shares, when observed, are strongly correlated. In particular, they run a constrained least squares estimation procedure to recover bilateral services flows that minimize deviations between imputed services trade shares and target shares (based on goods trade), subject to the constraint that the sum of the bilateral flows be equal to multilateral exports and imports for each country.

Given the assumptions in data construction, we complement Johnson and Noguera (2017) dataset with WIOD that also provides bilateral trade flows. WIOD covers the more recent period of 2000-2014 at 56 disaggregated sectors for 43 countries, among which 29 countries overlap with the Johnson and Noguera (2017) database. The WIOD assembles trade flows using data from numerous sources such as the OECD, Eurostat, UN, and the IMF. For comparability and to overcome the difficulty of dealing with zero trade flows which becomes more pertinent with more disaggregated flows, we aggregate the 56 WIOD sectors to match the Johnson and Noguera (2017) sectors.

Gravity Controls. Our gravity controls are from the CEPII database. For geographic distance, we use simple distance between most populated cities in km, which we convert to miles and generate the dummies for 6 intervals, as reported earlier. The dummies that indicate whether countries are landlocked or share a common continent are from GeoDist database of CEPII. The remaining controls are from the full version of the gravity dataset where we use the free trade agreement information sourced from the WTO, and the dummies on whether countries have ever been in a colonial relationship, whether they've shared a common colonizer post 1945 and whether they have a common official language.

Tariffs and Nontariff Barriers. We use two sets of tariff data: most-favored nation (MFN) rates and bilateral tariffs. We use the former, which are at the importer level to dissect the estimated nondiscriminatory import barriers, and the latter in the robustness analysis to rerun the gravity by explicitly controlling for some of the bilateral observables. We download the MFN applied tariffs at the Harmonized System 6-digit level from the Trade Analysis Information System of the United Nations Conference on Trade and Development Database via the World Integrated Trade System of the World Bank. To construct tariffs by importer-sector, we take the simple average of the MFN applied tariffs across 6-digit products that fall under each of our goods sectors (agriculture and manufacturing). The MFN tariff data are available for nearly all WTO members beginning in the late 1980s. Our bilateral tariff data is constructed by complementing the effectively applied tariff rates with information on bilateral trade data flows for countries with a trade agreement. Specifically, we take a simple average of tariffs across HS 6-digit products with nonzero trade flows between for each country pair to obtain sector level bilateral tariffs.

To gauge the restrictions of services trade, the OECD constructs Services Trade Restrictiveness Indices (STRI) for 44 countries covering 22 services subsectors over 2014-16. The STRIs are based on restrictions grouped under five different policy areas (Grosso et al., 2015): restrictions on foreign entry, restrictions on the movement of people, other discriminatory measures, barriers to competition, and regulatory transparency. The OECD's methodology is largely based on restrictions applied in practice, with the exception of the area of regulatory transparency, where some World Bank Doing Business indicators based on surveys are used as inputs. The scoring in each policy area ranges from 0 (completely open) to 1 (completely closed), and are translated into a single indicator for each subsector. The indicator we use then is the simple average across 22 subsectors to measure the height of services trade restrictions at the country level.

Another data we use is the Temporary Trade Barriers Database (TTB) assembled by Bown (2016) and provided by the World Bank. TTBs are part of the non-tariff measures that importers can impose bilaterally (anti-dumping, countervailing duties and China-specific safeguards) or unilaterally (global safeguards). The raw data is highly disaggregated at HS-8 or higher digits so, we follow Bown (2016) to assume that an HS 6-digit product has a TTB when a higher digit product is effected by such barriers. We then calculate the number of TTB affected HS 6 digit products at the country pair-sector level for bilateral TTBs and then divide by the number of nonzero HS 6 digit trade flows to get a sense of the share of TTB affected products. For the unilateral TTBs, we do the same exercise at the importer-sector level.

Other Variables. To measure the stock of domestic transport infrastructure, we use the road density indicator constructed by Du, Wei and Xie (2013), which is defined as the total length of paved roads and railroads per square kilometers. Unfortunately, the absolute level of road density may not be comparable across countries due to differences in geographic and topological features. For example, if a country may have a relatively low road density because of more desert or surface water within its territory but not necessarily because of insufficient transportation network. Our specifications with country fixed effects alleviate such concerns about measurement by controlling for all time-invariant features.

We use the total support estimate of the OECD to proxy state support in agriculture. OECD defines support as the annual monetary value of gross transfers to agriculture from consumers and taxpayers arising from government policies that support agriculture, regardless of their objectives and economic impacts.

The PPP-REER series is constructed by the IMF and draws on data for the level of countries prices in 2011 from the International Comparison Program survey and the REER indices from the IMF's Information Notice System. Essentially the REER indices are spliced for each country on to the 2011 level exchange rates after first expressing the ICP levels relative to trading partners.[9]

Finally, to obtain GDP per capita, we divide real GDP at chained PPPs by population, both from Penn World Table 9.0.

2.3 Gravity Estimation

Our gravity regressions fit the trade data well with reasonably stable coefficients over time, the properties that popularized the gravity as an analytical tool to understand trade flows. We present the estimates of the gravity coefficients for 1990 and 2005 in Table I, separately for each of the three sectors considered.

As Table I shows, geographic distance coefficients in absolute value are smallest for manufacturing and get smaller over time for all three sectors. It is not surprising that manufacturing trade is the least impacted by distance given these goods are less perishable than agriculture and they are easier to arrange and ship in large containers. The services sector generally faces higher geographic barriers as shown by the more negative coefficients associated with geographic distance. The latter is consistent with recent work suggesting that geographic distance constitutes a larger impediment to services trade than goods (Gervais et al. 2013, Anderson et al. 2014). The trend reduction in the importance of distance as an impediment, with largest reductions observed for manufacturing,

[9] These series on exchange rates, along with all of the CA regressors, except those that pertain to trade barriers, are provided at External Balance Assessment data page: https://www.imf.org/external/np/res/eba/data.htm.

is likely due to the technological advances in transportation and the associated declines in shipping costs (Feyrer, 2009).

Table I: Gravity Coefficients: 1990 vs. 2005

	1990			2005		
	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services
Distance dummy (in miles)						
[0, 375)	-3.284***	-2.164***	-4.096***	-2.805***	-1.194***	-3.483***
	(0.530)	(0.312)	(0.319)	(0.521)	(0.287)	(0.270)
[375, 750)	-3.729***	-2.513***	-4.509***	-3.042***	-1.384***	-3.866***
	(0.510)	(0.293)	(0.296)	(0.496)	(0.260)	(0.240)
[750, 1500)	-4.009***	-2.774***	-4.798***	-3.578***	-1.918***	-4.417***
	(0.511)	(0.285)	(0.281)	(0.500)	(0.246)	(0.230)
[1500, 3000)	-3.655***	-2.745***	-4.660***	-3.663***	-2.011***	-4.553***
	(0.513)	(0.269)	(0.273)	(0.519)	(0.249)	(0.230)
[3000, 6000)	-5.049***	-3.685***	-5.612***	-4.851***	-3.001***	-5.375***
	(0.433)	(0.222)	(0.207)	(0.414)	(0.182)	(0.158)
[6000, max)	-4.968***	-4.172***	-6.042***	-4.853***	-3.513***	-5.871***
	(0.465)	(0.265)	(0.274)	(0.429)	(0.192)	(0.167)
Common Border	0.639***	0.546***	0.585***	0.838***	0.451***	0.519***
	(0.145)	(0.099)	(0.106)	(0.126)	(0.123)	(0.117)
Common Language	0.276**	0.561***	0.357***	0.319**	0.395***	0.381***
	(0.127)	(0.114)	(0.128)	(0.157)	(0.133)	(0.122)
Common Colonizer	-1.894***	-3.666***	-1.169***	-1.579***	0.213	0.266
	(0.326)	(0.201)	(0.246)	(0.313)	(0.205)	(0.192)
Colonial Relationship	0.420***	0.298*	0.359*	0.311*	0.235*	0.066
	(0.149)	(0.164)	(0.209)	(0.176)	(0.122)	(0.118)
Landlocked	-1.075**	-0.645**	-0.683**	-0.674	-0.446*	-0.345
	(0.481)	(0.301)	(0.315)	(0.469)	(0.248)	(0.241)
Common Continent	-0.051	0.177	0.209	0.069	0.071	0.166
	(0.199)	(0.118)	(0.128)	(0.190)	(0.105)	(0.105)
RTA	0.922***	0.172	0.277*	0.338**	0.121	0.283**
	(0.156)	(0.157)	(0.148)	(0.152)	(0.127)	(0.120)
Currency Union				0.197	-0.033	0.022
				(0.153)	(0.126)	(0.120)
R-squared	0.87	0.94	0.88	0.88	0.87	0.89
N	1332	1332	1332	1332	1332	1332

Notes: * p<0.1; ** p<0.05; *** p<0.01. Reported numbers are the estimated coefficients multiplied by $\theta = 8.28$. Both 1990 and 2005 estimates are based on the dataset of Johnson and Noguera (2017).

Among the remaining gravity controls, the presence of a common border or common language tend to boost trade with roughly similar magnitudes. Unlike for distance, the effects of having a common border or language have not declined for all sectors but only for manufacturing. Somewhat surprisingly, being in the same continent or having a common currency do not seem to affect trade, at least not when controlling for other related factors.[10] One such related factor is the presence of a regional trade agreement, which contributes positively and significantly to increasing trade flows in agriculture and services. Its effect, however, is both economically and statistically less significant for manufacturing.

[10]The results on common currencies may not generalize because the euro area is the only currency union in our sample.

2.4 Patterns in Comparative Advantage

Figure II plots selected countries' estimated comparative advantages separately for both of our datasets. Since the country coverage and the construction of the bilateral service trade data for the two datasets differ, we report the estimates from them separately.

A few trends stand out upon inspection of comparative advantage for these economies. First, China's comparative advantage in manufacturing rose sharply after the 1990s, reaching similar levels as Germany and Japan. At the same time, China's advantage in agriculture has been falling. Second, the U.S gained comparative advantage in services starting in 1980s but its comparative advantage in manufacturing has been weaker than in other sectors and has deteriorated further during the 2000s. Third, Japan and the UK's comparative advantages in manufacturing have been declining since the early 1990s. Finally, China, Japan, Mexico and Germany have greater comparative advantage in manufacturing than in services, while the opposite is true for the US and the UK. This last observation shows that the casual observation about the configuration of the world's largest five economies comparative advantages based on their services trade balance as plotted in Figure I is supported qualitatively by our comparative advantage estimates.

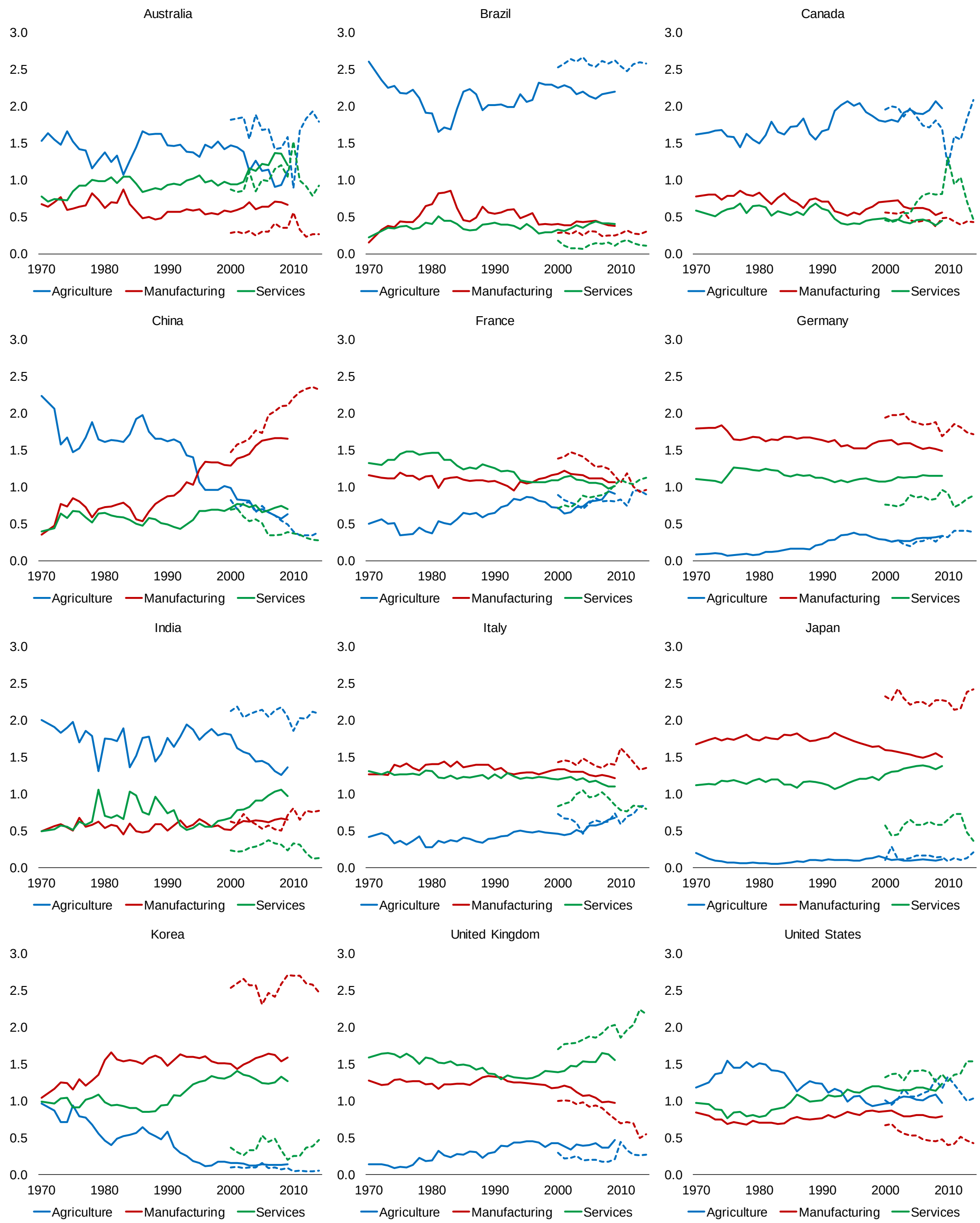
Consistent with French (2017), we find that the gravity-based and Balassa-type revealed comparative advantage measures overall correlate positively but differ in some cases. Comparing the gravity-implied comparative advantage measure with the Balassa-type revealed comparative advantage yields pooled correlations near 0.8 using either dataset. The only exception is for services during 1970-2009 when the correlation is at 0.40, suggesting that trade costs and importer-specific factors may have been more important drivers of services trade in that period. Looking at specific countries, there are several striking differences across the two measures. For example, the steep upward trend in China's comparative advantage in manufacturing based on the gravity approach does not hold when using the Balassa-type measure. Several studies establish that China experienced strong improvements in its manufacturing technology over this period. Another contrasting case is Brazil where the Balassa-type measure implies a strong improvement in the country's comparative advantage in agriculture starting around its trade liberalization in early 1990s. Hence, the Balassa-type measure tends to unduly associate trade liberalization with an improvement in comparative advantage.

2.5 Patterns in Sectoral Trade Barriers

Figure III compares estimated trade costs, DX_i^j, DM_i^j and im_i^j, across sectors, countries and time, revealing many interesting patterns.[11] Reported estimates for exporting and importing costs are ad-valorem tariff equivalents relative to the cost of shipping internally.

[11]In interest of space, this figure only reports the estimates using Johnson and Noguera (2017) dataset and using lagged trade weights.

Figure II: Gravity-Based Comparative Advantage Over Time for Selected Countries, 1970-2014



Notes: The figure plots C_i^j. Solid lines are estimates using data from Johnson and Noguera (2017) while dashed lines use WIOD Release 2016. Country selection is based on world export shares in 2014 according to WIOD. A value higher (lower) than "1" suggests comparative (dis)advantage.

Comparing across sectors reveals that the estimated costs of trade in manufacturing have trended down sharply, making it the sector with the lowest level of trade costs. This is consistent with the coefficients reported in Table I, even though those coefficients are informative only about the symmetric component of trade costs. As discussed earlier, part of the observed reduction may be due to the significant improvements in the shipping technology, including in the connectivity of countries, and information technologies in recent decades (IMF, 2016). In addition, policy barriers such as tariffs declined faster and further in manufacturing. As a result, the steepest declines in trade costs took place in this sector both when exporting and importing.

Costs in services stand out as being generally higher than other sectors, regardless of the direction of the flow. This is not surprising because some services, as in the well-known haircut example that requires production and consumption to occur at the same time, are naturally difficult to trade. This finding is consistent with those of Miroudot, Sauvage and Shepherd (2013) who find that tariff equivalent trade costs in services are much higher than those for goods, sometimes exceeding 200 percent in the year 2007. Moreover, policy induced barriers such as regulatory requirements may be relatively high in this sector (IMF/WB/WTO, forthcoming).

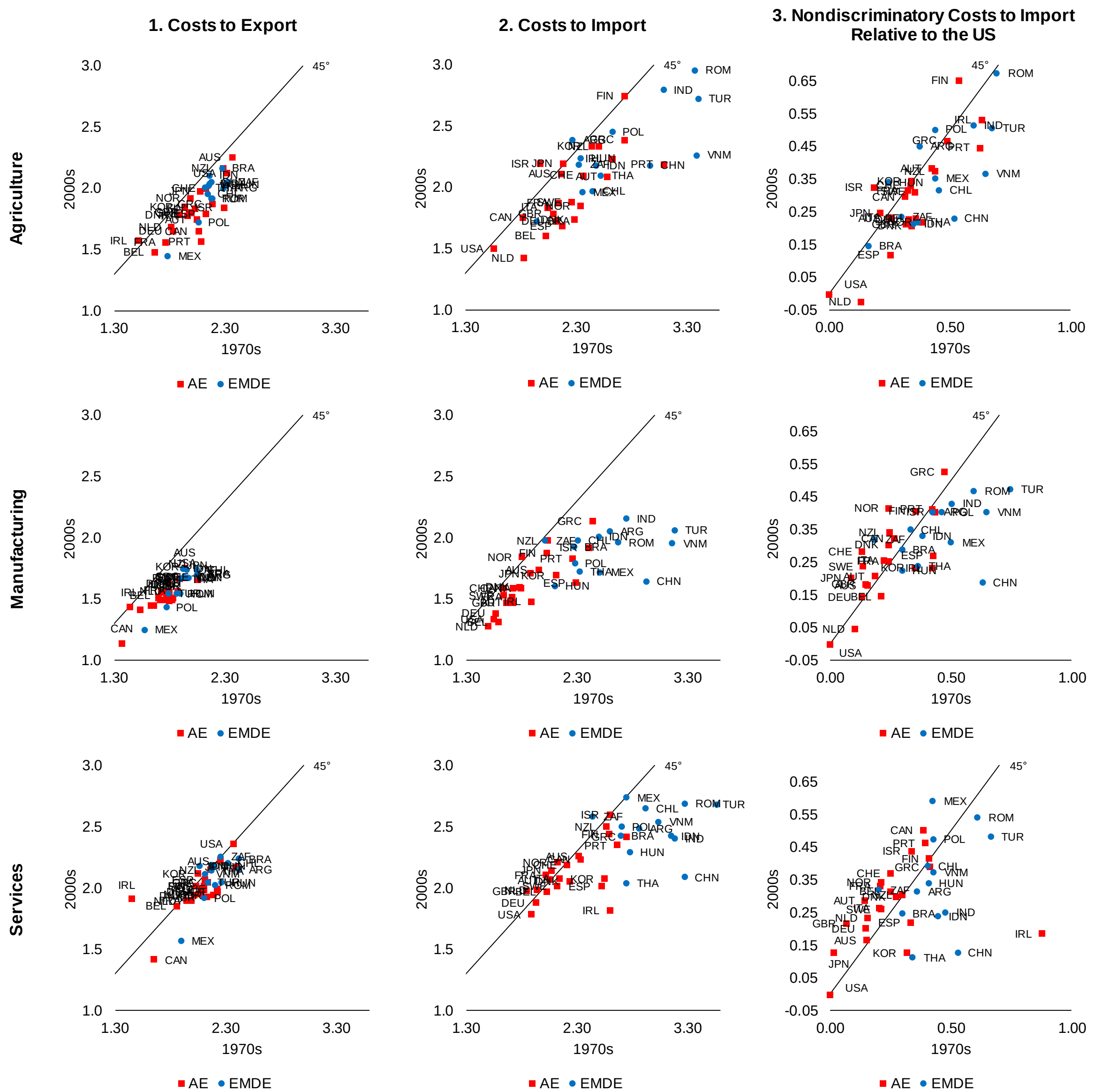
Costs to import appear to be higher for emerging market and developing economies (EMDEs) than advanced economies (AEs). This finding is consistent with EMDEs nondiscriminatory costs to import on average being somewhat higher than AEs. Over time, however, EMDEs have reduced sharply their costs to import in all three sectors as evidenced by the EMDEs observations mostly locating below and further away from the 45 degree line than the AEs observations. This trend may be reflecting the progress made by these countries through trade liberalization and reducing other barriers to foreign entry when looked over several decades.

The nondiscriminatory import barriers are estimated relative to a numeraire country, which is set as the US. This means that the US' nondiscriminatory costs are always equal to zero by construction and that the level of im is not meaningful in an absolute sense. Since the estimations reveal that essentially no country has negative costs, the US has the lowest estimated nondiscriminatory import barriers in our sample. Although China started with high nondiscriminatory barriers in the 70s, its barriers have significantly come down and were lower than a great majority of countries as of 2014.

3 Trade Barriers and the Current Account

In this section, we investigate whether aggregate effective trade barriers, separately when exporting and importing, help explain countries' CA outcomes. To this end, we start with a standard empirical model of current account determination, in the spirit of Chinn and Prasad (2003), Gruber and Kamin (2007), Lee et al. (2008) and Gagnon (2011). More specifically, we build on the IMF's External Balance Assessment (EBA) methodology, as laid out by Phillips et al. (2013), which

Figure III: Trade Costs Over Time and Across Sectors



Notes: The figure plots DX_i^j (LHS panel), DM_i^j (middle panel) and im_i^j (RHS panel) averaged for 1970-79 (horizontal axis) and 2000-09 (vertical axis) based on data from Johnson and Noguera (2017). AE: Advanced economies; EMDE: Emerging market and developing economies according to the classification of the IMF's World Economic Outlook. A value of "2" for DX_i^j or DM_i^j means that the estimated trade cost is equivalent to a tariff of 100 percent. im_i^j is relative to the US. For example, a value of "0.1" means that the tariff equivalent of the nondiscriminatory import cost is 10 percentage points higher than that of the US.

is a comprehensive reduced form framework for understanding the medium-term determinants of CA balances and is less subject to the omitted variable bias. We use the latest vintage of this methodology described in IMF (2018). The description and data sources of the variables used in this framework are listed in the Annex.

EBA's CA methodology is a panel regression that accounts for a substantial share of the variation in the current account-to-GDP ratio. The regression does not include any fixed effects but controls for a host of independent variables. It accounts for the effects of a number of domestic policy-related factors such as institutional and political environment, public health care spending, fiscal and monetary policies as well as foreign exchange intervention and credit growth. The framework also includes many demographic variables, given their economic significance in influencing the saving and investment decisions. Other factors such as the stock of net foreign asset positions, medium-term output growth and countries' net exports of exhaustible resources are also included. All of these independent variables combined account for more than 60 percent and 70 percent of the variation in CA balances for our 1986-2009 and 2000-14 samples, respectively, as reported in column (1) of Tables II and III.[12] The estimation uses pooled GLS with a panel-wide AR(1) correction to take into account the strong autocorrelation of the CA for a given country.

3.1 Baseline

We augment the latest vintage of the CA regression in EBA to include our measures of aggregate effective trade barriers. We proceed gradually to first include the effective cost of exporting and importing in turn (columns (2)-(3) and (5)-(6) in Tables II and III) and then include them at the same time (columns (4) and (7) in the same tables). We conduct these experiments separately in our two samples with Tables II reporting the results of the earlier sample and Table III reporting the later sample. With these modifications, we observe that the coefficient estimates for the original EBA model variables are generally stable across specifications.

We find a statistically significant negative effect of effective trade costs of exporting on the CA, although the average magnitudes are moderate as shown in columns (2) and (5) of Tables II and III. Thus, a country is more likely to run a CA deficit if it faces higher effective costs to export, especially in sectors of comparative advantage. Estimates for the period 1986-2009 suggest that the CA of an average country would improve by 0.5 percent of GDP if costs to export vis-à-vis all trading partners fell in all sectors by 10 percentage points.[13] Estimated effects of effective costs to export for 200114 are about half of those for the earlier period.

We find the effective costs to import to be usually statistically insignificant. The result is evident in the earlier sample as shown in columns (3) and (6) of Table II. The coefficients estimated for

[12]The most recent vintage of the EBA CA regression covers 1986-2016. Its overlap with our datasets from Johnson and Noguera (2016) and WIOD is therefore 1986-2009 and 2000-14, respectively.

[13]This hypothetical scenario is not a full general equilibrium counterfactual, however, as it assumes no wage or price responses and does not involve a commensurate reduction in the countrys costs to import.

Table II: Current Account and Trade Barriers, 1986-2009

		Lagged trade weights			Frictionless trade weights		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L. NFA/Y	0.019***	0.016**	0.019***	0.017**	0.016**	0.020***	0.017**
	(0.007)	(0.018)	(0.005)	(0.010)	(0.023)	(0.005)	(0.013)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.013	-0.012	-0.012	-0.011	-0.013	-0.012	-0.013
	(0.397)	(0.411)	(0.429)	(0.455)	(0.400)	(0.431)	(0.403)
L.Output per worker, relative to top 3 economies	-0.045	-0.044	-0.044	-0.039	-0.043	-0.045	-0.043
	(0.105)	(0.111)	(0.110)	(0.161)	(0.114)	(0.105)	(0.115)
L.Relative output per worker*K openness	0.115***	0.113***	0.109***	0.107***	0.107***	0.111***	0.104***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Oil and natural gas trade balance * resource temporariness	0.357***	0.375***	0.368***	0.371***	0.406***	0.364***	0.409***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years	-0.235	-0.240*	-0.214	-0.209	-0.298**	-0.214	-0.275*
	(0.103)	(0.095)	(0.142)	(0.149)	(0.037)	(0.144)	(0.057)
L.Public health spending/GDP	-0.155	-0.200	-0.168	-0.182	-0.118	-0.156	-0.107
	(0.397)	(0.262)	(0.366)	(0.315)	(0.504)	(0.394)	(0.540)
L.demeaned VIX*K openness	0.014	0.007	0.015	0.005	0.012	0.015	0.011
	(0.452)	(0.724)	(0.437)	(0.813)	(0.525)	(0.457)	(0.584)
L.demeaned VIX*K openness*share in world reserves	-0.020	-0.022	-0.019	-0.014	-0.021	-0.017	-0.014
	(0.790)	(0.757)	(0.804)	(0.844)	(0.769)	(0.826)	(0.845)
Own currency's share in world reserves	-0.034***	-0.025**	-0.036***	-0.023*	-0.023*	-0.036***	-0.024*
	(0.007)	(0.039)	(0.005)	(0.070)	(0.059)	(0.006)	(0.054)
Output gap	-0.345***	-0.349***	-0.345***	-0.349***	-0.356***	-0.344***	-0.354***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Commodity ToTgap * trade openness	0.211***	0.203***	0.212***	0.201***	0.196***	0.212***	0.195***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Institutional/political environment	-0.086***	-0.099***	-0.082***	-0.094***	-0.084***	-0.084***	-0.082***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Detrended private credit/GDP	-0.103***	-0.106***	-0.104***	-0.108***	-0.106***	-0.104***	-0.107***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cyclically adjusted fiscal balance, instrumented	0.386***	0.473***	0.347***	0.445***	0.403***	0.357***	0.384***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
(ΔReserves)/GDP* K controls, instrumented	0.269	0.307	0.249	0.300	0.309	0.243	0.282
	(0.297)	(0.244)	(0.339)	(0.260)	(0.234)	(0.353)	(0.284)
Dependency Ratio	-0.141***	-0.135***	-0.142***	-0.142***	-0.174***	-0.137***	-0.172***
	(0.009)	(0.009)	(0.006)	(0.005)	(0.001)	c(0.008)	(0.001)
Population growth	-1.200***	-0.820**	-1.118**	-0.872**	-0.638	-1.135***	-0.604
	(0.005)	(0.048)	(0.011)	(0.040)	(0.121)	(0.008)	(0.143)
Prime savers share	0.179***	0.235***	0.188***	0.227***	0.196***	0.184***	0.199***
	(0.005)	(0.000)	(0.004)	(0.000)	(0.001)	(0.003)	(0.001)
Life expectancy at prime age	-0.003*	c-0.006***	-0.004**	-0.006***	-0.004**	-0.003*	-0.004**
	(0.057)	(0.003)	(0.039)	(0.002)	(0.026)	(0.057)	(0.024)
Life expectancy at prime age * future dep. ratio	0.014**	0.019***	0.015**	0.019***	0.015**	0.014**	0.014**
	(0.019)	(0.002)	(0.015)	(0.002)	(0.011)	(0.025)	(0.013)
DXC		-0.050***		-0.049***	-0.082***		-0.081***
		(0.000)		(0.000)	(0.000)		(0.000)
DMC			-0.008	0.001		-0.007	-0.004
			(0.359)	(0.945)		(0.408)	(0.606)
Observations	761	761	761	761	761	761	761
R^2	0.613	0.643	0.622	0.647	0.651	0.619	0.656
Number of countries	35	35	35	35	35	35	35

Notes: * p<0.1; ** p<0.05; *** p<0.01; "L." denotes one year lag.

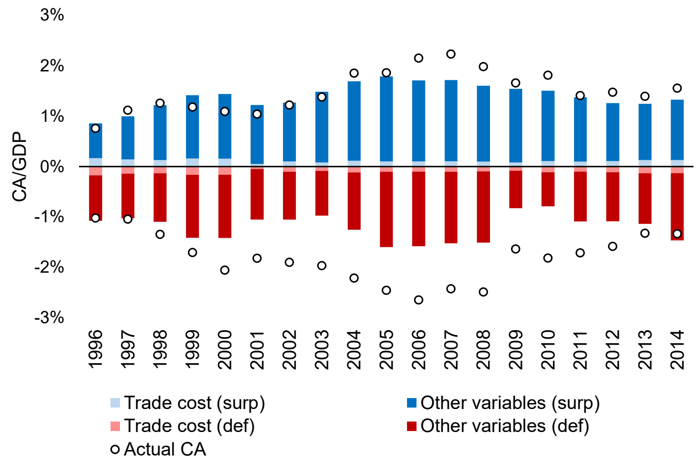
Table III: Current Account and Trade Barriers, 2001-14

		Lagged trade weights			Frictionless trade weights		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L. NFA/Y	0.028***	0.027***	0.028***	0.026***	0.024***	0.027***	0.023***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.004)	(0.001)	(0.006)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.049***	-0.052***	-0.051***	-0.048***	-0.045***	-0.047***	-0.043**
	(0.004)	(0.004)	(0.004)	(0.007)	(0.008)	(0.005)	(0.010)
L.Output per worker, relative to top 3 economies	-0.102**	-0.060	-0.074	-0.063	-0.088*	-0.102**	-0.092*
	(0.039)	(0.262)	(0.150)	(0.233)	(0.075)	(0.031)	(0.055)
L.Relative output per worker*K openness	0.187***	0.155***	0.160***	0.157***	0.183***	0.185***	0.185***
	(0.000)	(0.002)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)
Oil and natural gas trade balance * resource temporariness	0.302***	0.264***	0.305***	0.278***	0.276***	0.336***	0.307***
	(0.003)	(0.010)	(0.003)	(0.006)	(0.005)	(0.001)	(0.002)
GDP growth, forecast in 5 years	-0.062	-0.036	-0.067	-0.072	-0.192	-0.115	-0.244
	(0.753)	(0.854)	(0.722)	(0.708)	(0.333)	(0.545)	(0.209)
L.Public health spending/GDP	0.336	0.176	0.138	0.125	0.296	0.251	0.220
	(0.207)	(0.517)	(0.609)	(0.642)	(0.256)	(0.333)	(0.391)
L.demeaned VIX*K openness	-0.055**	-0.050**	-0.044**	-0.047**	-0.051**	-0.049**	-0.046**
	(0.012)	(0.020)	(0.042)	(0.030)	(0.019)	(0.028)	(0.038)
L.demeaned VIX*K openness*share in world reserves	0.253***	0.237***	0.228***	0.230***	0.229***	0.237***	0.215**
	(0.003)	(0.005)	(0.009)	(0.007)	(0.007)	(0.006)	(0.012)
Own currency's share in world reserves	-0.045**	-0.053***	-0.062***	-0.059***	-0.045***	-0.056***	-0.055***
	(0.013)	(0.003)	(0.001)	(0.002)	(0.009)	(0.002)	(0.002)
Output gap	-0.093	-0.163**	-0.176***	-0.172***	-0.122*	-0.115*	-0.141**
	(0.147)	(0.013)	(0.008)	(0.009)	(0.059)	(0.079)	(0.033)
Commodity ToTgap*trade openness	0.194***	0.171***	0.163***	0.170***	0.196***	0.186***	0.191***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Institutional/political environment	-0.076**	-0.048	-0.035	-0.046	-0.082**	-0.070**	-0.077**
	(0.019)	(0.148)	(0.277)	(0.160)	(0.011)	(0.029)	(0.016)
Detrended private credit/GDP	-0.102***	-0.097***	-0.094***	-0.096***	-0.104***	-0.099***	-0.102***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cyclically adjusted fiscal balance, instrumented	0.888***	0.771***	0.724***	0.744***	0.813***	0.814***	0.754***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
(ΔReserves)/GDP* K controls, instrumented	0.074	0.295	0.221	0.293	0.179	0.056	0.145
	(0.800)	(0.324)	(0.431)	(0.327)	(0.552)	(0.847)	(0.626)
Dependency ratio	-0.034	-0.028	-0.016	-0.022	-0.045	-0.021	-0.033
	(0.563)	(0.633)	(0.783)	(0.702)	(0.429)	(0.713)	(0.553)
Population growth	-1.537**	-1.155*	-1.213**	-1.092*	-1.148*	-1.371**	-0.993
	(0.011)	(0.056)	(0.041)	(0.066)	(0.062)	(0.020)	(0.103)
Prime savers share	0.006	0.023	0.009	0.025	0.015	0.017	0.028
	(0.937)	(0.774)	(0.906)	(0.758)	(0.844)	(0.826)	(0.716)
Life expectancy at prime age	-0.012***	-0.013***	-0.013***	-0.014***	-0.012***	-0.013***	-0.013***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Life expectancy at prime age * future dep. ratio	0.025***	0.025***	0.024***	0.025***	0.024***	0.026***	0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DXC		-0.024**		-0.020*	-0.035**		-0.034**
		(0.019)		(0.079)	(0.011)		(0.012)
DMC			-0.020*	-0.012		-0.021*	-0.019*
			(0.059)	(0.333)		(0.053)	(0.090)
Observations	465	434	434	434	465	465	465
R^2	0.739	0.753	0.762	0.763	0.746	0.754	0.758
Number of countries	31	31	31	31	31	31	31

Notes: * p<0.1; ** p<0.05; *** p<0.01; "L." denotes one year lag.

the latter sample are statistically significant but economically small with a counter intuitive sign. When both costs to export and import are included, the former appears to dwarf the latter from the perspective of both statistical and economic significance, as shown in columns (4) and (7) of Tables II and III.

Figure IV: Contribution of Effective Trade Costs to Global Imbalances



Source: Johnson and Noguera (2016) through 2000 and WIOD thereafter.
Note: The figure shows the actual and predicted values of the CA separately for surplus and deficit countries. The predicted values are broken down to those predicted by effective trade costs and by other variables included in the latest CA model of EBA. Effective trade costs are calculated using lagged trade shares.

These findings are consistent with theories that offer mechanisms to generate transitional and usually small effects of trade costs on CA balances. Such mechanisms include habit formation in consumption and time to build in investment (Joy et al. 2018). Interpreting our results on the differential impact of costs to export and import requires a better understanding of the underlying mechanisms that operate, which is beyond the scope of this paper.

As Figure IV shows, the contribution of trade costs to global imbalances has been minor. After sorting countries into CA surplus and deficit groups based on their average CA balances after 2000, we calculate the actual and predicted values of the aggregate CA balance of each group as a share of their total GDP. We then decompose the predicted values into those predicted by the effective trade costs, both when exporting and importing, and by other factors in the EBA model.[14] Looked at in this way, the contribution of trade costs to global imbalances has been a small fraction of the actual imbalances over the last two decades.

[14] Effective trade costs are calculated using lagged trade shares, and thus the corresponding coefficients are based on column (4) in Tables II and III. Results based on our alternative frictionless trade weights are reported in Annex XXX.

3.2 Robustness Checks

In this section, we perform a battery of checks to examine the robustness of our baseline results. We first allow for trade costs to have an exporter-specific component, as opposed to our baseline assumption that trade costs have an importer-specific component. Next set of experiments consider alternative weights to aggregate bilateral sectoral trade costs. Finally, we zoom into the impact of tariffs or use a lower value for the elasticity of trade to trade costs. In the interest of space, unless otherwise specified, the experiments conducted in this section use lagged trade shares to aggregate across trading partners.

Table IV: Robustness Checks

	Importer- vs. exporter-specific costs		Alternative weights to construct effective trade costs			"Effective"	
	$\chi_n^j = im_n^j$	$\chi_n^j = ex_n^j$	Contemp. Trade	GDP	Alternative Frictionless	tariffs	$\theta = 4$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
JN 1986-2009							
DXC	-0.044***	-0.040***	-0.041***	-0.085***	-0.068***	-0.203***	-0.013***
	(0.000)	(0.003)	(0.000)	(0.000)	(0.001)	(0.004)	(0.000)
DMC	-0.001	0.024*	-0.007	-0.002	-0.007	0.066*	0.001
	(0.851)	(0.059)	(0.406)	(0.838)	(0.391)	(0.060)	(0.732)
Observations	475	475	761	761	761	521	761
R^2	0.736	0.721	0.646	0.658	0.649	0.714	0.651
No of ctries	34	34	35	35	35	35	35
WIOD 2000-14							
DXC	-0.025**	0.011	-0.020*	-0.033**	-0.057**	-0.168***	-0.001
	(0.039)	(0.445)	(0.067)	(0.032)	(0.031)	(0.005)	(0.366)
DMC	-0.001	-0.023	-0.011	-0.015	-0.021**	0.043	-0.003
	(0.942)	(0.272)	(0.379)	(0.166)	(0.045)	(0.145)	(0.133)
Observations	420	420	465	465	465	465	434
R^2	0.763	0.766	0.757	0.758	0.766	0.759	0.761
No of ctrie	30	30	31	31	31	31	31

Notes: * p<0.1; ** p<0.05; *** p<0.01. Results reported in columns (1), (2) and (6) in the top panel are for 1995-2009 because of limited bilateral sectoral tariff data prior to 1995.

Importer- vs. exporter-specific costs In generating the asymmetric bilateral trade costs between trading partners, this paper follows Eaton and Kortum (2002) to formulate trade barriers by including an importer-specific component, im_n^j. That is, trade costs vary between trading partners contingent upon the importer. Other studies in the literature such as Waugh (2010), and Levchenko and Zhang (2016) have instead formulated trade costs to have an exporter-specific component such as export subsidies. If both importer- and exporter-specific barriers are at work, the trade costs specified in Equation (6) become

$$\ln d_{ni}^j = D_{ni}^j + B_{ni}^j + L_{ni}^j + Col_{ni}^j + CU_{ni}^j + RTA_{ni}^j + im_n^j + ex_i^j. \tag{18}$$

ex_i^j would enter the exporter fixed effect in Equation (8) with a negative sign (i.e. higher ex_i^j decreases the export capability). Equation (10) then becomes

$$im_n^j + ex_n^j = \frac{m_n^j - k_n^j}{\theta} \equiv \chi_n^j \tag{19}$$

where only the latent factor χ_n^j can be backed out from the gravity estimation. It then becomes apparent that im_n^j and ex_n^j cannot be simultaneously identified without additional data.

We assume $im_n^j = \chi_n^j$ in our baseline specification. To test if our results are robust to assuming $ex_n^j = \chi_n^j$, we re-estimate the gravity equation by controlling for bilateral tariffs and allowing for the exporter-specific component of trade barriers, ex_i^j:[15]

$$\ln d_{ni}^j = D_{ni}^j + B_{ni}^j + L_{ni}^j + Col_{ni}^j + CU_{ni}^j + RTA_{ni}^j + \beta^j \tau_{ni}^j + ex_i^j. \tag{20}$$

where $\tau_{ni}^j = \ln(1 + \text{tariff}_{ni}^j)$ is the bilateral tariff imposed by importing country n to exporting country i in sector j. Note that both ex_i^j and τ_{ni}^j contribute to the asymmetry in the bilateral trade costs between trading partners, i.e., $\tau_{ni}^j \neq \tau_{in}^j$. In addition, since ex_i^j directly affects the exporter fixed effect with this formulation, we use the importer fixed effect estimated from the gravity to compute comparative advantage, following the same double normalization procedure described in Equations 8 and 9.

It is particularly important to include bilateral tariffs in the gravity regression when considering $ex_n^j = \chi_n^j$ because tariffs tend to have a substantial nondiscriminatory importer-specific component. Not controlling for tariffs when $ex_n^j = \chi_n^j$ would lead the effect of nondiscriminatory tariffs to be incorrectly attributed to the estimated for the toughness of domestic competition and comparative advantage. However, in our baseline with $im_n^j = \chi_n^j$, such effects would already be accurately captured by im_n^j.[16]

Columns (1) and (2) in Table IV reveal that allowing for trade costs to differ contingent on the exporter does not alter our main results. For completeness, column (1) reports the results with $im_n^j = \chi_n^j$ but based on the gravity equation that controls for bilateral tariffs. The estimates for this case are similar to those reported for our baseline in column (4) in Tables II and III. More interestingly, column (2) which takes the alternative approach of setting $ex_n^j = \chi_n^j$, also yields

[15] We also try including a bilateral measure of temporary trade barriers as as described in Section 2.2. We find this variable not to have much explanatory power, which is not surprising given the small share of trade flows affected by such barriers.

[16] Other reasons for not including bilateral tariffs in our baseline gravity estimations are that it would limit our sample as sectoral bilateral tariff data starts only in 1995. In addition, our baseline specification is more flexible in that it does not restrict import demand elasticity of tariffs to be the same across importer-exporter-pairs.

fairly similar results in that aggregate effective export costs lower the current account by a limited amount, while costs to import have less significant, both economically and statistically, effects.

Alternative weights to construct effective trade costs Obtaining aggregate effective trade costs requires aggregating the gravity-based estimates of bilateral sectoral trade costs (d^j_{ni}) across trading partners and sectors. Our baseline aggregation choices are guided by our objective to gauge the height of trade barriers in countries' prime exports and imports. Since these choices are inevitably ad-hoc, here we consider three alternative weighting schemes: the first two are for aggregating across trading partners in columns (3) and (4), while the third one is for aggregating across sectors reported in column (5).

We first try using contemporaneous nominal trade shares as weights to aggregate across trading partners. Results reported in column (2) of Table IV reveal that DXC and DMC have smaller impacts (in absolute value) on CA balances. Next, column (3) reports the CA regression results using nominal GDP to aggregate across trading partners. This alternative weighting scheme leads the trade costs to have a larger impact on the CA with a coefficient of -0.085, instead of -0.05 in the baseline with lagged trade shares. Consistent with our baseline findings, aggregation schemes that do not depend on actual trade flows (contemporaneous or lagged) generally suggest larger CA effects.

In a third alternative in column (5), labeled "Alt. Frict.," we build on our earlier characterization of frictionless trade and use counterfactual trade flows to aggregate not only across trading partners but also across sectors. For the import side, using frictionless trade flows to aggregate across sectors is the same as using sectoral comparative advantage, as we do in our baseline exercises:

$$DMC_i = \sum_j DM^j_i \times C^j_i$$

However, on the export side, aggregating DX^j_i across sectors is done using:

$$DXC_i = \sum_j DX^j_i \times \frac{\sum_n X^j_n}{\sum_j \sum_n X^j_n}$$

where the sector weights are given by each sector's share in total world production, regardless of the country under consideration. This alternative, as reported in column (5), yields coefficient estimates that are slightly larger in absolute value for costs to export while costs to import remain statistically insignificant.

"Effective" tariffs Our next extension computes "effective tariffs," i.e., replaces d^j_{ni} with bilateral tariff data for manufacturing and agriculture and aggregate the same way as in our baseline to construct DX^j_i, DM^j_i, DXC^j_i and DMC^j_i. We consider this extension because of the earlier literature that focuses on the impact of tariffs, as opposed to total trade costs, on trade and CA balances. However, there are two drawbacks to this approach. First, it ignores the services sector, where barriers are not in the form of tariffs. Second, tariffs comprise a small fraction of total trade costs throughout our sample. According to our estimations, an average country in our sample had an aggregate effective export cost of about 88 percent in 2014 but it faced an effective tariff of only 4.7 percent in the same year. Going back to 1995, effective tariffs were somewhat higher at 6 percent, but were still fairly small relative to the effective export costs estimated to be 89 percent in that year.

As column (6) shows, the results are qualitatively similar to our baseline, but effective tariffs have quantitatively larger effects. Estimated coefficients suggest that if export tariffs faced by an average country in 2014 were to be eliminated *entirely* in both manufacturing and agriculture, the countrys CA balance would improve by 0.8 percent of GDP. Again, this implies a limited contribution of trade policies on the CA.

Lower elasticity of trade to trade costs In our final experiment, we set the value of θ equal to 4 for all three sectors, implying a lower elasticity of trade to trade costs than the baseline estimations. While many papers use EK's estimated elasticity of $\theta = 8.28$ as we do in our baseline, in more recent work Caliendo and Parro (2015) use tariff data to estimate aggregate elasticities and find them to be around 4, which motivates this robustness exercise. The lower value for the elasticity leads to higher trade cost estimates and consistently, column (7) in Table IV shows the estimated CA effects to be smaller than the baseline. In fact, the effects are not detectable in the WIOD sample.

4 Understanding the Importer-specific Component of Barriers

This section explores the potential factors that can account for the variations in estimated nondiscriminatory import barriers, im_n^j, across countries and time. To first gain some insights into what im_n^j may capture, we aggregate both sides of Equation (5) over all countries exporting to country n to obtain

$$im_n^j = \frac{1}{\theta}\left(\ln \frac{X_{nn}^j}{\bar{X}_n^j} - \ln T_n^j (c_n^j)^{-\theta}\right) - \ln \bar{d}_n^j, \tag{21}$$

where $\bar{X}_n^j = \Pi_i (X_{ni}^j)^{\frac{1}{N}}$ is the (geometric) average of country n expenditures on good j across source countries and $\bar{d}_n^j = \Pi_i d_{ni}^{sj}$ is the importing barrier for country n. This equation implies that any factor that increases a country's expenditure share on domestic produced goods beyond what can be accounted for by domestic competitiveness ($\ln T_n^j (c_n^j)^{-\theta^j}$) and import barriers would be included in im_n. In that sense, variations in im_n^j may arise due to many factors. For example, countries may have heterogeneous preferences whereby some have a higher degree of home bias and thus higher home sales share and higher im_n. Higher domestic transportation cost (as a result of weak infrastructure or larger geographic area) that increases the dock-to-consumer cost relative to the cost transporting domestically produced goods would also increase the estimated im_n^j. Broadly speaking, keeping home sales shares fixed, any factor that lowers the marginal cost of production (c_n^j), such as better institutions or low regulatory costs, would reduce import barriers.

In addition, in the theoretical framework that guides our measurement, factors that lower the producer cost of production would boost export capability (k_i^j) and import competitiveness (m_i^j) at the same time. For example, state support or a depreciated currency could lower the cost of domestic and foreign intermediate goods, respectively. If these effects on exports and imports have the same magnitude, state support or undervalued currency would have no impact on the estimated im_i^j. However, if they have a larger impact on enhancing import competitiveness than export capability, they would have a positive contribution to the estimated im_n^j. On the other hand, they would contribute negatively to the estimated im_n^j, if the effects on export capability are stronger.

The purpose of this section is not to explain the determinants of cross-country or within-country cross-time differences in barriers to import. However, it is informative to relate the estimated latent factor (im_n^j) to some of the aforementioned country characteristics. Quantifying the contribution of each individual country characteristic with confidence is difficult given the substantial correlations between some of the independent variables, for example, GDP per capita and the real exchange rate.

Table V shows coefficient estimates obtained by regressing $im_{n,t}$ in manufacturing on country-sector-year- and country-year-specific observations in pooled panel regressions (columns (1)-(4)) and regressions with country fixed effects (columns (5)-(8)). Pooled regressions suggest that the gravity-based importer-specific barriers are significantly and positively correlated with MFN tariffs, but exhibit no significant relationship with tariffs when GDP per capita—which may be a stand-in for a host of factors including the quality of institutions—is also controlled for. Richer countries typically have lower tariffs and the strong negative correlation between GDP per capita and tariffs (-0.7) may be responsible for this change in the coefficient estimate for tariffs. As expected, countries with better institutions and higher road density have lower import barriers. Interestingly, PPP-based REER and im have a statistically significant negative association suggesting that undervalued currencies improves import competitiveness more than export capability. However, the cross-sectional level REER results should be interpreted with caution given the well-known measurement errors in the ICP data.

The estimation results of regressions with country fixed effects are reported in columns (5)-(8). These specifications control for time invariant country-specific factors such as the degree of home bias and zoom into the within-variations. We find that tariffs and GDP per capita continue to play significant roles in accounting for within-country changes in import barriers.[17]

Next, Table VI reports how import barriers in agriculture are related to the same set of covariates as in Table V and an additional factor for which data is available only for agriculture—agriculture support. For most specifications, MFN tariffs in agriculture contribute significantly to the estimated $im_{n,t}$, even when GDP per capita is controlled for. In fact, MFN tariffs are a more robust predictor of import barriers in agriculture than in manufacturing. Column (2) shows that state support, although often associated with export subsidies, plays a more significant role impeding imports than promoting exports in agriculture. This is evident in the positive estimated coefficients in front of agriculture support, which are strongly statistically significant across all specifications. This variable also improves the R^2 substantially in both pooled and fixed effects regressions.

Finally, we conduct similar analysis for the services sector. Since this sector doesn't have tariff barriers, we focus our attention on the OECD's Services Trade Restrictiveness Index (STRI) to get some sense of the policy barriers associated with trade in this sector. In terms of time coverage, the overlap between our dataset and OECD's STRI is only 2014, which limits the scope for regression analysis. Nonetheless, exploratory regressions reveal a positive association between STRI and estimated nondiscriminatory trade barriers in services, but the associated coefficient becomes statistically insignificant once GDP pc or infrastructure is included.

Because STRIs are indices, and not tariff equivalents, aggregating across the OECD's 22 services subsectors using simple averages can lead to particularly noisy indicators. Given this challenge, we next focus on the subsectors for which the OECD and WIOD descriptions are similar, which requires rerunning the gravity estimations for these narrow subsectors. Correlating the gravity-implied nondiscriminatory costs of importing services and STRI yields a coefficient close to 0.3 when using the simple average of the indices across 22 subsectors and it increases to 0.5-0.8 for subsectors—such as telecommunications, broadcasting, retail and financial services—for which the overlap across the WIOD and OECD data sets is good.

While both exporter- and importer-specific factors could in principle be driving bilateral trade costs, this section shows evidence suggesting that the estimated latent factor, χ_n^j, tends to be significantly associated with observed importer-specific barriers, such as MFN tariffs, service trade restrictiveness, and the quality of institutions. In fact, even state support in agriculture, commonly perceived as an export distortion, appears to have a more significant role on importers by enhancing their import competitiveness than on exporters, and thus, functioning more like an import barrier than an export subsidy.

[17] We also examine the role of safeguards, a type of temporary trade barrier that is applied unilaterally by importers and find its coefficient to be statistically not significant.

Table V: Determinants of Importer-specific Trade Barriers in Manufacturing

	Dependent variable: $im^{manufacture}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MFN tariffs	0.693***	-0.058	-0.092	-0.066	0.566***	0.300***	0.320***	0.372***
	(0.071)	(0.100)	(0.115)	(0.136)	(0.125)	(0.078)	(0.083)	(0.083)
ln(GDP per capita)		-0.078***	-0.067***	-0.002		-0.157***	-0.137***	-0.111***
		(0.009)	(0.010)	(0.016)		(0.033)	(0.035)	(0.032)
ln(road&railway/area)			-0.014***	-0.015***			0.039*	0.023
			(0.003)	(0.003)			(0.020)	(0.020)
ln(REER_PPP)				-0.1075***				-0.043*
				(0.022)				(0.024)
Country FEs	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.1	0.19	0.21	0.2	0.17	0.33	0.36	0.35
Num of obs	660	660	644	608	660	660	644	608

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table VI: Determinants of Importer-specific Trade Barriers in Agriculture

	Dependent variable: $im^{agriculture}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MFN tariffs	0.508***	0.598***	0.456***	0.500***	0.499***	0.350**	0.275	0.248*	0.237*	0.287**
	(0.081)	(0.076)	(0.068)	(0.070)	(0.064)	(0.150)	(0.163)	(0.133)	(0.139)	(0.115)
Agriculture support		0.001***	0.001***	0.001***	0.001***		0.0005***	0.0004**	0.004**	0.0004***
		(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)
ln(GDP per capita)			-0.035***	-0.020**	0.073***			-0.120***	-0.112**	-0.080**
			(0.007)	(0.008)	(0.016)			(0.040)	(0.044)	(0.035)
ln(road&railway/area)				-0.013***	-0.016***				0.019	-0.002
				(0.004)	(0.004)				(0.021)	(0.021)
ln(REER_PPP)					-0.157***					-0.092***
					(0.022)					(0.029)
Country FEs	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
R^2	0.06	0.42	0.44	0.45	0.48	0.06	0.14	0.23	0.23	0.28
Num of obs	660	570	570	554	542	660	570	570	554	542

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

5 Conclusions

In this paper we assessed the effect of trade policies on external balances using an approach that exploits differences in sectoral specialization and trade costs. To do so, we inferred trade costs and sectoral comparative advantage for a globally representative set of countries over varying time periods using, for the most part, data on bilateral trade flows. Further, we proposed an *effective trade cost* measure that weights trade costs by comparative advantage to better capture costs that pertain to sectors in which countries may have a greater underlying potential to export and import. We found only a fairly robust modest link between effective trade costs and CA outcomes. Countries facing higher effective costs to export tend to have modestly lower CA balances, implying that the overall contribution of trade costs to global imbalances have been small. These results are consistent with the predictions of theory that suggest limited effects of trade costs on current account balances.

We finally note that a limitation of our approach is that the causality could run from the CA to the effective trade costs and bias our estimates. As considered by Dekle, Eaton and Kortum (2008), movements in the CA can have general equilibrium effects on sectoral prices and wages, which can in turn have implications for comparative advantage. In the EK framework we adopt, such effects would be eliminated from our comparative advantage measure via the normalization with the country average of absolute advantage a la Hanson et al. (2018). However, this normalization would remove price and wage effects to the extent that such effects are common across sectors.

Annex: Description of Other Variables in the CA Regression

Our CA regression augments the latest version of the IMF's External Balance Assessment Methodology. For completeness, we provide below the definitions and sources of the variables used by this methodology, which can be downloaded at: https://www.imf.org/external/np/res/eba/data.htm.

L. NFA/Y: Lagged net foreign asset to GDP ratio from Lane and Milesi-Ferretti (2018)

L. NFA/Y*(dummy if NFA/Y < -60%): Above variable interacted with a dummy that takes the value of "1" when a country's NFA to GDP ratio is below -60 percent

L.Output per worker, relative to top 3 economies: Lagged PPP GDP divided by working age population from the IMF's World Economic Outlook Database relative to the average of the US, Japan and Germany.

L.Relative output per worker*K openness: Above variable interacted with capital account openness from the Quinn database.

Oil and natural gas trade balance * resource temporariness: Difference between exports and imports of oil and natural gas as percentage of GDP which enters only when the balance is positive. The balance is interacted with a measure of temporariness calculated as the ratio of current extraction to proven reserves to (i.e. the inverse of 'years-till-exhaustion') scaled by the same ratio for Norway in 2010. Higher values of the temporariness term indicate that the resource is expected to be exhausted sooner. Data sources are IMF's World Economic Outlook Database, World Bank, BP Statistical Review.

GDP growth, forecast in 5 years: IMF's World Economic Outlook's forecast of the 5-year ahead real GDP growth.

L.Public health spending/GDP: Ratio of public health spending to GDP assembled from the OECD, World Bank World Development Indicators, United Nations Economic Commission for Latin America and the Caribbean, IMF's Financial Affairs Department, Asian Development Bank.

L.demeaned VIX*K openness: Chicago Board Options Exchange Volatility Index from Haver interacted with the capital account openness described as above.

Own currency's share in world reserves: Country's currency share in world reserves from IMF and Currency Composition of Official Foreign Exchange Reserves.

L.demeaned VIX*K openness*share in world reserves: The above two variables interacted.

Output gap: Output gap as estimated by the IMF's World Economic Outlook.

Commodity ToTgap * trade openness: The commodity terms of trade index is calculated the ratio of a geometric weighted average price of 43 commodity export categories to a geometric weighted average price of 43 commodity imports, both of them relative to the advanced economies' manufactured goods prices. Weights are given by the commodities' export and import shares. To get the cyclical gap, the terms of trade series is first extended into the medium term (using commodity prices projected by the most recent IMF World Economic Outlook) and then HP-filtered for each country. The resulting gap is interacted with a measure of the countrys trade openness, latter defined as the ratio of exports plus imports of goods and services in GDP.

Institutional/political environment (ICRG-12): Indicator to gauge institutional and political risk, including socio-economic conditions, investment profile, corruption, religious tensions, democratic accountability, government stability, law and order, and bureaucratic quality from International Country Risk Guide.

Detrended private credit/GDP: Private credit detrended using the methodology developed by the Bank for International Settlements, which considers the role of financial deepening and other low-frequency movements in credit. Sources are the Bank for International Settlements credit statistics and the WB World Development Indicators.

Cyclically adjusted fiscal balance, instrumented: The instrument is generated using a first stage regression with the lagged cyclically adjusted global fiscal balance, a time trend, lagged world GDP growth, lagged domestic and world output gaps, US corporate credit spreads, exchange rate regime, the polity index, and the average cross-sectional fiscal balance.

(ΔReserves)/GDP* K controls, instrumented: Change in central bank foreign exchange reserves scaled by nominal GDP, both in U.S. dollars. The first stage regression included M2/GDP, U.S. interest rates, and global reserve accumulation, with country specific slopes, in order to account for various reserve accumulation motives. Sources are IMF's World Economic Outlook, Lane and Milesi-Ferretti (2018), IMF's Data Template on International Reserves and Foreign Currency Liquidity.

Dependency ratio: Old-age dependency ratio (ages 65+/3064) from UN World Population Prospects.

Population growth: UN World Population Prospects

Prime savers share: Share of prime savers (ages 4564) as a proportion of the total working-age population (ages 3064) from UN World Population Prospects.

Life expectancy at prime age: Life expectancy of a current prime-aged saver from UN World Population Prospects.

Life expectancy at prime age * future OADR: Interaction of life expectancy at prime age with future old-age dependency ratio as defined above.

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