WP/19/8

IMF Working Paper

Effective Trade Costs and the Current Account: An Empirical Analysis

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INTERNATIONAL MONETARY FUND

IMF Working Paper

Research Department

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January 2019

Abstract

A view receiving increased support is that the height of trade costs in prime export sectors has 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. To test this view, we first infer comparative advantages and trade costs, by sector, within a large sample of countries for the period 1970–2014. Then we construct *effective trade costs*—trade costs weighted by sectoral comparative advantage—to gauge the height of a country's overall trade costs. Results reveal that, although higher effective exporting costs are associated with lower current account balances, their impact is quantitatively limited; furthermore, the effective costs of importing often have no statistically significant effect.

JEL Classification Numbers: F13, F14, F32, F41

Keywords: current account, global imbalances, trade costs, structural gravity model, comparative advantage, trade restrictiveness

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[1] We thank JaeBin Ahn, Diego Cerdeiro, Luis Cubeddu, Russell Green, Hiau Looi Kee, Andrei Levchenko, Maurice Obstfeld, Jonathan Ostry, and Petia Topalova for their generous comments and feedback as well as Steven Wu Chaves for excellent research assistance. The views expressed in this paper are those of the authors and do not necessarily represent the views of the IMF, the IDB, their Executive Boards, or their management.

1 Introduction

The height of trade costs, and its potential impact on countries' external balances, have recently gained popularity in discussions in policy and academic circles. Given prevailing patterns of specialization, an important observation in these discussions 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 specializing in sectors characterized by low trade costs tend to run CA surpluses.[1] For example, Figure I illustrates the negative correlation between services trade and CA balances—where both are measured as a share of gross domestic product (GDP)—for the world's five largest economies. This observation led some authors to posit a causal relationship between trade costs in prime export sectors and current account balances (Joy et al. 2018).[2] Relatedly, the rise in global CA imbalances that began in the early 2000s might have resulted from a more rapid reduction in trade costs for manufacturing than for services (Barattieri 2014). This dynamic implies, from the policy perspective, that global imbalances would shrink if trade costs became more closely aligned across sectors; such alignment could arise either from lower trade costs for services or from higher costs for manufacturing.

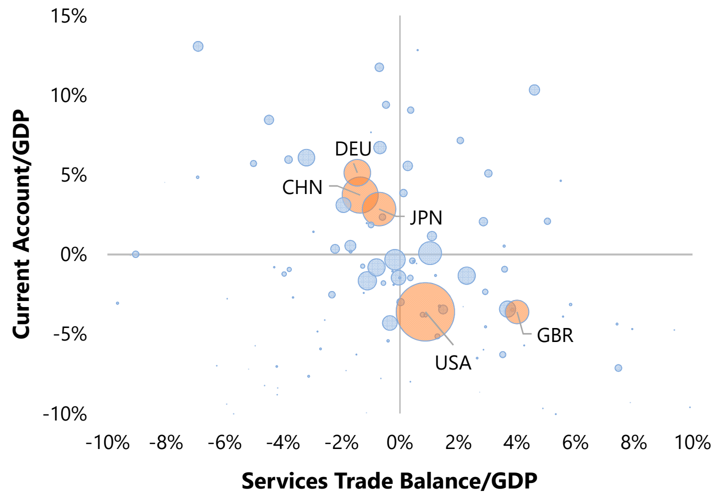
However, the predictions of theory on the effect of trade costs are strikingly context specific. Earlier research found that a host of factors influence the magnitude of the effects of tariffs on the trade balance, including the expected duration of the tariff change, the number of sectors considered, the type of goods subject to the tariff change and preferences (Svensson and Razin 1983; Engel and Kletzer 1986; Ostry 1988; Ostry 1991a; Ostry 1991b; Ostry and Rose 1992), and the strength of the offsetting response of the exchange rate (Krugman 1982; Obstfeld 2016). The recent literature considered more elaborate structural frameworks and showed that the transitional effects of trade costs on trade or current account balances can be significant (Barattieri 2014; Reyes-Heroles 2016; Eaton, Kortum and Neiman 2016; Erceg, Prestipono, and Raffo 2017; IMF 2017; Joy et al. 2018). But as in the earlier literature, the magnitude of the effects depends on the model and its calibration, and are most likely strengthened by the assumption of perfect foresight with regard to the future path of trade costs in some studies.

What are the effects of trade costs—especially as they apply to countries' prime export sectors—on CA outcomes? Are the effects quantitatively significant? Has the variation of trade costs contributed to the global imbalances observed in the last two decades? We aim to answer these questions using an empirical approach. By doing so, our analysis not only sheds light on the past

[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; it can also face high policy-related barriers, including regulatory requirements (Miroudot, Sauvage and Shepherd 2013).

[2] According to Governor Carney of the Bank of England: "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 [the] US and [the] UK, are more likely to run current account deficits." ("A Fine Balance," speech at the Mansion House, London, 20 June 2017.

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



Source: IMF World Economic Outlook database.

Notes: Each bubble represents a country, where bubble sizes are proportional to countries' average GDP (in US dollars) over the period 2001–2017.

patterns but also informs the debate on the possible consequences of the recent wave of protectionist policies.

Against this background, we study a globally representative sample of countries over nearly half a century to empirically quantify the effects of trade costs on CA outcomes while accounting for specialization patterns. Such quantification faces three key challenges: (i) measuring disaggregated trade costs; (ii) defining and measuring "comparative advantage"; and (iii) aggregating trade costs across trading partners and sectors—to evaluate overall country-specific restrictiveness and then to relate that restrictiveness to CA balances. To overcome these challenges, we employ a standard *structural gravity* framework.

We infer the size of disaggregated bilateral trade costs by applying the Ricardian trade model of Eaton and Kortum (2002; henceforth EK) to data on bilateral trade flows in agriculture, manufacturing, and services. Deriving separate estimates for different years and sectors, we allow the trade costs and their relationship with trade flows to vary over time and across sectors. Such variation is critical for our analysis, which examines a 45-year period characterized by significant improvements in shipping and information technologies for sectors that exhibit heterogeneous tradability.

Our measures of trade cost include nontariff barriers that are difficult to quantify but potentially pervasive. Broadly speaking, trade costs include all costs incurred while moving goods or services from the producer to a final user in a different country. These costs include not only expenses for tariffs and goods shipment, which are relatively easy to measure and on which most of the literature focuses, but also nontariff barriers that are either difficult to quantify (e.g., quotas) or not directly observed (e.g., information costs, contract enforcement costs, legal and regulatory costs)—especially in the case of services (Anderson and van Wincoop 2004). Direct measures of *services* trade barriers are in the form of indices, and their country and time-series coverage tends to be limited. As for trade in *goods*, data on nontariff barriers are likewise sparse and not comprehensive.

We allow bilateral trade costs to be asymmetric between importers and exporters. Toward that end, we follow EK and estimate an importer-specific component of trade costs. A country's overall imports from a given sector could be low either because its production costs are low in that sector, rendering the country more competitive than its trading partners, or because it imposes relatively high *nondiscriminatory* import barriers. The framework distinguishes between these two effects by incorporating additional information about exports, such that if low imports are coupled with high exports then we presume that the country has low production costs in that sector. If both imports and exports are low vis-à-vis all trading partners, then our framework implies the existence of nondiscriminatory import barriers.

Comparative advantage is difficult to measure because it requires characterizing the differences between world prices and domestic prices that would have prevailed under autarky. Since the counterfactual relative prices cannot be observed, it follows that comparative advantage must somehow be inferred from observed post-trade outcomes. We follow Hanson, Lind, and Muendler (2018) and use the gravity equation to infer each country's sectoral export capability before applying a "double normalization" to obtain the comparative advantage. In this procedure, the first normalization is relative to the world average of export capability and yields the absolute advantage for each country-sector pair. Second, we normalize absolute advantage relative to its countrywide average across sectors to remove the potentially confounding effects of domestic aggregate growth. The resulting measure of comparative advantage reflects differences in countries' technology adjusted for input costs. A crucial advantage of this measure is that it is not influenced by the effects of importer-specific factors or bilateral trade costs; in that sense, it is more refined than the traditional "revealed" comparative advantage of Balassa (1965), which is calculated using only observed gross trade flows.

Armed with these estimates, we compute *aggregate effective trade costs* to capture the size of overall costs to countries' natural exports and natural imports. Our estimated trade costs are by country pair, sector, and year. To obtain country-year measures of trade costs, we must aggregate across trading partners and sectors. We aggregate across trading partners in two different ways. First, we employ a commonly used approach by using *lagged* trade weights, which help mitigate the endogeneity problem associated with using contemporaneous trade weights. Yet because that approach is not likely to resolve this problem completely, our second approach relies on counterfactual frictionless trade flows given by setting the 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 (Loveday 1931; Leamer 1974; Anderson and Neary 2005).[3] To

[3]Anderson and Neary (2005) explain that the choice between frictionless and actual trade weights is equivalent to

aggregate across sectors, we use sectoral comparative advantages as weights because our objective is to capture costs as they apply to prime export sectors.

Introducing the estimates of aggregate effective trade costs—separately for both the export and import sides—to an empirical model of CA determination that resembles those from Chinn and Prasad (2003) and Lee et al. (2008), we find that countries facing higher export costs in their comparative advantage sectors have modestly lower CA balances. For the sample period of 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 amounting to 0.5–0.8 percent of GDP (depending on the aggregation scheme). Estimates based on a 2001–2014 sample yield effects that are about half the size of those for the earlier period. Effective costs of importing generally have small and statistically insignificant effects. Decomposing global CA imbalances into those explained by effective trade costs and by other factors suggests that effective trade costs have made a limited contribution.

These results are robust to considering a number of alternative assumptions and specifications. Most importantly, we check whether our results hinge on the assumption that trade costs have an importer-specific component. In particular, our estimates for the nondiscriminatory import barriers 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. Although our data set does not enable a simultaneous identification of importer- and exporter-specific barriers, incorporating bilateral tariff data allows us to re-estimate, as a robustness check, trade costs with an *exporter*-specific component. Reassuringly, in this latter scenario, our main conclusion regarding the limited effects of trade costs on CA outcomes remains unchanged.

Finally, we investigate the potential determinants of our estimated nondiscriminatory import barriers. We find that MFN tariffs play a significant role in accounting for the within-country variation in estimated import barriers in both agriculture and manufacturing. GDP per capita also stands out as a robust correlate, where richer countries tend to have lower import barriers. Further, we find that state support, which is only available for agriculture, is significantly *positively* associated with the estimated importer-specific barriers. This result suggests that, even though often associated with export subsidies, state support in agriculture impedes imports more than it promotes exports. In the case of the services sector, we find a positive correlation between services trade restriction indices and estimated import barriers. Overall, data seems to support considering nondiscriminatory barriers on the import side than on the export side, in line with our baseline EK framework.

Our empirical findings are consistent with theories that generate small effects of trade costs on current account balances. Numerous studies have introduced mechanisms that generate provide a

the choice between Laspeyres and Paasche price indices; the former index relies on a fixed basket, whereas the latter fully reflects the substitution that occurs following a price change.

link from trade costs to the CA—where these effects depend on the extent to which the shocks tilt the expected future profile of intertemporal prices and income—central macroeconomic determinants of saving and investment. For example, in a seminal contribution, Obstfeld and Rogoff (2000) show that trade costs can lead to a wedge between the effective interest rates faced by the borrowers and creditors, thus have a bearing on consumption and saving decisions. The CA effects of trade costs in that model, however, are unlikely to be significant, except at high levels of trade restriction. By studying whether observed fluctuations in actual trade costs have had a significant effect on current account balances, we find generally small effects. Also consistently with the prediction of Obstfeld and Rogoff (2000), we find a stronger relationship between the CA and trade restrictions for our earlier sample, when the level of trade restrictions tended to be higher.

This paper is most closely related to two studies that consider asymmetries in trade costs across sectors, the configuration of countries' comparative advantages, and the implications of those factors for CA balances. Much as we do, Barattieri (2014) estimates a gravity equation to quantify the height of trade barriers for goods and services separately. Yet in contrast to our approach, Barattieri constructs a home bias index (à la Anderson and Yotov 2010) that is aggregated to the world level with the goal of feeding this information into a two-country model. We rely instead on an EK-type framework to measure trade costs and then use the cross-country heterogeneity of those costs in our empirical tests. This distinction is crucial because there is substantial heterogeneity across countries in terms of both the level and evolution of trade costs.

The second related study is that of Joy et al. (2018), which quantify how current account balances are affected by the interaction between country-specific revealed comparative advantages in goods and world average tariffs; their paper reports a strong negative relationship. Yet this result is difficult to interpret because the decline in the world average tariff does not distinguish between exporting and importing costs—even though they could well have different implications for a country's CA. That study also relates CA balances to the Services Trade Restrictiveness Index (STRI) published by the Organisation for Economic Co-operation and Development (OECD); however, these data are available only for 2014–2016 but are assumed by the authors to be unchanged since the 1990s. Finally, both Barattieri (2014) and Joy et al. (2018) rely on the Balassa revealed comparative advantage measure which confounds the effects of trade costs and importer-specific factors.[4]

[4]Another related strand of literature focuses on understanding the costs to trade in services. For example, Gervais and Jensen (2013) and Anderson, Milot, and Yotov (2014) examine services trade within the United States and between the United States and Canada (respectively); these authors find that geographical distance is itself a substantial impediment. Our paper's approach is also similar to that of Anderson et al. (2015), which estimate a structural gravity equation using detailed data on services trade and production.

2 Measurement and Aggregation

In this section, we start by providing details of the theoretical framework that guides our measurement and also some of the aggregation exercises. Then we describe our data set and discuss the gravity estimation results, after which we present some stylized facts concerning the estimated measures of comparative advantage and trade costs.

2.1 Theoretical Framework

Here we describe the structural framework adopted to estimate sectoral comparative advantages and trade costs. This framework follows the multisector generalization of Eaton and Kortum (2002). Subscripts for time are omitted unless needed for clarity.

As in EK, output in sector j of country i is produced using a constant elasticity of substitution production function that aggregates a continuum of varieties. Each variety q is produced by a firm whose productivity is $z_i^j(q)$. That is: producing one unit of variety q requires $1/z_i^j(q)$ units of the input bundle, which combines labor, capital, and intermediate inputs from all sectors. Thus the cost of producing one unit of variety q in sector j of country i is given by $c_i^j/z_i^j(q)$, where the cost of input bundle c_i^j depends on the local wage, the rental rate of capital, and the cost of intermediate inputs. As in Caliendo and Parro (2015), sectoral linkages imply that c_i^j depends on the wages and capital costs in other sectors and countries. We assume that product and factor markets are each perfectly competitive.

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

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

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

Absent a home bias in preferences, consumers shop globally for the cheapest source of each variety; hence the prevailing price of the good in country n is given by $p_n^j(q) = \min_i\{p_{ni}^j(q)\}$.[5]

[5] Any home bias in product preferences would appear in the source country–specific variables (e.g., c_i^j, z_i^j).

Given the source country's productivity distribution and Equation (1), the prices that country i quotes to country n for sector-j products is distributed as $G^j_{ni}(p) = 1 - \exp(-T^j_i(c^j_i d^j_{ni})^{-\theta} p^\theta)$. Let π^j_{ni} denote the probability that country i supplies a sector-j good at the lowest price in country n. Then

$$\pi^j_{ni} = \frac{T^j_i(c^j_i d^j_{ni})^{-\theta}}{\sum_k T^j_k(c^j_k d^j_{nk})^{-\theta}}. \tag{2}$$

Since we assume a continuum of varieties, it follows that this probability equals the share of goods sold in country n that are sourced from sector j in country i. Let X^j_{ni} denote country n's spending on country i goods in sector j, and let X^j_n denote country n's total expenditures on sector-j goods. We can then write

$$X^j_{ni} = \frac{T^j_i(c^j_i d^j_{ni})^{-\theta}}{\sum_k T^j_k(c^j_k d^j_{nk})^{-\theta}} X^j_n. \tag{3}$$

Dividing both sides of this equation by country n's expenditure on domestically produced goods in sector j, X^j_{nn}, yields

$$\frac{X^j_{ni}}{X^j_{nn}} = \frac{T^j_i(c^j_i d^j_{ni})^{-\theta}}{T^j_n(c^j_n)^{-\theta}}. \tag{4}$$

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

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

$$\ln \tilde{X}^j_{ni} = \ln(T^j_i(c^j_i)^{-\theta}) - \ln(T^j_n(c^j_n)^{-\theta}) - \theta \ln d^j_{ni}. \tag{5}$$

Each term in Equation (5) has an intuitive interpretation. The first term, $T^j_i(c^j_i)^{-\theta}$, captures the exporting country i's *export capability* in sector j, which increases with the country's average productivity (T^j_i) in that sector and with the dispersion of productivity across firms ($1/\theta$) but decreases with the unit production cost (c^j_i). The second term, $T^j_n(c^j_n)^{-\theta}$, is a measure of the toughness of industry competition in the importing country n. Once again, both higher average productivity in sector j and lower unit production costs increase the importing country's competitiveness and therefore make it more difficult for foreign suppliers to penetrate its markets. Any factor (e.g., lower domestic transportation costs) that reduces domestic production costs will improve a country's competitiveness. The third term, d^j_{ni}, represents the bilateral trade cost.

Both natural and man-made factors can deflect trade, and these factors should be viewed as components of trade costs d^j_{ni}. Natural factors identified in the structural gravity literature include geographic distance as well as whether (or not) a country pair shares a common border, language, and/or colonial relationship. Man-made factors include the presence of a currency union or trade agreement between trading partners in addition to tariffs and such nontariff barriers as institutional and regulatory costs. Importantly, we assume that bilateral trade costs include an importer-specific nondiscriminatory component (im_n^j). This assumption follows EK and is crucial because it allows—in the gravity estimation—for asymmetric bilateral trade costs in the absence of other bilateral directional observables.[6]

Trade costs can be expressed formally as follows:

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

here the dummy variable associated with each factor has been suppressed to simplify notation. The term $D_{ni,h}^j$ is the contribution to trade costs made by the geographic distance (in miles) between countries n and i, where that distance is within the hth interval defined as one of $[0, 350]$, $[350, 750]$, $[750, 1500]$, $[1500, 3000]$, $[3000, 6000]$, or $[6000, \text{maximum}]$. Other controls include dummies for the presence—between country n and country i—of a common border (B_{ni}^j), of a common language (L_{ni}^j), of a common continent (Con_{ni}^j), of a currency union (CU_{ni}^j), of a common colonial history or relationship (Col_{ni}^j), and of a regional trade agreement (RTA_{ni}^j).

For each sector-year, we plug our data into the following gravity equation saturated with exporter fixed effects (k_i^j) and importer fixed effects (m_n^j):

$$\begin{aligned} \ln\ \tilde{X}_{ni}^j &= \underbrace{[\ln(T_i^j (c_i^j)^{-\theta})]}_{\text{Exporter FE, } k_i^j} - \underbrace{[\ln(T_n^j (c_n^j)^{-\theta}) + \theta im_n^j]}_{\text{Importer FE, } m_n^j} \\ &- \theta \underbrace{(D_{ni}^j + B_{ni}^j + L_{ni}^j + Con_{ni}^j + Col_{ni}^j + CU_{ni}^j + RTA_{ni}^j)}_{\text{Bilateral observables}}. \end{aligned} \tag{7}$$

A considerable fraction of bilateral trade flows is zero, especially in the case of sectoral data. Therefore, we estimate the gravity equation using the Poisson pseudo-maximum likelihood method in order to deal with the heteroskedasticity associated with log-linearized models (see Silva and Tenreyro 2006).[7]

For most of our calculations, we assume that $\theta = 8.28$ in all sectors; as a robustness test, we also consider the alternative of $\theta = 4$. The values estimated for fixed effects, k_i^j, m_i^j, and d_{ni}^j are then used to measure each country's comparative advantage in each sector as well as 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. Following Hanson et al. (2018), we express a country's export capability in a particular sector as its deviation from the global average for that sector: $\sum_{i=1}^N \exp(k_i^j)/N$, where N is the

[6] In Section 3.2 we shall incorporate directional observables into the structural gravity estimation.

[7] Our use of the Poisson pseudo-maximum likelihood method means that our comparative advantage estimates are closer to those proposed by French (2017) than to those proposed by Costinot, Donaldson, and Komunjer (2012).

number of exporting countries in the world. Thus we derive that country's *absolute* advantage:

$$A_i^j = \frac{\exp(k_i^j)}{\frac{1}{N}\sum_{i=1}^{N}\exp(k_i^j)}. \tag{8}$$

This normalization nets out shocks that are sector specific but common across countries. In the Ricardian tradition, then, *comparative* advantage is the absolute advantage of country i in sector j relative to its absolute advantage averaged across sectors:

$$C_i^j = \frac{A_i^j}{\frac{1}{J}\sum_{j=1}^{J} A_i^j} \tag{9}$$

for J the total number of sectors. French (2017) shows that, under the EK assumption that all sectors use inputs in the same proportions and there is no intermediate input linkages, this second normalization eliminates the effects of labor and intermediate input costs—leaving only the differences in relative productivity.

Bilateral Trade Costs. We use Equation (6) to estimate the bilateral trade costs d_{ni}^j. The nondiscriminatory component of this equation, im_n^j, is given by the difference between estimated exporter and importer fixed effects for a given country:

$$im_n^j = \frac{m_n^j - k_n^j}{\theta}. \tag{10}$$

At this point we should remark that several studies in the literature (e.g., Waugh 2010; Levchenko and Zhang 2016) consider the difference between importer and exporter fixed effects to reflect not import barriers but rather export subsidies. We explain in Section 3.2 that in the more general case—where import barriers and export subsidies are both allowed—the left-hand side of Equation (10) would be replaced by their total. Hence these two factors cannot be distinguished without incorporating additional data. In our baseline case we follow EK and focus on the overall destination effect by assuming that trade costs vary across trading partners contingent upon the importer. Our analysis in Section 4, which correlates the inferred nondiscriminatory component with a number of observables, provides some empirical support for this choice. In addition, Section 3.2's robust checks suggest that the empirical relationship between effective trade costs and the current account does not hinge on this assumption.

Aggregating Trade Barriers across Trading Partners. Having estimated the sectoral bilateral trade costs d_{ni}^j, we next aggregate across trading partners to construct country-sector–level costs. We make a distinction throughout between costs that apply to exports and those that apply to imports, which are calculated (respectively) as

$$DX_i^j = \sum_n w_{ni}^j d_{ni}^j \quad \text{and} \quad DM_i^j = \sum_n w_{in}^j d_{in}^j.$$

Two alternatives are considered for the weights w_{ni}^j: lagged trade shares and "frictionless trade" weights, as we explain in what follows.

Lagged trade shares are simply the one-year–lagged shares of countries's exports/imports in their trading partners' total nominal exports/imports for each sector. This weighting scheme is commonly employed because of its simplicity and its potential to reduce the biases introduced when using contemporaneous trade shares. Since exports and imports respond to trade costs, it follows that weighting bilateral trade costs by contemporaneous trade shares would bias downward the effects of overall trade costs.

To characterize a *frictionless trade* counterfactual we consider a partial equilibrium version of the Eaton and Kortum (2002) model by assuming $d_{ni} = 1$. With the latter assumption, we can solve for this counterfactual without resorting to a structural estimation and can also derive intuitive expressions that flesh out how the weighting scheme relates to countries' export capability. More specifically, using this approach allows us to show analytically that the weights assigned to aggregate importing costs are given by the source countries' absolute advantage whereas those assigned to aggregate exporting costs are determined by countries' shares in world spending in 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

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

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

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

This expression reveals that the weights correspond to the source countries' absolute advantage A_n^j, as defined in Equation (8).

Using the same counterfactual trade flows, the weights used to calculate country-sector–level export costs for a given exporter i, denoted DX_i^j, are

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

If trade is frictionless then, by Equation (3), we can rewrite X_{nn}^j in this expression 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 Equation (15) back into the Equation (14) then yields

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

It is intuitive that the frictionless trade weights used for weighting export costs are simply the partners' shares in world gross expenditures for each sector. These weights do not vary across exporters, so destination countries are assigned the same weight regardless of the exporter whose trade costs are being aggregated. Countries with higher expenditures correspond to larger potential markets and are therefore weighted more heavily.

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

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

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

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; hereafter JN); and the 2016 release of the World Input-Output Database (WIOD).[8] For the period 1970–2009, JN assemble a balanced panel of sectoral bilateral trade flows for 37 countries in the sectors of agriculture, manufacturing, services, and nonmanufacturing industry. The nonmanufacturing industry includes commodities, with respect to which trade (as argued by Fally and Sayre 2018) may have particularly low elasticities of demand and supply; we therefore exclude that sector from our analysis. Since

[8] https://www.rug.nl/ggdc/valuechain/wiod.

bilateral services trade data are limited, especially for earlier periods, JN impute bilateral services trade flows by applying bilateral trade shares for goods to multilateral data on services. This method is motivated by the observed strong correlation between the shares of trade in goods and services. To recover bilateral services flows, Johnson and Noguera run a constrained least-squares estimation procedure that minimizes deviations between imputed services trade shares and target shares (based on goods trade) and is subject to the constraint that, for each country, the sum of bilateral flows be equal to multilateral exports and imports.

Given the assumptions in data construction, we complement the JN data set with the WIOD, which also provides bilateral trade flows. Note that the WIOD covers the more recent period of 2000–2014 and covers 56 disaggregated sectors in 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, the United Nations (UN), and the International Monetary Fund (IMF). For the sake of comparability—and to overcome the problems of dealing with zero trade flows, which become more prevalent as flows become more disaggregated—we aggregate the 56 WIOD sectors so that they match the JN sectors.

Gravity Controls. Our gravity controls are from the CEPII database. For geographic distance we use simple distance in kilometers, between the respective countries' most populated cities; these distances are converted to miles for the purpose of generating the six interval-based dummies described in Section 2.1. The dummy variables that indicate whether a country is landlocked or whether countries share a common continent are from GeoDist database of CEPII.[9]. Our remaining controls are from the full version of the CEPII's structural gravity data set; these controls include a regional trade agreement indicator based on information from the World Trade Organization (WTO) as well as dummies for whether countries have ever been in a colonial relationship, whether they were governed (after 1945) by the same colonizer, 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 given at the importer level) to disambiguate the estimated nondiscriminatory import barriers, and we use the latter when rerunning the gravity regressions) to analyze robustness by explicitly controlling for some of the bilateral observables. The MFN applied tariffs, at the Harmonized System (HS) 6-digit level, are downloaded from the Trade Analysis Information System of the UN 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 within each of our goods sectors (agriculture and manufacturing). The MFN tariff data are available for nearly all WTO

[9]http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6

members starting from the late 1980s. We construct our bilateral tariff data by complementing the applied effective tariff rates with information on bilateral trade flows for countries with a trade agreement. More specifically, we take a simple average of tariffs across HS 6-digit products with nonzero trade flows between each country pair to obtain sector-level bilateral tariffs.

To gauge the restrictions on services trade, the OECD constructs STRIs for 44 countries and 22 service subsectors for the period 2014–2016. These indices are based on restrictions that are grouped into five different policy areas (Grosso et al. 2015): restrictions on foreign entry, restrictions on the movement of individuals, other discriminatory measures, barriers to competition, and regulatory transparency. The OECD's methodology is based mainly on restrictions that are applied in practice; the only exception is regulatory transparency, where inputs include some survey-based World Bank "ease of doing business" indicators. The scoring in each policy area ranges from 0 (completely open) to 1 (completely closed), and the scores are translated into a single value for each subsector. The indicator that we use—to measure the extent of services trade restrictions at the country level—is then the simple average across 22 subsectors.

Another source we use is the Temporary Trade Barriers (TTB) database assembled by Bown (2016) and published by the World Bank. The TTBs are instances of nontariff measures that importers can impose bilaterally (anti-dumping measures, countervailing duties, and China-specific safeguards) or unilaterally (global safeguards). The raw data are highly disaggregated (HS-8 or higher), so we follow Bown in assuming that an HS 6-digit product has a TTB when a higher-digit product is affected by such barriers. We then calculate the number of TTB-affected 6-digit products at the country pair–sector level for bilateral TTBs and then divide by the number of nonzero 6-digit trade flows to estimate the share of TTB-affected products. For unilateral TTBs, we perform the same exercise at the importer-sector level.

Other Variables. We assess domestic transport infrastructure via the road density index of Du, Wei, and Xie (2013), which is based on the total length of railroads and paved roads and railroads per square kilometer. Of course, the absolute level of road density may not be comparable across countries owing to their different geographic and topological features. For example, a country's relatively low road density may reflect its greater area of desert land or surface water more so than an insufficient transportation network. We address this measurement concern by controlling for all time-invariant features in our specifications.

We use the OECD's "total support" estimate to proxy for the state support of agriculture. The OECD defines such 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 impact.

The IMF's PPP-REER series draws on data for the level of countries' 2011 prices from the International Comparison Program survey (ICP) and on REER indices from the IMF's Information

Notice System. For each country, the REER indices are essentially "spliced" onto the 2011 exchange rates after first expressing the ICP levels relative to trading partners.[10] Finally, we obtain GDP per capita by dividing real GDP (at "chained" PPPs) by population; data for both of these factors are from the Penn World Table 9.0.

2.3 Gravity Estimation

Our gravity regressions fit the trade data well and yield coefficients that are fairly stable over time—properties that have made gravity analysis a popular tool for understanding trade flows. We present our estimated gravity coefficients for 1990 and 2005, separately for each of the three sectors considered, in Table I.

As Table I reports, the absolute value of our geographic distance coefficients are smallest for manufacturing and become smaller over time for all three sectors. It is not surprising that manufacturing trade is the least affected by distance—given that these goods are less perishable than agricultural goods and are easier to pack and ship in large containers. The services sector generally faces higher geographic barriers, as shown by its more negative coefficients for geographic distance. This finding is consistent with previous research suggesting that geographic distance is a greater impediment to trade in services than in goods (Gervais and Jensen 2013, Anderson et al. 2014). The lesser importance of distance in 2005 as compared with 1990, with the greatest reductions observed for manufacturing, is likely due to technological advances in transportation and the associated declines in shipping costs (Feyrer 2009).

As for the other gravity controls, the presence of a common border or common language tends to boost trade by roughly similar magnitudes. Unlike the case of distance, the effects of having a common border or language have become smaller only for manufacturing. It is somewhat surprising that neither being located on the same continent nor belonging to the same currency union seems to affect trade—at least not when we control for other related factors.[11] One of these related factor is the presence of a regional trade agreement, which makes a positive and significant contribution to increasing trade flows in agriculture and services. However, the effect of such an agreement is relatively less significant, both economically and statistically, for manufacturing.

2.4 Patterns of Comparative Advantage

Figure II plots selected countries' estimated comparative advantages separately for each of our data sets (i.e., for JN and WIOD). Because both the country coverage and the construction of bilateral services trade data differ between the two data sets, we report separate estimates for them.

[10]These series on exchange rates, along with all of the current account regressors (except for those pertaining to trade costs), are available from the External Balance Assessment website (https://www.imf.org/external/np/res/eba/data.htm).

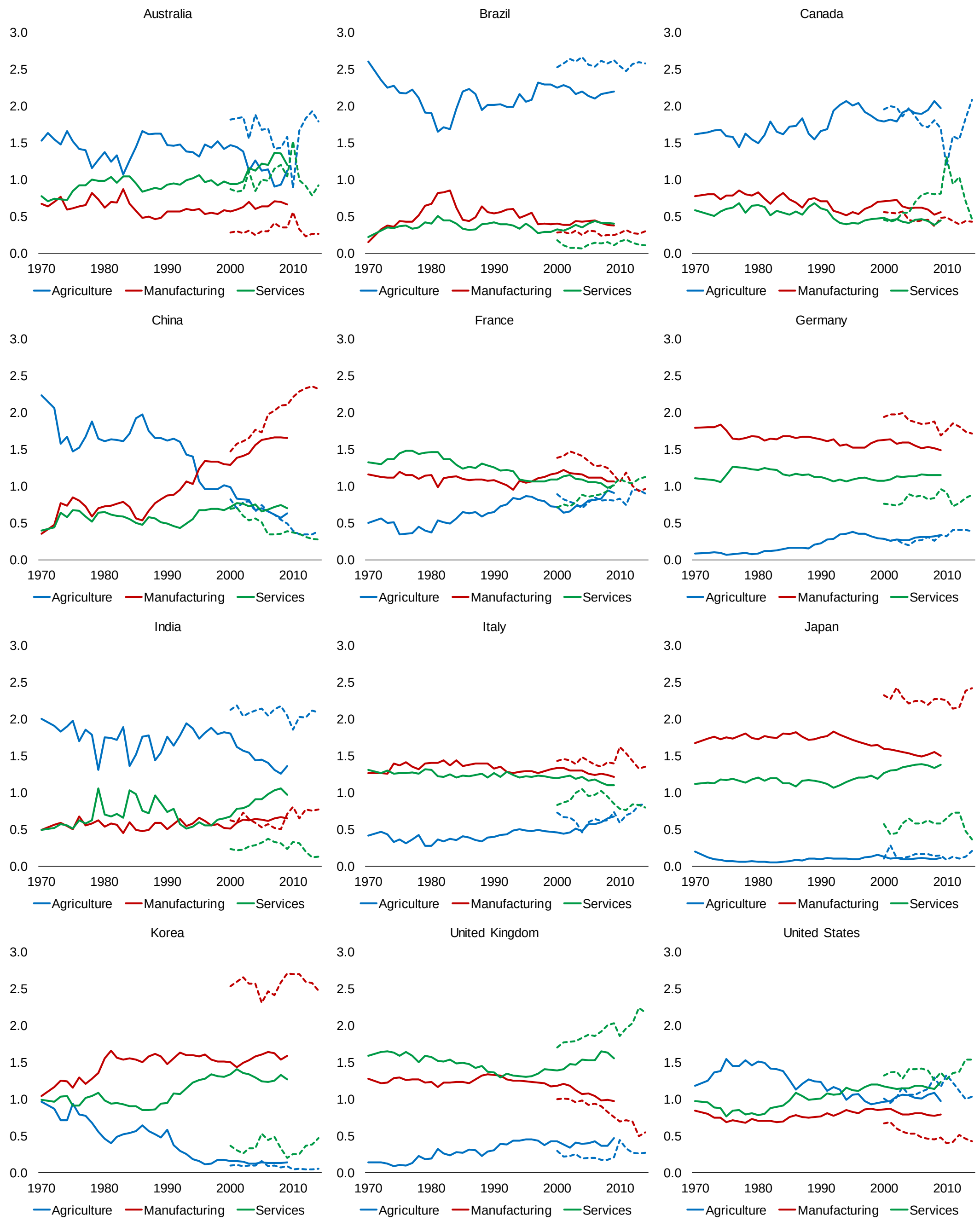
[11]The results for common currencies might not be generalizable because the eurozone is our sample's *only* currency union.

Table I: Structural Gravity Coefficients—1990 versus 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: Reported values are the estimated coefficients multiplied by $\theta = 8.28$. Estimates for both 1990 and 2005 are based on the Johnson and Noguera (2017) data set.
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

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



Notes: Each graph plots C_i^j. Solid lines are estimates based on data from Johnson and Noguera (2017); dashed lines are based on the 2016 WIOD. Country selection is based on world export shares in 2014 (as reported by WIOD). A value higher (resp. lower) than 1 is indicative of a comparative advantage (resp. disadvantage).

A few trends stand out upon inspection of the comparative advantages for these economies. First, China's comparative advantage in manufacturing rose sharply after the 1990s and reached levels similar to those of Germany and Japan. At the same time, China's advantage in agriculture has been falling. Second, the United States gained comparative advantage in services starting in 1980s; however, its comparative advantage in manufacturing has been weaker than in other sectors and has deteriorated during the 2000s. Third, the comparative advantage in manufacturing of Japan and the United Kingdom have been declining since the early 1990s. Finally, China, Germany, Japan, and Mexico have greater comparative advantages in manufacturing than in services, while the opposite holds for the United States and the United Kingdom. This last observation shows that the configuration of the world's five largest economies' comparative advantages in terms of their services trade balances—as plotted in Figure I—is supported qualitatively by our comparative advantage estimates.

In line with French (2017), we find that the gravity-based and Balassa-type revealed comparative advantage measures exhibit a positive correlation overall despite differing in some cases. Comparison of the gravity-implied comparative advantage measure with the Balassa-type revealed comparative advantage yields pooled correlations of nearly 0.8 using either data set. The only exception is services during 1970–2009, for which the correlation is only 0.4; this result suggests that trade costs and importer-specific factors may have been, relatively speaking, more important drivers of services trade in that period. When looking at specific countries, we see several visible differences across the two measures. For example, the gravity based estimates suggest a steeper upward trend in China's comparative advantage in manufacturing relative to the Balassa-type measure after mid 80s. Another contrasting case is that of Brazil, for which the Balassa-type measure implies a strong improvement in the country's comparative advantage in agriculture that roughly coincided with the trade liberalization undertaken by that country in the early 1990s. Thus it seems that the Balassa-type measure tends to associate trade liberalization too strongly with improvements in comparative advantage.

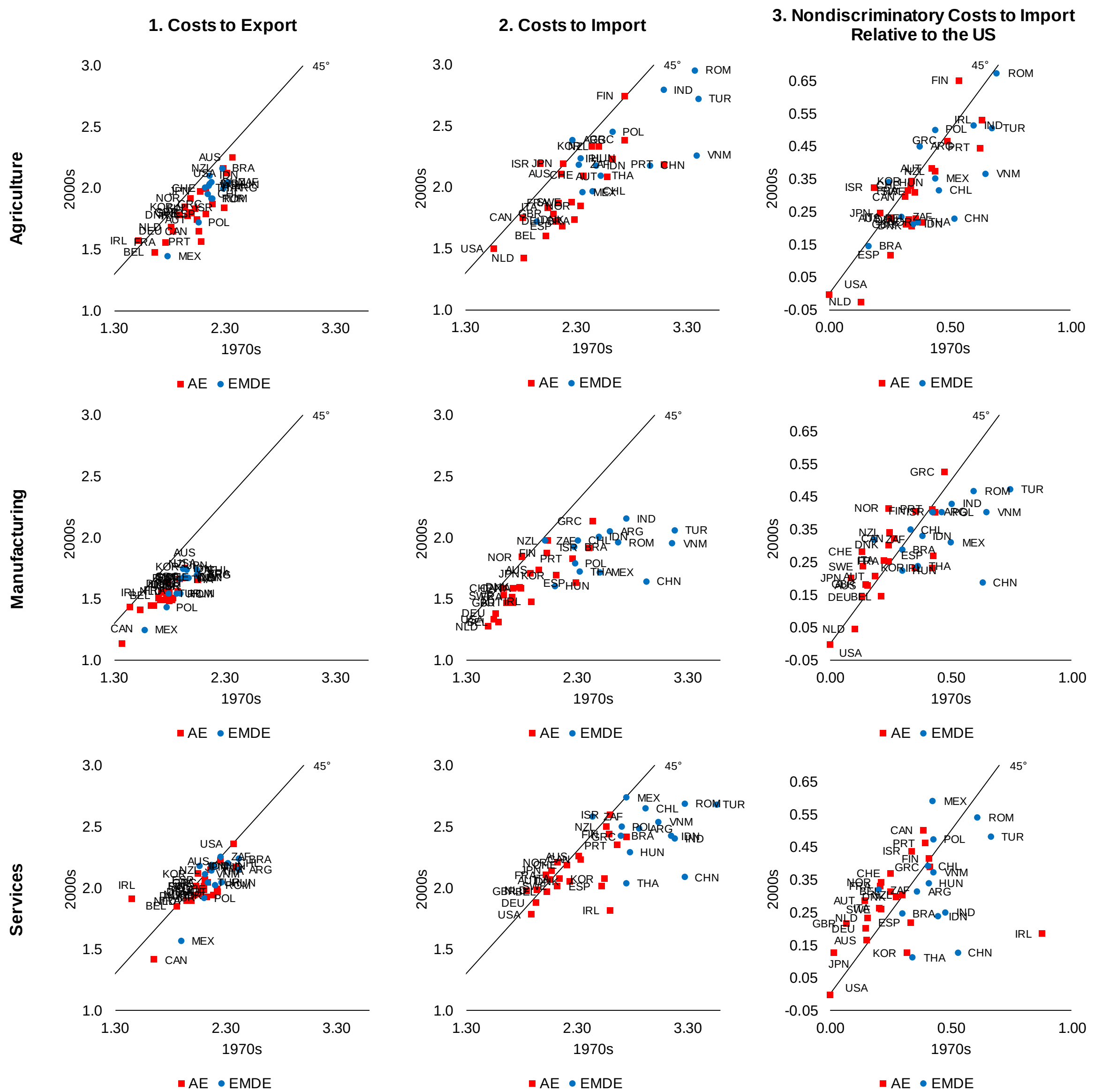
2.5 Patterns of Sectoral Trade Costs

Figures III and IV compare the estimated trade costs, DX_i^j, DM_i^j and im_i^j across sectors, countries, broad country groups and time, revealing a number of interesting patterns.[12] Reported estimates for exporting and importing costs are ad valorem tariff equivalents relative to the cost of shipping internally.

Comparing across sectors in Figures III and IV reveals that the estimated costs of trade in manufacturing have trended down sharply, rendering it the sector with the lowest level of trade costs. This result is consistent with the coefficients reported in Table I—despite those coefficients

[12]To preserve space, these figures report only those estimates that use lagged trade weights and are based on the Johnson and Noguera (2017) data set.

Figure III: Trade Costs over Time and across Sectors



Notes: The figure plots DX_i^j (column 1), DM_i^j (column 2), and im_i^j (column 3) averaged for 1970–1979 (horizontal axes) and 2000–2009 (vertical axes) based on data from Johnson and Noguera (2017). The IMF's World Economic Outlook is used to classify countries as either advanced economies (AE in the figure) or emerging market and developing economies (EMDE). A value of 2 for DX_i^j or DM_i^j indicates that the estimated trade cost is equivalent to a tariff of 100 percent. A value of 0.1 for im_i^j means that the tariff equivalent of the nondiscriminatory import cost is 10 percentage points higher than the value of this factor for the United States.

being informative only about the symmetric component of trade costs. As discussed earlier, part of this reduction may be due to dramatic improvements in shipping technology (including connectivity among countries) and information technology during recent decades (IMF 2016). In addition, policy barriers such as tariffs declined faster and further in manufacturing than in the other two sectors. Hence, with respect to both exporting and importing, the steepest declines in trade costs occurred in this sector.

Costs in services stand out as being generally higher than in other sectors irrespective of the trade flow direction. This result is not surprising because some services—as in the oft-cited haircut example, where production and consumption must occur simultaneously—are naturally difficult to trade. This finding is consistent with those of Miroudot et al. (2013), who report that tariff-equivalent trade costs in services are much higher than those for goods, and sometimes (during 2007) by more than 200 percent. Moreover, policy-induced barriers such as regulatory requirements tend to be relatively high in this sector (IMF/WB/WTO 2018).

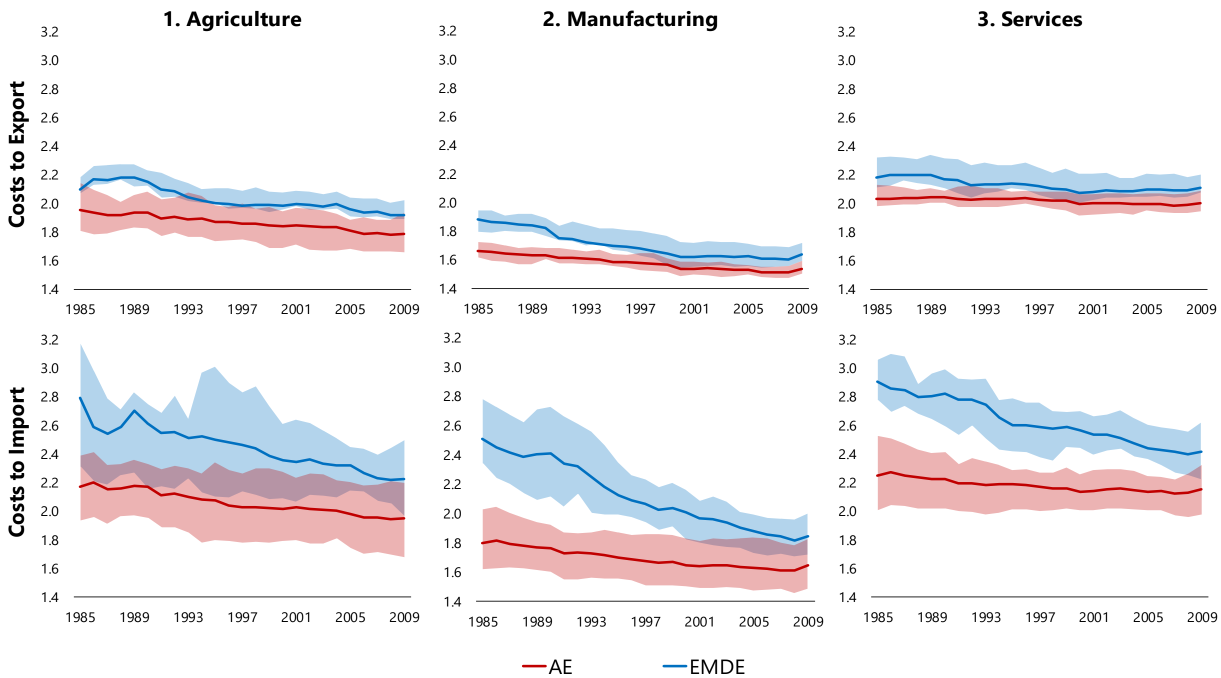
Importing costs (column 2 of Figures III and bottom row of Figure IV) are apparently higher in emerging market and developing economies (EMDEs) than in advanced economies (AEs). This outcome is consistent with the observation that nondiscriminatory costs to import are (on average) somewhat higher in EMDEs than in AEs. Over time, however, EMDEs have sharply reduced their costs of importing for all three sectors—as evidenced by the observations for EMDEs being located mostly below the 45-degree line in column 2 of Figure III and also further away from that line than are the observations for AEs. This trend may be a reflection of the progress made by these countries, over the past few decades, in liberalizing trade and reducing other barriers to foreign entry.

The nondiscriminatory import barriers plotted in column 3 of Figure III are estimated relative to a numéraire country, which is the United States. By construction, then, such nondiscriminatory costs are always zero in that country and that the level of im is not meaningful in an absolute sense. Since the estimations reveal that essentially no country has *negative* costs, it follows that the United States has the lowest estimated nondiscriminatory import barriers in our sample. Most emerging markets observed declines in their nondiscriminatory barriers between the 1970s and 2000s.

3 Trade Barriers and the Current Account

In this section we investigate whether aggregate effective trade costs, separately when exporting and importing, help explain a country's CA outcome. To this end, we start with a standard empirical model of CA determination in the spirit of Chinn and Prasad (2003), Gruber and Kamin (2007), Chinn and Ito (2007), Lee et al. (2008), and Gagnon (2011). More specifically, we build on the IMF's External Balance Assessment (EBA) methodology (as described by Phillips et al. 2013), which is a comprehensive reduced-form framework for understanding the medium-term determinants of CA

Figure IV: Trade Costs for Broad Country Groups



Notes: The figure plots DX_i^j (top row) and DM_i^j (bottom row) in agriculture, manufacturing and services for broad country groups based on data from Johnson and Noguera (2017). A value of 2 for DX_i^j or DM_i^j indicates that the estimated trade cost is equivalent to a tariff of 100 percent. The solid lines and shaded areas denote the simple average and the interquartile range across economies, respectively. The sample comprises 23 advanced economies (AE), and 14 emerging market and developing economies (EMDE).

balances and is less subject than are other specifications in the literature to omitted variable bias. We use the latest vintage of the methodology as described in IMF (2018). The description and data sources of the variables used in this framework are listed in the Appendix of our paper.

The EBA methodology for determining the current account consists of a panel regression that captures much of the variation in the CA/GDP ratio. The regression does not include any fixed effects, but it does control for a host of independent variables. In particular, it controls for the effects of several domestic policy–related factors—including the institutional and political environment, public healthcare spending, and fiscal and monetary policies—as well as for the effects of credit gap and foreign exchange intervention. The framework also includes many demographic variables, which are critical in light of the economic significance of their effect on saving and investment decisions. Other factors that the regression incorporates include the stock of net foreign asset positions, medium-term output growth, and countries' net exports of exhaustible resources. All of these independent variables together account for more than 60 percent and 70 percent of the variation in CA balances for our 1986–2009 and 2000–2014 samples, respectively; see column (1) of Tables II and III.[13] The estimation uses pooled generalized least squares with a panelwide first-order autoregressive correction to take into account the CA's strong autocorrelation within a given country.

3.1 Baseline

We augment the EBA current account regression just described with our measures of aggregate effective trade costs. These modifications proceed gradually as we first include the effective cost of exporting and importing in turn (columns (2) and (3) and columns (5) and (6) in Tables II and III) and then include both at the same time (columns (4) and (7) in the same tables). We conduct these experiments separately for our two samples, so Table II reports results using the earlier (1986–2009) sample and Table III using the later (2001–2014) sample. The regression results show that, even after our own measures are incorporated, the coefficient estimates derived for the original EBA model's variables are generally stable across specifications.

We find a statistically significant negative impact of effective exporting trade costs on the CA, although the average magnitudes are moderate (see 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 with respect to sectors in which it has a 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 the costs of exporting to all trading partners fell by 10 percentage points in all sectors.[14] The estimated

[13]The most recent version of the EBA current account regression covers the period 1986–2016; hence its overlap with our data sets from Johnson and Noguera (2017) and the 2016 WIOD is, respectively, 1986–2009 and 2000–2014.

[14]However, this hypothetical scenario of a 10 percentage point decline in the costs of exporting is not a counterfactual based on a full general equilibrium because it does not take into account any wage or price responses. It also does not incorporate a commensurate reduction in the country's costs of importing.

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: "L." = one-year lag; $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

Table III: Current Account and Trade Barriers, 2001–2014

		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

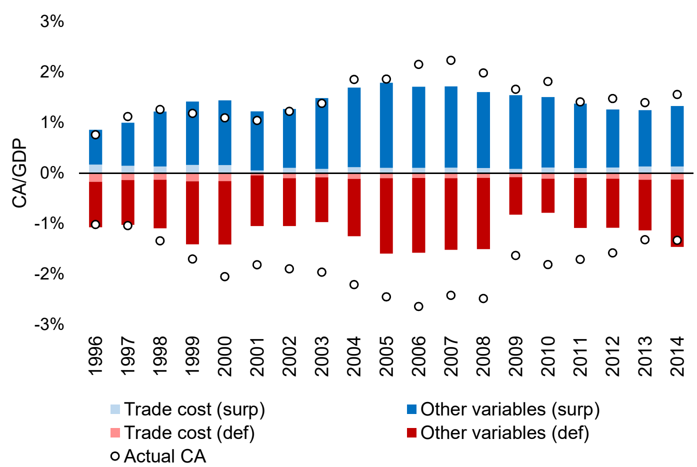
Notes: "L." = one-year lag; *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

effects of these exporting costs for 2001–2014 are about half of those for the 1986–2009 period. The average effects, however, mask noticeable differences across countries, where effective trade costs can account for a nonnegligible portion of the CA balance in countries with higher-than-average effective costs to export, for example, the US.

In general, the effective costs to import are statistically insignificant. This result is most evident in the earlier sample, as shown in columns (3) and (6) of Table II. The coefficients estimated for the later sample are statistically significant, but they are economically small and are in the counterintuitive direction. When the costs of exporting and importing are both included, the former dwarfs the latter from the perspectives of statistical *and* economic significance; see columns (4) and (7) of Tables II and III.

These findings are consistent with theories positing mechanisms that 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 as considered by Joy et al. (2018). In the face of increased protectionism, Barattieri, Cacciatore and Ghironi (2017) find small improvements in the trade balance that arise due to a combination of expenditure switching and reduced demand for imports with lower real incomes. A detailed interpretation of our differential results on the impact of costs of exporting versus importing would depend on a deeper knowledge of the underlying mechanisms at work; an exploration of that sort is beyond the scope of this paper.

Figure V: Contribution of Effective Trade Costs to Global Imbalances



Sources: For years through 2000, Johnson and Noguera (2017); for years thereafter, the WIOD.
Notes: This figure plots the actual values (open circles) and predicted values (bars) of the CA separately for surplus (blue) and deficit (red) countries. The predicted values consist of those derived from effective trade costs (light shading) and from other variables in the latest EBA current account model (dark shading). Effective trade costs are calculated using lagged trade shares.

Figure V shows that, over the last two decades, effective trade costs have made only a minor contribution to global CA imbalances. After sorting countries into 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. Then we decompose the predicted values into those predicted by the effective trade costs (of both exporting and importing) and those predicted by other factors in the EBA model.[15] Looked this way, effective trade costs have had a small contribution to the observed global imbalances.

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—in contrast to our baseline assumption that trade costs have an importer-specific component. Then we consider alternative weights for the aggregation of bilateral sectoral trade costs. Finally, we zoom into the impact of tariffs, and use a lower value for trade's elasticity with respect to trade costs. Unless otherwise specified, all these experiments use lagged trade shares to aggregate across trading partners.

Importer- versus Exporter-Specific Costs. In generating the asymmetric bilateral trade costs between trading partners, we have followed Eaton and Kortum (2002) in formulating trade costs that include the 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 viewed trade costs as having an *exporter*-specific component (e.g., export subsidies). If trade costs reflect both importer- and exporter-specific barriers, then the costs specified in Equation (6) become

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

We remark that ex_i^j would enter the exporter fixed effect in Equation (8) with a negative sign (i.e., because higher ex_i^j *reduces* country i's 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 derived from the gravity estimation. It is therefore apparent that im_n^j and ex_n^j cannot be simultaneously identified absent additional data.

Our baseline specification assumes that $im_n^j = \chi_n^j$. To see whether our results are robust to the alternative assumption $ex_n^j = \chi_n^j$, we re-estimate the gravity equation while controlling for bilateral

[15] Effective trade costs are calculated using *lagged* trade weights, so the corresponding coefficients are based on column (4) of Tables II and III. Results based on *frictionless* trade weights are reported in Annex XXX.

tariffs and incorporating ex_i^j, the exporter-specific component of trade barriers:[16]

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

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

It is especially important to include bilateral tariffs in the gravity regression when considering $ex_n^j = \chi_n^j$; the reason is that tariffs tend to have a substantial nondiscriminatory importer-specific component. Not controlling for tariffs in these circumstances would lead the effect of nondiscriminatory tariffs to be incorrectly attributed to the estimated comparative advantage and the toughness of of domestic competition. In our baseline case with $im_n^j = \chi_n^j$, however, such effects would already be accurately captured by im_n^j.[17]

Columns (1) and (2) in Table IV reveal that allowing trade costs to differ contingent on the exporter does not alter our main results. For completeness, in column (1) we report the results with $im_n^j = \chi_n^j$ but based on a gravity equation that controls for bilateral tariffs. The estimates for this case are similar to those reported for our baseline regression in column (4) of Tables II and III. Of perhaps greater interest is that column (2), which takes the alternative approach of setting $ex_n^j = \chi_n^j$, also yields fairly similar results: aggregate effective export costs reduce the current account by only a small amount, and the effects of import costs are less significant both economically and statistically.

Alternative Weights in Constructing Effective Trade Costs. Obtaining aggregate effective trade costs requires aggregating the gravity-based estimates of bilateral sectoral trade costs (d_{ni}^j) across trading partners and sectors. Our baseline aggregation choices are guided by the objective of assessing the height of trade barriers erected to favor countries' prime exports and imports. Since those are inevitably ad hoc choices, here we consider three alternative weighting schemes; the first two are for aggregating across trading partners (see columns (3) and (4) in Table IV), and the third is for aggregating across sectors (column (5)).

We first try using contemporaneous nominal trade shares as weights to aggregate across trading

[16] We also try including a bilateral measure of temporary trade barriers, as described in Section 2.2. We find that this variable has little explanatory power, which is not surprising in light of the small share of trade flows affected by such barriers.

[17] There are two other reasons for excluding bilateral tariffs in our baseline gravity estimations. First, doing so would reduce the sample size because we have no bilateral sectoral tariff data before year 1995. Second, our baseline specification is more flexible in that it does not require that the import demand elasticity of tariffs be the same across importer–exporter pairs.

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: In this table's upper panel, the results reported in columns (1), (2), and (6) are only for 1995–2009 owing to the lack of bilateral sectoral tariff data prior to 1995.

$*p < 0.1$, $**p < 0.05$, $***p < 0.01$

partners. The regression results, which are given in column (2) of Table IV, establish that DXC and DMC have smaller effects (in absolute value) on current account balances. Next, column (3) reports the CA regression results using nominal GDP to aggregate across trading partners. This alternative weighting scheme leads to trade costs having a greater impact on the CA: the coefficient is -0.085, as compared with the -0.05 coefficient in our baseline regression with lagged trade shares. In accord with the baseline findings, aggregation schemes that do not depend on actual trade flows—whether contemporaneous or lagged—usually indicate larger CA effects.

As a third alternative, in column (5 we build on Section 2.1's 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 (cf. our baseline exercises):

$$DMC_i = \sum_j DM_i^j \times C_i^j$$

On the export side, however, aggregating DX_i^j across sectors proceeds as follows:

$$DXC_i = \sum_j DX_i^j \times \frac{\sum_n X_n^j}{\sum_j \sum_n X_n^j};$$

here the sector weights are given by each sector's share in total world production (i.e., regardless of the country under consideration). Using this alternative weighting scheme yields the coefficient estimates reported in column (5) of Table IV, which are slightly larger (in absolute value) for costs to export—even as costs to import remain statistically insignificant.

"Effective" Tariffs. Our next extension computes "effective tariffs". In other words, it replaces d_{ni}^j with bilateral tariff data for manufacturing and agriculture and then aggregates the same way (as in our baseline case) to construct DX_i^j, DM_i^j, DXC_i^j and DMC_i^j. We test this approach in response to previous research that examines the impact of tariffs—and not total trade costs—on trade and CA balances. Yet there are two drawbacks to this approach. First, it ignores the services sector, where barriers are not in the form of tariffs. Second, tariffs constitute only a small fraction of total trade costs throughout our sample. According to our estimations, an average country in the sample had an aggregate effective export cost of about 88 percent in 2014 while facing an effective tariff of only 4.7 percent. The effective tariffs were somewhat higher in 1995, at 6 percent, but were still fairly small relative to the effective export costs (estimated to be 89 percent in that year).

Column (6) of Table IV shows that the results of this extension are qualitatively similar to those of our baseline regressions, although here the effective tariffs have quantitatively larger effects. Estimated coefficients suggest that if the export tariffs faced by an average country in 2014 were *eliminated* in both manufacturing and agriculture, then the country's CA balance would improve by 0.8 percent of GDP. As before, the implication is that trade policies have a limited effect on the current account.

Lower Elasticity of Trade with Respect to Trade Costs. In our final experiment, we set the value of θ to 4 for all three sectors and thereby assume a lower elasticity of trade to trade costs than in the baseline estimations. Many papers use Eaton and Kortum's (2002) estimated elasticity of $\theta = 8.28$, as in our own baseline setup; yet this particular robust check is motivated by more recent work (e.g., Caliendo and Parro 2015), which uses tariff data to estimate aggregate elasticities and reports values of about 4. That lower value of elasticity translates into higher trade cost estimates, and column (7) in Table IV accordingly shows that the estimated CA effects are smaller than under the baseline scenario. However, these effects are not detectable in the WIOD sample.

4 Deconstructing the Importer-Specific Component of Barriers

This section examines the relationship between the estimated latent factor ($im_n^j = m_n^j - k_n^j$) and some observed country characteristics that can potentially affect the estimated import barriers. In doing so, it does not intend to explain the determinants of cross-country or within-country cross-time differences in importer-specific barriers: quantifying the exact contribution of each individual factor is difficult due to data limitations, the substantial correlations between some of the independent variables (e.g., GDP per capita and the real exchange rate) as well as potential endogeneity problems.

To gain some insights into what im_n^j may capture, we aggregate both sides of Equation (5) over all countries exporting to country n and obtain the following expression:

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

where $s_{nn}^j = \ln X_{nn}^j - \frac{1}{N}\sum_i \ln X_{ni}^j$ captures country n's expenditure on domestically produced goods relative to its expenditure on an average country's products, $\bar{d}_n^{sj} = \frac{1}{N}\sum_i \ln d_{ni}^{sj}$ represents the average importing costs arising from the symmetric gravity-related costs (denoted by d_{ni}^{sj}) such as distance, language, border effects, etc. Equation 21 then implies that any factor responsible for increasing a country's relative expenditures on domestically produced goods, beyond what can be explained by the observed import costs and domestic productivity adjusted for input costs ($\ln T_n^j (c_n^j)^{-\theta}$), would be included in im_n^j. In this sense, although the EK model is designed to capture the supply-side explanations of trade flows, heterogeneous preferences across countries—whereby some countries exhibit more home bias and thus have a higher share of home sales—would also be reflected in a higher im_n^j. To the extent that this home bias is relatively stable over time, it would be controlled for in the specifications with country-fixed effects.

There may be many factors responsible for affecting a country's expenditure patterns across countries beyond what can be explained by the input cost adjusted productivities, some of which can impact export capability (k_i^j) and import competitiveness (m_i^j) at the same time. For example, some forms of state support could lower the cost of domestic intermediate goods; similarly, a depreciated currency could lower the cost of foreign intermediate goods. If these effects on export capability and import competitiveness are of the same magnitude, then neither state support nor an undervalued currency should affect the estimated im_i^j. Yet, if either effect has a greater impact on import competitiveness than on export capability, they would have a positive contribution to the estimated im_n^j; conversely, if the effects on export capability were stronger then the result would be a decrease in the estimated im_n^j. This section thus explores the empirical association between estimated im_n^j and these various factors.

Table V presents coefficient estimates obtained by regressing $im_{n,t}$ in manufacturing on country-year–specific (and country-sector-year–specific) observations. Columns (1)–(4) of the table report on pooled panel regressions, while columns (5)–(8) report on regressions with country fixed effects. The pooled regressions suggest that our gravity-based importer-specific barriers are significantly and positively correlated with MFN tariffs—but that they exhibit no significant relationship with tariffs when we also control for per capita GDP, which might proxy for a host of factors including the quality of institutions. Richer countries typically have lower tariffs, and the strong negative correlation (-0.7) between per capita GDP and tariffs may explain this change in the coefficient estimate for tariffs. As expected, countries with higher-quality institutions and higher road density have lower import barriers. It is interesting that PPP-based REER and $im_{n,t}$ have a statistically significant negative association, which suggests that an undervalued currency improves import competitiveness more than it does export capability. However, REER results at the cross-sectional level should be interpreted with caution in view of the documented measurement errors in ICP data and potential endogeneity problems.

The estimation results of regressions country fixed effects are reported in columns (5)-(8) of Table V. These specifications control for time-invariant, country-specific factors (e.g., the extent of home bias) and focus on within-country variations. We find that tariffs and per capita GDP continue to play significant roles in accounting for within-country variation in import barriers. In fact, MFN tariffs are a more robust predictor of the variation of $im_{n,t}$ over time as it continues to be statistically significant even in the most saturated specification reported in column (8).[18]

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

Table V: Determinants of Importer-Specific Trade Barriers—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

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table VI: Determinants of Importer-Specific Trade Barriers—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

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Next, in Table VI we report on how import barriers in agriculture are related to the same set of covariates listed in Table V as well as to an additional factor—state support—for which data is unavailable in other sectors. For most specifications, MFN tariffs in agriculture contribute significantly to the estimated $im_{n,t}$ even when we control for GDP per capita; in fact, MFN tariffs are a more robust predictor of import barriers in agriculture than in manufacturing. Column (2) of the table shows that state agricultural support, although often associated with export subsidies, impedes imports more than it promotes exports. This conclusion follows from the positive and high statistical significant estimated coefficients for agriculture support, across all specifications. This variable also substantially improves the R^2 value in both the pooled and fixed-effects regressions.

Finally, we conduct similar analyses for the services sector. Because this sector does not face tariff barriers, we focus our attention on the OECD's Services Trade Restrictiveness Index to develop a sense of the policy barriers associated with international trade in this sector.[19] In terms of time coverage, 2014 is the only year of overlap between our data set and the OECD's STRI; hence the scope for regression analysis is rather limited. Even so, exploratory regressions (not tabulated here) reveal a positive and statistically significant association between our estimated nondiscriminatory trade barriers in services and the simple average of STRI across 22 services subsectors—although the coefficient becomes statistically insignificant if either infrastructure or per capita GDP is controlled for in the regression.[20]

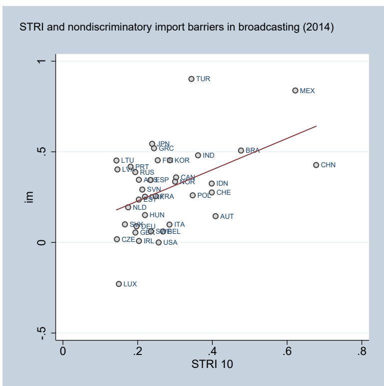
Because STRIs are indices and not tariff equivalents, using simple averages to aggregate across the OECD's 22 services subsectors can lead to especially noisy indicators. We therefore focus on the subsectors for which the OECD and WIOD descriptions are similar, an approach that requires rerunning the 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; that value increases to 0.5–0.8 for subsectors—such as telecommunications, broadcasting, retail and financial services—that feature a more extensive overlap between the WIOD and OECD data sets. The relationship between STRI and estimated import barriers for those subsectors is plotted in Figure VI.

In principle, both exporter- and importer-specific factors could be driving bilateral trade costs. However, the evidence presented in this section suggests that the estimated latent factor, χ_n^j, tends to be significantly associated only with observed importer-specific barriers—for instance, MFN tariffs, services trade restrictiveness, and the quality of institutions. Even state support in agriculture, which is widely viewed as an export distortion, seems to have a more significant effect on importers (by enhancing their import competitiveness) than on exporters and thus, serving more

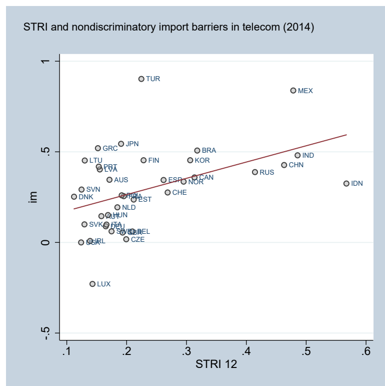
[19] Some of the measures underlying the OECDs indices apply to both domestic and foreign firms. Such across-the board barriers could worsen a countrys comparative advantage through their adverse impact on productivity of domestic firms and may not necessarily translate into higher trade costs to import. They would, however, constitute nondiscriminatory trade barriers to the extent that they affect foreign firms disproportionally more.

[20] To be consistent with the construction of estimated nondiscriminatory trade barriers, this analysis uses each country's average STRI relative to that of the US.

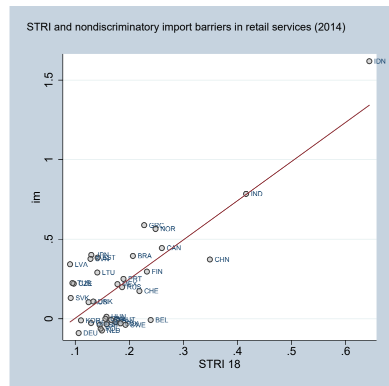
Figure VI: Services Trade Restrictiveness Index and Estimated Nondiscriminatory Import Barriers



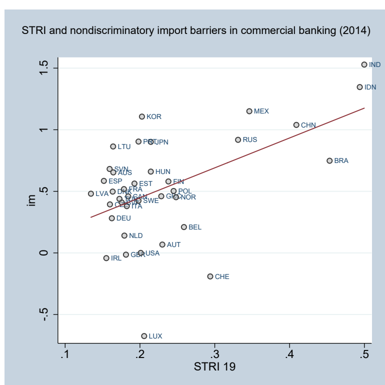
(a)



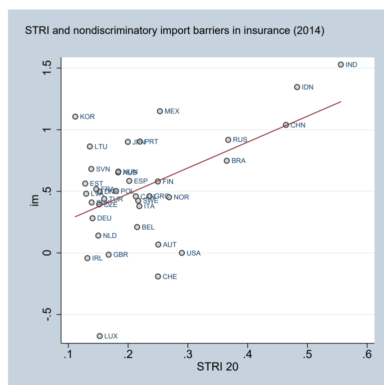
(b)



(c)



(d)



(e)

Sources: WIOD and OECD Services Trade Restrictiveness Index.

Notes: The figure plots the STRI against gravity-implied nondiscriminatory import barriers, im, both relative to the US, for select subsectors in services for 2014.

as an import barrier than an export subsidy.

5 Conclusions

In this paper we assessed the effect of trade policies on external balances by adopting an approach that exploits differences in sectoral specialization and trade costs. To do so, we used (for the most part) data on bilateral trade flows to infer trade costs and sectoral comparative advantage for a globally representative set of countries over varying time periods. We also proposed an *effective trade cost* measure that weights trade costs by comparative advantage, thereby more accurately capturing costs that pertain to sectors in which countries may have a greater underlying potential to export and import. We found a modestly robust link between effective trade costs and current account outcomes. Thus, countries facing higher effective costs to export tend to have only somewhat lower CA balances, which implies that the overall contribution of trade costs to global imbalances has been small. These results are consistent with previous theoretical predictions suggesting limited effects of trade costs on current account balances.

One limitation of this approach is that our estimates could be biased by the potential for causality to instead run from the CA to effective trade costs. Dekle, Eaton, and Kortum (2008) point out that movements in the current account can have general equilibrium effects on sectoral prices and wages, which in turn can have implications for comparative advantage. In the Eaton and Kortum (2002) framework that we adopt, such effects would be eliminated from our comparative advantage measure via the normalization by the country average of absolute advantage (à la Hanson et al. 2018). However, this normalization would remove price and wage effects to the extent that they are common across sectors.

Appendix: 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 the definitions and sources of the variables used (they can also be downloaded from 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%): The preceding variable interacted with a dummy that takes the value of 1 when a country's NFA-to-GDP ratio is less than –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 United States, Japan, and Germany.

L.Relative output per worker * K openness: The preceding 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 a percentage of GDP; this factor enters the regression only when the balance is positive. The balance is interacted with a measure of temporariness, which is calculated as the ratio of current extraction to proven reserves (i.e., the inverse of "years until exhaustion") scaled by the same ratio applicable to Norway in 2010. Higher values of the temporariness term indicate that the resource is expected to be exhausted sooner. Data sources: the IMF's World Economic Outlook database, the World Bank, and the BP Statistical Review of World Energy.

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

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

L.demeaned VIX * K openness: Chicago Board Options Exchange Volatility Index (from Haver Analysis database) interacted with the capital account openness described previously.

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

L.demeaned VIX * K openness * share in world reserves: Interaction between the preceding two variables.

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

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

Institutional/political environment (ICRG-12): Indicator used to gauge institutional and political risk based on factors that include socioeconomic conditions, investment profile, corruption, religious tensions, democratic accountability, government stability, law and order, and bureaucratic quality (from the PRS Group's International Country Risk Guide).

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

Cyclically adjusted fiscal balance, instrumented: The instrument is generated using a first-stage regression that incorporates the lagged and cyclically adjusted global fiscal balance, a time trend, lagged world GDP growth, lagged domestic and world output gaps, US corporate credit spreads, exchange rate regimes, 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 US dollars. The first-stage regression includes M2/GDP, US interest rates, and global reserve accumulation with country-specific slopes in order to account for various reserve accumulation motives. Sources: IMF's World Economic Outlook, Lane and Milesi-Ferretti (2018), and IMF's Data Template on International Reserves and Foreign Currency Liquidity.

Dependency ratio: Old-age dependency ratio (ages 65+/ages 30–64), from UN World Population Prospects.

Population growth: From UN World Population Prospects.

Prime savers share: Share of prime savers (ages 45–64) as a proportion of the total working-age population (ages 30–64), 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 dep. ratio: Interaction between future old age dependency ratio (computed as a moving average of the ratio 15-25 years forward) and life expectancy at prime age (as defined previously).

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