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EXCHANGE RATES, INTERNATIONAL TRADE AND GROWTH: RE-EVALUATION OF UNDERVALUATION

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Exchange Rates, International Trade and Growth: Re-Evaluation of Undervaluation*

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Abstract

This paper shows that a regional bias resulting from trade integration alters the transmission of a country's monetary policy by shifting the burden of the exchange rate adjustment towards the less integrated trading partners. I first develop a simple model which illustrates how a concentration of trade flows among regional trading partners affects the sensitivity of the trade balance to the terms-of-trade. In particular, the trade balance becomes less sensitive to the terms-of-trade vis-à-vis regional partners and more sensitive to the terms-of-trade vis-à-vis the other country. I then test the implication of the model using a panel of 133 countries between 1985 - 2010 that includes information on Regional Trade Agreements (RTA). I find that movements in the terms-of-trade vis-à-vis non-RTA members affect a country's trade balance, while movements vis-à-vis RTA partners do not.

Keywords: trade balance, regional trade agreements, competitive depreciation, economic integration, terms-of-trade
JEL classification: F10, F13, F14, F15, F40, F41, F45

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1 Introduction

The idea that a competitive real exchange rate[1] fosters economic growth has received a lot of attention both in academic and policy circles. In particular, it has gained increasing interest recently with respect to the currency movements of the biggest economies and a seeming disconnect with developing countries, and with the mixed evidence on its impact on trade.

This paper contributes to the discussion by combining the question of favorable effect of competitive exchange rate – the change in terms of trade – with the trade linkages and integration of countries through regional trade agreements (RTAs). Specifically, I build a flexible price model that shows that higher regionalism is associated with shift in the exchange rate adjustment to the less integrated trading partners. The exploited channel is the decreasing sensitivity of the trade balance to the movements in the terms-of-trade with the more integrated trading partners, and increasing sensitivity to the terms-of-trade with the less integrated ones. Taking this observation to the empirical data and utilizing the information on regional integration through the regional trade agreements (RTAs), I find that the improvement of the trade balance is indeed channeled from the non-RTA trading partners.

There has been no consensus on the likely effects of exchange rates on trade – and thus on trade balances – with theory usually overstating actual results.[2] The most commonly cited fact for the disconnect is the expansion of the global production networks (Ahmed *et al.* , 2015). The question of this paper is akin to one of the latest World Economic Outlook reports (IMF, 2015) that has also been concerned with the disconnect between exchange rates and trade, and the role of global value chains in this disconnect. The report's findings repealed the complete disconnect between the exchange rate and trade, while establishing some evidence of the distortive role of global production networks. This paper differs from the report in several dimensions: first, the question asked is not whether the exchange rate elasticity exists at all, but rather who is the source of this elasticity; second, instead of looking into the measures of the global value chains, I bring into the discussion the legal dimension of the regional trade agreements (RTAs), which makes the discussion more tractable; finally, the scope is not only the advanced and emerging countries, but a larger sample of 133 countries.[3]

The literature formulated negative relationship between the contemporaneous terms-of-trade

[1] Here and throughout this paper exchange rate is defined as the units of domestic currency needed to acquire a unit of foreign currency. Competitive exchange rate is defined as exchange rate that allows for beggar thy neighbor monetary policy by means of currency devaluations.

[2] See, for example, the argument Krugman (2015) on forecasting large adjustments and Huchet-Bourdon & Korinek (2011); Haddad & Pancaro (2010) analysis that show that the evidence is, at best, highly scarce and not convincing. An example of the match between the exchange rate change and trade balance is the Japanese-US after Plaza Accord adjustment.

[3] All countries having an RTA as according to the threshold used in this paper – a Free Trade Agreement (FTA) or more integrative.

increase and the net trade balance (Backus *et al.* , 1994), implying that the more expensive are the imports in terms of exports, the greater will be the trade balance. Further investigations delivered a variety of estimates, highlighting that this relation depends on other factors[4] and in much extent on the degree of trade liberalization (Ostry & Rose, 1992). The latter has become more sound since the entering of GATT into force and the decline of the overall import protectionism through tariffs.

The effect of trade liberalization on trade balances across the world is heterogeneous: while the positive effect has traditionally been found discussed (Gourinchas & Rey, 2014), for developing countries the evidence is usually negative (Santos-Paulino & Thirlwall, 2004), mixed (Wu & Zeng, 2008) or insignificant (Ostry & Rose, 1992). This asymmetry in effect of trade liberalization on the trade balance is due to the use of different data sets, time spans, theoretical models, estimation techniques, measures and sample selection. In their cross-country analysis almost all of the previous empirical studies assumed a homogenous effect of trade liberalization, overlooking the existence of deeper trade integration. This paper incorporates regional trade integration to explain the heterogeneous effect of trade liberalization on the trade balance.

This is not the first time the effects of exchange rates are discussed in the context of RTAs – the common fear of the "beggar-thy-neighbor" policies motivated a number of studies, especially on Latin American countries (Fernandez-Arias *et al.* , 2002). So far most of the studies have either concerned themselves with the bilateral trade or bilateral exchange rate effects, or looked at the aggregate effects on growth of the economy. In contrast to such studies I incorporate the fact that the effect of the exchange rate depreciation (or appreciation) in the globalized world is not bilateral, and – while it has an effect on the bilateral trade flows – it is transmitted along the trading partners asymmetrically. Using RTAs can be an efficient proxy when looking at the aggregate reaction between trading partners. It is so due to the fact that the agreements that are signed provide better – and more efficient – economic and legal environment between the trading partners, while letting the participating countries reveal their comparative advantage more and engage into more global supply chain activities. This fact – that RTAs address issues that go beyond the fixed and variable costs of trade[5] – enhances and deepens the economic ties between participating countries.

As a multitude of models and empirical investigations show, preferential terms within an RTA result in increased trade flows between countries that enter the RTA relationship. Preferential

[4]Among other parameters influencing the estimates could be the listed level of aggregation from industry to aggregate parameter (Imbs & Mejean, 2015), the source of productivity shocks Corsetti *et al.* (2005), financial opennessRazin *et al.* (2002) or capital goods trade intensity (Cashin & Kent, 2003).

[5]One could think of the existence of an RTA (or a deeper RTA) between the countries as a better guarantee of the property rights and better (and longer lasting) firm-level relationships.

treatment of goods produced in other RTA members' economies indicates their greater preference share in the consumption basket. This paper incorporates this regional bias[6] into the standard multi-country model of external adjustment (Obstfeld & Rogoff, 2005). This regional bias lessens the elasticity of trade balance to terms-of-trade vis-à-vis other RTA trading partners, while intensifying the elasticity to terms-of-trade of other countries. Notably, this result is achieved even with homogeneous elasticity of substitution between goods produced in different countries and only final good production.

As mentioned before, some of the literature has discussed the role of the vertical trade and global value chains (GVCs) in changing trade balance elasticities,(Kose & Yi, 2001; Ahmed *et al.* , 2015) but as the most recent studies show it cannot account for the full spectrum of different findings.IMF (2015) The influence of vertical trade is in line with the more aggregate approach adopted in this paper. Vertical trade and GVC activity are more likely within RTAs, which create stronger production links within RTAs[7] and neutralize the terms-of-trade within RTAs.[8] By adding regional bias into the consumption basket in the model of external adjustment, this paper captures such developments within RTAs.

It should be noted that it has been widely recognized that RTAs are heterogeneous, and not all of them result in the same level of trade integration and regionalisation (Baier *et al.* , 2015). The structure of the developed model accounts for that by adding the within-region home bias. Following the gravity trade literature, the less efficient an RTA is, the lower the increase in bilateral trade is. This means the lower is the domestic country's preference for the goods produced by the other RTA members, and the lower will be the reduction of elasticity vis-à-vis RTA trading partners and increase vis-à-vis non-RTA trading partners.

In the traditional macroeconomic literature, the effects of competitive depreciations on terms-of-trade have been usually studied in sticky price model settings with the particular assumptions on the type of currency pricing used (Betts & Devereux, 1999). The model presented in this paper considers a flexible price setting in order to assess the sensitivity of the trade balance to movements in the terms-of-trade. The flexible price assumption allows to track the effect of depreciations without regarding currency pricing, which can be a subject to further extensions. Greater sensitivity to particular terms-of-trade indicates the source of the welfare gain from a

[6]According to the standard trade theory, increase in bilateral trade flows between RTA members compared to the outside can be seen as a higher preference for RTA produced goods as compared to the outside of RTA produced goods.

[7]The evidence could be taken from the cases of EU (di Mauro *et al.* , 2016) and Latin American countries (Blyde *et al.* , 2014). For more detailed discussion see the companion paper "Trade Re(Im)Balanced: The Role of Regional Trade Agreements."

[8]This refers to the effect first discussed by Staiger & Bagwell (1999): by forming RTAs countries "locks out" other countries that are not participating in regional integration, making it harder for them to enter while increasing the overall competitiveness (market price lowers with RTA). More detailed discussion is available in the companion paper.

competitive depreciation.

The empirical results of this paper suggest that the burden of external adjustment of 135 economies between 1985 and 2010 was mostly on non-RTA trading partners. Utilizing various measures of the trade balance, I estimate that a 10% depreciation versus non-RTA trading partners resulted on average in 2.5% to 11.8% improvement of trade balance, while a 10% depreciation versus RTA trading partners resulted in a decrease from 0.8% to 5.5% of the trade balance. The result on the positive elasticities of non-RTA trading partners is highly robust across different specifications.

This paper contributes to the literature in several ways. First, I incorporate regionalism into the well-known Obstfeld-Rogoff exchange rate adjustment model (Obstfeld & Rogoff, 2005) and show that the existence of regional bias shifts the burden of the exchange rate adjustment to the less integrated trading partners. Based on the existent evidence, having heterogeneous preferences to RTA and non-RTA trading partners is a plausible assumption. Second, I take this observation to data on trade balance elasticities and find support in the large sample of 133 countries since 1985. Third, the empirical investigation shows that RTA integration is an important proxy for monetary policy shock transmission. Altogether, this paper offers a useful tool for the analysis of the heterogeneous exchange rate adjustment for the purpose of forecasting, as an RTA relationship is a relatively simple indicator to account for.

The next section 2 provides the review of the relationships between trade balances, exchange rates and regional trade agreements. Section 3 introduces the theoretical model that incorporates regionalism into an intratemporal external adjustment model. Section 4 describes the empirical strategy and 5 presents the results. Section 6 concludes the discussion.

2 Background

In this section, to give motivation for the model and the subsequent estimations, I provide a brief background on the importance and developments of trade balances and price elasticities (as measured by the exchange rate changes), and the current developments in the Regional Trade Agreements (RTAs).

2.1 Economic Growth and Trade Balances

In the recent era of trade liberalization, the positive trade balance of a country has usually been a sign of a growing and improving economy. Rodriguez & Rodrik (2001) have found a disconnect in such thinking, and later economists started worrying about the economies that are running persistent positive or negative trade balances, since in some cases this may provoke economic

crises if countries cannot finance them (Obstfeld & Rogoff, 2009).

Trade balance is a part of a country's GDP and an important indicator of the economic state in the country. While the positive values have – till recently – rarely been a concern to the local governments, the negative values have been seen as a threat to the economic growth. Since changing the total factor productivity or revealing the comparative advantage in the economy is obviously a complex task, and does not lie directly in the hands of the government, the historical problem has been a threat of artificial manipulation of the exchange rate – and thus the prices of exports – in order to improve the value of the trade balance.

The traditional open economy interpretation of the exchange rates is that a depreciation of the real effective exchange rate makes exports relatively cheaper, while making imports relatively more expensive (as compared to the selected set of countries). This boosts the net exports and therefore improves the income in the economy. Therefore, the talk about "currency wars" has traditionally had at heart the concern about the trade balance and economic growth.

In this paper, I argue that in the world of complex trade and production links, the connection between the trade balance and such manipulation has to be rethought. While trade balances are still a concern for governments, this concern actually is the trade balances with the non-integrated trading partners – the partners that I proxy as not having an RTA in place. As Figure 4 illustrates, the trade balances within the RTA relationship are much lower, while the deepest RTAs are associated with the lowest imbalances.[9] Within RTAs countries are linked more through their trade networks,[10] and their trade balance adjustment will be different as compared to the non-RTA trade balance adjustment. More precisely, a depreciation against an RTA partner will enhance the exports to the RTA trading partner, but will also increase the price that has to be paid for imports and thus there will be a lower trade balance improvement, making it less elastic to price changes. To make this example illustrative, one can imagine a country producing one good, for example pillows, – having an RTA with a neighbor to import an intermediate input – cotton. Upon depreciation, the pillows will become relatively cheaper to all countries in the world, and thus the trade balance of the country will adjust, but to a lesser extent with the RTA trading partner, as there will be more intermediate input needed since cotton will have to be imported at higher prices.

Taking this argument to the level of the whole economy, I show in this paper both theoretically and empirically that with the existence of the regional bias the trade balance improvement will be

[9]Full investigation is available in the companion paper "Trade Re(Im)Balanced: The Role of Regional Trade Agreements".

[10]In my definition, trade networks relate to the fact that some countries drop or decrease production of some goods – final or intermediate – as they can import them from their RTA partners at a cheaper price.

done mostly on the expense of less integrated trading partners (as compared to the RTA-bounded trading partners).

This paper's concern about trade balances is twofold: first, to link the trade integration to the exchange rate adjustment process; and second, to show that the legal interrelation between the countries in trade – having an RTA in place – can act as a proxy for a more accurate trade balance assessment. Thus, I continue with the discussion of the price elasticities in trade and summarize the key recent literature on the RTAs next.

2.2 Exchange Rates

The concern about the exchange rate is that it can be overvalued or undervalued – thus, it is not reflecting the actual state[11] of the host economy. This then favors (harms) the exchange terms with other economies through benefitting (harming) a country's trade. Since the era of the Bretton-Woods system and the shift to the system of floating exchange rates, this started potentially posing an even greater threat. However, there is an opposing point of view on the relevance and extent of the possibility of exchange rate manipulation. One line of argument is that the real and nominal exchange rates can be disconnected from other macroeconomic fundamentals. and thus the exchange rate depreciation may not have the desired impact[12] The other line of argument refers to the expansion of world integration and breakdown of goods (and services) production which made the reactions more heterogeneous and not as beneficial to the host economy.[13]

The majority of the papers studying the exchange rate elasticities have been looking at the bilateral exchange rate of some currency to the USD.[14] The nature of the exchange rate is bilateral – it is the price of one currency in terms of another. Yet, since virtually all currencies can be traded against one another, the effect of the change in the exchange rate cannot be isolated to a bilateral relationship. Thus, I take a less common[15] – albeit more suitable for the purpose of the paper – approach of looking at the effective exchange rates. This allows the derived elasticities to capture the composition of trade flows and the multi-country nature of RTAs.

The model in this paper introduces the new regional preference in the process of the exchange rate adjustment as described in the Obstfeld & Rogoff (2005) model. This regional preference creates a new type of "transfer effect" [16] on the terms of trade – the "regional transfer effect"

[11] Some literature refers to it as "fundamental state".

[12] See Devereux & Engel (2002) for an example of causes and consequences.

[13] The work of Kose & Yi (2001) highlighted the importance of accounting not only for trade, but also for the type of trade links – meaning the existence of vertical specialization – between the countries in order to explain the transmission of business cycles between the countries.

[14] Di Nino *et al.* (2011); Rodrik (2008); Dollar (1992) are some examples.

[15] This approach in context of RTAs is used only by Fernandez-Arias *et al.* (2002), while as a reference any of the J-curve or Marshall-Lehner effect estimation literature can be used.

[16] According to Obstfeld & Rogoff (2005): the "transfer effect" refers to the fact that deterioration of a country

which creates in my model heterogeneous adjustment to the same change in a different country's terms of trade. In the presence of higher preference for the regional goods as compared to the non-regional goods, the improvement of the trade balance is associated to a lower extent with the deterioration of the terms of trade with the RTA partner, but more with the non-regional trading partners. Thus, the competitive depreciations are beneficial on the expense of the non-regional trading partners.

In the empirical part of the paper, I build two real effective exchange rate (REER) indices – described in the methodology and in the Appendix II – that indicate the relative price competitiveness of countries to their RTA and non-RTA trading partners, respectively. This allows to test the model on real data, as RTAs indeed are associated with trade integration and higher preferences for the goods produced within RTA.

2.3 Regional Trade Agreements

As Baldwin (2011b, 2012) discuss, the regionalism and global supply chain linkages should be considered together – since the mid-1980s the world has moved from trying to cultivate internal production network in each country to using the cross-border supply links and production abilities. Supply chain trade changes the map and the scope of world trade, while RTAs foster the links and intensity, some are signed on the "deep" provisions – such as intellectual property, service provision, etc. (Baldwin & Lopez-Gonzalez, 2013; De Melo, 2011).

Recent research has confirmed that RTAs affect indeed not only the fixed and variable costs of trade, but also institutional inconsistencies that distort trade Baier *et al.* (2015); Handley & Limão (2015). It is plausible to assume that countries that sign an RTA are more likely to prefer the final and intermediate goods produced by their RTA partners. As discussed by Freund & Ornelas (2010) it has been believed to be one of the main reasons for the emergence of RTAs, while the empirical firm-level investigation of Blyde *et al.* (2014) in Latin American countries shows that signing an integration agreement enhances the production links between the countries within RTAs. The newest research of Blanchard *et al.* (2016) suggests that there is indeed certain political economy in the tariff liberalization in RTAs that is driven by the value-added considerations: a country is more likely to have a lower tariff on the intermediates that are used in the production of the final goods with higher domestic value added.

RTAs seem to offer a valid proxy for trade integration, and also for policy design – every country knows its RTA trading partners, and RTA membership is an active notion not only in academic

A terms of trade, when there is present home bias present in consumer price indices, will create both nominal and real depreciation of the *A*'s currency.

circles, but also in the wider policy institutions and business unions. Even though RTAs have sometimes created short-run instability, the medium- and long-term gains from signing an RTA are undoubted (Baldwin, 2012; Freund & Ornelas, 2010).

Leaving aside the question of selection into the RTAs,[17] this paper asks the question whether the RTA relationship is associated with benefits from "beggar-thy-neighbor" policies or not. The standard and main concern with entering into an RTA is that, while the RTA promotes more stable and transparent trade-related terms, there are - with the exception of the recently signed but not yet enforced Trans-Pacific-Partnership (TPP) – no clauses on the exchange rate supervision or management. Thus, this provides incentives to depreciate the domestic exchange rate in order to boost exports to other RTA-members.

An alternative view that is adopted and tested in this paper states that with the greater integration of economies and higher trade dependency within RTAs (Frankel *et al.* , 1996; Baldwin, 2011a; Frankel & Wei, 1998; Moser & Rose, 2014), the efficiency of depreciations changes. High interdependency can lead to a different effect of depreciation on the trade balance of the depreciating economy. When a competitive depreciation is directed at the RTA partners, the decrease in the relative price of exports may be matched by an increase in relative price of imports from the RTA partners. Since production links are more present between countries that have signed an RTA production links are more present, exporters will see an increase in the price of imported inputs, which will offset the trade balance adjustment.

Another fact that supports the assumption of a trade-integrative effect of RTA is that the trade imbalances are lower between countries that have an RTA in place, as illustrated in the figure 4 below.[18] The visible exception is the Economic Union countries, represented by the Eurozone countries, but this is largely due to the initially low level of imbalances and high level of initial integration. The existence of the Eurozone has implications also for this paper, and is separately discussed further.

Figure 7 presents a comparison of the average real effective exchange rate indices (REER, normalized to 2005) among the RTA and non-RTA members for subsamples of countries by their level of development. While on the aggregate, they appear to be similar, by-country split indicates several traits, such as: a) advanced economies[19] saw average increase in competitiveness towards their non-RTA trading partners, while b) emerging economies were more competitive to their RTA trading partners than non-RTA. Low-income countries appear not to have a consistent pattern,

[17]There may exist self-selection bias into signing an RTA between trading partners with relatively more stable bilateral exchange rates (Frankel & Wei, 1998; Frankel *et al.* , 1996)

[18]This result is discussed at length in the companion paper "Trade Re(Im)Balanced: The Role of Regional Trade Agreements"

[19]I use the IMF definitions of the country groups.

but (including the crisis periods of 1996-1998) most commonly they were more competitive in their RTA trade than in non-RTA trade. But what are the real implications of such behaviors on the trade values of these countries?

The contribution of this paper is the following: first, I theoretically and empirically show that trade balance adjustments happen at the expense of the less integrated trading partners – meaning the trade balance is more price elastic to the less integrated partners; second, RTA-level of integration can be used as a proxy for measuring trade integration for the purpose of the trade balance adjustment. These results imply that RTAs can ensure against the "beggar-thy-neighbor" policies within an RTA.

3 Theoretical Motivation

The main purpose of this paper is to show that supply chain activities that accompany trade integration have a substantive impact on the burden of exchange rate adjustment. In the presence of regionally biased preferences, the adjustments happen at the expense of the non-RTA trading partners – the less integrated trading partners. I show this by investigating the price elasticities of the trade balance, accounting for the presence of the regional bias.

The regional trade model that I develop is an extension of the well-known (Obstfeld & Rogoff, 2005) (henceforth the OR model) three-country endowment model. This model has been a workhorse for assessments of current account adjustments and exchange rate effects in the multi-country setting. My extension to incorporate regionalism into their model provides several insights: in a world where some countries are more integrated than others, the real exchange rate adjustment is asymmetric among trading partners. The key assumption of existence of regional bias is realistic – as described above, the vast literature in international trade has established expansive and integrative effect of RTAs on the participating economies.

I focus solely on the intra-temporal price consequences of trade integration and assume (as Obstfeld & Rogoff (2005)) fully flexible nominal prices in order to highlight the importance of integration on the exchange rate adjustment.

In the empirical part I show that the cut-off for burden of adjustment can indeed be proxied through the type of trade agreements in place. Previewing the results, I show that the real cost of the exchange rate adjustment for a sample of 135 countries between 1985 and 2010 was borne by the trading partners which had no trade agreements in place, or had less integrative forms of trade agreements.[20] Full derivations and steps are in the Appendix, while here I present the key

[20] Full classification of the trade agreements is provided in table 2

assumptions and takeaways.

As the discussion above has highlighted, RTAs have fostered greater and more linked trade between the participating countries – in the cases of the relatively more integrative trade agreements the gains go far beyond the fixed and variable cost gains of trade by expanding the production across borders.

The consumption basket of a country A in the Northern region takes the following form:

$$C_A = \left[\begin{array}{c} \left(\frac{1}{4}(1+\alpha)(1+a)\right)^{\frac{1}{\lambda}} (C_{AA})^{\frac{\lambda-1}{\lambda}} + \left(\frac{1}{4}(1-\alpha)(1+a)\right)^{\frac{1}{\lambda}} (C_{AB})^{\frac{\lambda-1}{\lambda}} \\ + \left(\frac{1}{4}(1-a)\right)^{\frac{1}{\lambda}} (C_{AC})^{\frac{\lambda-1}{\lambda}} + \left(\frac{1}{4}(1-a)\right)^{\frac{1}{\lambda}} (C_{AD})^{\frac{\lambda-1}{\lambda}} \end{array} \right]^{\frac{\lambda}{\lambda-1}} \quad (1)$$

C_{ij} represents the good of country j consumed in country i, a is regional bias and α is domestic bias within the Northern region. Every country produces one single good. The model is based on four countries within two regions – "North" and "South" with countries A and B, and C and D, respectively. The countries can be seen as two integrated regions: A and B in the North have an RTA between them, and likewise for C and D in the South. As I concentrate my analysis on country A, for simplicity the RTA in the South is disregarded, as for A country consumption goods from South will be similar irrespective to the origin from C or D. Therefore, the shares of countries C and D in the consumption basket are the same.

The existence of the positive regional bias $a \in [0; 1]$ that increases the share of RTA goods in the consumption basket of the member countries is supported by findings in the literature as discussed above. First, signing an RTA increases gross trade flows between RTA member countries(); second, there is an increase in the GVC activity between RTA members(); and third, RTAs address issues beyond fixed and variable costs of trade that synchronize the business cycles between RTA members(). All these facts stipulate the higher preferences share for the goods produced within the region in a country's consumption basket. Although the argument can be extended to the intermediate goods trade as the region engages in production networks, the intuition can be captured in the model with final goods only and nested CES preferences in consumption.

In the equations below ρ represents the price level in a given country (country indicated as an index). As is common in the steady-state equations, "hat" sign indicates the deviation from the steady state. Term $(\hat{\rho}_A - \hat{\rho}_B)$ than depicts the change of prices in A relative to the change in prices in B, and represents the terms-of-trade of A versus B (as the good is tradable).

The Appendix I provides all derivation steps and additional information on the role of domes-

tic and regional bias in the model. The main result is that the existence of the regional bias (a) provokes non-symmetric adjustments from the regional and non-regional trading partners. Dropping the α for the presentation purposes, assuming there is no difference between C and D from the standpoint of A and that country sizes are constant in the steady state (full equations in the Appendix I), the trade balance (as the absolute value of net exports) of country A is equal to:

$$\begin{aligned} T\hat{B}_A &= T\hat{B}_{AB} + T\hat{B}_{AC} + T\hat{B}_{AD} \\ &= P_0C_0\left[\frac{1+a}{4}(1-\lambda_C) + \frac{a(1-a)}{4}\lambda\right](\hat{\rho}_A - \hat{\rho}_B) \\ &\quad + \frac{1-a}{4}P_0C_0\left[\ \lambda a(\hat{\rho}_A - \hat{\rho}_B) + 2(1-\lambda_C(1+a))(\hat{\rho}_A - \hat{\rho}_C)\ \right] \end{aligned} \tag{2}$$

The trade balance of country A is composed of the bilateral trade balances to the RTA trading partner (the first term above) and to the non-trading partners (the second term above). Equation 2 indicate that the effect of the price change in A will effect the trade balances of to regional and non-regional trading partners in a different way when the regional bias a is present. The reaction of TB_a to the change in the terms of trade with B, and will be lower the higher is a, and will not depend on the price change in the Southern region. The reaction of the trade balance TB_a will be dependent on the change in terms-of-trade of A to both of the Southern countries ($(\hat{\rho}_A - \hat{\rho}_C)$ and $(\hat{\rho}_A - \hat{\rho}_D)$) and also on the terms-of-trade in the domestic Northern region.

In more general terms, the more a country is integrated with its RTA partners (the higher is a), the less trade with them will react to terms-of-trade changes, while becoming more elastic to the less integrated trading partners. Having same λ (elasticity of substitution) for all trading partners in this context yields different results, as λ is being scaled by the term that includes the regional bias.

Another insight is provided by the inclusion of α (within region preference for goods bias): if countries within the RTA have a bias against the goods produced within the other RTA member, then the effect on the elasticity of trade flows will be lower. This captures the effect that different RTAs may actually be less efficient unless they effectively liberalize trade within the RTA.

To further illustrate the effect, figure 1 provides the estimation of the effect of a on the elasticity of the trade balance to a Southern country. Figure 1 shows the results of the simulation with no α, $\lambda = 2$ and a 10% change in the price of the good produced in country A. In order to measure the *sensitivity* of price elasticity depending on the value of the regional bias, I scale the bilateral trade balance by the size of trade between the partners in the steady state. The price elasticity

of bilateral trade balance to country A thus remains constant (as trade will grow at the constant pace determined by the elasticity of substitution *lambda* between the goods), while the elasticity of the trade balance to the non-regional partner increases.

Figure 1: Sensitivity of the initial elasticities simulation

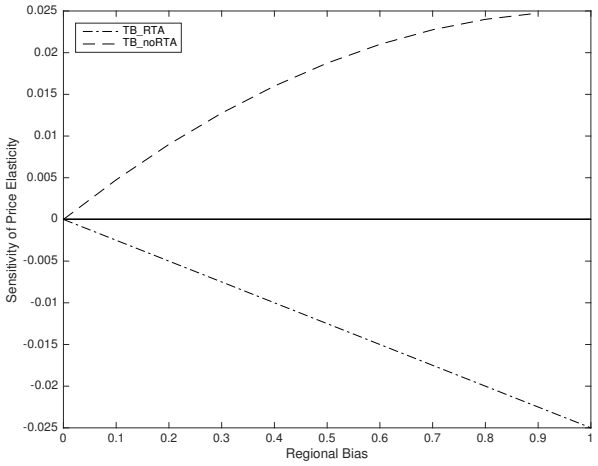

Figure 2: Relation of regional and within region bias

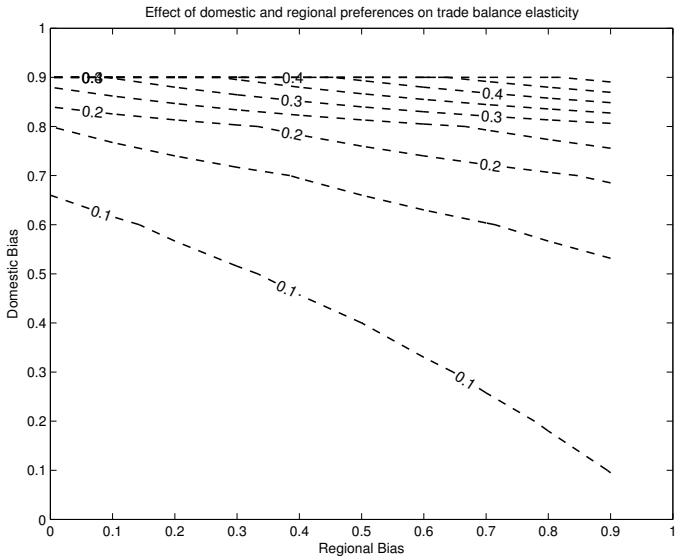

Figure 2 projects the change in the elasticity of trade balance to the non-RTA trading partner C with the combinations of the regional bias a and the within regional domestic bias α. It indicates that the elasticity-increasing effect of the presence of a will be lower when there is a greater α. The more the country A prefers the domestically produced good over the good produced in the RTA partner, the lower will be the effect of the presence of regional bias a on the elasticity of trade flows to the outside of the RTA. This implies that unless RTA is efficient – meaning it decreases the

trade costs and liberalizes trade within the RTA – the change of the elasticity will be lower. Long-term price elasticities of trade balance that are the main consideration of this paper, and they can be treated as the steady-state reactions to the price level changes (change in the terms-of-trade) versus RTA and no-RTA partners. Therefore the reduced form empirical specification (holding the same assumptions) relies on the accompanying form of trade balance adjustment (derivation and fuller version with α in the Appendix I):

$$\begin{aligned} \hat{TB}_{A,1} &= \frac{\hat{TB}_{AB} + \hat{TB}_{AC} + \hat{TB}_{AD}}{X_{A,0} + M_{A,0}} \\ &= \left(\frac{2}{3-a}\right)\left[\left(\Phi - \lambda\left[\Phi\left(1+\frac{a}{2}\right) - \frac{a}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_B) + (1-\Phi)(1-\lambda[1+a])(\hat{\rho}_A - \hat{\rho}_C)\right] \end{aligned} \tag{3}$$

where Φ is the share of trade between A and B in A's total trade:

$$\Phi = \frac{1+a}{3-a}$$

Equation 3 provides the equation for the main measure of the trade balance used in the estimations – the net exports over the total trade of the country. The full analysis includes alternative measures of the trade balance, such as total exports to imports and net exports over GDP:

$$\begin{aligned} \hat{TB}_{A,2} &= \frac{\hat{X}_{AB}}{\hat{M}_{AB}} \\ &= \lambda\left(s_0(\hat{\rho_A} - \hat{\rho_B}) - (1-s_0)((\hat{\rho_A} - \hat{\rho_C}) + (\hat{\rho_A} - \hat{\rho_D})\right) \end{aligned} \tag{4}$$

where:

$$s_0 = \frac{(1-\alpha)(1+a)}{(1-\alpha)(1+a) + 2(1-a)}$$

$$\begin{aligned} \hat{TB}_{A,3} &= \frac{\hat{TB}_{AB} + \hat{TB}_{AC} + \hat{TB}_{AD}}{P_0 C_0} \\ &= \left(\Phi - \lambda\left[\Phi\left(1+\frac{a}{2}\right) - \frac{a}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_B) + (1-\Phi)(1-\lambda[1+a])(\hat{\rho}_A - \hat{\rho}_C) \end{aligned} \tag{5}$$

All the three measures 3 - 5 (full derivations with α and country sizes in the Appendix I) indicate that with the presence of regional bias there are different price elasticities of the trade balance. I also run separate regressions on imports and exports as to further persuade the reader that the trade between the RTA partners indeed is less sensitive to price changes. In the empirics,

I use the effective exchange rate indices constructed to RTA and no-RTA trading partners as the measures of prices to the RTA and non-RTA trading partners.

4 Empirical Estimation

4.1 Data

As the main data source I use the Direction of Trade bilateral trade statistics and International Financial Statistics of the International Monetary Fund database.

I aggregate the monthly exchange rates to the yearly average and use CPI yearly values to calculate the real exchange rate between countries.

The DOTS data covers the time period between 1960 and 2009, with a maximum of 134 countries. As RTA-s became a relatively widespread occurrence only in the last couple of decades, to make the assessment full, I only use the time period between 1985 and 2010.[21] Data on GDP and on classification of countries by income is from the World Development database. The data on the contingency is taken from the gravity dataset provided by CEPII.

RTA data comes from publicly available Bergstrand dataset. The classifications of the agreements, list of countries and agreements in the original dataset are provided in tables 2, and 11 and 10 in the Appendix III.

When looking at the Eurozone countries after the introduction of the Euro, I use the conversion rates set by the ECB to convert the Euro rate and use it for uninterrupted time series of the exchange rates.

4.2 REERs

To find empirical evidence of my adaptation of the OR model, I need to estimate the trade balance elasticity vis-à-vis integrated and non-integrated trading partners of each country. As the discussion above states, RTAs provide the conditions for the greater trade and production integration between the participating countries. Thus, RTAs can be used as a proxy for trade integration. I do not look at the GSP concessions and bilateral preferential trade agreements, as they have less bounding nature and/or do not have a statutory two-way duties or concessions.[22] In the sample separation of the REER indices (discussed below) for the selection into the RTA-integrated partners I use the following types of agreements: Free Trade Agreements (FTAs), Custom Unions (CUs), Common

[21] That allows me to capture the integration after the Soviet Union collapse and insures the quality and comparability of the data.

[22] I use the RTA classification of Bergstrand dataset as provided in table 2. It should be noted that results including the PTAs hold, but less robustly.

Markets (CMs), and Economic Unions (EUNs).

I am interested in estimating the effect of the more competitive exchange rate vis-à-vis certain group of trading partners: according to the model and the main equations 3, there are two types of trading partners – integrated in the North and not integrated in the South. Using the real effective exchange rate allows me to combine all RTA-partners into one price index (the *North* trading country B in the model) and all non-RTA trading partners into the other price index (the *South* trading partners C and D).

Another advantage, apart from the ability of selecting a certain subgroup of countries, is that REER is comparable between countries and years.[23]

Therefore, for any given country i in year t that has an RTA signed with the subset J_1 of its trading partners, I calculate the following measures:

$$REER_{i,t}^{RTA} = \prod^{j \in J_1} (brer_{i,j})^{\omega_j}$$

$$REER_{i,t}^{noRTA} = \prod^{j \in J_2} (brer_{i,j})^{\omega_j}$$

As discussed above, I use RTA[24] as a proxy for the integrated subsample J_1 and the non-integrated subsample J_2.

For the main specification, I calculate the yearly-weighted trade weights ω_j, which sum to unity over the subset. I also conduct a robustness check with a five year chain averages for the REER calculation. In order to benefit from the data and have the largest country coverage, I do not limit to a subset of countries but take into account all existent trading partners in every year (as reported by DoTS trade flows). By doing so I aim to expand the country coverage from the conventional centralization on developed countries.

I calculate CPI-based REERs. The use of CPI-based REER is necessitated by the availability of data, though I recognise that the use of the GDP-deflator would be more reputable. All REERs for all countries are indexed to 2005 for estimation and comparison ease purposes.[25] The increase in the given REER indicates that the domestic country is becoming more competitive relative to the subsample of trading partners. Similarly, the decrease in REER is associated with appreciation of the currency relative to the subset of trading partners.

As I am working in a panel setup, I estimate within-country time-variance controlling for all time-variant non-country specific shocks.

[23] The full process and data used in the construction REERs is presented in the Appendix II.

[24] From here on by referring to RTAs I imply the types of RTAs described in the previous subsection and as acording to the table 2.

[25] Indexing to 2000 does not change the general findings, but decreases the sample size as I lose countries that did not have an RTA in effect at that date.

4.3 Empirical Specification

The main highlight of adding regionalism to the OR model is the adjustment mechanism summarised in the evolution of the trade balance in the equations 3-5. To test the validity of the model on real data, I examine the price elasticity of the total trade balance of a country to the price changes (as measured by the real effective exchange rate) vis-à-vis RTA and non-RTA trading partners. The following reduced-form specification is used:

$$TB_{it} = \gamma_0 + \gamma_1 ln(REER^{RTA}) + \gamma_2 ln(REER^{noRTA}) + \gamma_3 TB_{i,t-1} + controls + \lambda_i + \lambda_t + \epsilon_{it} \quad (6)$$

Equation 6 relates the trade balance of a country i at time t to the two price competitiveness indices of the RTA and the non-RTA trading partners – corresponding to the coefficients by the change in the terms-of-trade with country A in theoretical equations 3-5. To control for the level effect of the previous value of trade balance (and as a form of reducing the endogeneity – discussed further) I add the lagged trade balance $TB_{i,t-1}$. As the assumption of constant countries' sizes is not realistic in the long-term estimations, I add controls for domestic and world income.

The REERs are constructed as described above. I include the country-variant time-invariant and time-variant country-invariant fixed effects. As I aim to investigate whether the greater (more positive) trade balance is associated with the more competitive (thus more depreciated) effective exchange rates to the non-RTA trading partners, the higher value of $\gamma_2 > \gamma_1$ suggests that on average the greater values of trade balance are associated with the more competitive exchange rates to the non-RTA partners. This is interpreted to mean that there is a higher elasticity of the trade balance to the non-RTA trading partners. The *Controls* are the levels of domestic income (measured through the nominal GDP), foreign income (measured as trade-weighted nominal GDP of trading partners) and the initial (t-1) level of trade balance.

There are several widely used trade balance measures, and I follow the literature in this regard. The first measure is the net exports over total trade:

$$TB_1 = \frac{Exp_{it} - Imp_{it}}{Exp_{it} + Imp_{it}}$$

. I also present the results with the alternative measures of the trade balance:

$$TB_2 = ln(\frac{Exp_{it}}{Imp_{it}})$$

and

$$TB_3 = \frac{Exp_{it} - Imp_{it}}{GDP_{it}}$$

.

Whenever the trade balance is represented as a share (TB_1 and TB_3), I use the beta-regression estimations, as they are more appropriate than OLS regressions in finding the ML estimator[26]. Otherwise, I use a simple OLS regression, unless otherwise stated. Where possible, all standard errors are clustered at the country level. The controls included in the regression are the standard controls used in the literature – domestic and foreign income. In order to keep the sample of countries, income is measured by the GDP (in USD). Foreign income is measured as the trade-weighted GDP of the trading partners as in Ahmed *et al.* (2015), but results are robust to using the non-weighted GDP in most of the specifications.

The regressions in the main specification are run on annual values as due to the short timespan of the data – while the data dates back to 1985, the number of countries with RTAs picks up only after 2000 (as illustrated in figure 9). The main concern with using annual data is the lag dependency, which I control for by including the lagged value of the trade balance. Using yearly data appears to bias my estimates downward: in the alternative specification where I use 3-year averages the estimates are consistent with the yearly estimation and appear to be higher.

As a further robustness check, I also run separate regressions on the imports and exports. Based on the model predictions (the precise equations for exports and imports are in the Appendix I), the elasticity of imports and exports is higher for the non-RTA trading partners.

The stated above estimations all refer to the long-term elasticities of the trade balance. Given that the model refers to the already existing regional preference – level of a – it is not wrong to limit the estimations to only the long-term elasticities. The simple log changes on log changes estimation of 6 is performed to check whether the effect will hold on changes. I acknowledge that the proper investigation of the short-run elasticities can make the picture more complete, but, relating to the existent empirical evidence, this should be left for further research.[27]

4.4 Causality

It can be assumed that governments are still concerned with the real exchange rate and do not let it float freely and that the policies directed at the nominal exchange rates also make its real

[26] In STATA, beta regressions are done through the `betafit` command. For further reference on beta regression or on how to go from the two-parameter fit of beta regressions to maximum likelihood methods, see Ferrari & Cribari-Neto (2004); Paulino (2001); Smithson & Verkuilen (2006)

[27] The usual techniques involve the J-curve estimations using ARDL or other approaches – see, for example, Bahmani-Oskooee & Fariditavana (2016)

"counterpart" co-move. Therefore regressing the trade balance on the exchange rates can be compromised by the causality of the movement.

Apart from controlling (partially) for this in the main specification by inclusion of the lagged trade balance and running a robustness check with the 3-year averages, I also follow Rodrik (2008) methodology. I use the dynamic panel approach through generalized method of moments (GMM) to address the reverse causality through allowing for the endogeneity of the regressor.

5 Results

5.1 Trade Balance Elasticities

The results of the main specification on the different measures of the trade balance are presented in Table 3. Regression (1) is the comparison regression on the conventional measure of the real effective exchange rates and the controls. I provide results using the three types of trade balance measures – both with and without controls. Country and time fixed effects are included in every regression.

In estimations with controls for income, depending on the type of trade balance measure used, a 10% depreciation[28] results in 2.6-15.4% range improvement of the trade balance if the depreciation of the effective exchange rate to the non-regional trading partners (coefficient of $lnREER^{noRTA}$ in regressions (2)-(7)), and 1.4-8.4% deterioration in the trade balance if it is done at the expense of the regional trade agreement partners (coefficient of $lnREER^{RTA}$ in regressions (2)-(7)).

As predicted by the theoretical model, higher (more positive) trade balances are associated with more depreciated exchange rates to the non-regional trade partners and less depreciated to the regional trade partners. This is achieved independently from the type of measure of trade balance used. This implies that regional trade integration can improve the trade balance and change the adjustment process for the trading partners.

As for the main specification where annual data is used in the cross-section regression, one of the concerns could be that there is high inter-temporal persistence. Therefore, in table 4 the results of the regression on the three-year averaged data are provided. The relationship remains unchanged: the depreciation against non-RTA trading partners yields higher trade balance, while depreciation against RTA trading partners decreases it.

Additional information is to exploit the dynamic aspects of the effect of the change in the effective exchange rates on the change of the trade balance alike to the specification adopted in

[28] I use terms "depreciation" and "increase in the price competitiveness" interchangeably as they both refer to the rise in the price levels

Ahmed *et al.* (2015) on exports:

$$\Delta TB_{it} = \gamma_0 + \gamma_1 \Delta ln(REER^{RTA}) + \gamma_2 \Delta ln(REER^{noRTA}) + controls + \lambda_i + \lambda_t + \epsilon_{it}$$

Table 5 provides the results for the three measures of the trade balance. The results support the main hypothesis of this paper that trade balance adjustment is done at the expense of the non-RTA trading partners: an increase (decrease) in the non-RTA associated effective exchange rate by 10% increases (decreases) the measure of trade balance by 1.6% to 4.1%, while there is no significant influence of change of the RTA-associated exchange rate.

5.2 Causality

Table 6 presents both the two-step difference and two-step system estimator[29] for the estimations on the three measures of the trade balance. I also add the usual trade balance determinants used in the main estimation to control for the other variables that might be effecting the relationship.

The results of regressions (1)-(6) in Table 6 support the results that trade balance is more elastic to the exchange rates with the non-RTA trading partners. The magnitude of the effect is different for different measures of elasticities: 10% depreciation improves the trade balance as measured by TB_1(net exports share in trade) by 0.5-0.8%; increases the ratio of exports to imports by 0.3-0.6% (TB_2) and increases the net exports as a share of GDP by 0.72-1.58%. Notably, in three out of six specifications there are significantly negative elasticities associated with depreciations vis-à-vis RTA-trading partners, albeit small in magnitude.

Even though the econometric procedure that can control for endogeneity of prices in such regressions is yet to be determined, I believe my results offer convincing evidence supporting the main message: trade integration changes the burden of the trade balance adjustment at the expense of the less integrated trading partners, and these trading partners can be proxied through the RTA. There is a differentiated effect on the trade balance from competitive depreciation to RTA trading partners versus non-RTA trading partners. This is channeled through greater trade interdependency and therefore different price elasticity of output (and, therefore, trade balance). A monetary shock will have a dissimilar transmission and efficiency based on the composition of the trade flows.

[29] Based on the Arellano & Bond (1991) and Blundell & Bond (1998) procedures

5.3 Eurozone

The Eurozone is a monetary union of highly integrated developed economies. There has been evidence that accounting for single-country trade balance dynamics is not efficient for the purpose of analysis (di Mauro *et al.* , 2016). The estimations of the elasticities of imports and exports, presented in Tables 7 and 8 suggest the same. There is no significant long-term evidence of the price elasticities of imports vis-à-vis non-regional trading partners, while the results on the exports suggest that a 10% effective depreciation against RTA partners results in 43% lower exports of a Eurozone country. This is consistent with my model, as it can be explained through a higher elasticity λ as compared to the rest of the world. Indeed, the Eurozone countries are bound by the agreements that insure a high level of mobility of resources, such as skill, worker and knowledge mobility. In the presence of the high elasticity of substitution, a decline in the price level can result in lower trade balance elasticity. In the context of the Eurozone – as countries within it have a common currency – this could be achieved not through changes in the exchange rate, but through other common policies that result in the cost competitiveness , such as tax cuts (Dustmann *et al.* , 2014).

My findings are in line with the recent paper of Chen *et al.* (2012) on external balances in Eurozone, who find that the recent changes in the Eurozone countries trade imbalances have been resulting from the change in competitivess and asymmetric trade developments vis-à-vis the rest of the world.

My results support the evidence that the Eurozone should assess its joint trade balance as opposed to member countries separate trade balances.

5.4 Other Robustness

Even though for the purpose of this paper I do not discuss the selection into the RTA, one possible concern may be that in the empirical part the effect I am capturing originates from some other sources of variation rather than from the effect of regionalism.

In the companion paper "Trade Re(Im)Balanced: The Role of Regional Trade Agreements," I describe the fact that deeper RTAs are associated with lower bilateral trade imbalances. Applying this observation into the framework of the model presented above, this implies that RTAs decrease bilateral trade imbalances (while the regional bias actually rises). Thus, to check whether it is indeed RTAs that are driving the result on the trade balance adjustment, and that it is not the result of a purely statistical nature[30] I split the subsamples of REER based on the size of the

[30] Referring to the following concerns: first, RTAs are signed between the countries that trade a lot initially as compared to the missing trade; second, one can not improve a trade balance that does not exist, and once you start

median bilateral trade imbalance. The results are presented in table 9. The non-robust results imply that the split by RTA indeed has a meaningful reasoning.

Another interesting result is to test how regional is the regional bias. I split the REERs by the contiguity of the countries in Table 10. The results are quite robust; nevertheless, they are of lower magnitude (or lower significance) than the RTA split[31]. This supports the observation that most RTAs are signed by neighboring countries.

5.5 Further discussions

One of the encountered critiques is that I am not accounting for the bilateral estimations which are the fundamental driver of the effect of both competitive exchange rates and trade. This critique is countered with the assertion that, even if indeed the bilateral effects are at the heart of the mechanism of the exchange rate adjustment, RTAs have multi-country effects: the production integration tends to happen across a number of countries that sign an RTA, and is not isolated to a bilateral relation. For example, assume there is an RTA between *Australia*, *Phillipines* and *Malayasia*. As a result of the domestic country *Australia*'s depreciation, a trade balance to a given RTA trading partner *Phillipines* may actually increase more than to some non-RTA *Brazil*, but at the same time *Phillipines* has improved the trade balance with *Malaysia*, with which *Australia* has worsened it.

This example shows that looking at the effective exchange rates would be a more intuitive way to test whether regionalisation has changed the mechanics of the exchange rate adjustment. For the purpose of my theoretical model, the domestic country *Australia* will then see *Phillipines* and *Malaysia* as one common area B, while *Brazil* (and other countries in the world) will be the Southern region of countries C and D.

The model presented deals with the already existing regional preferences rather than with the microeconomic rationale for increasing preferences when an RTA is signed. The question is left for the further research, while the companion paper "Trade Re(Im)Balanced: The Role of Regional Trade Agreements" provides empirical evidence of the lower imbalances between the RTA-trading partners, and that the deeper is the agreement, the lower is the trade imbalance.

trading your trade will be completely disbalanced in the first period. This implies that the improvement of the trade balance can be on the expense of such "disbalanced" trade rather than the absence of some legal arrangement between the countries.

[31] When the Eurozone is omitted, the results lose more levels of significance

6 Conclusion

By adapting a well-known theoretical model to the realities of regional integration, in this paper I create the framework that can be used to analyse the asymmetric adjustments of the trade balances (current accounts) after depreciations. The empirical estimations show that the current Regional Trade Agreements (RTAs) in place can be used as a proxy for the asymmetric adjustments of the current account.

The contribution of this paper can be summarized in the following points: first, in the presence of regional trade integration, the adjustment of the trade balance of a country will happen mostly at the expense of the non-integrated trading partners. This implies that upon a competitive depreciation – or a price level increase – the trade balance will improve at the expense of the countries that are less integrated. Second, this split between less and more integrated trading partners can be proxied by the trade agreement in place. The empirical estimations show that since 1985 the average burden of adjustment has been on the countries that are not bound by RTAs.

The results of this paper highlight two important observations: first, the current production and trade integration has changed the conventional understanding of exchange rate transmission mechanisms; and second, the common legal environment (which, in the scope of this paper, is supplied by the RTAs) provides an important channel for the transmission of economic shocks.

The concerns about the more/less depreciated exchange rates have always been in a bright spotlight – especially concerning developing countries or during times of slower economic growth. This paper brings to the table the reason for the selectivity of these concerns: the Canadian Dollar has changed its value relative to its NAFTA trading partner' US Dollar by about 20% between since 2013 and April 2016; yet, the media and politicians are more concerned about relatively smaller changes to other economies. Benefiting from the existence of RTAs, countries can become less concerned about the "beggar-thy-neighbor" policies when they sufficiently integrate (and thus together become a more integrated body in terms of economies). Freer trade might still be under fire, but at the same time freer trade (and thus more integrated production) has provided us with the greater number of allies.

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Figure 3: World trade by the type of RTA,
(bln current USD, changing sample of RTAs)

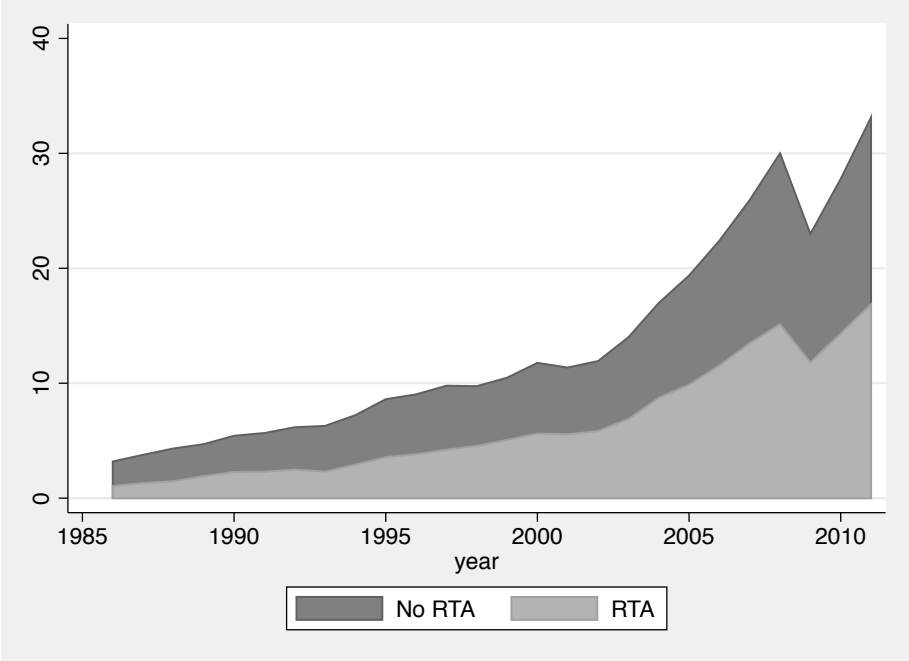


Table 1: Evolution of the type of RTA in bilateral relationships

Year	NR_PTA	PTA	FTA	CU	CM	EUN
1965	113	84	84	12	0	0
1970	129	152	104	12	0	0
1975	1791	371	152	102	0	0
1980	1977	442	153	112	0	0
1985	2253	746	199	173	0	0
1990	2460	764	245	207	0	0
1995	2784	874	444	189	208	0
2000	3132	878	1053	204	138	216
2005	4089	641	1510	252	574	216
2010	3407	2426	1874	285	536	326

Figure 4: Dynamics of bilateral trade imbalances

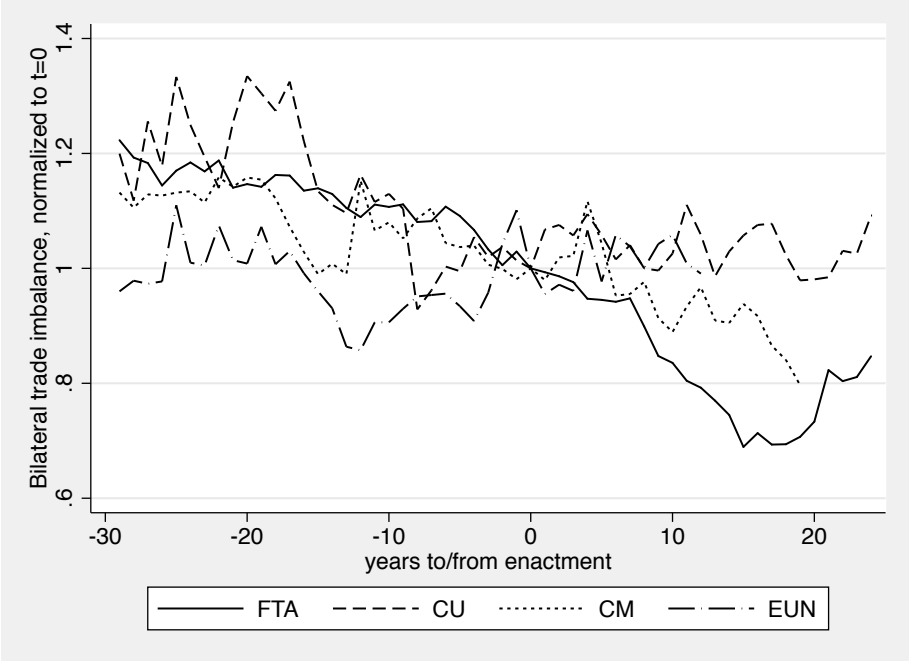


Figure 5: Average GDP-weighted RTA-associated aggregate trade imbalances (1990=1)

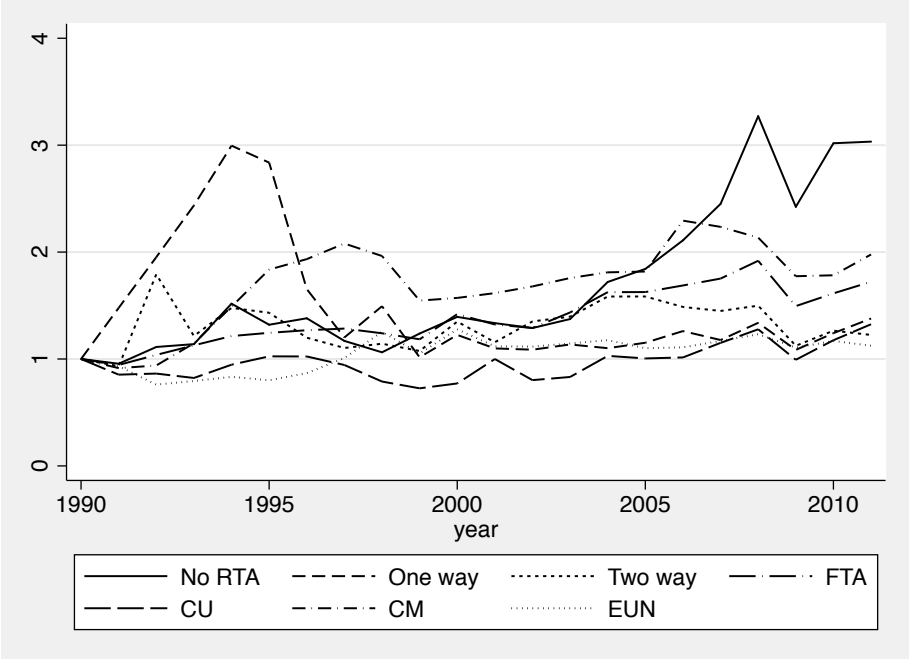


Figure 6: Distribution of the bilateral trade imbalances between RTA and non-RTA trading partners

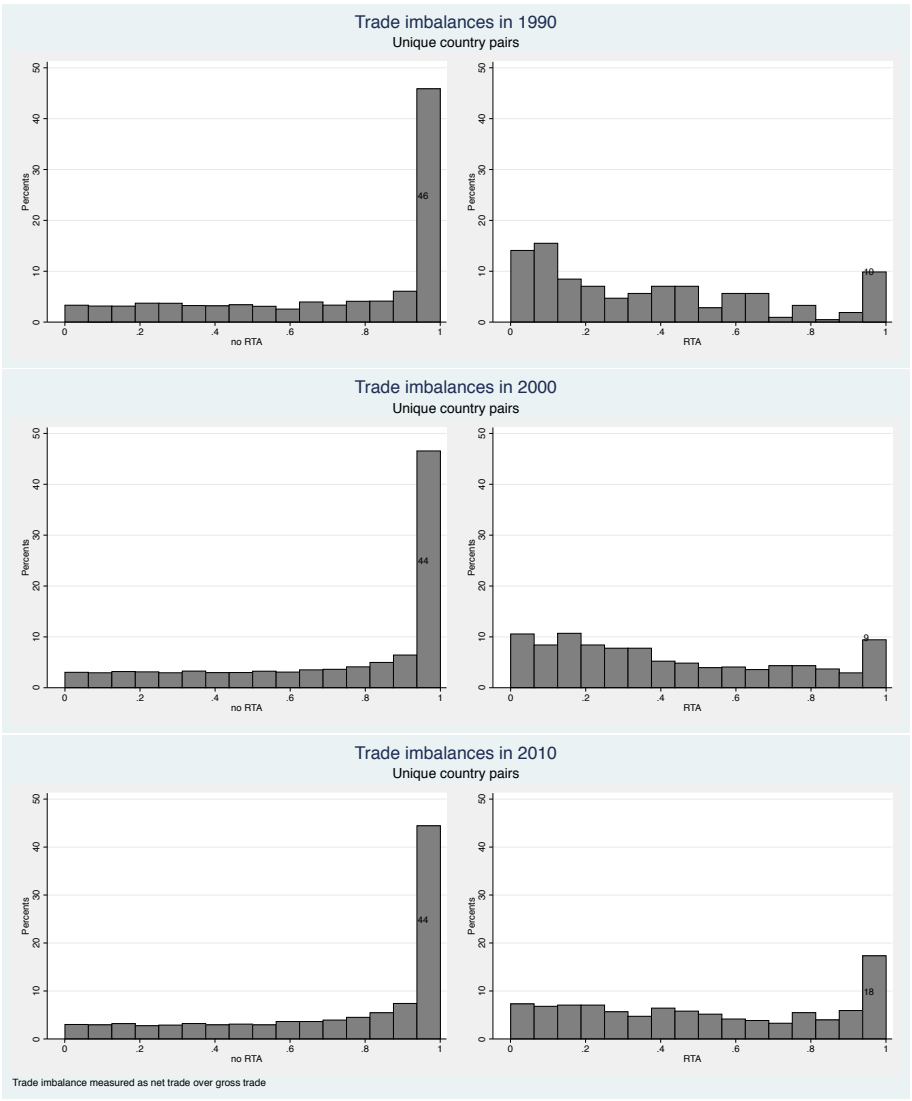
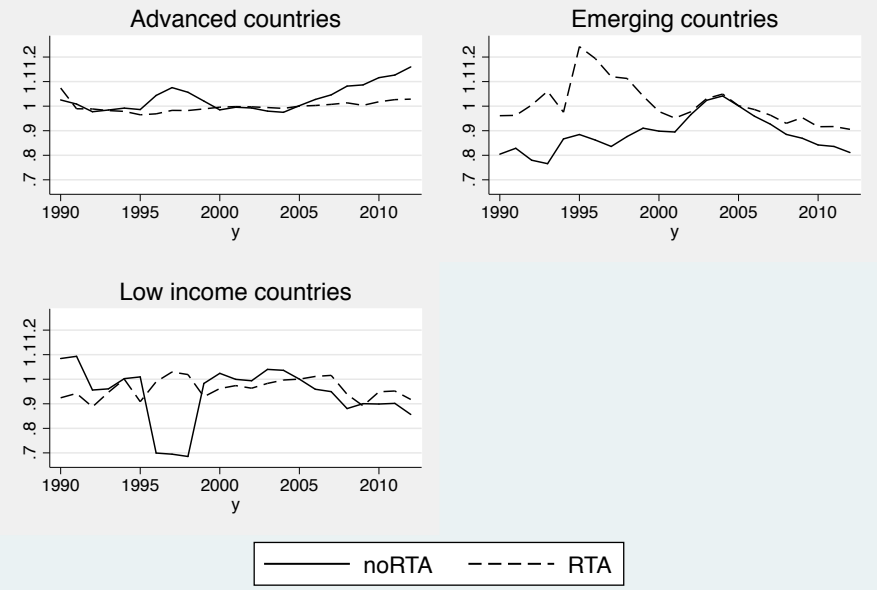
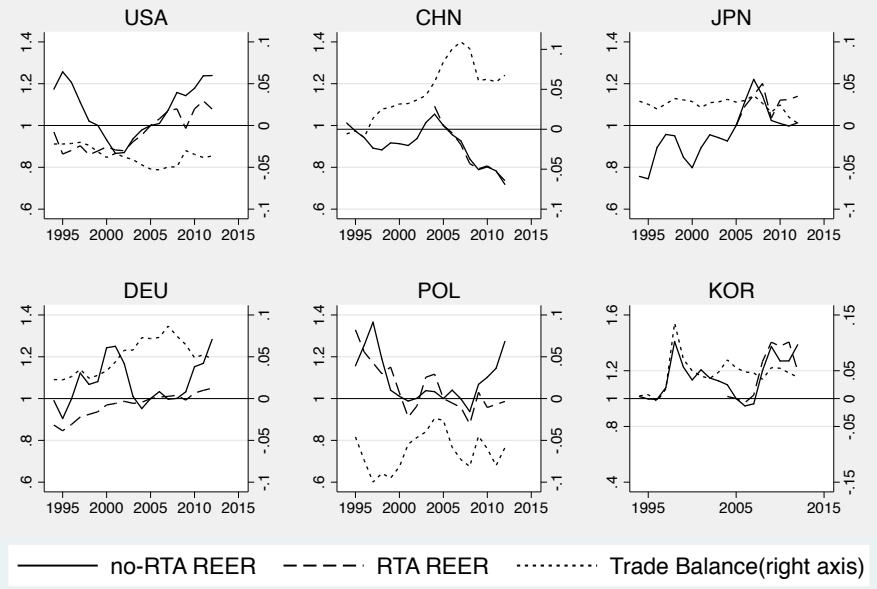


Figure 7: Average competitiveness to RTA and non-RTA trading partners



Changing trade weights, exchange rate normalized to 2005.

Figure 8: Average competitiveness to RTA and non-RTA trading partners (selected countries)



REER Increase - dereciation(2010=1); TB measured as % of GDP. Author's calculations and BIS.

Figure 9: Sample by time

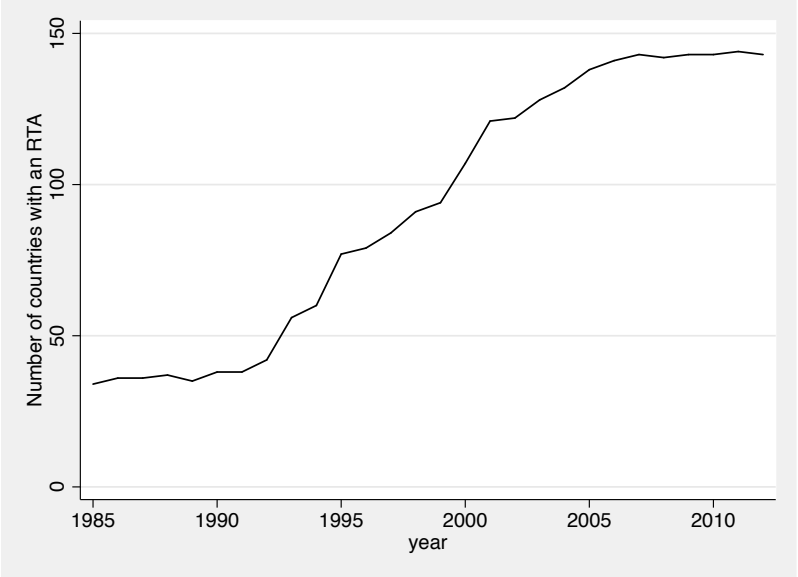


Table 2: Descriptions of types of RTA

	Indication	Type of Agreement	Definition
Recorded as "no RTA"	NA	No Agreement	No preferential trade agreement
	NR_PTA	Non Reciprocal Preferential Trade Agreement	Preferential terms and customs concessions given by developed nations to developing countries
	PTA	Preferential Trade Agreement	Preferential terms to members vs. non-members
Recorded as "RTA"	FTA	Free Trade Agreement	Trade barriers eliminated (or substantially so) among members; treat non-members differently
	CU	Customs Union	Same as FTA; but treat non-members the same
	CM	Common Market	Same as CU; but also includes free movemet of labor/capital
	EUN	Economic Union	Same as CM, but also monetary and Fiscal Policy coordination; further harmonization of taxes/regulation/monetary systems

Table 3: Long-term elasticities of trade balance

VARIABLES	(1) TB_1	(2) TB_1	(3) TB_1	(4) TB_2	(5) TB_2	(6) TB_3	(7) TB_3
$lnREER$	0.72***						
	(0.19)						
$lnREER^{noRTA}$		0.80***	1.01***	0.26***	0.25***	0.91***	1.18***
		(0.19)	(0.22)	(0.10)	(0.08)	(0.20)	(0.23)
$lnREER^{RTA}$		-0.84***	-0.57***	-0.18**	-0.08*	-0.82***	-0.55***
		(0.14)	(0.14)	(0.08)	(0.04)	(0.14)	(0.15)
$lnWorldIncome$			4.77		-0.39		-0.47
			(4.92)		(0.82)		(3.37)
$lnDomIncome$			0.53***		0.13		0.84***
			(0.14)		(0.07)		(0.14)
lag_TB			2.30***		0.53***		2.61***
			(0.24)		(0.06)		(0.28)
Constant	-1.87***	-1.98***	3.41***	0.01	25.69	3.58***	3.64***
	(0.21)	(0.25)	(0.06)	(0.07)	(23.33)	(0.29)	(0.06)
Observations	529	663	636	1,954	1,881	661	636
R-squared				0.84	0.85		
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

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

Left hand-side are the three different measures of the aggregate trade balance. $TB_1 = \frac{Exp_{it} - Imp_{it}}{Exp_{it} + Imp_{it}}$; $TB_2 = \frac{Exp_{it}}{Imp_{it}}$; $TB_3 = \frac{Exp_{it} - Imp_{it}}{GDP_{it}}$. For TB_1, TB_3 betafit estimation is used as it is more appropriate for estimating proportions (it fits better the mean and dispertion parameters than a linear estimation). For TB_1, TB_3 negative trade balances, trade balances equaling zero or over unity are excluded – hence a lower sample. TB_2 is estimated using fixed-effects OLS. Standard errors are clustered at the country level.

Table 4: Long-term elasticities of trade balance (3-year averages)

VARIABLES	(1) TB_1	(2) TB_1	(3) TB_2	(4) TB_3
$lnREER$	1.31***			
	(0.43)			
$lnREER^{noRTA}$		0.73**	0.34***	1.05***
		(0.40)	(0.12)	(0.44)
$lnREER^{RTA}$		-0.92***	-0.10**	-0.89***
		(0.26)	(0.05)	(0.30)
$lnWorldIncome$	-7.49*	12.57**	2.86	15.21***
	(3.91)	(3.84)	(1.79)	(4.56)
$lnDomIncome$	0.62*	0.88***	0.26**	0.90***
	(0.32)	(0.23)	(0.11)	(0.24)
lag_TB		1.07***	0.28**	1.19***
		(0.44)	(0.09)	(0.46)
Constant	3.70***	3.93***	-29.58	4.12***
	(0.11)	(0.10)	(18.36)	(0.10)
Observations	158	191	574	191
R-squared			0.90	
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Left hand-side are the three different measures of the aggregate trade balance. $TB_1 = \frac{Exp_{it} - Imp_{it}}{Exp_{it} + Imp_{it}}$; $TB_2 = \frac{Exp_{it}}{Imp_{it}}$; $TB_3 = \frac{Exp_{it} - Imp_{it}}{GDP_{it}}$. For TB_1, TB_3 betafit estimation is used as it is more appropriate for estimating proportions (it fits better the mean and dispertion parameters than a linear estimation). For TB_1, TB_3 negative trade balances, trade balances equaling zero or over unity are excluded – hence a lower sample. TB_2 is estimated using fixed-effects OLS. Standard errors are clustered at the country level. RTA membership defined for all countries that have an FTA, CU, CM or EUN in place (see table 2 for description).

Table 5: Change in the long-term elasticities of trade balance

VARIABLES	(1) TB_1	(2) TB_2	(3) TB_3
$\Delta lnREER^{noRTA}$	0.16**	0.41***	0.34**
	(0.19)	(0.16)	(0.16)
$\Delta lnREER^{RTA}$	0.16	-0.07	-0.03
	(0.20)	(0.12)	(0.02)
$\Delta lnWorldIncome$	-0.05	-0.32	0.11
	(0.12)	(0.28)	(0.13)
$\Delta l\_DomIncome$	0.73**	0.25	0.30***
	(0.37)	(0.24)	(0.11)
lag_TB	-0.34***	-0.76***	-0.19***
	(0.05)	(0.14)	(0.06)
Constant	-0.12***	-0.30***	-0.14***
	(0.28)	(0.15)	(0.06)
Year FE	YES	YES	YES
Observations	1,918	1,918	1,918
R-squared	0.25	0.20	0.19
Year FE	YES	YES	YES
Country FE	YES	YES	YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Dependent variables – different measures of trade balance. See commentary to table 3 for the definitions.

Table 6: GMM estimators

VARIABLES	Two step difference (1) TB_1	Two step system (2) TB_1	Two step difference (3) TB_2	Two step system (4) TB_2	Two step difference (5) TB_3	Two step system (6) TB_3
$lnREER^{noRTA}$	0.08***	0.05***	0.06***	0.03***	1.58***	0.72**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.40)	(0.35)
$lnREER^{RTA}$	-0.01*	-0.01**	-0.01	-0.01**	-0.47	-0.26
	(0.01)	(0.01)	(0.00)	(0.00)	(0.38)	(0.31)
TB_{t-1}	0.48***	0.91***	0.56***	0.92***	0.14*	0.84***
	(0.10)	(0.03)	(0.07)	(0.04)	(0.07)	(0.05)
$lnWorlIncome$	-0.01	0.22	-0.42	0.10	23.33	-2.55
	(0.64)	(0.20)	(0.71)	(0.12)	(16.38)	(2.77)
$lnDomIncome$	0.04**	0.00**	0.03**	0.00*	0.57	-0.05
	(0.02)	(0.00)	(0.01)	(0.00)	(0.43)	(0.04)
Constant		-2.35		-1.17		26.18
		(2.21)		(1.31)		(27.39)
Observations	1,715	1,842	1,715	1,842	513	583
Number of panel_id	125	125	125	125	51	56
P-value Hansen test	1	1	1	1	1	1

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Left hand-side are the three different measures of the aggregate trade balance. $TB_1 = \frac{Exp_{it} - Imp_{it}}{Exp_{it} + Imp_{it}}$; $TB_2 = \frac{Exp_{it}}{Imp_{it}}$; $TB_3 = \frac{Exp_{it} - Imp_{it}}{GDP_{it}}$. RTA membership defined for all countries that have an FTA, CU, CM or EUN in place (see table 2 for description).

Table 7: Long-term elasticity in imports

	Dependent variable – log of total country imports					
	(1) Full Sample	(2)	(3) Eurozone	(4) Other Advanced	(5) Emerging	(6) Low-Income
VARIABLES						
$lnREER$	-0.73***					
	(0.11)					
$lnREER^{noRTA}$		-0.54***	0.73	-0.27*	-0.55***	-0.69**
		(0.08)	(0.51)	(0.15)	(0.14)	(0.26)
$lnREER^{RTA}$		0.00	0.05	-0.46	0.07	0.19
		(0.05)	(0.16)	(0.28)	(0.17)	(0.25)
$lnWorldIncome$	-1.59	0.55	-3.98	0.51	-6.62*	24.32***
	(1.80)	(1.31)	(5.26)	(0.69)	(3.41)	(6.01)
Constant	25.24	1.95	51.99	5.61	71.92**	-231.66***
	(18.17)	(12.88)	(54.27)	(6.77)	(33.53)	(59.08)
Observations	1,954	1,954	191	396	824	543
R-squared	0.99	0.99	1.00	0.99	0.99	0.97
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Errors clustered at the country level. Classification of countries according to IMF 2014. Eurozone countries are selected for the years when they were officially the part of the Eurozone. RTA membership defined for all countries that have an FTA, CU, CM or EUN in place (see table 2 for description).

Table 8: Long-term elasticity exports

	Dependent variable – log of total country exports					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		Eurozone	Other Advanced	Emerging	Low-Income
VARIABLES						
$lnREER$	0.38**					
	(0.16)					
$lnREER^{noRTA}$		0.45***	0.60	0.45***	0.56***	0.75*
		(0.11)	(0.72)	(0.14)	(0.20)	(0.39)
$lnREER^{RTA}$		-0.06	-0.43**	0.40	-0.27*	-0.27
		(0.05)	(0.18)	(0.26)	(0.15)	(0.26)
$lnDomIncome$	0.90***	0.87***	0.03	0.94***	0.83***	0.96***
	(0.09)	(0.09)	(0.23)	(0.18)	(0.14)	(0.25)
Constant	5.34***	3.29***	11.49***	5.14***	4.55***	3.52***
	(0.43)	(0.16)	(1.35)	(1.07)	(0.18)	(0.40)
Observations	1,056	1,946	191	197	824	537
R-squared	0.99	0.99	1.00	1.00	0.99	0.97
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Errors clustered at the country level. Classification of countries according to IMF 2014. Eurozone countries are selected for the years when they were officially the part of the Eurozone. RTA membership defined for all countries that have an FTA, CU, CM or EUN in place (see table 2 for description).

Table 9: Robustness: By median bilateral trade imbalance

	(1) TB_1	(2) TB_1	(3) TB_2	(4) TB_2	(5) TB_3	(6) TB_3
VARIABLES						
$lnREER^{AboveMed}$	-0.13	-0.42	0.06	0.09	0.29	0.29
	(0.21)	(0.28)	(0.08)	(0.10)	(0.20)	(0.29)
$lnREER^{BelowMed}$	0.42*	1.09***	0.08	0.19	0.12	0.63**
	(0.22)	(0.28)	(0.11)	(0.14)	(0.21)	(0.29)
$lnWorldIncome$		-10.53***		-2.26		-6.39**
		(2.35)		(1.77)		(2.74)
$lnDomIncome$		0.37***		0.17*		0.51***
		(0.14)		(0.09)		(0.14)
Constant	-1.82***	99.98***	0.07*	22.09	-3.29***	57.17**
	(0.20)	(23.38)	(0.04)	(17.44)	(0.24)	(27.24)
Observations	838	796	2,618	2,495	835	795
R-squared			0.81	0.81		
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

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

Left hand-side are the three different measures of the aggregate trade balance. $TB_1 = \frac{Exp_{it} - Imp_{it}}{Exp_{it} + Imp_{it}}$; $TB_2 = \frac{Exp_{it}}{Imp_{it}}$; $TB_3 = \frac{Exp_{it} - Imp_{it}}{GDP_{it}}$. For TB_1, TB_3 betafit estimation is used as it is more appropriate for estimating proportions (it fits better the mean and dispertion parameters than a linear estimation). For TB_1, TB_3 negative trade balances, trade balances equaling zero or over unity are excluded – hence a lower sample. TB_2 is estimated using fixed-effects OLS. Standard errors are clustered at the country level. REERs are split by the size of the median trade balance – $REER^{AboveMed}$ will have the sample of countries the country i has the highest trade balance.

Table 10: Robustness: Contingent countries

VARIABLES	(1) TB_1	(2) TB_1	(3) TB_2	(4) TB_2	(5) TB_3	(6) TB_3
$lnREER^{noRTA}$	0.61**	1.06***	0.24**	0.40***	1.05***	1.70***
	(0.24)	(0.28)	(0.10)	(0.13)	(0.26)	(0.31)
$lnREER^{RTA}$	-0.19	-0.34*	-0.09	-0.13	-0.58***	-0.72***
	(0.20)	(0.21)	(0.10)	(0.11)	(0.22)	(0.22)
$lnWorldIncome$		-9.04**		-2.05		-6.20*
		(3.51)		(2.26)		(3.27)
$lnDomIncome$		0.43***		0.19*		0.61***
		(0.15)		(0.11)		(0.16)
Constant	-1.68***	85.25**	0.03	19.92	-3.02***	55.18*
	(0.22)	(34.81)	(0.04)	(22.22)	(0.26)	(32.39)
Observations	704	702	2,003	1,994	701	701
R-squared			0.79	0.79		
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

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

Left hand-side are the three different measures of the aggregate trade balance. $TB_1 = \frac{Exp_{it} - Imp_{it}}{Exp_{it} + Imp_{it}}$; $TB_2 = \frac{Exp_{it}}{Imp_{it}}$; $TB_3 = \frac{Exp_{it} - Imp_{it}}{GDP_{it}}$. For TB_1, TB_3 betafit estimation is used as it is more appropriate for estimating proportions (it fits better the mean and dispertion parameters than a linear estimation). For TB_1, TB_3 negative trade balances, trade balances equaling zero or over unity are excluded – hence a lower sample. TB_2 is estimated using fixed-effects OLS. Standard errors are clustered at the country level. RTA membership defined for all countries that have an FTA, CU, CM or EUN in place (see table 2 for description).

8 Appendix I: Model derivation

Until the laws of thermodynamics are repealed, I shall continue to relate outputs to inputs – i.e. to believe in production functions.
Samuelson (1972) (p. 174)

8.1 Consumption

There are 4 countries, A and B, C and D. A and B has an RTA signed (can be seen as "Northern" countries), C and D have a separate RTA (and can be seen as "Southern" countries). Consumption is a nested CES with regional (if $a > 0$) and domestic (if $\alpha > \frac{1}{2}$) bias.

8.2 Consumption allocation

In country A the consumer maximizes

$$C_A = \left[\begin{array}{c} \left(\frac{1}{4}(1+\alpha)(1+a)\right)^{\frac{1}{\lambda}} (C_{AA})^{\frac{\lambda-1}{\lambda}} + \left(\frac{1}{4}(1-\alpha)(1+a)\right)^{\frac{1}{\lambda}} (C_{AB})^{\frac{\lambda-1}{\lambda}} \\ + \left(\frac{1}{4}(1-a)\right)^{\frac{1}{\lambda}} (C_{AC})^{\frac{\lambda-1}{\lambda}} + \left(\frac{1}{4}(1-a)\right)^{\frac{1}{\lambda}} (C_{AD})^{\frac{\lambda-1}{\lambda}} \end{array} \right]^{\frac{\lambda}{\lambda-1}}$$

α is the split $A-B$ and a the split center-periphery. Both are between 0 and 1 ($\alpha = a = 0$ is an even world, $\alpha = a = 1$ is autarky)

This implies:

$$\begin{aligned} C_{AA} &= \frac{(1+\alpha)(1+a)}{4} \left[\frac{P_{AA}}{P_A}\right]^{-\lambda} C_A \\ C_{AB} &= \frac{(1-\alpha)(1+a)}{4} \left[\frac{P_{AB}}{P_A}\right]^{-\lambda} C_A \\ C_{AC} &= \frac{1-a}{4} \left[\frac{P_{AC}}{P_A}\right]^{-\lambda_C} C_A \\ C_{AD} &= \frac{1-a}{4} \left[\frac{P_{AD}}{P_A}\right]^{-\lambda_C} C_A \end{aligned}$$

where :

$$P_A = \left[\frac{(1+\alpha)(1+a)}{4} [P_{AA}]^{1-\lambda} + \frac{(1-\alpha)(1+a)}{4} [P_{AB}]^{1-\lambda} + \frac{1-a}{4} [P_{AC}]^{1-\lambda} + \frac{1-a}{4} [P_{AD}]^{1-\lambda}\right]^{\frac{1}{1-\lambda}}$$

The elasticity across brands is θ. The labor supply is:

$$W_A = P_A C_A$$

8.3 Firms allocation

The output of a representative firm in A is:

$$Y_A = A_A L_A$$

Firms sets prices as a markup over marginal cost:

$$P_{AA} = P_{AB} = P_{AC} = P_{AD} = \rho_A = \frac{\theta}{\theta - 1}\frac{W_A}{A_A}$$

The demand for goods procuded in country A is:

$$\begin{aligned} Y_A &= \frac{(1+\alpha)(1+a)}{4}\left[\frac{\rho_A}{P_A}\right]^{-\lambda} C_A + \frac{(1-\alpha)(1+a)}{4}\left[\frac{\rho_A}{P_B}\right]^{-\lambda_C} C_B \\ &\quad + \frac{1-a}{4}\left[\frac{\rho_A}{P_C}\right]^{-\lambda} C_C + \frac{1-a}{4}\left[\frac{\rho_A}{P_D}\right]^{-\lambda} C_D \end{aligned}$$

8.4 Exports and imports

The volume and value of exports from country A is:

$$\begin{aligned} X_A^R &= X_{AB}^R + X_{AC}^R + X_{AD}^R \\ &= \frac{(1-\alpha)(1+a)}{4}\left[\frac{\rho_A}{P_B}\right]^{-\lambda} C_B + \frac{1-a}{4}\left[\frac{\rho_A}{P_C}\right]^{-\lambda} C_C + \frac{1-a}{4}\left[\frac{\rho_A}{P_D}\right]^{-\lambda} C_D \\ X_A^{Val} &= \rho_A \frac{(1-\alpha)(1+a)}{4}\left[\frac{\rho_A}{P_B}\right]^{-\lambda} C_B + \rho_A \frac{1-a}{4}\left[\frac{\rho_A}{P_C}\right]^{-\lambda} C_C + \rho_A \frac{1-a}{4}\left[\frac{\rho_A}{P_D}\right]^{-\lambda} C_D \end{aligned}$$

The volume and value of imports is:

$$\begin{aligned} M_A^R &= M_{AB}^R + M_{AC}^R + M_{AD}^R \\ &= \frac{(1-\alpha)(1+a)}{4}\left[\frac{\rho_B}{P_A}\right]^{-\lambda} C_A + \frac{1-a}{4}\left[\frac{\rho_C}{P_A}\right]^{-\lambda} C_A + \frac{1-a}{4}\left[\frac{\rho_D}{P_A}\right]^{-\lambda} C_A \\ M_A^{Val} &= \rho_B \frac{(1-\alpha)(1+a)}{4}\left[\frac{\rho_B}{P_A}\right]^{-\lambda} C_A + \rho_C \frac{1-a}{4}\left[\frac{\rho_C}{P_A}\right]^{-\lambda} C_A + \rho_D \frac{1-a}{4}\left[\frac{\rho_D}{P_A}\right]^{-\lambda} C_A \end{aligned}$$

8.5 Steady state

Because of symmetry all outputs are equal, all prices are equal, and all consumption are equal. The key equations are:

$$\begin{aligned} W_0 &= P_0 C_0 \\ P_0 &= \frac{\theta}{\theta - 1} \frac{W_0}{A_0} \\ Y_0 &= C_0 \end{aligned}$$

which implies:

$$\frac{W_0}{P_0} = C_0 = Y_0 = A_0 \frac{\theta - 1}{\theta}$$

Exports and imports are (trade is balanced bilaterally):

$$\begin{aligned} X^R_{A,0} &= X^R_{AB,0} + X^R_{AC,0} + X^R_{AD,0} = \frac{(1-\alpha)(1+a)}{4} C_0 + \frac{1-a}{4} C_0 + \frac{1-a}{4} C_0 \\ M^R_{A,0} &= M^R_{AB,0} + M^R_{AC,0} + M^R_{AD,0} = \frac{(1-\alpha)(1+a)}{4} C_0 + \frac{1-a}{4} C_0 + \frac{1-a}{4} C_0 \end{aligned}$$

8.6 Linear approximation

The price index is approximated as:

$$\begin{aligned} \hat{P}_A &= \frac{(1+\alpha)(1+a)}{4} \hat{\rho}_A + \frac{(1-\alpha)(1+a)}{4} \hat{\rho}_B + \frac{1-a}{4} \hat{\rho}_C + \frac{1-a}{4} \hat{\rho}_D \\ \hat{P}_B &= \frac{(1+\alpha)(1+a)}{4} \hat{\rho}_B + \frac{(1-\alpha)(1+a)}{4} \hat{\rho}_A + \frac{1-a}{4} \hat{\rho}_C + \frac{1-a}{4} \hat{\rho}_D \\ \hat{P}_C &= \frac{(1+\alpha)(1+a)}{4} \hat{\rho}_C + \frac{(1-\alpha)(1+a)}{4} \hat{\rho}_D + \frac{1-a}{4} \hat{\rho}_A + \frac{1-a}{4} \hat{\rho}_B \\ \hat{P}_D &= \frac{(1+\alpha)(1+a)}{4} \hat{\rho}_D + \frac{(1-\alpha)(1+a)}{4} \hat{\rho}_C + \frac{1-a}{4} \hat{\rho}_A + \frac{1-a}{4} \hat{\rho}_B \end{aligned}$$

The expansion of country A's exports are (written in terms of trade):

$$\begin{aligned} \hat{X}^R_{AB} &= \frac{X^R_{AB} - X^R_{AB,0}}{X^R_{AB,0}} = -\lambda_C \left(\hat{\rho}_A - \hat{P}_B \right) + \hat{C}_B \\ \hat{X}^R_{AC} &= -\lambda \left(\hat{\rho}_A - \hat{P}_C \right) + \hat{C}_C \\ \hat{X}^R_{AD} &= -\lambda \left(\hat{\rho}_A - \hat{P}_D \right) + \hat{C}_D \\ \hat{X}^R_{A} &= \frac{X^R_{A} - X^R_{A,0}}{X^R_{A,0}} = s_0 \hat{X}^R_{AB} + (1 - s_0) \left(\hat{X}^R_{AC} + \hat{X}^R_{AD} \right) \end{aligned}$$

where:

$$s_0 = \frac{(1-\alpha)(1+a)}{(1-\alpha)(1+a)+2(1-a)}$$

This implies that when the price of the good A rises – meaning you (holding sizes of the countries unchanged), the price elasticity of export volume to B is:

When the price of A rises in terms of trade- meaning you need more of good B to acquire the goods of country A, the effect on the exports from A to B is lower

$$\hat{X}^R_{AB} = = -\lambda_C\left(\hat{\rho}_A - \hat{P}_B\right) = -\lambda_C\left(\hat{\rho}_A - \frac{(a+1)(1-\alpha)}{4}\hat{\rho}_A\right)$$

Thus, the pass-through of the change in prices in A will be reduced more the higher is the a. Alike the pass-through to C will be higher (reduced lower) the higher is a:

$$\hat{X}^R_{AC} = -\lambda\left(\hat{\rho}_A - \hat{P}_C\right) = -\lambda\left(\hat{\rho}_A - \frac{1-a}{4}\hat{\rho}_A\right)$$

If $\alpha = 0$ and country A reduces prices of its good by 10%, the pass through to the terms of trade with B will be $2\frac{1+a}{4}$ lower than to the terms of trade of C. This implies that the deeper regional bias – deeper regionalisation will make the exports to the regional partners less elastic.

Similar procedure is applied to the expansion of country A's imports (as measured by the terms of trade):

$$\begin{aligned}
\hat{M}^R_{AB} &= \frac{M^R_{AB} - M^R_{AB,0}}{M^R_{AB,0}} = -\lambda_C\left(\hat{\rho}_B - \hat{P}_A\right) + \hat{C}_A \\
\hat{M}^R_{AC} &= -\lambda\left(\hat{\rho}_C - \hat{P}_A\right) + \hat{C}_A \\
\hat{M}^R_{AD} &= -\lambda\left(\hat{\rho}_D - \hat{P}_A\right) + \hat{C}_A \\
\hat{M}^R_{A} &= s_0\hat{M}^R_{AB} + (1-s_0)\left(\hat{M}^R_{AC} + \hat{M}^R_{AD}\right)
\end{aligned}$$

The main concern of the paper is the trade balances. The trade balance of A will consist of

The bilateral trade balances are:

$$\begin{aligned}
TB_{AB} &= \frac{(1-\alpha)(1+a)}{4} P_0 C_0 \left[(1-\lambda)(\hat{\rho}_A - \hat{\rho}_B) - \lambda\left(\hat{P}_A - \hat{P}_B\right) - \left(\hat{C}_A - \hat{C}_B\right)\right] \\
&= \frac{(1-\alpha)(1+a)}{4} P_0 C_0 \left[\left(1 - \lambda\left[1 + \frac{\alpha(1+a)}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_B) - \left(\hat{C}_A - \hat{C}_B\right)\right] \\
TB_{AC} &= \frac{1-a}{4} P_0 C_0 \left[(1-\lambda)(\hat{\rho}_A - \hat{\rho}_C) - \lambda\left(\hat{P}_A - \hat{P}_C\right) - \left(\hat{C}_A - \hat{C}_C\right)\right] \\
&= \frac{1-a}{4} P_0 C_0 \left[\begin{array}{c} \lambda\frac{(1-\alpha)(1+a)-(1-a)}{4}(\hat{\rho}_A - \hat{\rho}_B) + \left(1 - \lambda_C\left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{4}\right]\right)(\hat{\rho}_A - \hat{\rho}_C) \\ -\lambda\frac{(1-\alpha)(1+a)-(1-a)}{4}(\hat{\rho}_A - \hat{\rho}_D) - \left(\hat{C}_A - \hat{C}_C\right) \end{array}\right] \\
TB_{AD} &= \frac{1-a}{4} P_0 C_0 \left[(1-\lambda)(\hat{\rho}_A - \hat{\rho}_D) - \lambda\left(\hat{P}_A - \hat{P}_D\right) - \left(\hat{C}_A - \hat{C}_D\right)\right] \\
&= \frac{1-a}{4} P_0 C_0 \left[\begin{array}{c} \lambda\frac{(1-\alpha)(1+a)-(1-a)}{4}(\hat{\rho}_A - \hat{\rho}_B) + \left(1 - \lambda_C\left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{4}\right]\right)(\hat{\rho}_A - \hat{\rho}_D) \\ -\lambda\frac{(1-\alpha)(1+a)-(1-a)}{4}(\hat{\rho}_A - \hat{\rho}_C) - \left(\hat{C}_A - \hat{C}_D\right) \end{array}\right]
\end{aligned}$$

The higher are the regional preferences, the greater will be the increase in trade with non-regionals (since the first term increases on a,b), and the lower will be the change in the trade with the regional trading partner. Equations **??** and **??** link the terms of trade and the exchange rate in the presence of regionalism and domestic bias. The depreciation of A will improve the terms of trade with all trading partners, but much more so with the non-regional (see equation **??**).

Therefore when production integration between the regional trading agreement members is more intensive, upon depreciation trade balance improves more on the account of the non-RTA trading partners.

Focus on the impact of prices. If $\alpha = 0$ (no bias A vs B):

$$\begin{aligned}
TB_{AB} &= \frac{1+a}{4} P_0 C_0 (1-\lambda)(\hat{\rho}_A - \hat{\rho}_B) \\
TB_{AC} &= \frac{1-a}{4} P_0 C_0 \left[\lambda\frac{a}{2}(\hat{\rho}_A - \hat{\rho}_B) + \left(1 - \lambda\left[1 + \frac{a}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_C) - \lambda\frac{a}{2}(\hat{\rho}_A - \hat{\rho}_D)\right] \\
TB_{AD} &= \frac{1-a}{4} P_0 C_0 \left[\lambda\frac{a}{2}(\hat{\rho}_A - \hat{\rho}_B) + \left(1 - \lambda\left[1 + \frac{a}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_D) - \lambda\frac{a}{2}(\hat{\rho}_A - \hat{\rho}_C)\right] \\
TB_{AB} + TB_{AC} + TB_{AD} &= P_0 C_0 \left[\frac{1+a}{4}(1-\lambda_C) + \frac{a(1-a)}{4}\lambda\right](\hat{\rho}_A - \hat{\rho}_B) \\
&\quad + P_0 C_0 \frac{1-a}{4}\left[1 - \lambda(1+a)\right](\hat{\rho}_A - \hat{\rho}_C) \\
&\quad + P_0 C_0 \frac{1-a}{4}\left[1 - \lambda(1+a)\right](\hat{\rho}_A - \hat{\rho}_D) \\
TB_{AC} + TB_{AD} &= \frac{1-a}{4} P_0 C_0 \left[\begin{array}{c} \lambda a(\hat{\rho}_A - \hat{\rho}_B) + (1 - \lambda_C(1+a))(\hat{\rho}_A - \hat{\rho}_C) \\ + (1 - \lambda(1+a))(\hat{\rho}_A - \hat{\rho}_D) \end{array}\right]
\end{aligned}$$

$$
\begin{aligned}
X^R_{A,0} &= X^R_{AB,0} + X^R_{AC,0} + X^R_{AD,0} = \frac{1+a}{4}C_0 + \frac{1-a}{4}C_0 + \frac{1-a}{4}C_0 \\
M^R_{A,0} &= M^R_{AB,0} + M^R_{AC,0} + M^R_{AD,0} = \frac{1+a}{4}C_0 + \frac{1-a}{4}C_0 + \frac{1-a}{4}C_0
\end{aligned}
$$

This is the most reasonable case. If we scale the trade balance by the corresponding steady state gross flows ($(1+a)/4$ and $2*(1-a)/4$), the terms-of-trade A vs B impact both TB_{AB} and $TB_{AC} + TB_{AD}$. The impact of $\hat{\rho}_A - \hat{\rho}_B$ on TB_{AB} is smaller (in absolute magnitude, i.e. less negative) than the impact of $\hat{\rho}_A - \hat{\rho}_C = \hat{\rho}_A - \hat{\rho}$ on $TB_{AC} + TB_{AD}$:

$$
\begin{aligned}
1-\lambda &< 0 \\
1-\lambda(1+a) &< 0 \\
1-\lambda &> 1-\lambda(1+a)
\end{aligned}
$$

If $a = 0$ (no bias center-periphery):

$$
\begin{aligned}
TB_{AB} &= \frac{1-\alpha}{4}P_0C_0\left(1-\lambda\left[1+\frac{\alpha}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_B) \\
TB_{AC} &= \frac{1}{4}P_0C_0\left[-\lambda\frac{\alpha}{4}(\hat{\rho}_A - \hat{\rho}_B) + \left(1-\lambda\left[1+\frac{\alpha}{4}\right]\right)(\hat{\rho}_A - \hat{\rho}_C) + \lambda\frac{\alpha}{4}(\hat{\rho}_A - \hat{\rho}_D)\right] \\
TB_{AD} &= \frac{1}{4}P_0C_0\left[-\lambda\frac{\alpha}{4}(\hat{\rho}_A - \hat{\rho}_B) + \left(1-\lambda\left[1+\frac{\alpha}{4}\right]\right)(\hat{\rho}_A - \hat{\rho}_D) + \lambda\frac{\alpha}{4}(\hat{\rho}_A - \hat{\rho}_C)\right] \\
TB_{AB} + TB_{AC} + TB_{AD} &= \frac{1}{4}P_0C_0\left[(1-\alpha)\left(1-\lambda\left[1+\frac{\alpha}{2}\right]\right) - \lambda\frac{\alpha}{2}\right](\hat{\rho}_A - \hat{\rho}_B) \\
&\quad + \frac{1}{4}P_0C_0(1-\lambda)(\hat{\rho}_A - \hat{\rho}_C) \\
&\quad + \frac{1}{4}P_0C_0(1-\lambda)(\hat{\rho}_A - \hat{\rho}_D)
\end{aligned}
$$

8.7 Empirical Estimation Trade Balance Measures

Recall the steady state real exports and imports (nominal are the same times P_0)

$$
\begin{aligned}
X^R_{A,0} &= X^R_{AB,0} + X^R_{AC,0} + X^R_{AD,0} = \frac{(1-\alpha)(1+a)}{4}C_0 + \frac{1-a}{4}C_0 + \frac{1-a}{4}C_0 \\
M^R_{A,0} &= M^R_{AB,0} + M^R_{AC,0} + M^R_{AD,0} = \frac{(1-\alpha)(1+a)}{4}C_0 + \frac{1-a}{4}C_0 + \frac{1-a}{4}C_0
\end{aligned}
$$

The steady state value of A exports (and imports) is:

$$
(X+M)_0 = 2*\left(\frac{(1-\alpha)(1+a)}{4} + \frac{1-a}{2}\right)P_0C_0
$$

Recall the trade balances:

$$
\begin{aligned}
TB_{AB} &= \frac{(1-\alpha)(1+a)}{4} P_0 C_0 \left[\left(1 - \lambda \left[1 + \frac{\alpha(1+a)}{2} \right] \right) (\hat{\rho}_A - \hat{\rho}_B) - \left(\hat{C}_A - \hat{C}_B \right) \right] \\
TB_{AC} &= \frac{1-a}{4} P_0 C_0 \left[\begin{array}{c} \lambda \frac{(1-\alpha)(1+a)-(1-a)}{4} (\hat{\rho}_A - \hat{\rho}_B) + \left(1 - \lambda_C \left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{4} \right] \right) (\hat{\rho}_A - \hat{\rho}_C) \\ -\lambda \frac{(1-\alpha)(1+a)-(1-a)}{4} (\hat{\rho}_A - \hat{\rho}_D) - \left(\hat{C}_A - \hat{C}_C \right) \end{array} \right] \\
TB_{AD} &= \frac{1-a}{4} P_0 C_0 \left[\begin{array}{c} \lambda \frac{(1-\alpha)(1+a)-(1-a)}{4} (\hat{\rho}_A - \hat{\rho}_B) + \left(1 - \lambda_C \left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{4} \right] \right) (\hat{\rho}_A - \hat{\rho}_D) \\ -\lambda \frac{(1-\alpha)(1+a)-(1-a)}{4} (\hat{\rho}_A - \hat{\rho}_C) - \left(\hat{C}_A - \hat{C}_D \right) \end{array} \right]
\end{aligned}
$$

Assuming that $\hat{\rho}_D = \hat{\rho}_C$ to abstract from intra-periphery stuff. The trade balance measures as according are then as follows. Taking Φ equal to the share of trade between A and B in A's total trade:

$$\Phi = \frac{\frac{(1-\alpha)(1+a)}{4}}{\frac{(1-\alpha)(1+a)}{4} + \frac{1-a}{2}}$$

I formulate the three measures used in the empirical research of the trade balance as approximations around their steady-state values. In all three measures the presence of a makes the reaction to the change in terms-of-trade with the regional partner B less (negative) than with the non-regional trade agreement partners.

Net exports over total steady-state trade: $TB_1 = \frac{EXP-IMP}{EXP+IMP}$:

$$
\begin{aligned}
\frac{T\hat{B}_A}{(X+M)_0} &= \frac{T\hat{B}_{AB} + T\hat{B}_{AC} + T\hat{B}_{AD}}{2P_0C_0 * \left(\frac{(1-\alpha)(1+a)}{4} + \frac{(1-a)}{2} \right)} \\
&= \left\langle \Phi \left(1 - \lambda \left[1 + \frac{\alpha(1+a)}{2} \right] \right) (\hat{\rho}_A - \hat{\rho}_B) \right. \\
&\quad + (1-\Phi) \left[\begin{array}{c} \lambda \frac{(1-\alpha)(1+a)-(1-a)}{4} (\hat{\rho}_A - \hat{\rho}_B) \\ + \left(1 - \lambda \left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{2} \right] \right) (\hat{\rho}_A - \hat{\rho}_C) \end{array} \right] \\
&\quad \left. + \left[\Phi \hat{C}_B + \frac{1-\Phi}{2} \left(\hat{C}_C + \hat{C}_D \right) \right] - \hat{C}_A \right\rangle 2\Phi \left(\frac{(1-\alpha)(1+a)}{4} \right)^{-1} \\
&= \left\langle \left(\Phi - \lambda \left[\Phi \left(1 + \frac{(1+\alpha)(1+a)-(1-a)}{4} \right) - \frac{(1-\alpha)(1+a)-(1-a)}{4} \right] \right) (\hat{\rho}_A - \hat{\rho}_B) \right. \\
&\quad + (1-\Phi) \left(1 - \lambda \left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{2} \right] \right) (\hat{\rho}_A - \hat{\rho}_C) \\
&\quad \left. + \left[\Phi \hat{C}_B + \frac{1-\Phi}{2} \left(\hat{C}_C + \hat{C}_D \right) \right] - \hat{C}_A \right\rangle 2\Phi \left(\frac{(1-\alpha)(1+a)}{4} \right)^{-1}
\end{aligned}
$$

Log of total exports over total imports: $TB_2 = ln\left(\frac{EXP}{IMP}\right)$

$$
\begin{aligned}
\frac{\hat{X}_{AB}}{\hat{M}_{AB}} &= s_0(-\lambda)(\hat{\rho_A} - \hat{P_B}) + (1-s_0)(-\lambda)(2\hat{\rho_A} - \hat{P_C} - \hat{P_D}) - \\
&\quad -s_0(-\lambda)(\hat{\rho_B} - \hat{P_A}) + (1-s_0)(-\lambda)(\hat{\rho_C} + \hat{\rho_D} - \hat{P_A}) = \\
&= -\lambda\left(s_0\left[\hat{\rho_A} - \hat{\rho_B} - (\hat{P_B} - \hat{P_A})\right] - (1-s_0)\left[\hat{\rho_A} - \hat{\rho_C} + \hat{\rho_A} - \hat{\rho_D} - (\hat{P_C} - \hat{P_A}) - (\hat{P_D} - \hat{P_A})\right]\right) \\
&= \lambda\left(1 + \frac{\alpha(1+a)}{2}\right)(s_0(\hat{\rho_A} - \hat{\rho_B}) - (1-s_0)((\hat{\rho_A} - \hat{\rho_C}) + (\hat{\rho_A} - \hat{\rho_D}))
\end{aligned} \tag{7}
$$

Net exports the scaled by steady state GDP $TB_3 = \frac{EXP-IMP}{P_0C_0}$::

$$
\begin{aligned}
\frac{TB_A}{P_0C_0} &= \frac{TB_{AB} + TB_{AC} + TB_{AD}}{P_0C_0} \\
&= \Phi\left(1 - \lambda\left[1 + \frac{\alpha\,(1+a)}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_B) \\
&\quad + (1-\Phi)\left[\begin{array}{c} \lambda\frac{(1-\alpha)(1+a)-(1-a)}{4}\,(\hat{\rho}_A - \hat{\rho}_B) \\ +\left(1 - \lambda\left[1 + \frac{(1+\alpha)(1+a)-(1-a)}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_C) \end{array}\right] \\
&\quad + \left[\Phi\hat{C}_B + \frac{1-\Phi}{2}\left(\hat{C}_C + \hat{C}_D\right)\right] - \hat{C}_A \\
&= \left(\Phi - \lambda\left[\Phi\left(1 + \frac{(1+\alpha)\,(1+a) - (1-a)}{4}\right) - \frac{(1-\alpha)\,(1+a) - (1-a)}{4}\right]\right)(\hat{\rho}_A - \hat{\rho}_B) \\
&\quad + (1-\Phi)\left(1 - \lambda\left[1 + \frac{(1+\alpha)\,(1+a) - (1-a)}{2}\right]\right)(\hat{\rho}_A - \hat{\rho}_C) \\
&\quad + \left[\Phi\hat{C}_B + \frac{1-\Phi}{2}\left(\hat{C}_C + \hat{C}_D\right)\right] - \hat{C}_A
\end{aligned}
$$

9 Appendix II: REER construction

For the construction of the aggregate REER we use the common system of CPI-based REER construction, that goes back to Armington (1969) and **?** theoretical foundations. This construction technic is used by BIS, IMF, OECD and other institutions.

The CPI-based REER of country i is then give by the geometric average of the real exchange rates across the j trading partners:

$$REER_{i,t} = \prod_{j=1}^{j=n} \left(\frac{cpi_i ner_i}{cpi_j ner_j} \right)^{\omega_{ij}}$$

Nominal exchange rate $ner_{i,j}$ and consumer price indices $cpi_{i,j}$ are taken from the IFS database and aggregated to yearly values (simple average) across the available data. Competitiveness weight ω_{ij} is calculated in accordance to what is called "third market effect" as opposed to simple trade weights.

Therefore, assume that country i and j can compete in k markets (including their own). Define T_l^k as the sales of country l in country k's market. Then s_j^k is country's j market share in country k and w_i^k share of country i's output sold in country k. s_i^i is the domestic supply of country i to country i. We proxy for domestic supply on the basis of the original Turner & dack (1993) methodology and the WEO data.

$$s_j^k = \frac{T_j^k}{\sum_l T_l^k}$$

$$w_i^k = \frac{T_l^k}{\sum_n T_l^n}$$

Then the weight attached to country j by coutry i is:

$$\omega_{ij} = \frac{\sum_k w_i^k s_j^k}{\sum_k w_i^k (1 - s_i^k)}$$

This weight could be understood as the sum over all possible markets of the magnitude of the degrees of competition between producers of the ij country pair over the magnitude of competition of the producers of the country i over all possible markets.

This construction of the competitiveness weight is a convex combination of the bilateral import weight and a double export weights, and can be represented in a following way:

$$\omega_{ij} = \lambda_i^{IMP} \omega_{ij}^{IMP} + \lambda_i^{EXP} \omega_{ij}^{EXP}$$

Where:

$\omega_{ij}^{IMP} = \frac{s_i^j}{\sum_{l \neq i} s_l^i}$ - simple import weight;

$\omega_{ij}^{EXP} = \frac{\sum_{k \neq i} w_i^k s_j^k}{\sum_{k \neq i} w_i^k (1 - s_i^k)}$ - ratio of the intensity of competition between the producers of i and j markets, taking into account the competition of the other possible markets;

$\lambda_i^{IMP} = \frac{w_i^k (1 - s_i^i)}{\sum_k w_i^k (1 - s_i^k)}$ - is the measure of relative importance of competition of the domestic producers of country i and all other producers;

$\lambda_i^{EXP} = \frac{\sum_{k \neq i} w_i^k (1 - s_i^k)}{\sum_k w_i^k (1 - s_i^k)}$ - the measure of relative importance of competition of the exporters of country i and other producers in all export markets.

For calculating the RTA and no-RTA REERs, we represent all countries outside the sample as a single competeing country. For example, when we are calculating the competitiveness weights attached to the Germany-France trade flows in 2005 as they have an RTA signed, we treat Russia and China as a part of a joint non-RTA market where both of the countries compete. This allows us to estimate the competitiveness weights with respect to the RTA (or non-RTA) trading partners without isolating them from the existence of the non-RTA (RTA) markets. Then $REER^{RTA}$ and $REER^{noRTA}$ become the rempresentative measure of price competitiveness with respect to the given group.

This technic has a long history of being demanding on restricting the elasticity of substitution between final and intermediate goods to the same level. This has been recently chalenged by the developments on new, better, indices relax this assumptionBems & Johnson (2012). These indeces use different weight structures, or even industry-level underpinned construction, allowing to better capture the competitiveness of the economy. We use as the alternative index the VAREER developed by Bems & Johnson (2012). The section below describes in general its construction.

10 Appendix III: Lists of Regional Trade Agreements (replicated from Bergstrand dataset)

Economic Unions

Euro Area (1999): Austria, Belgium, Cyprus (2008), Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta (2008), Netherlands, Portugal, Slovak Republic (2008), Slovenia (2008), Spain
West African Economic and Monetary Union (UEMOA/WAEMU) (2000): Benin, Burk- ina Faso, Guinea-Bissau, Ivory Coast, Mali, Niger, Senegal, Togo
Economic and Monetary Community of Central Africa (CEMAC) (2000): Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon

Common Markets

European Economic Area (EEA) (1993): Austria (1994), Belgium, Bulgaria (2007), Cyprus (2005), Czech Republic (2005), Denmark, Estonia (2005), Finland (1994), France, Germany, Greece, Hungary (2005), Iceland (1994), Ireland, Italy, Latvia (2005), Lithuania (2005), Luxembourg, Malta (2005), Netherlands, Norway (1994), Poland (2005), Portugal, Romania (2007), Slovak Republic (2005), Slovenia (2005), Spain, Sweden (1994), UK
East African Community (EAC) (2001): Burundi (2008), Kenya, Rwanda (2008), Tanzania, Uganda

Customs Union

Andean Community 1 (1995): Bolivia, Colombia, Ecuador, Peru, Venezuela
Caribbean Community and Common Market (CARICOM) (1975): Antigua And Barbuda, Bahamas (1984), Barbados, Belize, Dominica, Grenada, Guyana, Haiti (2003), Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname (1996), Trinidad and Tobago
Central American Common Market (CACM1) (1966-1969): Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
Eurasian Economic Community (EURASIAN) (2010): Belarus, Kazakhstan, Russia
European Economic Community (EEC) (1962-1992): Belgium, Denmark (1973), France, Germany, Greece (1981), Ireland (1973), Italy, Luxembourg, Netherlands, Portugal (1986), Spain (1986), UK (1973)
European Union Customs Union (EUCU): EU-San Marino (1993), EU-Cyprus (1993)
Gulf Cooperation Council Customs Union (GCCCU) (2003): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates
Mercado Comn del Sur (MERCOSUR) (1995): Argentina, Brazil, Paraguay, Uruguay
Southern African Customs Union (SACU) (1970): Botswana, Lesotho, Namibia (1990), South Africa, Swaziland
West African Economic and Monetary Union (WAEMU) (1995-1999): Benin, Burkina Faso, Guinea-Bissau (1997), Ivory Coast, Mali, Niger, Senegal, Togo
Czech Republic-Slovak Republic (1993-2004)

Free Trade Agreements

1. Plurilateral Agreements
Andean Community 2 (1993-1994): Bolivia, Colombia, Ecuador, Venezuela
Arab Common Market (ACM) (1965): Egypt, Iraq, Syria, Yemen
ASEAN-ANZERTA (2010): Australia, New Zealand and ASEAN members
Association of Southeast Asian Nations (ASEAN) (2000): Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand, Vietnam
Baltic FTA (BAFTA 1999-2004): Estonia , Latvia, Lithuania

Caribbean Free Trade Agreement (CARIFTA) (1968-1974): Antigua and Barbuda, Barbados, Belize (1971), Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago
Central American Common Market (CACM2) (1951-1965): Costa Rica (1963), El Salvador, Guatemala (1955), Honduras (1957), Nicaragua
Central American Common Market (CACM3) (1993): Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
Central European Free Trade Area (CEFTA) (1993): Albania (2007), Bosnia and Herzegovina (2007), Bulgaria (1999-2006), Croatia (2003), Czech Republic (until 2004), Hungary (1993-2004), Macedonia (2006), Moldova (2007), Poland (until 2004), Romania (1997-2006), Slovak Republic (1993-2004), Slovenia (1996-2004)
Colombia -Northern Triangle FTA: Colombia, Mexico, El Salvador, Guatemala, Honduras
Common Market for Eastern and Southern Africa (COMESA) (2001): Burundi (2005), Comoros (2006), Congo D.R., Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya (2006), Madagascar, Malawi, Mauritius, Rwanda (2005), Seychelles, Swaziland, Uganda, Sudan
Dominican Republic-Central America-United States FTA (2006) (CAFTA-DR): Costa Rica (2009), Dominican Republic (2007), El Salvador, Guatemala (2007), Honduras, Nicaragua, United States
European Free Trade Association (EFTA 1960): Austria (until 1995), Denmark (until 1973), Finland (1986-1995), Iceland (1970), Norway, Portugal (until 1986), Sweden (until 1995), Switzerland, United Kingdom (until 1973)
European Union (EU) (1958): Austria (1995), Belgium, Bulgaria (2007), Cyprus (2004), Czech Republic (2004), Denmark (1973), Estonia (2004), Finland (1995), France, Germany, Greece (1981), Hungary (2004), Ireland (1973), Italy, Latvia (2004), Lithuania (2004), Luxembourg, Malta (2004), Netherlands, Poland (2004), Portugal (1986), Slovak Republic (2004), Slovenia (2004), Spain (1986), Sweden (1995), United Kingdom (1973)
Gulf Cooperation Council (GCCFTA)(1983-2002): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates
NAFTA (North American Free Trade Agreement 1994): Canada, Mexico, US
Pan-Arab Free Trade Area (1998) (PAFTA/GAFTA): Algeria (2009), Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon (1999), Libya (1999), Morocco, Oman, Palestine (2005), Qatar, Saudi Arabia, Sudan (2005), Syria, Tunisia, United Arab Emirates, Yemen (2005)
Pacific Island Countries Trade Agreements (2003) (PICTA): Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Samoa
South Asian Free Trade Area (SAFTA)(2006): Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka
Southern African Development Community (SADC) (2001): Botswana, Congo D.R., Lesotho, Madagascar, Malawi (2009), Mauritius, Mozambique (2009), Namibia, South Africa, Swaziland, Tanzania (2009), Zambia, Zimbabwe
Trans-Pacific Partnership (TPP) (2006): Brunei, Chile, New Zealand, Singapore
West African Monetary Union (WAMU) (1962-1965): Burkina Faso, Mali, Mauritania, Niger, Senegal

2. Bilateral Agreements
Albania-Bosnia and Herzegovina (2004-2006)
Albania-Croatia (2004-2006)
Albania-Macedonia (2003-2006)
Albania-Macedonia (2003-2006)
Albania-Romania (2004)
Andean Community 1-Chile (2005)
Andean Community 1-MERCOSUR (2005)
Angola-Egypt (2001)
Armenia-Georgia (1999)
Armenia-Kazakhstan (2002)
Armenia-Kyrgyz Republic (1996)
Armenia-Moldova (1996)

Armenia-Russia (1993)
Armenia-Turkmenistan (1997)
Armenia-Ukraine (1997)
ASEAN-China (2006)
ASEAN-India (2010)
ASEAN-Japan (2008)
ASEAN-South Korea (2007)
Australia-Chile (2009)
Australia-New Zealand (1983-2009)
Australia-Papua New Guinea (1977)
Australia-Singapore (2003-2009)
Australia-Thailand (2005-2009)
Australia-USA (2005)
Azerbaijan-Georgia (1997)
Azerbaijan-Russia (1993)
Azerbaijan-Ukraine (1997)
Bahrain-USA (2007)
Belarus-Russia (1993-2009)
Belarus-Ukraine (2007)
Bolivia-Chile (1996-2004)
Bolivia-Mexico (1995)
Bosnia and Herzegovina-Bulgaria (2005)
Bosnia and Herzegovina-Croatia (2001-2006)
Bosnia and Herzegovina-Macedonia, (2003-2005)
Bosnia and Herzegovina-Moldova (2005-2006)
Bosnia and Herzegovina-Romania (2004-2006)
Bosnia and Herzegovina-Slovenia (2002-2003)
Bulgaria-Israel (2002-2006)
Bulgaria-Macedonia (2000-2006)
Bulgaria-Moldova (2004)
CACM3-Dominican Republic (1998)
CACM3-Mexico (2001)
Cameroon-Gabon (1966-1999)
Canada-Chile (1997)
Canada-Israel (1997)
Canada-Peru (2010)
Canada-USA (1989-1993)
CARICOM-Costa Rica (2004)
CARICOM-Dominican Republic (1998)
CEFTA-Bulgaria (1993-1998)
Chile-China (2007)
Chile-Costa Rica (2002)
Chile-El Salvador (2003)
Chile-Japan (2008)
Chile-Korea (2004)
Chile-Mexico (2000)
Chile-Panama (2008)
Chile-USA (2004)
China-Costa Rica (2010)
China-Hong Kong (2004)
China-Macao (2004)
China-New Zealand (2009)
China-Nicaragua (2007)
China-Pakistan (2008)
China-Peru (2010)
Colombia-Mexico (1995-2009)

COMESA-SADC (2006)
Congo, Republic of-Gabon (1966)
Costa Rica-Mexico (1995-2000)
Croatia-Macedonia (2004)
Czech Republic-Estonia (1997)
Czech Republic-Israel (1997-2004)
Czech Republic-Latvia (1997-2004)
Czech Republic-Lithuania (1997-2004)
Czech Republic-Romania (1997-2006)
EEC-Israel (1975-1992)
EEA-Israel (1993)
EFTA-Albania (2010)
EFTA-Bulgaria (1994-2006)
EFTA-Canada (2010)
EFTA-Chile (2005)
EFTA-Croatia (2002)
EFTA-Czech Republic (1994-2004)
EFTA-Egypt (2007)
EFTA-Estonia (1997-2004)
EFTA-GCCCU (2009)
EFTA-Hungary (1994-2004)
EFTA-Israel (1993)
EFTA-Jordan (2002)
EFTA-Latvia (1996-2004)
EFTA-Lebanon (2007)
EFTA-Lithuania (1997-2004)
EFTA-Macedonia (2001)
EFTA-Mexico (2002)
EFTA-Morocco (2000)
EFTA-Poland (1994)
EFTA-Romania (1994-2006)
EFTA-SACU (2008)
EFTA-Singapore (2003)
EFTA-Slovak Republic (1993-2004)
EFTA-Slovenia (1995-2004)
EFTA-South Korea (2007)
EFTA-Tunisia (2005)
Egypt-Jordan (1999)
El Salvador-Panama (2003)
Estonia-Hungary (1999-2004)
Estonia-Slovak Republic (1997-2004)
Estonia-Slovenia (1997-2004)
EU-Algeria (2005)
EU-Bulgaria (1994-2006)
EU-Chile (2005)
EU-Croatia (2003)
EU-Cyprus (1988-2004)
EU-Czech Republic (1992-2004)
EU-EFTA (Agreement/European Economic Area 1973/1994)
EU-Egypt (2005)
EU-Estonia (1998-2004)
EU-Faroe Islands (1997)
EU-Hungary (1992-2004)
EU-Israel (2000)
EU-Jordan (2002)
EU-Lativa (1995-2004)

EU-Lebanon (2003)
EU-Lithuania (1995-2004)
EU-Macedonia (2002)
EU-Mexico (1998)
EU-Morocco (2001)
EU-Poland (1992-2004)
EU-Romania (1993-2006)
EU-Slovak Republic (1993-2004)
EU-Slovenia (1997-2004)
EU-South Africa (2000)
EU-Tunisia (1999)
Faroe Islands-Iceland (1994)
Faroe Islands-Norway (1994)
Faroe Islands-Poland (2000-2004)
Faroe Islands-Switzerland (1996)
Georgia-Kazakhstan (2000)
Georgia-Russia (1993)
Georgia-Turkmenistan (2000)
Georgia-Ukraine (1997)
Hungary-Israel (1998-2004)
Hungary-Latvia (2000-2004)
Hungary-Lithuania (2000-2004)
India-Sri Lanka (1999-2005)
India-Singapore (2006)
India-South Korea (2010)
Ireland-Latvia (1995)
Ireland-Lithuania (1995)
Israel-Mexico (2001)
Israel-Poland (1998-2004)
Israel-Romania (2002-2006)
Israel-Slovak Republic (1997-2004)
Israel-Slovenia (1999-2004)
Israel-USA (1986)
Japan-Switzerland (2010)
Jordan-Singapore (2006)
Jordan-USA (2002)
Kazakhstan-Kyrgyz Republic (1996)
Kazakhstan-Russia (1993-2009)
Kyrgyz Republic-Moldova (1997)
Kyrgyz Republic-Russia (1993)
Kyrgyz Republic-Ukraine (1998)
Kyrgyz Republic-Uzbekistan (1999-2007)
Latvia-Slovak Republic (1997-2004)
Lithuania-Poland (1997-2004)
Lithuania-Slovak Republic (1997-2004)
Lithuania-Slovenia (1997-2003)
Macedonia-Moldova (2005-2006)
Macedonia-Romania (2004-2006)
Macedonia-Slovenia (1997-2003)
Macedonia-Ukraine (2002-2005)
MERCOSUR-Bolivia (1996-2004)
MERCOSUR-Chile (1996)
MERCOSUR-Israel (2008)
Mexico-Colombia (1995)
Mexico-Japan (2005)
Mexico-Nicaragua (1999)

Mexico-Uruguay (2005)
Mexico-Venezuela (1995)
Moldova-Ukraine (2005)
Morocco-USA (2006)
New Zealand-Singapore (2001-2009)
New Zealand-Thailand (2006-2009)
Oman-USA (2009)
Pakistan-Sri Lanka (2005)
Panama-Singapore (2007)
Peru-Singapore (2010)
Peru-USA (2009)
Poland-Latvia (1999-2004)
Romania-Moldova (1995-2006)
Russia-Tajikistan (1993)
Russia-Turkmenistan (1993)
Russia-Ukraine (1994)
Russia-Uzbekistan (1993)
SADC-SACU (2009)
Slovak Republic-Estonia (1997)
Slovenia-Israel (1999)
Slovenia-Latvia (1997)
Tajikistan-Ukraine (1995)
Turkmenistan-Ukraine (1995)
TPP-China (2007)
Ukraine-Estonia (1997)
Ukraine-Uzbekistan (1996)
USA-Singapore (2004)

Table 11: Country List

Afghanistan	Egypt, Arab Rep.	Lithuania	South Africa
Albania	El Salvador	Luxembourg	Spain
Algeria	Estonia	Macedonia, FYR	Sri Lanka
Argentina	Ethiopia	Madagascar	St. Kitts and Nevis
Armenia	Fiji	Malawi	St. Lucia
Australia	Finland	Malaysia	St. Vincent and the Grenadines
Austria	France	Maldives	Sudan
Bahamas	Gabon	Mali	Sweden
Bahrain	Georgia	Malta	Suriname
Bangladesh	Germany	Mauritius	Switzerland
Barbados	Greece	Mexico	Syrian Arab Republic
Belgium	Grenada	Morocco	Tanzania
Belize	Guatemala	Mozambique	Thailand
Benin	Guyana	Nepal	Togo
Bosnia and Herzegovina	Honduras	Netherlands	Tonga
Brazil	Hong Kong	New Zealand	Trinidad And Tobago
Brunei Darussalam	Hungary	Nicaragua	Tunisia
Bulgaria	Iceland	Niger	Turkey
Burkina Faso	India	Nigeria	Uganda
Burundi	Indonesia	Norway	Ukraine
Cambodia	Ireland	Oman	United Kingdom
Cameroon	Israel	Pakistan	United States
Canada	Italy	Panama	Uruguay
Central African Republic	Ivory Coast	Paraguay	Venezuela
Chile	Jamaica	Philippines	Vietnam
China	Japan	Poland	Yemen
Colombia	Jordan	Portugal	Zambia
Congo, Dem. Rep.	Kazakhstan	Qatar	
Costa Rica	Kenya	Russian Federation	
Croatia	Korea, Rep.	Rwanda	
Cyprus	Kuwait	Saudi Arabia	
Czech Republic	Kyrgyz Republic	Senegal	
Denmark	Latvia	Singapore	
Dominica	Lebanon	Slovak Republic	
Dominican Republic	Libya	Slovenia	