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*Background Paper*

An Empirical Investigation of Trade  
Diversion and Global Value Chains

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## Abstract

This paper uses data on directional trade flows and Regional Trade Agreements (RTA) to i) estimate the effects of RTA on trade flows and ii) assess the importance of Global Value Chains for these effects. Based on a Difference-in-Difference identification strategy, we find that RTAs are associated with: (1) an increase in trade within the region, (2) a decrease in inflows to the region, and (3) an increase in outflows from the region. The first two findings can be understood as trade creation and trade diversion due to a

shift in demand associated with the lower trade barriers within the region and Rules of Origin as an implicit trade barrier for imports from the rest of the world. Global Value Chains are most relevant to understand the third finding on the increase in outflows from the region. The key determinant of the increase in outflows is the importance of the *Regional Value Chains for imports of intermediates* by members of the region.

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# An Empirical Investigation of Trade Diversion and Global Value Chains

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# 1 Introduction

The rise of Global Value Chains (GVCs) is a dominating feature of the recent evolution in the structure of international trade. In the OECD, the import content of exports increased by 63% between 1995 and 2011, reaching a value of 24.3% on average.<sup>1</sup> This internationalization of production through global value chains calls for a reevaluation of the effects of regional trade agreements (RTA) on trade flows.

Since [Viner \(1950\)](#), the effects of regional trade agreements are framed in terms of two concepts: trade creation and trade diversion. An increase in intra-regional trade associated with a RTA is called *trade creation*. In turn, a decrease in trade between the region and the rest of the world is called *trade diversion*. Trade creation is thought to be associated with resources being shifted from relatively inefficient domestic suppliers towards more efficient regional suppliers. In contrast, trade diversion could be the result of resources being shifted from efficient extra-regional suppliers towards inefficient regional suppliers. The desirability of regional trade agreement depends on the balance between trade creation and trade diversion.

This paper provides estimates of the effects of regional trade agreements on trade within the region, and trade between the region and the rest of the world. Our identification strategy exploits the panel structure of the data to control for country-pair, and country-year fixed effects. Importantly, directed trade flows allows to separately identify the extent of trade agreements for inflows to, and for outflows from, the region. The separate identification of the effects of trade agreements on inflows to, and outflows from, the region for a large sample of countries and trade agreements is the first contribution of this paper.

We find evidence of an increase in intra-regional trade, which is in line with the existing literature. We also find strong evidence of a decrease in inflows to the region and an increase in outflows from the region. The evidence of strong effects on inflows and outflows is, to the best of our knowledge, new to the literature. To be sure, our results on inflows and outflows are also in line with results previously found in the literature: there is a small *net* effect on trade between the region and the rest of the world. However, looking at inflows and outflows separately uncovers the strong opposite effects on inflows and outflows underlying the small net effect on total flows. Our findings on the effects of RTA on intra-regional flows and on inflows to the region

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<sup>1</sup>For some countries such as Luxembourg or Belgium, imports make up more than a third of their exports. See data <https://data.oecd.org/trade/import-content-of-exports.htm>

are suggestive of trade creation and trade diversion; two mechanisms that have been studied extensively. Less studied is our finding of an increase in outflows from the region associated with RTAs.

We then refine our analysis to account for participation in Global Value Chains (GVC). In particular, we construct two different indices of participation to the GVC. The first index captures the importance of the country as a supplier of inputs to the GVC. The second index measures the importance of the regional part of the GVC for a given country. The explicit account of GVC for the study of the effect of regional trade agreements on trade flows is the second main contribution of this paper.

We find that accounting for Global Value Chains matters most for the increase in outflows from the regions associated with Regional Trade Agreements. In particular, our index measuring the importance of the regional part of the GVC accounts for the positive effect of RTAs on outflows from the region. We interpret these findings as a manifestation that globalization benefits industry performance through regional input-output networks.

In a context of production chains that are increasingly global, our findings have implications for the future of the debate on regionalism and multilateralism. We use the literature on the determinants of optimal trade policy to interpret our findings' implications for this debate. Our findings suggest that the effect of RTAs on trade volumes lowers the region's incentive to have trade barriers on inflows, while it increases the incentives for the rest of the world to raise trade barriers on outflows from the region.

## Literature

Estimating the effects of regional trade agreements requires to build a counterfactual world. There are two main approaches: using a structural model to simulate the counterfactual as in [Caliendo and Parro \(2015\)](#), or using gravity equations to predict the counterfactual as in [Carrere \(2006\)](#), [Magee \(2008\)](#), [Baier and Bergstrand \(2007\)](#) and [Baier and Bergstrand \(2015\)](#).

This paper is closely related to [Magee \(2008\)](#), which estimates the effects of trade agreement using a panel of 133 countries from 1980 to 1998. Also closely related is [Carrere \(2006\)](#) who uses a gravity model to assess trade creation and trade diversion effects. Our contribution comes from the broader coverage of Regional

Trade Agreements and countries, our focus on the effect of RTA on inflows to and outflows from the region, and on our account of the role of Global Value Chains.

Also related is [Baier and Bergstrand \(2007\)](#) and [Baier and Bergstrand \(2015\)](#) who address the problem of endogeneity related to free trade agreements and trade flows by using panel data and average treatment effects (ATEs). They find positive estimates and conclude that free trade agreements increase members' international trade.

[Anderson and Yotov \(2016\)](#) refer to a gravity model to estimate the effects of trade agreements on terms of trade and global efficiency. They face two main problems: heteroskedasticity in trade flows data, and endogeneity due to the two way causality. To address the first one, they use the Poisson pseudo maximum likelihood (PPML). To address the second one, they introduce two variables, one for trade agreements between countries with low most-favored-nation tariffs (MFN), the other for trade agreements between countries with high MFN tariffs. They find an increase in the global efficiency of manufactures trade over the period 1990-2002.

The behavior of trade flows following a regional trade agreement is also impacted by the depth of the agreement, as analyzed in [Mattoo et al. \(2019\)](#). Using a sample of 96 countries for the period 2002-2014, they show that deep agreements lead to more trade creation and less trade diversion than shallow agreements.

Additionally, beyond complementarity in trade policy, GVCs also create strong interdependence of GDP fluctuation at business cycle frequency and are associated with network propagation effects of any reform aiming at reducing the cost of cross-country trade.<sup>2</sup> Moreover, the segmentation of production across countries also has significant implications for the magnitude of estimated trade elasticities ([Amiti et al. \(2014\)](#), [de Soyres et al. \(2018\)](#)).

Finally, [Estevadeordal et al. \(2008\)](#) study the impact of regional trade agreements on trade liberalization towards non-members. Focusing on Latin American countries, they found “complementary effects” in the sense that a preferential tariff reduction leads to a reduction in the external tariff. [Freund and Ornelas \(2010\)](#) provide an insightful review of the literature on regionalism. The empirical findings of this paper, combined with theories of optimal trade policy suggest two opposing forces towards greater global integration: the response of trade flows to an RTA gives members an incentive to reduce trade barriers towards non-members; however

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<sup>2</sup>See [Gunnella et al. \(2019\)](#) and [de Soyres and Gaillard \(2019\)](#) for the former point, [Boehm et al. \(2019\)](#) and [de Soyres et al. \(2019\)](#) for the latter.

it gives non-members an incentive to increase trade barriers towards the region. The incentive for members to lower trade barriers echoes the literature on multilateralism (Estevadeordal et al. (2008), Bagwell and Staiger (1999)).

The rest of the paper is organized as follows: the second section presents the data sources and the construction of key variables. The third section analyses the effects of Regional Trade Agreements abstracting from Global Value Chains. Section four extends the analysis to tease out the role played by Global Value Chains in our findings from Section 3. Section 5 discusses the implications of our findings for the debate on regionalism and multilateralism. Section 6 concludes.

## 2 Data

### 2.1 Data on Trade Flows

We collect data on bilateral trade flows from the Observatory of Economic Complexity (MIT). This database covers 215 countries over the period 1962-2014. The data are classified according the 4-digit Standard International Trade Classification (SITC), Revision 2. Only products and commodities are considered. Then, we aggregate these bilateral trade flows at the country-level.

To classify trade flows into final and intermediate goods, we use a concordance table<sup>3</sup> from SITC Rev. 2 to Broad Economic Categories (BEC). We then classify goods into five categories: primary, semi-finished goods, parts and components, capital goods, consumption goods, and a residual category called goods non-specified. We group these categories into intermediate and final goods as follows: intermediate goods are primary goods, semi-finished goods, parts and components; and final goods are consumption goods and capital goods.

### 2.2 Data on Trade Agreements

The data on trade agreements comes from a World Bank database<sup>4</sup>. We use the “bilateral observations” file where each observation is a country-pair agreement for one year. There are 189 countries. The period covered is 1958-2015, during which 279

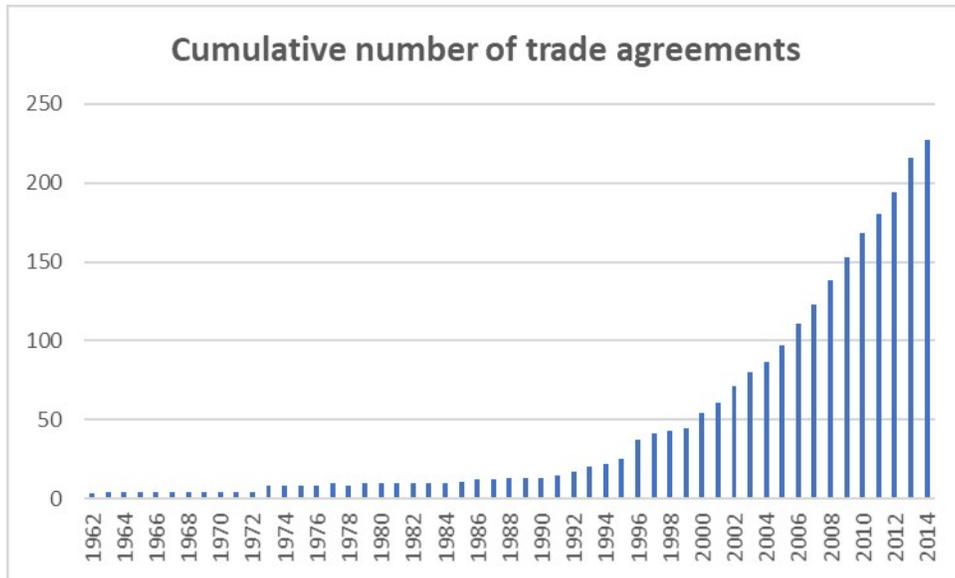
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<sup>3</sup>The concordance table from SITC Rev2 to BEC can be found on the UN Trade Statistics webpage: <https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp> .

<sup>4</sup>See Hofmann Claudia and Ruta (2017)

agreements were signed. We delete trade agreements on services only, which leaves us with 227 trade agreements in our final database. Figure 1 shows the cumulative number of trade agreements over time. We observe a net increase in the number of trade agreements since 1990.

Figure 1: Cumulative number of trade agreement over time



Based on the World Bank database on trade agreements, see [Hofmann Claudia and Ruta \(2017\)](#).

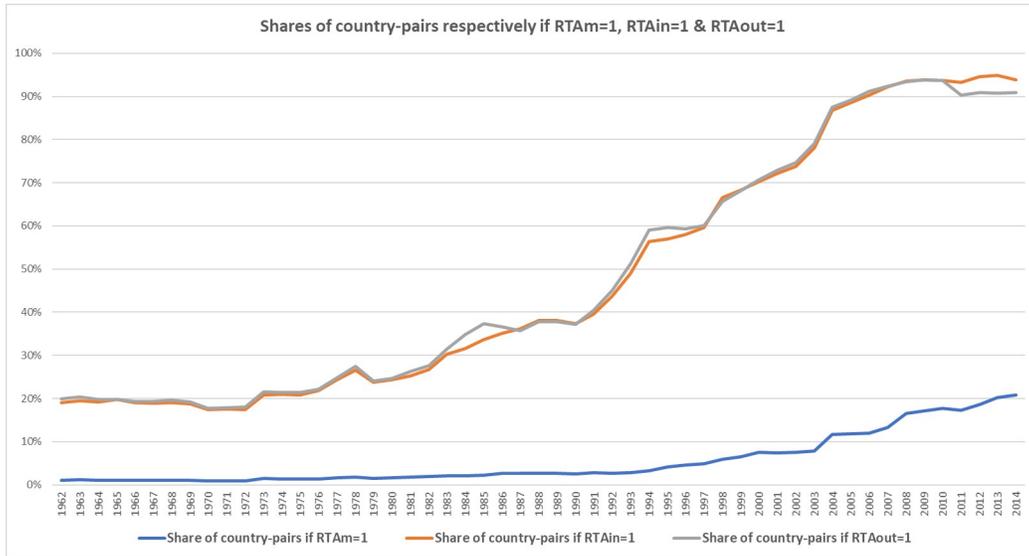
### 2.3 Variables

We create three variables encoding countries' membership in the different trade agreements. The first variable, denoted  $RTA_m$ , is equal to 1 when the country of "origin" and the country of "destination" are both members of the same trade agreement;  $RTA_m$  is equal to 0 otherwise. We use the directed trade flows to create variables encoding inflows and outflows from the region. That is, the second variable, denoted  $RTA_{in}$ , is equal to 1 when the country of "origin" is not a member of any trade agreements to which the country of "destination" belongs; otherwise  $RTA_{in}$  is equal to 0. The third variable, denoted  $RTA_{out}$ , is equal to 1 when the country of "destination" is not a member of any trade agreement to which the country of "origin" belongs; otherwise,  $RTA_{out}$  is equal to 0. Trade agreements are complex

and vary in their coverage and depth. Our analysis of more than two hundred trade agreements limits us in the extent to which we can code the complexity of preferential trade agreements. Our binary coding of Regional Trade Agreements provides a coarse measure of the evolution of preferential trade regions over time, which risks being a source of attenuation bias. As we will see, we still find strong effects.

Figure 2 displays the evolution of the shares of country-pairs that are part of a regional trade agreement ( $RTA_m = 1$ ), an exporter to a regional trading block ( $RTA_{in} = 1$ ), and an importer from a regional trading block ( $RTA_{out} = 1$ ). We see that over the past fifty years, the share of countries that are part of a regional trade agreement rose from 2% to over 20%. The share of countries that do not trade with any regional trade block decreased from 80% to below 10%.

Figure 2: Evolution of the shares of country-pairs respectively when  $RTA_m=1$ ,  $RTA_{in}=1$  &  $RTA_{out}=1$



Participation in Global Value Chains is multifaceted. A country's participation ought to be differentiated by import and export status. The analysis of Regional Trade Agreements suggests decomposing Global Value Chains into their regional components. We construct two variables to capture the degree of participation of a country in Global Value Chains. The first such variable, denoted *share1*, is the

share of intermediate goods that the country of "origin" exports to the country of "destination". The variable *share1* accounts for a country's importance in Global Value Chains as an exporter. The second variable, denoted *share2*, is the share of intermediate inputs that the country of "origin" is importing from other countries that are part of the same regional trade agreement. The variable *share2* accounts for the importance of the regional component of GVC to the imports of a given country.

As we will discuss in the next section on our empirical approach, trade policy is endogenous. Countries that are natural trade partners may be more inclined to sign a trade agreement (Krugman (1991)). Figure 3 provides empirical support to this hypothesis by showing that on average, upon signing an agreement, a country-pair that just signed an agreement trades roughly twice as much as a country-pair where only one country only joined the trade agreement. More precisely: for each country and agreement, we normalized to 100 the trade flows between two countries signing a trade agreement, on the year the agreement is put into force. We can then compare this number (for the same year) to the trade flows between a member country to a non-member country. On average across all countries and trade agreements, we find that trade with non members is only 55.94% of trade between members, on the first year of the agreement.<sup>5</sup>

### 3 Regional trade agreements and trade flows

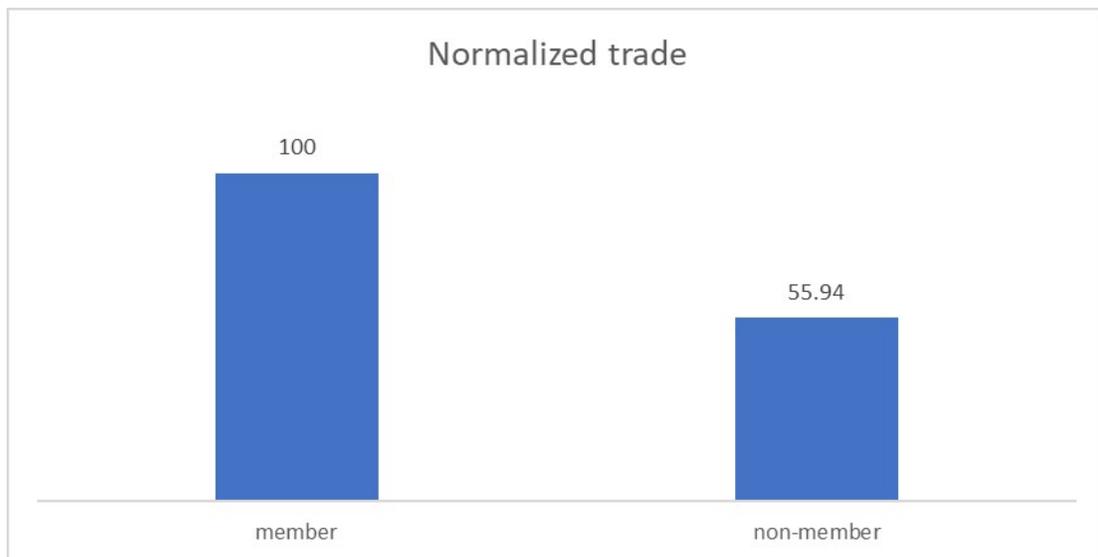
Difference-in-differences is the natural identification strategy for a panel setting in which a policy affects groups. Our identification of the effects of trade agreements comes from comparing trade flows, for the relevant country-pairs, before and after a trade agreement comes into effect, for the 227 trade agreements that were signed between 1958 and 2015. Importantly, our specification controls for country-pair and country-time fixed effects.<sup>6</sup> The country pair fixed effects not only accounts for standard time invariant covariates of gravity models such as geography, institutions, and culture, but also for unobserved time invariant heterogeneity. Country-time

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<sup>5</sup>In order to avoid outliers, we keep 92.5% of the observations.

<sup>6</sup>The directional trade data we use is rich enough that we could expand on the country-time fixed effects to control for country-time by exporter and importer status. Country-time fixed effects by exporter and importer status would however absorb all the variations that we use to separately identify the effects of trade agreements on inflows and outflows.

Figure 3: Normalized trade by distinguishing countries member of a RTA and non-member countries



Note: on average, upon signing an agreement, a country-pair that just signed an agreement trades roughly twice as much as a country-pair where only one country only joined the trade agreement.

fixed effects controls for all country-specific factors in a given year; these include observable covariates such as GDP, domestic politics such as election year, weather and all other country-specific unobservables. We estimate the following regressions by Ordinary Least Squares:

$$\ln(\text{Trade}_{ijt}) = \delta_m \text{RTA}_{mijt} + \delta_{in} \text{RTA}_{inijt} + \delta_{out} \text{RTA}_{outijt} + \beta_{ij} + \beta_{it} + \beta_{jt} + \epsilon_{ijt} . \quad (1)$$

A positive coefficient  $\delta_m$  suggests evidence of trade creation where members respond to a decrease in trade barriers by trading more. A negative coefficient  $\delta_{in}$  would suggest trade diversion where members of the newly created trade block import less from the rest of the world. A positive coefficient  $\delta_{out}$  would indicate that members of the newly created trade block export more to the rest of the world. The interpretation of the coefficients is sensitive to endogeneity issues to which we now turn.

*Endogeneity of trade agreements:* While our baseline specification aims to capture the effect of trade agreements on trade flows, the causality may play in the other

direction: countries self-select into membership, importer, and exporter to the trade block. In other words, members of the trade agreement may be a selected group of countries inclined to trading with one another. This concern is partly addressed by country-pair fixed effects. Country-pair fixed effects control for the extent to which self-selection into membership is based on an inclination to a high level of trading. The extent to which self-selection into membership is based on an inclination to a high increase in trade over time, however, is not controlled for. Such self-selection into trade blocks due to an inclination to a high increase in trade over time would lead to over-estimate trade creation; that is the estimator for  $\delta_m$  would be biased upward. Likewise, for trade partners which were not selected to be part of the agreement, the results would over-estimate trade diversion; that is  $\delta_{in}$  and  $\delta_{out}$  would be biased downwards.

Trade agreements vary in their coverage and depth for trade within the region. They do also affect the region’s trade policy with the rest of the world. [Estevadeordal et al. \(2008\)](#) find that preferential tariff reduction leads to a reduction of the tariff applied to non-members. In contrast, Rules of Origin requirements would tend to have the opposite effect. Our binary coding of participation in various trade agreements provides a coarse measure of the change in trade barriers between countries. Such measurement error is a source of attenuation bias which would tend to compensate for some of the biases due to potential reverse causality.

*Clustering standard errors:* An observation is a unidirectional trade flow for a country-pair in a given year. Standard errors are robust to clustering at the country-pair level, which accounts for correlation across either directions in the bilateral relationship as well as for serial correlation across time. That is, we allow for the error term to have a fixed country-pair component common to both pairs  $(ij)$  and  $(ji)$  and for serial correlation within bilateral country pairs.

### 3.1 Results

Table 1 presents the OLS estimates of the within-group transformation of the regression equation (1). The coefficient for  $RTA_m$  is positive and highly significant. When two countries sign a trade agreement, trade flows between them increase by an estimated 27%. The coefficient for  $RTA_{in}$  is -0.22. When a country becomes a member of a trade agreement, the imports coming from a country outside the trade agreement decrease by an estimated 22%. The coefficient for  $RTA_{out}$  is 0.296:

when a country signs a trade agreement, its exports increase by an estimated 30% to non-member countries.

	log(trade)
RTAm	0.274*** (9.99)
RTAin	-0.220*** (-7.44)
RTAout	0.296*** (9.80)
Country pair FE	Yes
Country×time FE	Yes
Observations	796,107
R2	0.7945

t statistics in parentheses  
\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 1: OLS estimates of regression equation (1)

As expected, two countries entering a trade agreement is associated with an increase in trade between them. This is evidence of trade creation, which corroborates what was found in previous studies. More interesting is the associated strong decrease in inflows to, and a strong increase in outflows from, the region. While this does not contradict previous findings of a small effect on total trade with the rest of the world, our findings uncover strong underlying effects on inflows and outflows.

The decrease in inflows to the region following the implementation of a trade agreement is evidence of trade diversion. The lower trade barriers within the region make imports from the region relatively more appealing. As a result, members source more from within the region and less from outside the region. While regional trade agreements lower trade barriers within the region, their effect on trade barriers with the rest of the world is ambiguous. On the one hand, trade agreements feature Rules of Origin clauses which regulate the origin of the goods benefiting from lower trade barriers. Rules of Origin are a form of trade barrier on inflow to the region which is an additional factor explaining the decrease in inflows to the region associated

with a regional trade agreement. On the other hand, [Estevadeordal et al. \(2008\)](#) find evidence that regional trade agreements lead to lower external trade barriers. Overall, our findings suggest that, despite complementarities in tariff reductions within the region and on imports, regional trade agreements tend to lower imports from the rest of world.

The strong increase in outflows from the region associated with a regional trade agreements is less expected. Trade diversion lowers the demand for imports from the rest of the world which could have adverse effects on production abroad thereby promoting exports from the region. The emergence of a consensus that “globalization improves industry performance” (cf. [De Loecker and Goldberg \(2014\)](#)) suggests a complementary mechanism contributing to the observed increase in outflows. Industries within the region benefit from greater access to their regional part of the Global Value Chains. The associated increase in performance fosters exports from the region. The next section investigates the extent to which Global Value Chains contribute to our findings.

### **The importance of separating inflows from outflows**

It is interesting to contrast our findings to a setup similar to [Magee \(2008\)](#), where the effect of RTA on total flows, an aggregate of inflows and outflows, is measured. To do so, we define a dummy variable  $RTA_{in-or-out}$  which is equal to one if and only if either  $RTA_{in}$  or  $RTA_{out}$  is equal to one. Such a dummy captures the changes in total trade flows between a member of a RTA and a non-member of a RTA compared to the control group composed of country-pairs that do not join a RTA the same time period. We estimate the role of RTAs based on the following equation:

$$\ln(Trade_{ijt}) = \delta_m RTA_{mijt} + \delta_{in-or-out} RTA_{in-or-out}_{ijt} + \beta_{ij} + \beta_{it} + \beta_{jt} + \epsilon_{ijt} . \quad (2)$$

Results presented in [Table 2](#) show that if one does not account for inflows outflows separately, the net effect of RTAs on flows between a member and a non member is positive overall. This is the net effect of two strong underlying effects documented in [Table 1](#).

	log(trade)
RTAm	0.280*** (10.27)
RTA $in-or-out$	0.103*** (4.56)
Country-Pair FE	Yes
Country $\times$ time FE	Yes
Observations	796,107
R2	0.793

Table 2: OLS estimates of regression equation (2)

## 4 Accounting for Global Value Chains

To assess the contribution of Global Value Chains to the effects of regional trade agreements on trade flows, we augment the analysis from the previous section to include two measures of participation in Global Value Chains. As described in subsection 2.3, our first measure, denoted  $share1$ , is the share of intermediates in bilateral exports from the country of origin. The second measure, denoted  $share2$ , is the country of origin's share of intermediates in imports from the region. The variable  $share1$  captures the importance of a country as a supplier of intermediate goods to the Global Value Chains. The variable  $share2$  captures the importance of the region's part of the Global Value Chains in supplying intermediate goods to a given country. The augmented regression equation reads as follows:

$$\begin{aligned}
\log(Trade_{ijt}) = & \delta_m RTAm_{ijt} + \delta_{in} RTAin_{ijt} + \delta_{out} RTAout_{ijt} \\
& + \delta_1 share1_{ijt} + \delta_2 share2_{ijt} \\
& + \delta_{m1} RTAm \times share1_{ijt} + \delta_{m2} RTAm \times share2_{ijt} \\
& + \delta_{in1} RTAin \times share1_{ijt} + \delta_{in2} RTAin \times share2_{ijt} \\
& + \delta_{out1} RTAout \times share1_{ijt} + \delta_{out2} RTAout \times share2_{ijt} \\
& + \beta_{ij} + \beta_{it} + \beta_{jt} + \epsilon_{ijt}.
\end{aligned} \tag{3}$$

## 4.1 Results

Table 3 presents the OLS estimates of the within-group transformation of the regression equation (3).

	log(trade)
RTAm	0.215** (2.91)
RTAin	-0.329*** (-6.05)
RTAout	-0.097 (-1.57)
share1	0.898*** (33.92)
share2	-0.196 (-1.35)
RTAm $\times$ share1	0.094 (1.55)
RTAm $\times$ share2	-0.012 (-0.10)
RTAin $\times$ share1	0.093** (3.00)
RTAin $\times$ share2	-0.083* (-2.09)
RTAout $\times$ share1	-0.706*** (-22.91)
RTAout $\times$ share2	1.47*** (10.05)
Country pair FE	Yes
Country $\times$ time FE	Yes
Observations	796,107
R2	0.7982
t statistics in parentheses	
* p<0.05, ** p<0.01, *** p<0.001	

Table 3: OLS estimates of regression equation (3)

To understand the importance of Global Value Chains (GVC) for the effect of Regional Trade Agreements on trade flows, it is insightful to compare the results from model (1), which does not account for GVC, with the results from model (1), which does account for GVC. Comparing Table 1 to Table 3, one main message

emerges: participation in GVC is a key determinant of the strong positive effect of RTAs on outflows from the regions. It does not, however, contribute much to the creation of trade within regions and the diversion of inflows to the region.

First, we look at the effect of RTAs on the creation of trade within the region. Comparing Table 1 to Table 3, the coefficients for  $RTA_m$  are of similar magnitude. Our two measures of participation to GVC do not explain much of the trade creation resulting from RTA. It is worth noting that participation in GVC does, however, contribute mildly to trade creation. Likewise, comparing coefficient for  $RTA_{in}$  gives a similar picture of small effects of GVC on trade diversion for inflows to the region.

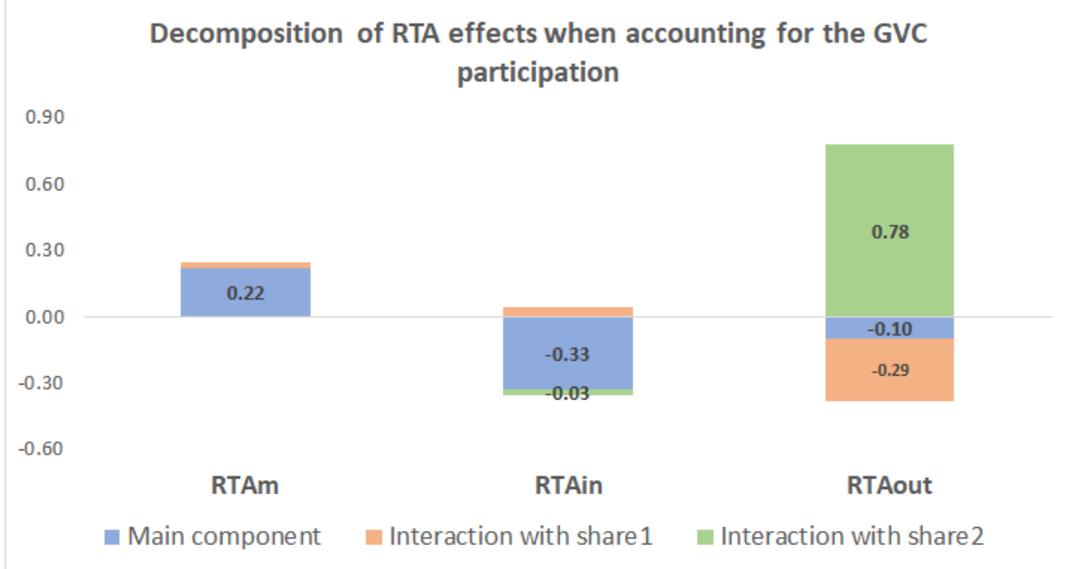
Accounting for participation in GVC gives rich insights into the mechanisms explaining the positive effect of RTAs on outflows from the regions. In the absence of GVC, that is if share1 and share2 were 0, the coefficient for  $RTA_{out}$  indicates that RTA would be associated with mild trade diversion of outflows from the region. Comparing Table 1 to Table 3, the drop in magnitude and the change of sign for coefficient  $RTA_{out}$  reveals that GVC play a major role in explaining the increase in outflows from the region.

Our two measures of participation in GVC allows to gain insights into the determinants of the increase in outflows from the regions. The effect of participation in exports to the Global Value Chains on outflows from the region is negative. Countries that mostly supply to the Global Value Chains are most affected by the shift in demand in the region. In contrast, the effect of participation in importing from the Regional Value Chains is positive and is the key determinant of the overall positive effect. Countries that rely most on the Regional Value Chain to source their inputs are the ones that benefit the most from the RTA. The boost in industry performance fosters more exports from the region to the rest of the world.

	if RTAm=1	if RTAin=1	if RTAout=1
Mean(share1)	0.33	0.42	0.41
Median(share1)	0.3	0.38	0.39
Mean(share2)	0.45	0.37	0.53
Median(share2)	0.52	0.48	0.56

Table 4: Mean and Median values of GVC variables, disentangled by RTA dummies

Figure 4: Results with GVCs



## 4.2 Timing of the effects of Regional Trade Agreements

The total effects of RTA on trade flows can be decomposed in effects at different points in time. We decompose the total effect on trade flows, as documented in Table 1, into anticipatory and lagged effects. The following estimating equation shows that we use five anticipatory effects and 6 lagged effects:

$$\ln(\text{Trade}_{ijt}) = \sum_{\tau=-5}^6 \delta_{m\tau} \text{RTAm}_{\tau} + \sum_{\tau=-5}^6 \delta_{in\tau} \text{RTAin}_{\tau} + \sum_{\tau=-5}^6 \delta_{out\tau} \text{RTAout}_{\tau} + \beta_{ij} + \beta_{it} + \beta_{jt} + \epsilon_{ijt} \quad (4)$$

Our results, presented in table 5, suggest that the effects of RTA on trade creation within the region are long-lasting. The anticipatory effect is strong for RTAin. This reminds us that trade negotiations is a lengthy process. The decrease in trade inflows associated with a trade agreement occurs mainly in anticipation of the trade agreement. For the outflows, we notice some anticipation effects and a strong positive effect post implementation.

Time	log(trade)		
	RTAm	RTAin	RTAout
-5	-0.0056 (-0.18)	-0.1614*** (-14.39)	0.0601*** (5.42)
-4	0.0014 (0.05)	-0.1615*** (-14.08)	0.0308** (2.72)
-3	-0.0080 (-0.26)	-0.1376*** (-11.62)	0.0291* (2.48)
-2	0.0429 (1.37)	-0.1073*** (6.91)	0.0618*** (10.67)
-1	0.0737* (2.31)	-0.0735** (-5.22)	0.0747*** (5.35)
0	0.1040** (2.79)	-0.0615** (-3.03)	0.0938*** (4.62)
1	0.2019*** (5.85)	-0.0042 (-0.29)	0.1385*** (9.54)
2	0.2405*** (6.91)	-0.0150 (-1.13)	0.1423*** (10.67)
3	0.2429*** (6.88)	0.0023 (0.19)	0.1329*** (10.46)
4	0.3067*** (8.67)	-0.0093 (-0.75)	0.1213*** (9.75)
5	0.3287*** (9.19)	0.0287* (2.32)	0.1063*** (8.63)
6 and more	0.5777*** (0.2990)	0.0962*** (10.02)	0.2773*** (28.97)
Country pair FE	Yes		
Country×time FE	Yes		
Observations	796,107		
$R^2$	0.7990		

t statistics in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 5: Timing of the effects of RTA on total trade flows

## 5 Regionalism and Multilateralism

This section studies the implications of our empirical findings for regionalism and multilateralism. A situation in which a Regional Trade Agreement heightens (resp. dampens) the incentive for trade protection between the region and the rest of the world is a case of regionalism (resp. multilateralism).

In particular, we study the effect of the change in trade flows associated with a Regional Trade Agreement on the incentives to erect trade barriers between the region and the rest of the world. We draw from the literature on optimal trade policy which finds that the volume of trade increases the incentive to raise trade barriers (cf. [Bagwell and Staiger \(2011\)](#)).<sup>7</sup> Our separate identification of the change in both inflows and outflows associated with a RTA allows to discuss i) the incentives for the region to raise trade barriers on inflows from the rest of the world, and ii) the incentives for the rest of the world to raise trade barriers on outflows from the region.

First, we consider the incentives for the region to raise trade barriers on inflows from the rest of the world. Members of the RTA that are also WTO members are constrained in setting their external policy to levels that are less constraining than they were before the regional agreement. Our finding that the region imports less from the rest of the world suggests that a regional trade agreement lowers the region's motive for trade protection from the rest of the world. This conclusion is in line with the empirical findings of [Estevadeordal et al. \(2008\)](#).

Less studied is the incentive for the rest of the world to raise trade barriers on outflows from the region in response to a Regional Trade Agreement. We find an increase in export volume from the region to the rest of the world for regions that have well developed regional value chains. Theories of optimal trade policy suggest then that the protectionist motive of the rest of the world toward the region is heightened.

It is important to note that our analysis is only suggestive of incentives for countries to alter their trade policy in response to a regional trade agreement. Empirical analysis of changes in trade protections in response to a Regional Trade Agreement, as in [Estevadeordal et al. \(2008\)](#), would be a natural complementary analysis to ours. While this is beyond the scope of this paper, our findings point to Global Value Chains as a determining factor for the incentives of non-members of a Re-

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<sup>7</sup>We emphasize, like [Bagwell and Staiger \(1990\)](#) Section 5, that the relevant determinant of trade protection is the trade volume and not the trade balance.

gional Trade Agreement to change their trade policy in response to a RTA.

## 6 Conclusion

This paper analyses the consequences of Regional Trade Agreements on the changes in trade flows both within the agreement region and with the rest of the world. Based on the universe of all trade agreements between 1962 and 2014 for a total of 215 countries, our results show that, once we control for country-pair and country-time fixed effects, RTAs are associated with an increase in trade flows within the zone, and an increase of the outflows from the region towards the rest of the world. However, there is a decrease in inflows from the rest of the world towards the agreement region.

We then study the role of Global Value Chains in shaping the reorganization of trade flows after a trade agreements. Our analysis reveals that the increase in trade flows towards the rest of the world is associated with a stronger participation in regional value chains. When countries are not integrated into production chains, they experience a decrease in both imports from and exports to the rest of the world after signing a regional trade agreement. Overall, our findings show that Global Value Chains are associated with an important change in the way trade flow are affected by trade agreement: by allowing firms to decrease their input price and hence reduce their production cost, a regional trade agreement in a region that is well integrated in terms production is associated with marked gains in market shares in the rest of the world.

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