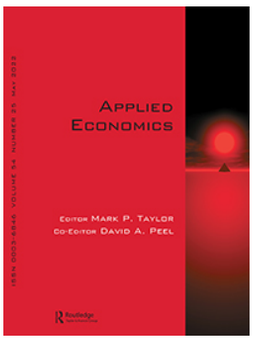

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Unequal trade, unequal gains: the heterogeneous impact of MERCOSUR

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ABSTRACT

We estimate the impact of MERCOSUR on trade flows and on gains from trade for its member countries using a standard modern general equilibrium quantitative structural gravity model. We find a highly heterogeneous impact on bilateral trade flows and gains from trade. We estimate that gains from trade attributable to MERCOSUR are equivalent to a 4.0% increase in per-capita consumption for Argentina. For the other countries, gains from trade are smaller: 0.8% for Uruguay, 0.5% for Paraguay, and 0.3% for Brazil. We study whether Brazil would benefit from withdrawing from MERCOSUR and signing a trade agreement with a different trade bloc but conclude that net gains from such a switch would be small, if any.

KEYWORDS

General equilibrium; international trade; MERCOSUR; structural gravity model; trade agreements

JEL CLASSIFICATION

F13; F14; F15; F62

I. Introduction

Countries do not benefit equally from signing a trade agreement. Recent research (e.g. Kohl 2014; Baier, Yotov, and Zylkin 2019b; El Dahrawy Sánchez-Albornoz and Timini 2021) reports estimates of the impact of trade agreements on trade flows that differ widely, both between and within trade agreements. Usually, welfare gains from trade also differ substantially between trade partners, possibly leading to conflict within a trade bloc, or ex-post renegotiation attempts by countries that sign a trade agreement. In this paper we study MERCOSUR, a trade bloc established by Argentina, Brazil, Paraguay and Uruguay in 1991, and estimate the impact on trade and welfare for its members within a structural gravity model framework, using modern methods, and allowing for heterogeneity within the trade bloc.

MERCOSUR serves as an interesting case study for various reasons. First, countries are of very different sizes, a circumstance that is likely to lead to heterogeneity in trade flows and in gains from trade. Second, as with other trade blocs, some of its members have occasionally flirted with abandoning the trade bloc, and our estimates serve to compute the impact on welfare of such a move.[1] Third, although MERCOSUR has received a moderate amount of attention in the past, it has not been studied to the same extent as the European Union or the North American Free Trade Agreement (NAFTA); in particular, the study of this particular trade bloc – the fourth largest in the world – lags behind in the use of the most recent methodological advances. To our knowledge, ours is the first paper to study the impact of MERCOSUR specifically using a modern medium-sized quantitative structural gravity model and data on intra-national trade flows that are constructed in a consistent way.[2]

To draw conclusions that are unencumbered by specific model details, we employ a general structural gravity framework that encompasses a large set of individual models that have been proposed to explain bilateral trade flows in the past. After estimating the parameters of the model in a theory-consistent way, we calculate gains from trade in

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[1] Newspaper coverage on countries' threats to withdraw from MERCOSUR is abundant, for example, The Economist (2012), Preissler Iglesias and Gamarski (2019), and Nessi (2020).

[2] Intra-national trade flows are desirable for theoretical reasons in a structural gravity model (Yotov 2012; Beverelli et al. 2018; Yotov 2021; Heid, Larch, and Yotov 2021) and, in our case, they are a necessary input to calculate effects on welfare.

Supplemental data for this article can be accessed here.

general equilibrium using a sufficient statistics formula à la Arkolakis, Costinot, and Rodriguez-Clare (2012), which requires information on just two sufficient statistics: the change in the share of internal trade and an elasticity parameter. This implies that our results on welfare do not depend on the exact details of an underlying model, as long as it fits into the structural gravity framework, as defined by Head and Mayer (2014).

We find that MERCOSUR has had a very heterogeneous impact on trade flows between its members. Argentina plays a central role, with trade flows attributed to MERCOSUR into and out of Argentina rising more than for the other trade relationships within the bloc. In fact, the bilateral trade flows between Argentina and Brazil strengthened substantially, as did trade flows between other bloc members and Argentina – but not between other bloc members and Brazil. These results explain why we find the largest gains from trade for Argentina.

Brazil is the member of MERCOSUR with the lowest gains from trade. This begs the question of whether Brazil would be better off by withdrawing from the agreement and joining a different trade bloc. We explore this question through a series of counterfactual scenarios and find that gains from trade for Brazil of switching into other trade agreements would be small, and therefore likely to be outweighed by switching costs associated to exiting the old treaty (e.g. increased uncertainty, disruptions in global and regional value chains) or entering the new one (use of political capital for negotiations and approval of the treaty), other economic factors (economic benefits from further integration within MERCOSUR) and domestic considerations distinct from gains from trade (e.g. the democratic clause or the migratory regulations embedded in the MERCOSUR treaty).

Prior work that has studied the impact of MERCOSUR on trade flows within a structural gravity framework consistently finds that MERCOSUR has led to an increase of intra-bloc trade. For example, Baier, Bergstrand, and Vidal (2007) report a large positive impact on trade flows and Magee (2008) and Baier, Bergstrand, and Clance (2018) find that the impact of MERCOSUR on trade flows exceeds that of other regional trade agreements.[3] Closer to our work is the recent paper by Baier, Yotov, and Zylkin (2019b), which estimates a structural gravity model allowing for heterogeneous impacts on trade bloc members, and using data that include intra-national trade flows. It finds that the trade impact of MERCOSUR is on the high end of the distribution of regional trade agreements.[4]

Our empirical strategy differs from prior work in that we employ more flexible specifications to explore whether the impact of MERCOSUR changes over time, or is heterogeneous between MERCOSUR members, and that we also focus on gains from trade. We proceed in two steps. In a first step we use a specification in which MERCOSUR is allowed to have a fully flexible impact on trade costs and trade flows along the temporal dimension. The results from this first part confirm historical details known about MERCOSUR and show a distinction between two periods: a transitional period between 1991 and 1994 with a rising impact on trade flows and a second period that starts in 1995 during which the impact on trade settles at a higher level. In a second step, we study heterogeneity between bloc members in each of these two periods.

A paper that comes close in spirit to our general question and to our focus on the computation of gains from trade is a recent article by Baier, Bergstrand, and Bruno (2019a), who study the impact of a hypothetical dissolution of NAFTA. Apart from the fact that we analyze a different trade agreement, our papers also differ in its methodology. Whereas they identify the partial equilibrium impact used as an input for the general equilibrium computations from the estimation of a common free trade agreement dummy variable plus a symmetric fixed effect, we allow the partial equilibrium impact to be specific to MERCOSUR, to evolve over time (before and after 1995, when MERCOSUR officially became a customs union), and to differ within country pairs depending on the direction of trade flows. In fact, we find that this second point is an important distinction,

[3]A few papers do not find clear evidence. For example, Kohl (2014) finds a large but imprecisely estimated point estimate and Carrère (2006) finds conflicting evidence for MERCOSUR, although for data ending in 1996.
[4]This result is confirmed by El Dahrawy Sánchez-Albornoz and Timini (2021), who use a different database and focus on Latin American countries.

given that the heterogeneity in the partial equilibrium estimates is substantial in the case of MERCOSUR.

The paper is structured as follows. We explain our empirical strategy in Section II. A description of the theory used to interpret our results is relegated to the appendix. In Section III we report our findings for trade flows and in Section IV the results for gains from trade. We conclude in Section V.

II. Empirical strategy

Theory-Consistent estimation

We estimate a specification of the form:

$$X_{ijt} = \exp\left(\eta_{it} + \psi_{jt} + b_{ijt}\right) + v_{ijt}. \qquad (1)$$

This is the usual specification used to estimate a structural gravity model (such as the one described in the appendix). The variable X_{ijt} denotes the value of exports from country i to country j in year . Countries t and i are not necessarily distinct: observations with j refer to domestic trade and those with $i = j$ to international trade. On the right side, the terms $i \neq j$ and η_{it} are exporter-time and importer-time fixed effects that capture the time-varying multilateral resistance terms of structural gravity models. This implies that the third term is a measure of ψ_{jt} bilateral trade costs. $\theta_{ijt} = \exp(b_{ijt})$ finally is an error term. We estimate the specification in (1) via a Poisson Pseudo-Maximum-Likelihood v_{ijt}(ppml) procedure (Santos Silva and Tenreyro 2006) and compute standard errors by clustering on exporter, importer, and year.[5]

All our estimations can be thought of as choosing different specifications for the bilateral term b_{ijt}. In all cases, we include either pair or directional fixed effects in b_{ijt} to capture the part of bilateral trade costs that stays constant through time (such as geographical distance). By adding dummy variables for the agreements in the Baier-Bergstrand eia database we also introduce time-variation in b_{ijt}. The Baier-Bergstrand eia database classifies trade agreements into six different types: non-reciprocal preferential trade agreement (denoted by gsp, the acronym for generalized system of preferences), preferential trade agreement (PTA), free trade agreement (FTA), customs union (CU), common market (CM), and economic union (ECU). At any point in time, a pair of countries can be in at most one of these categories. MERCOSUR is classified as a PTA until 1994 and as a CU starting in 1995. Because we focus on MERCOSUR separately, we remove this agreement from the Baier-Bergstrand database (set the dummy variables to zero) but include all other agreements.

Formally, the introduction of trade agreements can be described by defining time-indexed sets that contain all pairs of countries that participate in any given agreement. We define the sets $GSP_t, PTA_t, FTA_t, CU_t, CM_t, ECU_t$ for the different types of agreements in the Baier-Bergstrand database. So, for example, FTA_t contains the (ordered) pair (i, j) if and only if trade from country i to country j at date t is regulated by an agreement of type FTA. Because our focus is on MERCOSUR countries, we adopt a more flexible specification for the bilateral trade costs between these countries. We denote the set of MERCOSUR countries by M. This set contains the pairs (i, j) with $i \neq j$ such that both i and j are one of the four founding members of MERCOSUR : Argentina, Brazil, Paraguay, and Uruguay. The set M is not time dependent but we will estimate time-varying coefficients for this variable in our estimations.

With this notation, our baseline specification for bilateral trade costs is

$$\begin{aligned} b_{ijt} =& \delta_{ij} + \mu_t \mathbf{I}_{\{(i,j)\in M\}} + \gamma_t \mathbf{I}_{\{i\neq j\}} \\ &+ \alpha_{GSP}\mathbf{I}_{\{(i,j)\in GSP_t\}} + \alpha_{PTA}\mathbf{I}_{\{(i,j)\in PTA_t\}} \\ &+ \alpha_{FTA}\mathbf{I}_{\{(i,j)\in FTA_t\}} + \alpha_{CU}\mathbf{I}_{\{(i,j)\in CU_t\}} \\ &+ \alpha_{CM}\mathbf{I}_{\{(i,j)\in CM_t\}} + \alpha_{ECU}\mathbf{I}_{\{(i,j)\in ECU_t\}} \\ &+ \beta' Z_{ijt}, \end{aligned} \qquad (2)$$

[5]Santos Silva and Tenreyro (2006) introduced ppml as an appropriate choice to deal with heteroskedasticity. An added advantage of this estimator was discovered by Fally (2015), who showed that the estimated fixed effects of the ppml estimator comply with the definition of outward and inward multilateral resistance terms and the equilibrium constraints that they need to satisfy. Finally, the estimator can handle trade flows that are zero. We compute standard errors by clustering on exporter, importer, and year to address the multi-indexed structure of trade data. Egger and Tarlea (2015) show that because of this characteristic of trade data, computing standard errors that are clustered at the country-pair level leads to misleading inference on the impact of preferential trade agreements.

where $\mathbf{I}_{\{cond\}}$ denotes an indicator function that takes the value one if condition *cond* is satisfied and zero otherwise. The first term, δ_{ij}, is a directional fixed effect that takes the value one if trade flows from country i to j and zero otherwise. The object of interest is the sequence of parameters μ_t, which traces out the impact of MERCOSUR membership on trade through time. The coefficients γ_t measure how crossing an international border affects trade (i.e. how international trade flows differ from domestic trade flows). The evolution of these coefficients over time can be interpreted as a measure of a general globalization trend (Bergstrand, Mario, and Yotov 2015). The coefficients α_k capture the impact of the six types of trade agreement in the Baier-Bergstrand eia database. Finally, $\beta' Z_{ijt}$ stands for additional controls that we include in robustness checks.

Our specification encompasses more restrictive specifications as special cases. For example, a specification with symmetric pair effects corresponds to the special case in which directional fixed effects are restricted to satisfy $\delta_{ij} = \delta_{ji}$. Any estimation that uses the original Baier-Bergstrand eia database, which classifies the relationship between MERCOSUR countries as a pta until 1994 and as a CU afterward, implies the restriction $\mu_t = \alpha_{PTA}$ for $t \leq 1994$ and $\mu_t = \alpha_{CU}$ for $t > 1994$.

Data

Given our focus in gains from trade, we require data that contains intra-national trade flows. Our source for bilateral trade flows is the database compiled by Yotov et al. (2016). This database contains yearly bilateral trade flows of manufacturing goods for 69 countries over the period 1986–2006 constructed in a homogeneous way, and including intra-national trade flows. Unfortunately, it does not contain data on Paraguay, one of the members of MERCOSUR. We therefore construct bilateral data flows involving Paraguay following the procedure described by Yotov et al. (2016) as close as possible. With the addition of Paraguay, our database contains all flows between 70 countries over the period 1986–2006. We describe our methodology and the choices we made in detail in Appendix B.[6]

Data on trade agreements are taken from the 2017 version of the Baier-Bergstrand eia database. When reporting results, we express flows in constant US dollars using consumer inflation from the April 2020 World Economic Outlook by the International Monetary Fund. Bilateral distance, which is used in robustness checks, is taken from the geography database by CEPII (Mayer and Zignago 2011).

General equilibrium computations

As usual, we infer the changes in bilateral trade costs θ between two scenarios using estimates obtained for b_{ijt}. We then solve the static general equilibrium model described in the appendix for a particular date t using this change in θ and observed data on bilateral trade flows. We use a trade elasticity of four ($\epsilon = -4$) in all computations, as suggested by the results by Simonovska and Waugh (2014) and Bajzik et al. (2020).

III. The impact of Mercosur on trade

MERCOSUR was founded by the Treaty of Asunción in March 1991; Argentina, Brazil, Paraguay and Uruguay agreed to become a customs union by January 1995, and to gradually reduce tariffs applied to trade flows between them. Trade was to be liberalized over the period 1991–1994, by progressively reducing tariffs according to a linear schedule and by eliminating non-tariff barriers. In the Protocol of Ouro Preto (December 1994) and related agreements, the four MERCOSUR members approved an exception for goods on reduced country-specific lists, whose tariffs were allowed to remain positive, but had to converge linearly to zero over the next five years. In parallel, MERCOSUR also allowed for country-level deviations from the common external tariff. Despite these exceptions, since January 1995, MERCOSUR is considered as a customs union with free trade within the bloc.

[6]The focus on manufacturing is dictated by data availability and cross-study comparability. Indeed, the overwhelming majority of previous studies on trade agreements and trade flows use manufacturing flows only (see, e.g. Baier, Yotov, and Zylkin 2019b). Similar data for the total agricultural sector is only available from 1991 (FAOSTAT database), while more disaggregated data (170 industries) only from 2000 (Borchert et al. 2020). In both cases this prevents from estimating the MERCOSUR effect using a structural gravity with the whole set of fixed effects suggested by theory (and particularly pair fixed effects).

The initial generalized phasing out of tariffs over the period 1991–1994, and the posterior phasing out for a limited set of goods point to a gradual trade impact of MERCOSUR. We expect the coefficients μ_t in our specification of bilateral trade costs in (2) to increase over time, starting in 1991, when tariffs start to be reduced, and to keep increasing, although at a slower pace, after 1995.[7]

The evidence is consistent with this pattern. We plot estimates of μ_t in Figure 1 The continuous line traces out the evolution of point estimates, with the coefficient for the year 1990 normalized to zero. Coefficients are therefore interpreted as differences with respect to the value in the year immediately before the start of MERCOSUR .[8] The coefficients pick up a rapid intensification of intra-MERCOSUR trade flows between 1991 and 1994.

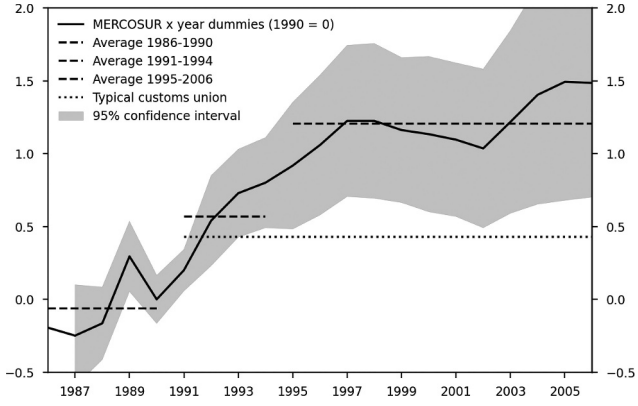


Figure 1. Intensification of trade between MERCOSUR countries. The continuous line depicts the estimates of μ_t with the coefficient for the year 1990 normalized to zero (i.e., we subtract the value of $\hat{\mu}_{1990}$ from all coefficients to use 1990 as the reference year). The coefficients are taken from specification (3) of Table S1 in Appendix C. The year 1986 is the excluded category in the estimation and, because of the normalization, we set its level to $-\hat{\mu}_{1990}$. The 95% interval shown as a shaded area is constructed from standard errors clustered by exporter, importer and year. Because the coefficient for the year 1986 is not estimated, we do not report a confidence interval for this year. The line for a typical customs union is set at the level of the point estimate for the CU dummy variable in specification (3) of Table S1 in Appendix C.

After 1995, the partial effect of the MERCOSUR dummies continues to intensify, although at a slower pace.

It is tempting to interpret the solitary jump in 1989 as an anticipatory effect of MERCOSUR. As with most trade agreements, public announcements preceded the establishment of MERCOSUR. For example, in 1988, Argentina and Brazil signed an Integration, Cooperation and Development Treaty, with the explicit goal of establishing a common market, which could be joined by other Latin American countries, although no clear time horizon was given. It is therefore possible that trade could have risen in anticipation of MERCOSUR. However, the year 1989 also witnessed other events that confound the inference. In 1989, both Argentina and Brazil experienced significant macroeconomic instability, with periods of hyperinflation and strong exchange rate fluctuations, which are likely to lead to fluctuations in trade flows (or their valuation). If these fluctuations were larger for the important bilateral trade relationship between Argentina and Brazil than for trade of these countries with other partners, then individual country-year dummy variables cannot fully absorb them, and the point estimate of μ_t for 1989 might be affected by events unrelated to trade policy.

Figure 1 also shows averages of the estimated coefficients for the periods before MERCOSUR 1986–1990, the transitional period 1991–1994, and the period 1995–2006. The two steps are substantial: the average in the pre-MERCOSUR period is slightly below the 1990 value, at −0.063. The other two averages are 0.568 and 1.204. Formal statistical tests reported in Table 1 in Appendix C confirm that these average values are statistically different from each other at the 1% level across all specifications. More importantly, a quick back-on-the-envelope partial equilibrium calculation using these averages implies that MERCOSUR is associated with a rise in intra-bloc trade of $\exp(0.568-(-0.063))-1=87.8\%$ during the transitional period, and an additional $\exp(1.204-0.568)-1=89.1\%$d in the

[7]In comparison, Baier, Yotov, and Zylkin (2019b), as do papers that use the Baier-Bergstrand database, use 1995 as the starting date of MERCOSUR. This will lead to an underestimate of the effect of MERCOSUR if there is an impact on trade flows already in the period 1991–1994. Additionally, Besedes, Kohl, and Lake (2020) analyze NAFTA and argue that delayed impacts on trade may also be linked to gradual effects stemming from reductions in information or reputational frictions.

[8]The coefficients used to construct the figure are taken from our baseline specifications, which is shown as specification (3) in Table S1 in Appendix C..

Table 1. Partial equilibrium trade impact of MERCOSUR assuming symmetry[a,b].

From/to	Argentina	Brazil	Paraguay	Uruguay
Period 1991–1994				
Argentina		155	129	*85*
Brazil	155		11	−1
Paraguay	129	11		49
Uruguay	*85*	−1	49	
Period 1995–2006				
Argentina		451	187	109
Brazil	451		*60*	1
Paraguay	187	*60*		229
Uruguay	109	1	229	

aChanges are expressed in percentage points. Exporters in rows, importers in columns. The coefficients used for the calculations are reported in Table S2 in Appendix C, specification (1).

bThe italic font denotes a calculation based on a coefficient that is significantly different from zero at the 5% level. The bold font denotes a calculation based on a coefficient that is significantly different from zero at the 1% level.

period in which it is a full customs union.[9] This increase in trade is substantially higher than that of a typical customs union (other than MERCOSUR) in the Baier-Bergstrand eia database, which raises international trade flows between its members by an estimated $\exp(0.430) - 1 = 53.7\%$.

Our results are consistent with prior studies and are located at the higher end of the range of estimates that are obtained using modern methods. Our average estimate for the period 1995–2006 is very close to the coefficient estimated by Baier, Yotov, and Zylkin (2019b), who use the same database as we do. They report a point estimate of 1.20. El Dahrawy Sánchez-Albornoz and Timini (2021) use the wtf database by Feenstra and Romalis (2014)—which does not include intra-national trade flows – and compute intra-national trade flows as the difference between GDP and exports, and obtain a lower point estimate, at 0.88. This lower coefficient could be explained by the fact that their coefficient for MERCOSUR also includes the transitional period 1991–1994.[10] Estimates using only international trade flows obtain lower estimates: Baier, Bergstrand, and Vidal (2007) and Kohl (2014) report point estimates of 0.78 and a 0.81, respectively. These graduated partial equilibrium trade impacts – higher when intra-national flows are included, lower when not – are to be expected, as they have been documented, for example, in a recent study by Vaillant, Flores, and Moncarz (2020).

In Figure 2, we compare how alternative specifications affect the estimation of the intensification of trade due to MERCOSUR. We consider several departures from our baseline specification (black solid line): the exclusion of domestic trade (green dashed line), the exclusion of the border-year interactions (cyan solid line with small dots), using intervals instead of data from consecutive years (yellow dots on the black solid line), and adding log-distance-year interactions (blue dotted line). Omitting domestic trade reduces the point estimates of the effect of MERCOSUR, which falls outside the 95% confidence interval of the baseline specification. The coefficient is smaller because

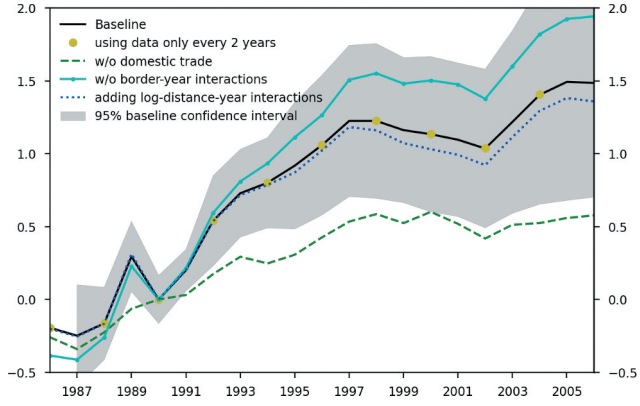


Figure 2. Intensification of trade between MERCOSUR countries according to alternative specifications. The continuous black line depicts the baseline estimates of μ_t with the coefficient for the year 1990 normalized to zero (i.e., we subtract the value of $\hat{\mu}_{1990}$ from all coefficients to use 1990 as the reference year). The coefficients are taken from specification (3) of Table S1 in Appendix C. The year 1986 is the excluded category in the estimation and, because of the normalization, we set its level to $-\hat{\mu}_{1990}$. The 95% interval shown as a shaded area is constructed from standard errors clustered by exporter, importer and year. The alternative specifications correspond to columns (1) (w/o domestic trade), (2) (w/o border-year interactions), (4) (using data only ever two years), and (6) (adding log-distance interactions) in Table S1 in Appendix C. Specification (5) is not shown, as it is virtually identical to specification (4). We perform a similar rescaling to normalize the coefficient of the year 1990 to zero in all alternative specifications.

[9]The increase in trade according to the exact formulas that use all individual coefficients instead of the averages are very close to these approximations (and close to each other), at 88.7% and 87.1%, respectively.

[10]In principle, their use of GDP rather than gross output to compute internal trade could also lead to a lower estimate: if trade agreements systematically lead to an expansion in higher value added activities, then this would mechanically introduce a downward bias for the coefficient of interest. However, Campos, Timini, and Vidal (2021) find that the inclusion of the fixed effects that are usual in structural gravity estimations alleviates this problem and that the effects of trade agreements on trade is estimated to be very similar, regardless of how domestic trade flows are computed.

such a specification does not capture the change in relative costs between selling products domestically and internationally caused (for members) by the trade agreement. In contrast, the point estimates of all specifications considering domestic trade fall within the 95% confidence bands of our baseline specification. Among these, we find that excluding border-year interactions raises the point estimates related to MERCOSUR in line with the idea that, in this specification, the MERCOSUR dummies capture not only the 'true' effect of MERCOSUR, but also wider globalization trends reflected in a relative easing of selling products internationally rather than domestically. Point estimates of the specification using intervals are practically identical. As recently suggested by Egger, Larch, and Yotov (2022), the use of consecutive-year data improves the efficiency of the estimates. Finally, adding log-distance-year interactions reduces the point estimates of the effect of MERCOSUR somewhat. On the one hand, this specification allows to absorb other time-varying sources of reductions in bilateral trade costs, for example, new infrastructure (e.g. a highway, a bridge, a railroad) connecting two countries. On the other hand, given their time-varying bilateral nature, log-distance-year interactions may also capture part of the 'true' MERCOSUR effect. In the case of MERCOSUR however, point estimates are very close and not statistically significant from each other.

To gauge the impact of MERCOSUR on trade flows over time through the lens of a structural gravity model, we solve for general equilibrium trade flows as described in the appendix. We do not choose a base year and, instead, iterate over all years. For each year we construct counterfactual trade flows by setting that year's μ_t to zero. The counterfactual should be interpreted as trade flows that would have occurred if bilateral trade costs between MERCOSUR countries had remained at their level of 1986 instead of weakening systematically relative to those with other partners. The counterfactual also removes all general equilibrium effects that result from lower trade costs between MERCOSUR members. International trade and counterfactual trade between MERCOSUR countries are shown in Figure 3 In this figure imports equal exports by definition. Figure 4 shows

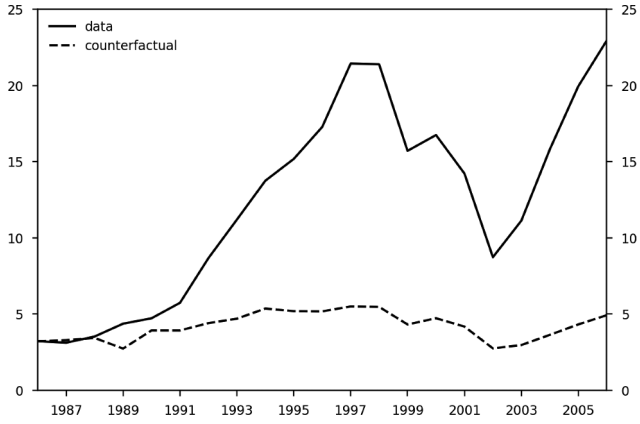
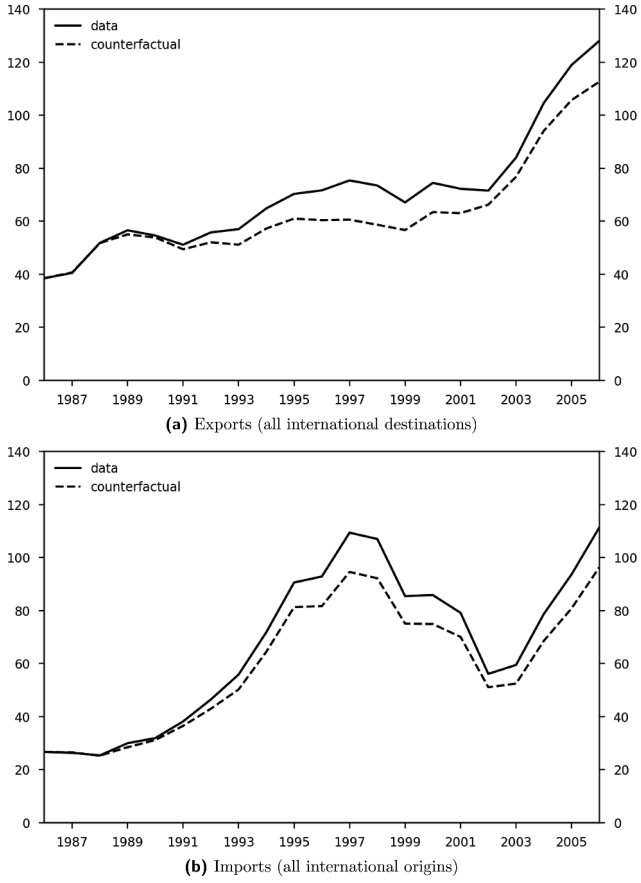


Figure 3. Trade between MERCOSUR countries. Units are billion constant US dollars for 2010 constructed using consumer inflation for the US (the source for US inflation is the April 2020 World Economic Outlook database by the IMF). Data and counterfactual are calculated as the sum of international trade flows between MERCOSUR members (intra-national trade flows are excluded). The counterfactual is the general equilibrium outcome computed by setting all coefficients μ_t to zero and using a trade elasticity of 4.

international trade and counterfactual trade, exports and imports, between MERCOSUR countries and all origins and destinations, including MERCOSUR.

MERCOSUR appears to have had a substantial impact on trade flows within the trade bloc but a limited impact on overall trade openness. Figure 3 shows a large and widening gap between actual data and the counterfactual. From start to end, trade grows by 53% in the counterfactual scenario while it increased more than 600% in the actual data. The gap widens especially after 1991, coinciding with the start of the initial period of tariff reductions. The 1999 currency crisis in Brazil and the 2001–2002 crisis in Argentina are clearly visible, both in the actual data and in the counterfactual; the gap between data and the counterfactual narrows in those years but starts widening again in 2002. In contrast, Figure 4 shows that the impact of MERCOSUR on total trade, and therefore trade openness is relatively limited. Before 1991, both lines are hardly distinguishable. In later years, the two lines separate but they remain remarkably close. Part of the diminished effect on total trade is driven by general equilibrium forces that redirect trade with other destinations to trade within MERCOSUR. However, the primary reason for the muted impact on total trade



(a) Exports (all international destinations)

(b) Imports (all international origins)

Figure 4. Total exports and imports by MERCOSUR countries. Units are billion constant US dollars for 2010 constructed using consumer inflation for the US (the source for US inflation is the April 2020 World Economic Outlook database by the IMF). Total exports is the sum of all exports by MERCOSUR countries to all destinations, including MERCOSUR as a destination, but excluding intra-national trade flows. Total imports is the sum of all imports by MERCOSUR countries from all origins, including MERCOSUR as an origin, but excluding intra-national trade flows. The counterfactual is the general equilibrium outcome computed by setting all coefficients μ_t to zero and using a trade elasticity of 4.

is that trade flows between MERCOSUR members are a small fraction of total trade, both in actual data and in the counterfactual.

The results we have discussed were derived assuming a homogeneous impact of MERCOSUR on all internal trade relationships. However, it is possible that MERCOSUR had heterogeneous effects on its members due to their differing economic structures, and also the different configuration of initial tariffs. Recent research by Baier, Yotov, and Zylkin (2019b) finds evidence of heterogeneous effects between trade partners in trade agreements in a systematic study using trade flows with the Yotov et al. (2016) database and, using a different database, El Dahrawy Sánchez-Albornoz and Timini (2021) find evidence of heterogeneous impacts on trade flows both between and within Latin American trade agreements, including MERCOSUR .[11]

We study whether MERCOSUR has a heterogeneous impact on member countries by amending the baseline specification in (2). A complete disaggregation into directed pair-year effects within MERCOSUR is infeasible, as it would imply that each coefficient is estimated from a single observation. It is therefore convenient to group years. Based on the previous analysis, we use 1986–1990, 1991–1994, and 1995–2006 as the three periods of interest. By doing so, we move away from exploring the year-by-year evolution of the intensification of trade and focus on the longer terms effects of MERCOSUR. Formally, we allow for variation of the coefficient of interest along origin country i and destination country j, i.e. by turning the coefficient μ_t into μ_{ijt} leaving the rest of the specification in (2) unchanged. To group the coefficients into periods, we restrict the coefficients μ_{ijt} to be constant in across in the period 1991–1994 and in the period 1995–2006 (the period 1986–1990 is the excluded category). We also consider the case of heterogeneous but symmetric trade impacts, which corresponds to estimations that restrict the coefficients to satisfy symmetry, i.e. $\mu_{ijt} = \mu_{jit}$. Results are shown in Table S2 in the appendix. In Tables 1 and 2 we show the implied partial equilibrium impact on trade flows from these estimations.

In Table 1 we report results for a symmetric specification. There are three stylized facts that emerge. We find that

(1) MERCOSUR has a particularly strong impact on trade links involving Argentina,
(2) The link between Argentina and Brazil shows the greatest impact, and

[11]As mentioned in the introduction, Baier, Bergstrand, and Bruno (2019a) estimate heterogeneous effects of NAFTA. Esteve-Pérez et al. (2020) also report heterogeneous effects on bilateral trade flows for countries in the European Monetary Union.

Table 2. Partial equilibrium trade impact of MERCOSUR without the symmetry assumption[a,b].

From/to	Argentina	Brazil	Paraguay	Uruguay
Period 1991–1994				
Argentina		123	111	30
Brazil	202		14	−15
Paraguay	323	13		7
Uruguay	181	22	61	
Period 1995–2006				
Argentina		301	160	*71*
Brazil	632		85	−7
Paraguay	467	−55		285
Uruguay	132	10	169	

aChanges are expressed in percentage points. Exporters in rows, importers in columns. The coefficients used for the calculations are reported in Table S2 in Appendix C, specification (3).

bThe italic font denotes a calculation based on a coefficient that is significantly different from zero at the 10% level. The bold font denotes a calculation based on a coefficient that is significantly different from zero at the 1% level.

(3) Trade flows between Paraguay and Uruguay strengthen, especially in the 1995–2006 period.

A specification that lifts the symmetry assumption, and allows for different effects depending on the direction of trade, allows to refine these findings. Results without the symmetry assumption are shown in Table 2. All three stylized facts continue to hold. Both exports and imports of Argentina attributed to MERCOSUR grow substantially. We find that this intensification of trade is stronger for Argentina's imports; their growth rates roughly double those of exports.

In addition, we find that exports from Brazil to Argentina attributed to MERCOSUR have the highest growth rate, exceeding 600%. Moreover, we find that MERCOSUR increased trade between Paraguay and Uruguay in both directions, with a higher impact on exports from Paraguay to Uruguay. An additional finding of the heterogeneous specification is that some directional impacts are small, or even negative.[12] As highlighted by Waugh (2010), among others, directional pair fixed effects may be better equipped for obtaining unbiased estimates if trade is unbalanced or trade costs are asymmetric. Baier, Yotov, and Zylkin (2019b) argue that the estimation of country-specific coefficients increases the likelihood that estimates reflect omitted factors. In our case, exports from Paraguay to Brazil start out from a very low value in the data, which may partially explain the large magnitude of this particular negative estimate.

Table 2 shows the partial equilibrium trade impact. To compute the general equilibrium trade impact we again iterate over all years and compare a scenario with MERCOSUR to a scenario without MERCOSUR. We convert nominal trade flows in each year to constant US dollars and then average them over the three periods of interest. Table 3 reports the resulting growth rates of trade flows attributed to MERCOSUR.

For trade within MERCOSUR, the general equilibrium flows are a muted version of the partial equilibrium flows, although the stylized facts remain unchanged. Relative to a counterfactual scenario without MERCOSUR, within-bloc trade increases by 93% in 1991–1994 and 208% in 1995–2006. The impact of MERCOSUR on trade relations with the rest of the world differs by country: Argentina and Paraguay experience an increase in their exports while those of Brazil and Uruguay decrease. On the other hand, imports from the rest of the world fall by 8% in the case of Argentina and by 18% for Paraguay, as they are replaced by within-bloc trade, while those of Brazil and Uruguay are roughly unchanged.

The degree to which MERCOSUR influences trade openness, and therefore gains from trade, also differs by country. Argentina experiences the largest opening to international trade, as internal flows drop by 6%. In Paraguay and Uruguay internal trade flows fall by 5.5% and almost 3%, whereas for Brazil they decrease but by less than 1%.[13]

The effects on trade – and therefore welfare – are heterogeneous across MERCOSUR members, not only because the estimated reductions in bilateral trade costs are heterogeneous, but also because factors that affect the general equilibrium, such as a country's size, differ across countries.[14] To separate the role played by the heterogeneity in estimates, in Table 3 (in the appendix) we compute the general equilibrium impact from assuming that

[12]However, only the impact on flows from Paraguay to Brazil in the 1995–2006 period is negative and significantly different from zero.

[13]Because we constructed data for Paraguay ourselves, it is convenient to check whether these data have an impact on the results from other countries. In Table 4 in the appendix we replicate the general equilibrium exercise and find that results are very similar.

[14]In structural gravity models, reductions in bilateral trade costs always lead to welfare gains for all countries involved. However, some countries may gain more than others even if the reduction in trade costs is homogeneous across countries.

Table 3. General equilibrium trade impact of MERCOSUR[a].

From/to	Argentina	Brazil	Paraguay	Uruguay	MERCOSUR[c]	RoW[c]	All destinations
1991–1994							
Argentina	*-2.7*	138	107	50	112	4	19
Brazil	173	*0.1*	4	−9	94	−2	5
Paraguay	305	20	*-2.9*	22	62	3	21
Uruguay	136	13	37	*-0.1*	52	−9	12
MERCOSUR[b]	169	94	24	10	93	−1	8
RoW[c]	−7	2	−6	10	−1	0.0	0.0
All origins	10	7	1	10	8	0.0	0.1
1995–2006							
Argentina	*-6.0*	310	113	70	239	1	29
Brazil	541	*-0.6*	46	−10	250	−2	9
Paraguay	495	−47	*-5.5*	343	17	17	17
Uruguay	108	9	114	*-2.9*	31	−2	10
MERCOSUR[b]	484	202	62	19	208	−2	14
RoW[c]	−8	2	−18	−1	−2	0.0	0.0
All origins	24	10	−2	7	13	0.0	0.1

aPercent change in trade flows in general equilibrium computed for a trade elasticity of 4. Exporters are in rows, importers in columns. Intra-national trade flows (the first four elements on the diagonals) are shown in italics. All other cells exclude intra-national trade. Changes are expressed with respect to a counterfactual in which trade intensification due to MERCOSUR does not occur and are measured in percentage points. The coefficients used for the computations are from the specification with heterogeneous directional trade effects in Table S2 in Appendix C, column (3).

bThe definition of MERCOSUR excludes the own country in cells that show a trade flow from/to Argentina, Brazil, Paraguay, or Uruguay. In all other cells, these four countries are included in the definition.

cRoW (rest of the world): all countries except the MERCOSUR countries: Argentina, Brazil, Paraguay, and Uruguay.

Table 4. Gains from trade in MERCOSUR[a].

	All origins and destinations			Trade bloc		Gains
	Domestic	Exports	Imports	Exports	Imports	From trade
1. Trade bloc disintegrates						
Argentina	18	−20	−20	−71	−82	−4.0
Brazil	0	−7	−10	−72	−70	−0.3
Paraguay	6	−16	2	−18	−38	−0.5
Uruguay	3	−7	−6	−26	−14	−0.8
2. Argentina exits						
Argentina	18	−20	−20	−71	−82	−4.0
Brazil	0	−7	−9	−70	−70	−0.3
Paraguay	2	−21	−1	−41	−10	−0.5
Uruguay	3	−6	−6	−19	−16	−0.7
3. Brazil exits						
Argentina	18	−18	−19	−64	−79	−3.8
Brazil	0	−7	−10	−73	−70	−0.3
Paraguay	3	11	4	35	−21	0.2
Uruguay	−1	1	1	2	3	0.1
4. Paraguay exits						
Argentina	0	0	0	−2	−1	−0.1
Brazil	0	0	0	−2	1	0.0
Paraguay	6	−16	2	−19	−38	−0.5
Uruguay	0	0	0	−2	−1	0.0
5. Uruguay exits						
Argentina	0	−1	−1	−4	−2	−0.1
Brazil	0	0	0	1	0	0.0
Paraguay	0	−4	0	−8	−2	−0.1
Uruguay	3	−7	−7	−28	−15	−0.8

aAll numbers are expressed in percent deviations from the status quo. The first scenario computes the general equilibrium impact of a dissolution of MERCOSUR. The other scenarios compute the general equilibrium impact of a single country leaving the trade bloc. The coefficients used for the computations are from the specification with heterogeneous directional trade effects in Table S2 in Appendix C, column (3). A trade elasticity of 4 is used in all scenarios.

MERCOSUR has a homogeneous effect on trade costs for member countries. As expected, the general equilibrium impact on trade flows becomes more similar across countries, i.e. lower in the case of trade flows involving Argentina and larger for those between other bloc members. In particular, the computation assuming homogeneity leads to a sizable impact on intra-national trade flows, and therefore welfare gains, for Uruguay (−11.5% instead of −2.9%) and Paraguay (−9.3% instead of −5.5%). In other words, disregarding heterogeneity leads to a substantial overestimation of the effect of MERCOSUR on trade openness and welfare for the two smaller countries. Because the change in trade openness translates directly into welfare calculations, this difference highlights the importance for our purposes of allowing for heterogeneity in the coefficients estimated in the gravity equations.

IV. Gains from trade

In the previous section, we analysed the impact of MERCOSUR on trade flows. By participating in MERCOSUR, all four countries experience a reduction in their domestic trade shares. Using the change in these domestic shares, gains from trade can be calculated using the familiar acr formula by Arkolakis, Costinot, and Rodriguez-Clare (2012). Gains from trade are expressed in terms of consumption of a representative agent in each country. We conduct various experiments changing the structure of MERCOSUR .[15] Results are reported in Table 4. For all calculations, similarly to

Felbermayr et al. (2020), we solve for a counterfactual scenario as described in Section 2.3 using an average of the three more recent years of data (2004–2006).[16] The results in the table are calculated in averages of trade flows over this period, after expressing trade flows in constant US dollars. Also, because the evidence suggests the presence of heterogeneous trade impacts (as discussed in the previous section), we use the coefficients from the specification with heterogeneous directional trade effects reported in column (3) of Table S2 in Appendix C.

In a first experiment, we simulate a complete disintegration of MERCOSUR. We follow the standard approach in the literature (e.g. Baier, Bergstrand, and Bruno 2019a; Mayer, Vicard, and Zignago 2019) and simulate the disintegration by assuming that the effect on trade costs of establishing and dismantling a trade agreement are symmetric.[17] This simulation reveals that a dissolution of MERCOSUR would reduce welfare by 4.0% in Argentina. For the other countries, the welfare loss induced by a dissolution of MERCOSUR would be smaller; for all three countries, their gains from trade would be reduced by less than 1%. These results are consistent with the prior finding that MERCOSUR has had an impact primarily on the trade relationship between Argentina and the other partners. The central role played by Argentina within MERCOSUR also explains why in our second scenario (shown in the second panel in the table) a unilateral exit by Argentina would impact all the other members of the trade bloc so strongly. The other scenarios show that an exit by Brazil would have a substantial negative impact on welfare in Argentina but a small positive impact on Paraguay and Uruguay, who benefit from increased trade with Argentina once Brazil is removed from the trade bloc. Finally, an exit by either Paraguay or Uruguay, would reduce the welfare of the country involved, leaving that of the other countries mostly unchanged.

Across scenarios, Brazil, the largest trade bloc member, is least affected by disruptions of MERCOSUR. In Brazil, trade with MERCOSUR and also overall international trade is small relative to intra-national trade, both in the actual data and in the counterfactual scenarios, leading to small changes in welfare.[18] Notably, an exit of Brazil would impose substantial trade costs on Argentina, its main trade partner within the bloc, but lead to a drop that is an order of magnitude lower for Brazil. One of the main reasons that explain these findings is the relative size of Argentina and Brazil's internal market (with respect to their external sector).

It may come as a surprise that the simulations yield such large welfare gains for Argentina in relation to those of Paraguay and Uruguay. All else equal, welfare gains are usually largest for smaller countries. In this case, however, much of the value of MERCOSUR is explained by having Brazil, the largest country in the bloc, as a trade partner. Whereas Argentina expanded its trade relations with Brazil greatly, Paraguay and Uruguay did not. As shown in Tables 2 and 3, MERCOSUR did not have a sizable impact on trade flows between the two smaller countries and Brazil. The scenario in which Brazil exits unilaterally (in Table 4) shows that the welfare losses for Argentina are almost as large as the losses from itself exiting the trade bloc, which is compelling evidence indicating that for Argentina almost the whole value of belonging to MERCOSUR is explained by having Brazil as a trade partner. Because for Paraguay and Uruguay trade benefited much less from the presence of Brazil, their welfare effects are also smaller.

The strong increase in trade flows between Argentina and Brazil accords with the narrative evidence on the strengthening of trade links between these two countries, especially in the

[15]These scenarios are not a merely of hypothetical interest. Member countries of MERCOSUR have recurrently expressed threats of leaving the bloc. See for example Preissler Iglesias and Gamarski (2019).

[16]By choosing only the three most recent years we exclude the period 2002–2003, which includes a currency crisis in Argentina, and may have led to temporary atypical trade flows.

[17]Glick and Rose (2016) argue that the symmetry assumption is reasonable for currency unions. For trade agreements, it assumes that a disintegration implies the reestablishment of both tariffs and non-tariff barriers that were eliminated with the agreement.

[18]The fact that Brazil is relatively closed to international trade has been studied before. Canuto, Fleischhaker, and Schellekens (2015) explain Brazil's low import and export penetration by an idiosyncratic economic structure that relies primarily on domestic value chains instead of global production networks.

manufacturing sector. The best known example for this is the automotive industry, which grew more interconnected in these two countries as a consequence of MERCOSUR, and also gave rise to an increase in trade of related manufactured goods, such as steel and chemical products, which are used in the automotive industry, and, to a lesser extent, textiles. Paraguay and Uruguay, on the other hand, did not enter these international production chains to the same extent and, as a consequence, trade in the automotive sector remained primarily a bilateral affair between Argentina and Brazil.

For Brazil, the low gains from trade derived from trading with MERCOSUR members leads to the question whether it could gain by switching from MERCOSUR to other preferred trade partners. The most likely candidates include an integration with other Latin American countries, or even signing an agreement with NAFTA, the European Union, or with China. However, agreements with other trade blocs impose certain costs. They require time for negotiations and spending political capital; they may influence domestic variables, such as income inequality, imply changes in regulation, or affect the environment, sometimes with undesired consequences. Additionally, exiting a consolidated trade agreement may have economic consequences beyond direct trade effects, by increasing uncertainty, disrupting existing global and regional value chains, etc. There may also be other payoffs to Brazil from remaining a member of MERCOSUR. Among them are the democratic clause of MERCOSUR, migration regulations tied to MERCOSUR and, more generally, the value placed on Latin American integration.

The argument that a country does not always prefer a trade agreement that maximizes gains from trade can be formally rationalized by modeling the choices of a decision maker whose objective function includes other considerations besides gains from trade. We define a function $R_i(\theta) > 0$ that scales gains from trade to denote all other consequences of changing trade policy to the matrix of trade costs θ and write the value of trade policy θ for the decision-maker in country i as:

$$V_i(\theta) = R_i(\theta) G_i(\theta). \tag{3}$$

In the model described in the appendix, gains from trade $G_i(\theta)$ are equal to the ratio between total nominal expenditure on final goods in a country and an ideal price index and can be interpreted as the consumption by a representative agent in each country. The term $R_i(\theta)$ scales up or down consumption of this representative agent, as in the consumption-based welfare measure of Lucas (2003). The function $R(\theta)$ may include concerns about inequality or the environment, which are not captured in the gains from trade measure, or the various (economic, political, social, etc.) costs or political economy motivations described above.[19] The factor $R(\theta)$ should not be interpreted simply as a parameter but can be thought of as an endogenous result of a process in which the decision-maker has exhausted all possibilities of improving the situation after switching to an alternative new trade agreement.[20]

The decision-maker in a country finds it worthwhile to change trade policy if

$$\frac{\Delta V_i}{V_i} \approx \frac{\Delta R_i}{R_i} + \frac{\Delta G_i}{G_i} \geq 0, \tag{4}$$

with indifference if the weak inequality becomes an equality. This implies that a new trade policy will not be adopted if positive gains from trade are more than compensated by a negative value of $\frac{\Delta R_i}{R_i}$.

To quantify the value placed by Brazil on MERCOSUR, we consider different scenarios in which Brazil exits MERCOSUR and enters a closer relationship with other trade blocs or countries. This depends on the type of trade or integration agreement considered, and on the assumed effect of the agreement on trade flows. We simulate the effects of Brazil signing a customs union with other trade blocs, which implies a relatively strong relationship with its new partners. Customs unions involving countries on different continents are very uncommon; they tend to be an intra-regional phenomenon (Lake and Yildiz 2016). Therefore, a more likely

[19]Recent examples that use a multiplicative specification as in (3) include the models by Heid and Larch (2016), where R_i captures changes in employment and Carrère, Grujovic, and Robert-Nicoud (2015), where it captures aversion to inequality.
[20]Results in this section are derived in the theoretical appendix (Appendix A).

scenario would be the establishment of a free trade agreement, rather than a customs union. Because the estimated impact on trade of an FTA is lower than that of a customs union, the results in this section should be interpreted as upper bounds on the gains from trade from joining different blocs of countries. We simulate the impact of a customs union using the coefficient that we estimated for this type of agreement over the whole period (1986–2006). We interpret this value as the ex-ante estimate of the increase in trade in a typical customs union. This estimate has the benefit that it would also be available to the decision-maker at the time of the decision, which we place in the second half of the 2000s.

We report changes in trade flows and the resulting gains from trade in Table 5. Numbers reported are the net effect of Brazil withdrawing from MERCOSUR and joining a customs union with different trade blocs or countries. The different alternatives we consider are the group of countries which would later form Alianza del Pacífico (Chile, Colombia, Peru, Mexico), NAFTA (Canada, Mexico, the US), and the European Union (the group of countries after the 2004 expansion but before the 2007 expansion).[21] We also report results for a customs union with two individual countries: China and the US.

The overall conclusion from Table 5 is that net gains from some alternatives are positive, although they do not exceed 0.3%. The simulations indicate that, although Brazil would become more open to international trade by leaving MERCOSUR and signing a customs union agreement with either the European Union or the US, the gains from trade would not be substantial. The signature of a customs union agreement would probably also impose regulatory changes in Brazil or lead to other changes that would be costly for the decision-maker. In fact, because Brazil did not seek to enter an agreement with NAFTA or the European Union during the 2000s, a revealed preference argument suggests that a value $\frac{\Delta R_i}{R_i} \leq -0.3$ was associated to these choices.

In conclusion, although Brazil does not exact substantial gains from trade from MERCOSUR, the incentives to leave MERCOSUR to join another trade bloc are small, and probably overshadowed by other economic and political economy considerations. Moreover, this result relies on the simulation of a very strong relationship with Brazil's new trade partners, exaggerating the gains from trade, and is therefore an upper bound on what Brazil could achieve in reality.

Table 5. Net impact for Brazil of withdrawing from MERCOSUR and forming a customs union with another trade bloc[a].

	All origins and destinations			Gains
	Domestic	Exports	Imports	from trade
Alianza del Pacífico	0	−3	−5	−0.2
NAFTA	−1	8	11	0.3
European Union	−2	6	9	0.3
US	−1	5	7	0.2
China	0	−4	−6	−0.2

aAll numbers are expressed in percent deviations from the status quo. Scenarios compute the general equilibrium impact of Brazil withdrawing from MERCOSUR and joining a customs union with a different trade bloc. The coefficients used for the computations are from the specification with heterogeneous directional trade effects in Table S2 in Appendix C, column (3). A trade elasticity of 4 is used in all scenarios.

V. Conclusion

In this paper, we estimate the impact of MERCOSUR on trade flows and on gains from trade for its member countries. We find that Argentina occupies a central role, with trade flows into and out of Argentina due to MERCOSUR strengthening more than for the other members of the trade bloc. Gains from trade are largest for Argentina and smallest for Brazil. Using a general equilibrium quantitative structural gravity model, we estimate that the dissolution of MERCOSUR would reduce welfare derived from gains from trade by 4.0% (in consumption-equivalent terms) in Argentina, and by much smaller amounts, 0.8%, 0.5% and 0.3%, in Uruguay, Paraguay and Brazil.

Because of the reduced gains from trade that accrue to Brazil, we study whether Brazil would be better off by withdrawing from MERCOSUR and joining a different trade bloc. Counterfactual scenarios show that the net gains from trade to Brazil of switching into other existing trade agreements would be 0.3% of consumption of a representative agent, at most, a small but positive number. However, as we discuss in the text, it is

[21] An analysis of the recent trade agreement between the European Union and MERCOSUR is outside the scope of the paper. See Timini and Viani (2020) for an in-depth study of this particular trade agreement.

likely that Brazil's decision to remain in MERCOSUR was driven by other (economic, political, social, etc.) considerations.

Our results are subject to a number of well-known caveats. Our methodology does not explicitly account for dynamics and input-output linkages and our empirical results rely on data on manufacturing goods alone. Certainly, the inclusion of trade in agricultural products and services would enrich the analysis. Moreover, the aggregate nature of the manufacturing data we use does not allow to shed light on interesting phenomena such as the integration in the automotive industry within MERCOSUR, where trade flows encompass both intermediate and final goods.

Our results shed light on the more general question of how bilateral trade flows and gains from trade are distributed among trade bloc members. In the case of MERCOSUR we uncover a substantial amount of heterogeneity. It would be interesting to see an application of the techniques of modern quantitative trade models that we use in this paper to other trade blocs, to detect to what extent MERCOSUR is an example of a more general pattern.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

Arkolakis, C., A. Costinot, and A. Rodriguez-Clare. 2012. "New Trade Models, Same Old Gains?" *The American Economic Review* 102: 94–130. doi:10.1257/aer.102.1.94.

Baier, S., J. Bergstrand, and J. Bruno. 2019a. "Putting Canada in the Penalty Box: Trade and Welfare Effects of Eliminating NAFTA." *The World Economy* 42: 3488–3514. doi:10.1111/twec.12870.

Baier, S.L., J.H. Bergstrand, and M.W. Clance. 2018. "Heterogeneous Effects of Economic Integration Agreements." *Journal of Development Economics* 135: 587–608. doi:10.1016/j.jdeveco.2018.08.014.

Baier, S.L., J.H. Bergstrand, and E. Vidal. 2007. "Free Trade Agreements in the Americas: Are the Trade Effects Larger Than Anticipated?" *The World Economy* 30: 1347–1377. doi:10.1111/j.1467-9701.2007.01047.x.

Baier, S.L., Y.V. Yotov, and T. Zylkin. 2019b. "On the Widely Differing Effects of Free Trade Agreements: Lessons from Twenty Years of Trade Integration." *Journal of International Economics* 116: 206–226. doi:10.1016/j.jinteco.2018.11.002.

Bajzik, J., T. Havranek, Z. Irsova, and J. Schwarz. 2020. "Estimating the Armington Elasticity: The Importance of Study Design and Publication Bias." *Journal of International Economics* 127: 103383. doi:10.1016/j.jinteco.2020.103383.

Bergstrand, J.H., L. Mario, and Y.V. Yotov. 2015. "Economic Integration Agreements, Border Effects, and Distance Elasticities in the Gravity Equation." *European Economic Review* 78: 307–327. doi:10.1016/j.euroecorev.2015.06.003.

Besedes, T., T. Kohl, and J. Lake. 2020. "Phase Out Tariffs, Phase in Trade?" *Journal of International Economics* 127: 103385. doi:10.1016/j.jinteco.2020.103385.

Beverelli, C., A. Keck, M. Larch, and Y.V. Yotov. 2018. ""Institutions, Trade and Development: A Quantitative Analysis"." School of Economics Working Paper Series 2018-3, LeBow College of Business, Drexel University.

Borchert, I., M. Larch, S. Shikher, and Y.V. Yotov. 2020. "The International Trade and Production Database for Estimation (ITPD-E)." *International Economics* 166: 140–166. doi:10.1016/j.inteco.2020.08.001.

Campos, R.G., J. Timini, and E. Vidal. 2021. "Structural Gravity and Trade Agreements: Does the Measurement of Domestic Trade Matter?" *Economics Letters* 208: 110080. doi:10.1016/j.econlet.2021.110080.

Canuto, O., C. Fleischhaker, and P. Schellekens. 2015. "The Curious Case of Brazil's Closedness to Trade." Policy Research Working Paper Series 7228, The World Bank.

Carrère, C. 2006. "Revisiting the Effects of Regional Trade Agreements on Trade Flows with Proper Specification of the Gravity Model." *European Economic Review* 50: 223–247. doi:10.1016/j.euroecorev.2004.06.001.

Carrère, C., A. Grujovic, and F. Robert-Nicoud. 2015. "Trade and Frictional Unemployment in the Global Economy." CEPR Discussion Papers 10692, C.E.P.R. Discussion Papers.

Egger, P.H., M. Larch, and Y.V. Yotov. 2022. "Gravity Estimations with Interval Data: Revisiting the Impact of Free Trade Agreements." *Economica* 89: 44–61.

Egger, P.H., and F. Tarlea. 2015. "Multi-Way Clustering Estimation of Standard Errors in Gravity Models." *Economics Letters* 134: 144–147. doi:10.1016/j.econlet.2015.06.023.

El Dahrawy Sánchez-Albornoz, A., and J. Timini. 2021. "Trade Agreements and Latin American Trade (Creation and Diversion) and Welfare." *The World Economy* 44: 2004–2040. doi:10.1111/twec.13126.

Esteve-Pérez, S., S. Gil-Pareja, R. Llorca-Vivero, and J. A. Martnez-Serrano. 2020. "EMU and Trade: A PPML Re-Assessment with Intra-National Trade Flows." *The World Economy* 43: 2574–2599. doi:10.1111/twec.12960.

Fally, T. 2015. "Structural Gravity and Fixed Effects." *Journal of International Economics* 97: 76–85. doi:10.1016/j.jinteco.2015.05.005.

Feenstra, R.C., and J. Romalis. 2014. "International Prices and Endogenous Quality." *The Quarterly Journal of Economics* 129: 477–527. doi:10.1093/qje/qju001.

Felbermayr, G., M. Larch, E. Yalcin, and Y.V. Yotov. 2020. "On the Heterogeneous Trade and Welfare Effects of GATT/WTO Membership." Working Paper Series 2020-12, LeBow College of Business Drexel University.

Glick, R., and A.K. Rose. 2016. "Currency Unions and Trade: A Post-EMU Reassessment." *European Economic Review* 87: 78–91. doi:10.1016/j.euroecorev.2016.03.010.

Head, K., and T. Mayer. 2014. "Chapter 3 - Gravity Equations: Workhorse,toolkit, and Cookbook." In *Handbook of International Economics*, edited by G. Gopinath; E. Helpman, and K. Rogoff, Vol. 4, 131–195. Elsevier.

Heid, B., and M. Larch. 2016. "Gravity with Unemployment." *Journal of International Economics* 101: 70–85. doi:10.1016/j.jinteco.2016.03.008.

Heid, B., M. Larch, and Y.V. Yotov. 2021. "Estimating the Effects of Non-Discriminatory Trade Policies Within Structural Gravity Models." *Canadian Journal of Economics/revue Canadienne D'Economique* 54: 376–409. doi:10.1111/caje.12493.

Kohl, T. 2014. "Do We Really Know That Trade Agreements Increase Trade?" *Review of World Economics (Weltwirtschaftliches Archiv)* 150: 443–469.

Lake, J., and H. Yildiz. 2016. "On the Different Geographic Characteristics of Free Trade Agreements and Customs Unions." *Journal of International Economics* 103: 213–233. doi:10.1016/j.jinteco.2016.09.003.

Lucas, R.E.J. 2003. "Macroeconomic Priorities." *The American Economic Review* 93: 1–14. doi:10.1257/000282803321455133.

Magee, C.S. 2008. "New Measures of Trade Creation and Trade Diversion." *Journal of International Economics* 75: 349–362. doi:10.1016/j.jinteco.2008.03.006.

Mayer, T., V. Vicard, and S. Zignago. 2019. "The Cost of Non-Europe, Revisited." *Economic Policy* 34: 145–199. doi:10.1093/epolic/eiz002.

Mayer, T., and S. Zignago. 2011. "Notes on Cepii's Distances Measures: The GeoDist Database." CEPII Working Paper 2011-25, CEPII.

Nessi, H. 2020. "Argentina to Exit Mercosur Trade Talks to Focus on Problems at Home," *Reuters*, Accessed 20 October 2020. https://www.reuters.com/article/us-argentina-mercosur-idUSKCN2270TA

Preissler Iglesias, S., and R. Gamarski. 2019. "A Latin American Brexit? Analyzing Brazil's Threat on Mercosur," *Bloomberg*, Accessed 20 October 2020. https://www.bloomberg.com/news/articles/2019-09-14/a-latin-american-brexit-analyzing-brazil-s-threat-on-mercosur

Santos Silva, J., and S. Tenreyro. 2006. "The Log of Gravity." *The Review of Economics and Statistics* 88: 641–658. doi:10.1162/rest.88.4.641.

Simonovska, I., and M.E. Waugh. 2014. "The Elasticity of Trade: Estimates and Evidence." *Journal of International Economics* 92: 34–50. doi:10.1016/j.jinteco.2013.10.001.

The Economist. 2012. "Mercosur RIP?" *The Economist*, Accessed 20 October 2020. https://www.economist.comthe-americas/2012/07/14/mercosur-rip

Timini, J., and F. Viani. 2020. "A Highway Across the Atlantic? Trade and Welfare Effects of the EU-Mercosur Agreement." Working Papers 2023, Banco de España.

Vaillant, M., M. Flores, and P. Moncarz. 2020. "Missing Data in the Structural Gravity: Estimation Bias of Preferential Trade Agreements Due to the Omission of Internal Trade." Documentos de Trabajo 2020-08, RedNIE.

Waugh, M.E. 2010. "International Trade and Income Differences." *The American Economic Review* 100: 2093–2124. doi:10.1257/aer.100.5.2093.

Yotov, Y.V. 2012. "A Simple Solution to the Distance Puzzle in International Trade." *Economics Letters* 117: 794–798. doi:10.1016/j.econlet.2012.08.032.

Yotov, Y.V. 2021. "The Variation of Gravity Within Countries." School of Economics Working Paper Series 2021-12, LeBow College of Business, Drexel University.

Yotov, Y.V., R. Piermartini, J.-A. Monteiro, and M. Larch. 2016. *An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model*. Geneva: World Trade Organization.