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Can Ethnic Diversity Explain the Varying Effects of Regional Trade Agreements?

by

Alexandra Sundmark

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Abstract

In response to the recent stagnation of global economic integration, a large part of world trade today transpires within the boundaries of regional trade agreements (RTAs). However, trade effects are heterogeneous both across and within RTAs - a phenomenon not fully understood. Since the end of the Cold War, researchers have studied the role of ethnic diversity in explaining low economic development, especially in Sub-Saharan Africa. Despite many possible theoretical mechanisms, as well as a strong connection between international trade and development policy, the link between diversity and trade has not been previously analysed empirically. In this paper, I evaluate the relationship between preferential trading opportunities, ethnic diversity, and trade flows for a large sample of bilaterally trading economies over the period 1988 to 2008 using the fixed effects Poisson-Pseudo-Maximum-Likelihood (PPML) estimator, looking at both static and cumulative effects. I find that the correlation between RTAs and trade flows seems to vary non-monotonically with the level of ethnic diversity. Hence, it is not predominantly a large number of different ethnic groups that presents an obstacle to export performance, but the tension created when a society approaches a situation with two equally sized, competing, ethnic groups. Moreover, the export of manufactured goods is particularly restricted in such, ethnically polarised, economies. A number of sensitivity analyses suggests that the results are fairly robust to sample and specification changes.

Keywords: Preferential Trade, Ethnic Fractionalization, Ethnic Polarisation, Heterogeneous Effects, PPML

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1 Introduction

In his influential work on the rise of a new world order following the end of the Cold War, Samuel P. Huntington (1993, p.22) wrote:

> The clash of civilizations will dominate global politics. The fault lines between civilizations will be the battle lines of the future. [...] Conflict between civilizations will be the latest phase in the evolution of conflict in the modern world.

The concept of *civilisation* in this context was meant to capture a national, regional, religious or ethnic group making up its own distinct cultural entity. Although Huntington's thesis remains surrounded by considerable controversy, ethnic civil conflict has indeed been a prevalent feature of the post-Cold War period (Collier and Hoeffler, 2004; Rose, 2000).

Even when not resulting in civil war, ethnic diversity is often presented as an important cause of underdevelopment. The 13 most ethnically fragmented countries in the world are located in Sub-Saharan Africa, a region characterised by persistent poverty, disappointing economic growth, and poor performance in a number of other development indicators (Alesina et al., 2003; Easterly and Levine, 1997). While ethnic diversity may display growth-enhancing properties at small levels of geographical aggregation such as cities, see e.g. Alesina and La Ferrara (2005), a range of studies establish that the correlation between diversity and economic growth at the country level is exclusively negative. This relationship dominantly runs through the quality of economic and political institutions (Alesina and Zhuravskaya, 2011; La Porta et al., 1999). Others emphasise investment and other business-related factors as possible mechanisms (Easterly and Levine, 1997; Montalvo and Reynal-Querol, 2004). However, no piece of research has previously considered trade as an intermediate outcome variable in any major way, despite the nowadays rather clear connection between trade and growth.

Participation in the international trading system is persistently considered a crucial component of a sensible development strategy, wherefore one of the main objectives of the World Trade Organization (WTO) is to facilitate the integration of developing countries into the global economy (WTO, 2014). Since the signature of the General Agreement on Tariffs and Trade (GATT) in 1947 and the subsequent establishment of the WTO in 1995, it has been recognised that a rules-based international trading system aiming at the substantial reduction of trade barriers is essential to maximise potential gains from trade. While the guiding principle of this system is one of non-discrimination, the recent standstill of multilateral negotiations and the consequential deceleration of global integration have motivated a rapid increase in the number of regional trade agreements (RTAs).[1] Countries are permitted to form free trade agreements (FTAs) and customs unions (CUs) with one or more trading partners under Article XXIV of the GATT, given that a substantial part of all trade is covered and external tariffs towards non-members are not raised (GATT, 1994).[2] There are currently 305 RTAs in force; hence, a considerable part of world trade is taking place inside these arrangements (WTO, 2020).

The formation of an RTA is naturally driven by the wish to promote integration between its members. While most relevant literature finds sizeable trade effects of RTAs on average, see e.g. Baier and Bergstrand (2007), Carrère (2006) and Magee (2008), not all RTAs are equally profitable; trade effects are often asymmetric both across and within RTAs (Baier et al., 2019). In addition to the provisions of the specific RTA, supply-side characteristics of the trading partners are key determinants of the scale of trade effects that could be expected, especially for developing countries (Stevens et al., 2015). While empirical research into the asymmetric impact of RTAs is remarkably scarce considering their importance for current economic integration, among the supply-side factors affecting export performance in general emphasised in the literature we find geography, infrastructure, institutions, and macroeconomic stability (Elbadawi et al., 2001; Francois et al., 2006; Fugazza, 2004; Levchenko, 2007). Considering these clearly intersect with the mechanisms through which ethnic diversity has been found to impede growth, could also diversity pose a constraint on export performance? Is it possible that the trade effects of RTAs vary with the level of ethnic heterogeneity?

This paper aims to analyse the relationship between reciprocal preferential trade, ethnic diversity and trade flows, to ascertain whether a change in market access has heterogeneous effects depending on the level of diversity in the exporting country. The functional form of a potential link between diversity and trade is further scrutinised by assessing the relative importance of different dimensions of diversity. For the empirical analysis, I use a gravity-type panel data approach, applied to 184 (potential) bilateral trading partners over the period 1988 to 2008, exploiting time variation in trade preferences and cross-country variation in ethnic diversity. The Poisson-Pseudo-Maximum-Likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006) is used to correct for issues with heteroskedasticity and zero trade flows. A number of

[1] The term RTA is used by the WTO to refer to any reciprocal trade agreement between two or more trade partners; there is no actual regional requirement. These are most commonly either FTAs or CUs.

[2] While members of both FTAs and CUs eliminate tariffs between each other, members of a CU also share common external trade policies.

interaction variables are introduced to capture the joint impact of RTAs and diversity on trade flows. In addition, the timing of both RTA and interaction effects is analysed by allowing RTAs to be "phased in" over a number of years. The results indicate the dominance of a non-monotonic relationship between ethnic heterogeneity and the trade effects of RTAs; it is mainly ethnic polarisation – a measure of how close the national distribution of ethnic groups is to the bimodal (1/2, 0,..., 0, 1/2) distribution – that presents a barrier to export performance. For instance, while the average moderately polarised country increases its exports by approximately 30 percent in the first five years after entering into an RTA, a highly polarised country does not benefit at all, at any conventional significance level.

This piece of research relates to the economics literature on the implications of ethnic diversity for growth and development, as well as the literature on the trade effects of RTAs and the constraints that supply-side conditions place on export performance. To my knowledge, no study has previously sought to quantify the connection between ethnic diversity and export performance or considered diversity as a supply-side condition potentially affecting the utility of preferential trading opportunities. The ambition of this paper is to evaluate a relationship that finds substantial theoretical motivation, while exploring several different empirical specifications and conceptual angles to initiate a methodological blueprint that future research could advance upon. In an era of the proliferation of RTAs, the policy relevance of the causes behind their uneven impact - effectively presenting an equity problem – is perhaps substantial. Surely, the lack of evidence concerning the origins of the asymmetry, especially when observed between developed and developing countries, is an issue for policy makers. This raises doubts of where policy efforts aimed at improved market access should be focused, as "fighting for better market access to international markets while neglecting supply conditions is likely to be unproductive in terms of export performance" (Fugazza, 2004, p.42).

The remainder of this paper is organised as follows. The next section discusses the theoretical background regarding the trade effects of RTAs and the impact of ethnic diversity on trade, growth and development. Section three introduces measures of ethnic diversity used in the literature and throughout this study, while a literature review is provided in section four. Section five presents the empirical strategy chosen to evaluate the research question and offers a description of the data employed. Section six discusses the empirical results in the context of previous literature. Section seven is a collection of sensitivity analyses. Section eight concludes.

2 Theoretical Background

Firstly, this chapter provides a theoretical framework for an analysis into the trade effects of RTAs. Then, it discusses the link between ethnic diversity, growth and development as identified in previous literature. The final part connects these concepts by introducing diversity as a supply-side condition and exploring the possible mechanisms through which ethnic diversity is expected to impact export performance, thereby guiding the empirical set-up.

2.1 Trade Effects of Regional Trade Agreements

A group of countries naturally form an RTA in the hopes of increasing their gains from trade and overall welfare, which seems an intuitive outcome of reducing tariffs. We can illustrate the effects of this type of trade liberalisation in a dynamic industry model with heterogeneous firms. In this model, exporting firms face both variable (τ) and fixed (f_x) trade costs. In addition to costs that vary with export volumes, such as transport expenditures and tariffs, firms must obtain information on foreign markets and comply with foreign standards. Because of the extent of trade costs, only firms with productivity levels above some threshold, φ_x, export while less productive firms produce only for the domestic market or exit completely (Melitz, 2003). The profits of an exporting firm depends on φ, τ and f_x according to:

$$\pi_x(\varphi) = B\tau^{1-\sigma}\varphi^{\sigma-1} - f_x \tag{1}$$

The introduction of an RTA is modelled as a reduction in the variable trade cost from τ to τ'.[3] This shift is illustrated in Figure 1, where π_x pivots to the left around f_x, resulting in a new equilibrium with $\varphi'_x < \varphi_x$.[4] Since trade costs have decreased, a lower productivity level is required to break even - thus staying in the export market - and more firms export. Also the value of exports of each firm is predicted to increase according to standard gravity assumptions at the firm level. Consequently, the heterogeneous firm model anticipates a positive impact of RTAs among members both at the extensive and intensive margins of trade. Furthermore, due to increased competition from abroad, the least productive firms in the industry are forced to exit even the domestic market, which results in a reallocation of resources and a rise in aggregate productivity (Chaney, 2008; Helpman, 2006; Melitz, 2003).

[3] It would also be possible to model this as a reduction in the fixed trade cost, or a combination of fixed and variable costs, due to e.g. the harmonisation of standards, drops in search and information costs for companies, etc. This is especially valid for more recent RTAs that typically offer deeper integration.

[4] Note that a drop in τ causes the slope of the profit function to increase because of the assumption of a constant elasticity of substitution (CES) utility function with $\sigma > 1$.

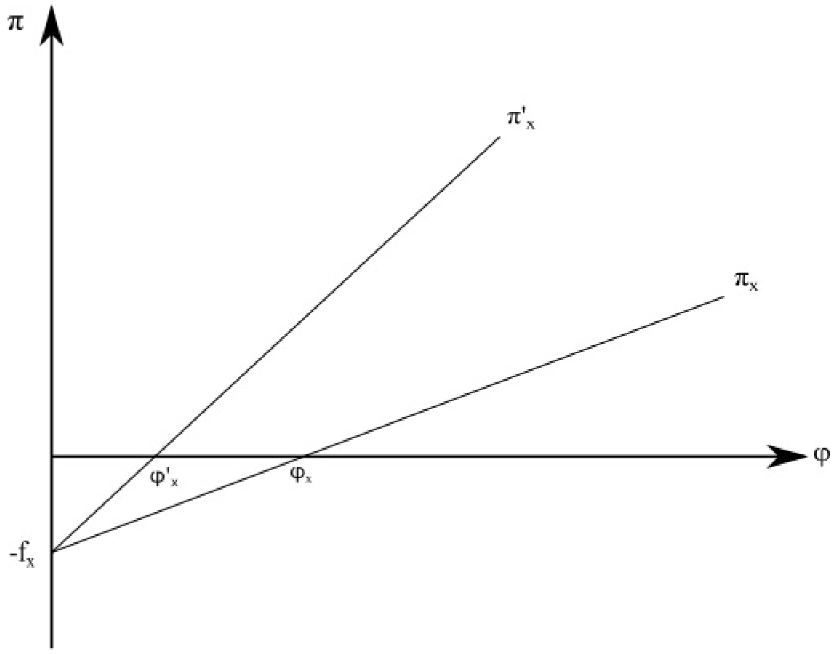


Figure 1: The Effect of an RTA on the Productivity Threshold for Exporting.

The size of the trade effect that can be expected from the establishment of an RTA naturally depends on the extent of the improvement in market access. It is reasonable to presume that trade between members of an RTA will be greater the larger the reduction in tariffs. Hence, the potential of an RTA to increase trade among its members depends of the preference margin - the difference between the preferential and the most-favoured-nation (MFN) tariff (Cipollina and Salvatici, 2011). Moreover, with the proliferation of RTAs in the last 25 years, chances are that your trade partners are signatories to multiple RTAs, which clearly reduces the value of the preferences you are granted (Alexandraki and Lankes, 2004; Francois et al., 2006). Another factor fundamentally affecting the utility of RTAs is the stringency of the rules-of-origin principle. Rules of origin - requiring that a good being exported must originate in the preference-receiving market - are necessary in the case of FTAs to prevent trans-shipment and tariff fraud (Panagariya and Krishna, 2002).[5] Considering the rapid evolution of complex global supply chains, rules of origin are increasingly costly and important barriers to trade; the administrative costs associated with proving that an intermediate-good intensive product complies with the rules are often substantial (Augier et al., 2002; Cadot and de Melo, 2008).

2.2 Diversity, Growth and Development

With the evolution of methods to quantify ethnic diversity, both the theoretical and empirical research on its impact on economic growth and development has intensified, motivated by the

[5] Rules of origin are not necessary in CUs since members have common external tariffs.

hypothesis that ethnic heterogeneity may help explain why some countries lag behind. Diversity affects economic aspects crucial for development, such as the quality of institutions, the provision of public goods, and the climate for investment. In the most extreme cases, ethnic differences may provoke civil conflict, with obvious consequences for growth and welfare.

There are also instances where ethnic diversity could be beneficial for growth and development. Alesina and La Ferrara (2005) suggest the presence of ethnic specialisation, arising from variety of skill and complementarities across ethnic groups. Therefore, product variety is potentially higher in ethnically diverse societies. However, with the progressive availability of regional data, this channel has empirically mainly been discovered at low levels of geographical aggregation, such as cities. As the size of the unit increases, so does the cost of heterogeneity, and at country level, diversity is most likely negative for development (Montalvo and Reynal-Querol, 2020). However, the relationship between diversity and various growth and development outcomes is often shown to be non-monotonic, suggesting that it is not necessarily the number of ethnic groups within a country that is challenging, but some other dimension of diversity (Collier, 2001; Gören, 2014; Montalvo and Reynal-Querol, 2005). This issue is further treated in section 3.

2.2.1 Institutional Quality

The quality of government is typically lower in societies with high levels of ethnic heterogeneity, where diversity is associated with lower government efficiency and worse regulatory environments (La Porta et al., 1999). Corruption, in addition to being more widespread in ethnically diverse societies, may further have worse consequences in such environments (Easterly and Levine, 1997; Mauro, 1995). Shleifer and Vishny (1993) suggest that in very heterogeneous settings, there are a greater number of independent bribe-takers; the resulting uncoordinated equilibrium is much more costly than a more coordinated situation because each bribe-taker does not internalise the impact of their actions on other bribe-takers. In this setting, collusive bribe-setting is less costly but, as argued, also less likely in an ethnically diverse community (Mauro, 1995). Additionally, Alesina and Zhuravskaya (2011) show how low levels of trust characterise societies with high ethnic diversity. Lack of trust - in its role as informal institution - is frequently associated with low governmental quality and inferior economic performance (Knack and Keefer, 1993; La Porta et al., 1997).

2.2.2 Public Goods

Alesina et al. (1999) argue that the coordination issues related to ethnic diversity result in inadequate provision of public goods such as education, health care and infrastructure. Different ethnic groups have diverging preferences regarding the design of public goods provision, and the utility that each ethnic group derives from a certain good is reduced by their non-excludable nature. Hence, even in political systems characterised by proportional representation, ethnic divisions may cause governmental under-investment in key societal provisions (Collier, 2001). The situation is further deteriorated by authoritarian regimes, where it has been shown that leaders tend to favour the own ethnic group at the expense of overall welfare (Franck and Rainer, 2012). In essence, rent-seeking behaviour by different ethnic groups damages the government's capacity to efficiently supply public goods and may cause sub-optimal allocation (Collier, 2001; Easterly and Levine, 1997). While this phenomenon is not exclusive to a certain political system, Reynal-Querol (2002) finds that democracies are more successful in overcoming the difficulties imposed by ethnic heterogeneity.

2.2.3 Investment

Another important driver of growth and development is investment, both domestically and in the form of foreign direct investment (FDI). Ethnic heterogeneity typically reduces the rate of investment, mainly by increasing political instability and potential conflict (Montalvo and Reynal-Querol, 2004). Also the high levels of corruption associated with diversity deters investment (Montalvo and Reynal-Querol, 2005). Foreign investors are discouraged by insecurity, which affects both horizontal and vertical FDI. The risks associated with investing in foreign markets, such as the risk of expropriation, naturally increases with the level of instability and institutional weakness (Albuquerque et al., 2005; Berger et al., 2013). Moreover, specific to vertical FDI, Antràs and Helpman (2004) and Helpman (2006) show that when risks associated with FDI are elevated, firms may favour offshoring over investing abroad, effectively reducing intra-firm trade.

2.2.4 Civil Conflict

Lastly, ethnic diversity is frequently quoted as a dominant explanatory variable of civil conflict (Alesina et al., 2003; Collier and Hoeffler, 1998; Collier and Hoeffler, 2004). Ethnic disputes spread to all parts of an economy through various social and political channels, and may in the extreme case result in armed conflict (Montalvo and Reynal-Querol, 2005). That armed conflict is not conducive to economic growth and development is hardly surprising. Fearon and Laitin

(2003) argue that civil wars - armed conflict within the borders of a state - have in many aspects produced worse consequences than interstate wars in the years following the Second World War; between 1945 and 1999, there were approximately 127 intrastate conflicts killing more than 16 million people. During the period, civil wars involved more countries, led to more deaths and generated more displaced persons that conflicts between states.

2.3 Diversity and Trade

It was argued in section 2.1 that the trade effects of RTAs depend on aspects inherent to the design of the particular RTA. However, it is also possible that factors specific to individual countries are important determinants of the success of RTAs in expanding intra-bloc trade. Earlier literature has discussed the importance of supply-side conditions such as infrastructure, institutions and macroeconomic policy for the ability to benefit from trade liberalisation and to profit from preferential trade, see e.g. Fugazza (2004). Variations in supply-side characteristics may explain why the impact of preferential trading opportunities is lower than expected, particularly for developing countries (Page and Hewitt, 2002; Stevens et al., 2015; Stevens and Kennan, 2001). Following the discussion in the previous section, where it was suggested that ethnic diversity may influence a number of social, political, and economic factors, it is likely that diversity impacts countries' export potential directly as well as countries' ability to import intermediate goods, impacting exports in the longer run. As such, this section serves to raise the possibility of ethnic diversity as a supply-side characteristic influencing the trade effects of RTAs.

In the case where ethnic diversity provokes civil conflict, we can expect a rather direct effect on trade; war naturally disrupts production, destroys infrastructure and depletes human capital. Martin et al. (2008) show that these effects are economically very large, even before accounting for the drop in income and subsequent demand responses. Nevertheless, even in the absence of conflict, there are likely indirect effects where ethnic diversity gives rise to "coordination costs" that inhibit the development of an export-friendly environment. Here, we may envision diversity to operate through the channels of infrastructure, a number of institutional variables, as well as the ability to scale up production; these factors may reasonably affect the variables of the profit function in Equation (1), and therefore alter the exporting behaviour of firms according to the dynamic industry model.

2.3.1 Infrastructure

That the cost of transportation, influenced by the availability and quality of infrastructure, is an important determinant of the size of trade flows is widely accepted within the trade literature, and is often proxied by the distance between trading partners. While international transportation networks are surely essential, see e.g. Bernhofen et al. (2016), recent research further acknowledges the significance of domestic infrastructure. Scarce transportation opportunities and deficient communication infrastructure at the regional level affect the extent to which firms can participate in export markets (Albarran et al., 2013). The causal impact of domestic infrastructure on trade has been estimated by exploiting natural experiments offering exogenous variation in infrastructure. For instance, Volpe Martincus and Blyde (2013) use the damage of the road network following the 2010 Chilean earthquake while Donaldson (2018) exploits the vast railroad network built by the British government in colonial India; regional trade costs associated with infrastructure are shown to substantially impact both inter-regional and international trade.

Accordingly, transportation infrastructure has emerged as a major supply-side constraint to export performance (Fugazza, 2004). As previously discussed, public goods provision may not be as straightforward in ethnically diverse societies. Moreover, even existing infrastructure can exhibit what Montalvo and Reynal-Querol (2005) call "ethnic bias"; if the use of domestic infrastructure is restricted to certain ethnic groups, the trade potential of a country is probably not maximised. All in all, we expect diversity to increase the frictions in society, negatively affecting the movement of goods and people. Transportation costs are commonly perceived as variable trade costs, since they depend on the number of units exported (Hummels and Skiba, 2004). Hence, deficient access to and quality of infrastructure most likely raises the value of τ, reducing the size of the pivot in response to trade liberalisation as shown in Figure 1; a higher productivity level is required to reach the threshold for exporting.

2.3.2 Corruption, Property Rights and Trust

Also the quality of institutions is potentially an important supply-side determinant of export performance. It has been suggested that good institutions offer so called "institutional comparative advantage" – perhaps an even greater source of competitiveness than factor endowments (Levchenko, 2007; Nunn, 2007). Álvarez et al. (2018) state that rent-seeking activities perpetuated by badly functioning institutions might restrict trade flows when agents monopolise trade to their advantage. The economic magnitude of the impact of institutional quality on trade flows when analysed in a gravity framework is often shown to be substantial (De Groot et al., 2004; Francois and Manchin, 2013).

Certain aspects of institutions might be of particular relevance for trade. Anderson and Marcouiller (2002) find that corruption, modelled as a concealed tax on trade, constrains trade as much as tariffs, mainly by increasing transaction costs. While corruption may theoretically improve efficiency in environments characterised by a lot of "red tape" by helping to "grease the wheels", empirical research is fairly conclusive regarding its negative impact on trade (Musila and Sigué, 2010; Thede and Gustafson, 2012). Moreover, Nunn and Trefler (2014) argue that inadequate property rights and incomplete contract enforcement impact negatively on trade potential because these institutional deficiencies cause an inefficiently low level of investment. In other words, contractual shortcomings obstruct the adoption of more advanced technologies, which can generate substantial productivity differences across countries (Acemoglu et al., 2007). De Groot et al. (2004) confirm that uncertainty concerning property rights and contract enforcement directly raise transaction costs; they further argue that low levels of trust – a deficient informal institution – raise them indirectly. While it is naturally difficult to quantify such an abstract concept as trust, empirical studies using survey data tend to find a positive relationship between trust and exports (Guiso et al., 2009; Yu et al., 2015).

Considering the quality of institutions is identified as one of the main mechanisms through which ethnic diversity affects economic growth and development, it is likely that the political instability and substandard institutional quality of very divided communities presents a barrier to trade and to the ability to maximise the benefits of preferential trading opportunities. The role of institutions in the Melitz-Chaney framework is not entirely straightforward, but perhaps most closely resembles a fixed cost, mainly impacting export market entry rather than export volumes (Anderson and van Wincoop, 2004; Briggs, 2013; World Bank, 2020). An increase in f_x shifts the intercept in Figure 1 downwards, resulting in a higher productivity cutoff level, where fewer firms export; only the extensive margin of trade is affected.

2.3.3 Production Capacity

Export performance is closely tied to production potential. In the case of preferential trade agreements, their trade creation effect will depend on the ability of the exporting country to increase the production of products already being traded as well as the ability to diversify exports (Stevens and Kennan, 2001). Fugazza (2004) suggests that FDI is crucial for the technological development and structural progression of the export sector; the lower levels of FDI associated with ethnic diversity could, hence, hinder the extent to which preferential trade strengthens export flows. Furthermore, Montalvo and Reynal-Querol (2005) assert that the diffusion of technological innovations becomes more difficult the larger the ethnic heterogeneity. In addition, both obstacles to innovation and lack of trust obstruct the development of an encouraging business environment (Churchill 2017). Consequently, there is reason to believe that ethnically diverse societies will find it more difficult to rapidly expand production and to adopt technological innovations necessary for diversification. A lower average productivity level, $\overline{\varphi}$, ensures that there are fewer firms that can meet even the lower productivity threshold under trade liberalisation, φ'_x. In addition, the productivity level puts a limit on how much a certain firm can export, as φ enters also the firm-level gravity equation. Restricted production capacity, therefore, limits trade flows at both the extensive and intensive margins of trade (Melitz, 2003).

2.3.4 Product Differentiation

So far, we have considered the potential impact of diversity on aggregate goods flows. However, is it possible that diversity may carry different implications depending on the type of good being exported? On the one hand, we can imagine input-intensive manufacturing products to be most affected. Miroudot et al. (2009) state that imports of intermediates are more sensitive to trade costs than trade in final goods and services. Hence, the trade implications of ethnic diversity can be even greater for components used in the production process, which affects both current production capacity and the possibility for structural upgrading. Manufactured goods, requiring a more complex production chain, could therefore face more scale-up difficulties than goods with less value-added. On the other hand, countries with a high share of commodity exports, particularly fuels and minerals, are perhaps more likely to experience higher levels of potential conflict. There is a large political science literature on the link between ethnic and tribal frictions, natural resources and civil conflict, see e.g. Herb (2005), Klare (2001) and Ross (2001). Many countries with the highest natural resource dependencies, defined as the share of natural resource exports as a percentage of GDP, are also among the most ethnically fragmented, such as Angola, Libya, Nigeria and the Sudan. We could also suspect that exports of agricultural commodities could behave differently, since this is the main export sector for many diverse countries in Sub-Saharan Africa and Asia. An analysis of disaggregate trade flows could uncover which of these patterns, if any, that dominate.

3 Measuring Ethnic Diversity

This section introduces the diversity measures used in this paper and discusses their construction, distribution and limitations. Particularly, it compares two different dimensions of diversity prevalent in the literature on ethnic heterogeneity, and reviews the ensuing implications for the use of diversity measures in empirical applications.

3.1 Fractionalisation vs. Polarisation

While many authors recognise that there is an ethnic, a linguistic and a religious component of diversity, there is a fair amount of disagreement considering how best to define and empirically measure ethnic heterogeneity (Alesina et al., 2003; Easterly and Levine, 1997; Montalvo and Reynal-Querol, 2005). While some researchers suggest that it is the number of groups within a country that matters - perhaps the traditional definition of diversity - others argue that it is the geographical distribution or the relative size of groups that give rise to potential conflict. Theoretically, these interpretations of diversity represent quite different concepts. They also change the shape of the relationship between diversity and the chosen dependent variable, introducing the possibility of non-monotonicity. Next, I explore the similarities and differences between *fractionalisation* and *polarisation*, thereby scrutinising the functional form of the potential relationship between diversity and trade.[6]

The measure of *fractionalisation* was brought to attention by Easterly and Levine (1997) and later refined by Alesina et al. (2003). Fractionalisation refers to the number of groups within a society, and is defined as the probability that two random individuals belong to two different groups. Easterly and Levine (1997) compute an ethno-linguistic fractionalisation (ELF) index while Alesina et al. (2003) construct separate indices for ethnic, linguistic and religious fractionalisation. The fractionalisation index is defined as 1 minus the Herfindahl-Hirschman index (HHI) of group shares as follows:

$$FRACT_j = 1 - \sum_{i=1}^{N} s_{ij}^2 \tag{2}$$

[6]There is also the measure of *segregation* as brought forward by Alesina and Zhuravskaya (2011), which takes into account the geographical distribution of groups within a country. However, this measure has lower coverage and is most likely endogenous to government policy and political situation - requiring the use of instrumental variables - and is therefore not considered in this paper.

where s_{ij} is the share of group i ($i = 1, ..., N$) in country j.[7] The fractionalisation index approaches its maximum value of 1 when each person in a society belongs to a different group and $N \rightarrow \infty$.[8]

The other prevalent measure of diversity is *polarisation.* This index is based on the idea that tension within a society is maximised when there are two groups of the same size; this is the situation of complete polarisation (Montalvo and Reynal-Querol, 2005; Reynal-Querol, 2002). Thus, proponents of this measure believe that it is not a large number of different groups that is problematic, but how close the distribution of groups is to the bimodal (1/2, 0,..., 0, 1/2) distribution. For instance, a country wherein a large ethnic minority faces an ethnic majority would receive a high polarisation score. The polarisation index is calculated as follows:

$$POLAR_j = 1 - \sum_{i=1}^{N} \left(\frac{1/2 - \pi_{ij}}{1/2} \right)^2 \pi_{ij} \tag{3}$$

where π_{ij} is the proportion of group i in country j and N is the total number of groups. Visually, the polarisation index looks similar to the fractionalisation index; however, the probability that two randomly drawn individuals belong to different groups is now weighted by the relative size of each group. This considerably changes the interpretation of the index, as large groups now contribute to the diversity index more than their relative size while the opposite is true for the fractionalisation index in (2).[9] Note that the polarisation index allows for a non-monotonic relationship between diversity and the dependent variable; the function between ethnic heterogeneity and whatever outcome variable is chosen does not have to be strictly increasing or strictly decreasing in the number of groups.

3.2 Data

The construction of the different indices of ethnic diversity requires quite detailed information on ethnic, linguistic, and religious groups. Earlier work used the *Atlas Narodov Mira* (Atlas of the Peoples of the World), which is an atlas of ethno-linguistic groups compiled by Soviet researchers in the 1960s (Easterly and Levine, 1997). More recent literature collects the data from the *World Christian Encyclopedia* (WCE) or the *Encyclopedia Britannica* (EB). These data sources vary in their disaggregation, coverage and definition of an ethnic group.

[7] The Herfindahl-Hirschman index is traditionally a measure of the competitiveness of an industry in terms of the market shares of its members, but is also commonly used as a measure of the degree of concentration in various settings.

[8] $FRACT_j = 1 - N(1/N)^2 = 1 - 1/N$ if each individual comprises its own ethnic group.

[9] See Montalvo and Reynal-Querol (2005) and Montalvo and Reynal-Querol (2002) for formal proofs.

Table 1 shows descriptive data for the fractionalisation and polarisation indices. The fractionalisation index has further disaggregation into linguistic and religious components. The countries for which the indices are available vary between measures. The fractionalisation and polarisation indices closely follow normal distributions with means around 1/2. Throughout the rest of the paper, they are re-scaled from 0 to 100 for interpretation purposes.

Table 1: Descriptive Statistics of Measures of Diversity.

Variable	No. of countries	Mean	Std. Dev.	Min	Max
Fractionalisation					
Ethnic	184	0.4434	0.2562	0	0.9302
Linguistic	175	0.3998	0.2810	0.0021	0.9227
Religious	184	0.4381	0.2317	0.0028	0.8603
Polarisation	137	0.5158	0.2488	0.0167	0.9824

Source: Alesina et al. (2003); Montalvo and Reynal-Querol (2005).

Figure 2 and Figure 3 illustrate the geospatial distribution of the ethnic fractionalisation and polarisation indices respectively. As highlighted in previous literature, Sub-Saharan Africa stands out as a highly fractionalised region with many different ethnic groups.[10] Also other developing regions, mainly Latin America and Southeast Asia score high on the ethnic fractionalisation index. Uganda is the most ethnically fractionalised country in the sample. Strikingly, this North-South pattern is considerably less prominent when the measure of interest is polarisation. Although many developing countries are still classified as very diverse, several more advanced economies such as the United States, the United Kingdom, China, and Spain have group distributions approaching the bimodal distribution. Again, fractionalisation and polarisation are profoundly different measures of heterogeneity. Figure A.1 plots the relationship between ethnic fractionalisation and ethnic polarisation. For values of fractionalisation below approximately 40, there is a positive correlation with polarisation. In the intermediate range, there is virtually no relationship between the two measures. For high values of fractionalisation, the correlation turns negative. Consequently, it is very homogeneous and very heterogeneous communities that experience the lowest ethnic polarisation. For instance, Madagascar and the Republic of Korea have the same level of polarisation despite being at the opposite ends of the fractionalisation scale. This pattern is confirmed by Montalvo and Reynal-Querol (2005) and Gören (2014), and strengthens the need to empirically distinguish between the two measures.

[10]See e.g. Alesina et al. (2003), Collier (2001) and Easterly and Levine (1997).

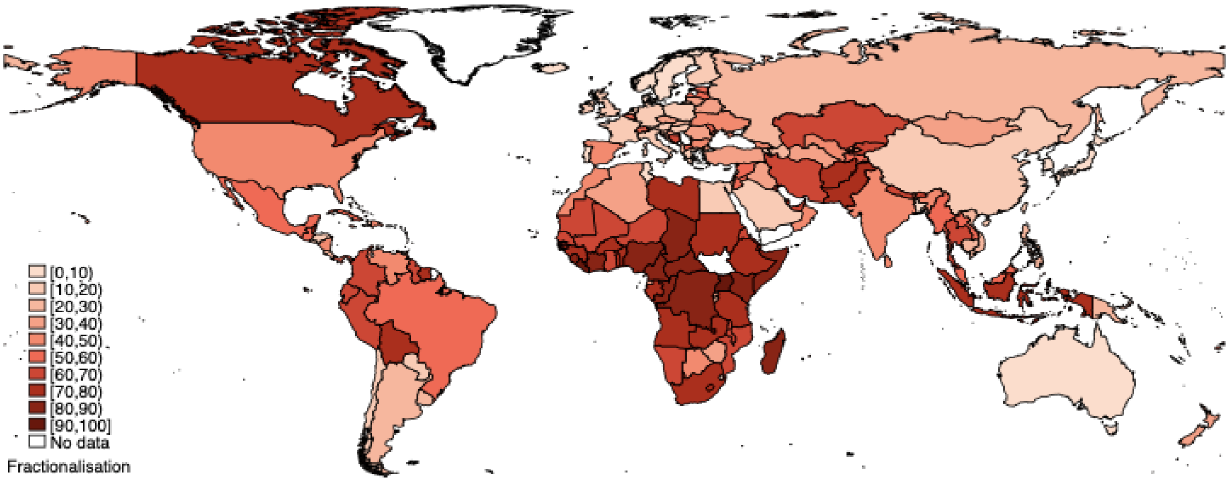


Figure 2: Spatial Distribution of Ethnic Fractionalisation.

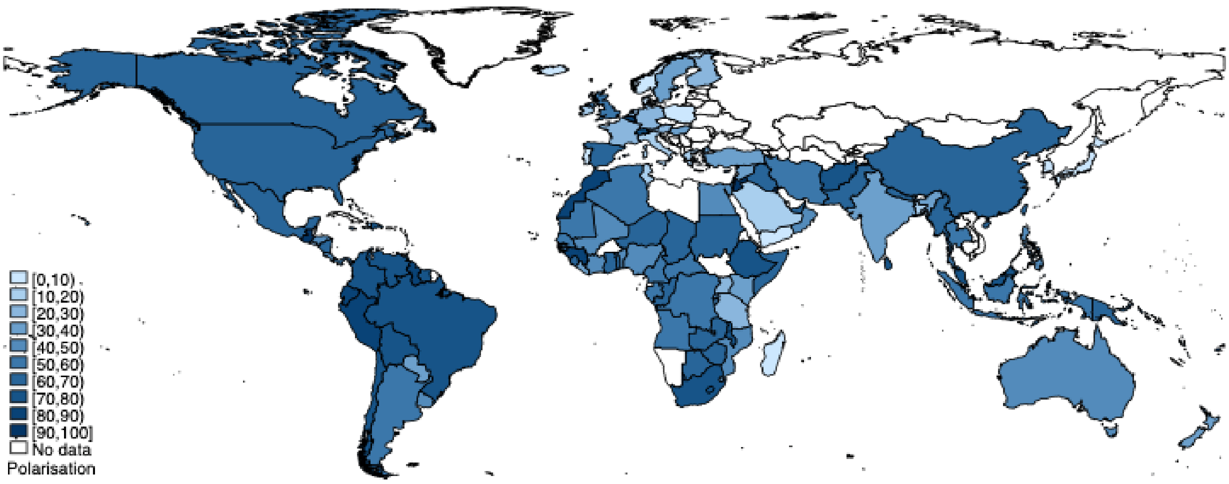


Figure 3: Spatial Distribution of Ethnic Polarisation.

3.3 Limitations of Measures of Diversity

Any index of ethnic diversity will certainly have its advantages and drawbacks. A central issue for all measures is the definition of the concept of ethnicity. According to the *Oxford English Dictionary*, ethnicity is the "fact or state of belonging to a social group that has a common national or cultural tradition". However, how people identify with a specific group tends to vary across countries and be accompanied by a certain degree of controversy. For instance, language may be an important criterion for defining ethnicity in some countries, while race or other physical criteria may be more important elsewhere. Commonly, the ethnicity variable is based on a combination of racial and linguistic characteristics; according to Fearon (2003), however, the most correct classification would take into account what the citizens of a particular country identify as the most socially relevant groupings rather than outside perceptions. Because the classification of ethnic groups is based on subjective choices by researchers, it should be recognised that diversity indices merely reflect the underlying data.

Considering the difficulty in collecting data on every single ethnic group in the world, the classifications – and therefore diversity indices – should, furthermore, perhaps be seen as approximations of the true nature of ethnic diversity rather than an exact representation. It is further assumed that the "distance" between ethnic groups is constant; the likeliness of two groups clashing is presumed identical for all group pairs (Alesina et al., 2003). This is clearly a simplification. Several potential improvements have been suggested. For instance, Posner (2004) includes only ethnic groups deemed "politically relevant" and Fearon (2003) considers only groups containing a certain percentage of a country's population, arguing that very small groups cannot be considered to affect most outcome variables used in empirical work, especially not at the macro level.

It is, moreover, possible that the diversity measures are subject to endogeneity issues. This problem could arise if the composition or classification of ethnic groups change over the time period studied. For instance, diverging fertility rates of different ethnic groups may change their relative size, and social, economic and political forces may alter the boundaries between ethnic groups. Nonetheless, Alesina et al. (2003) maintain that ethnic fractionalisation displays significant time persistence and that endogeneity should not be a serious concern if the period studied is not too long. Alesina et al. (2003) maintain that time persistence is shown for 20-30 years around time of measurement.

4 Previous Literature

Having briefly reviewed some of the theoretical and empirical literature on supply-side determinants of export performance in section 2, this section provides an overview of the empirical literature concerning the trade impact of RTAs, focusing on intra-bloc trade creation effects as this is of most relevance for this study. The most common approach when it comes to estimating the impact of different RTAs on trade flows is the gravity model, which has been shown to exhibit strong explanatory power and empirical robustness. This econometric approach is differentiated from simulation techniques, such as computable generalised equilibrium (CGE) models. CGE models can be useful for ex-ante policy analyses, but are heavily dependent on assumptions concerning behavioural parameters (Kepaptsoglou et al., 2010). There is a vast amount of literature examining the trade creation and trade diversion effects of various RTAs; some studies look at the general effects in large-sample cross-country settings while others consider specific FTAs or CUs.

Earlier studies tend to produce conflicting results. For instance, Aitken (1973) and Brada and Méndez (1985) find positive trade effects for members of the European Economic Community (EEC) (now European Union) and the European Free Trade Association (EFTA). In accordance, positive trade effects have been recorded for the North American Free Trade Agreement (NAFTA), the Association of East Asian Nations (ASEAN) and El Mercado Común del Sur (MERCOSUR) (Dhar and Panagariya, 1994; Frankel, 1997). However, insignificant and even negative effects on intra-bloc trade flows have been identified for the same RTAs (Krueger, 1999; Sharma and Chua, 2000; Soloaga and Winters, 1999). Thus, the results are fairly inconclusive, and seem to depend on the RTA in question, the time period and the gravity model specification.

More recent literature has acknowledged several empirical flaws of earlier studies. According to Ghosh and Yamarik (2004), cross-sectional specifications of the gravity equation yield remarkably unstable estimates. Baier and Bergstrand (2007) further suggest that early estimates are biased because these studies fail to account for the fact that trade partners select endogenously into preferential trade. Baier and Bergstrand (2007) then evaluate the impact of all FTAs and CUs notified to the GATT/WTO for 96 countries over the period 1960-2000. Being able to address the probable endogeneity of trade policy due to the panel data setting, RTAs are found to increase, on average, members' trade by almost 100 percent over a ten-year period – a number seven times larger than the corresponding cross-sectional estimate. In similar studies, Carrère (2006) uses a sample of 130 countries over the period 1962-1996 to identify sizable trade creation effects of seven of the most comprehensive RTAs, and Magee (2008) finds that the cumulative intra-bloc trade effect of RTAs is approximately 90 percent over an 11-year period for a sample of 133 countries between 1980-1998. In addition, this revised gravity model specification has been applied to, more recent, specific RTAs. Guilhot (2010) looks at three Asian FTAs: ASEAN, ASEAN-China and ASEAN-South Korea. Among these, only ASEAN exhibits positive both intra – and extra-bloc trade effects. In contrast, Yang and Martínez-Zarzoso (2014) detect substantial trade creation for the ASEAN-China FTA. Parra et al. (2016) investigate the impact of a number of FTAs in the Middle East and North Africa (MENA) region; the results are remarkably different across FTAs and North-South FTAs perform better than their South-South counterparts.

Despite considerable methodological developments within the literature, there are still contradictory findings regarding the performance of RTAs. For an average country joining an average RTA, there are indications that RTAs do stimulate trade among members of the agreement. However, the reasons for why certain RTAs do not perform as well as others and why the impact is not strictly positive across the board in accordance with the theoretical predictions are not fully understood. The discovery of the extent of the uneven impact of RTAs is perhaps a recent one. In a newly published paper, Baier et al. (2019) attempt to identify why there are such differing effects of RTAs not only across RTAs but also among members within the same trade agreement – thus addressing another dimension of heterogeneity. They find that within-RTA heterogeneity is responsible for 2/3 of overall asymmetric effects. Moreover, the uneven impact is discovered to be related to the level of pre-RTA trade frictions and countries' ability to alter each other's terms of trade.

To summarise, the empirical literature into the trade effects of both RTAs in general and of specific agreements is abundant, while research into the reasons behind their heterogeneous impact is not. As introduced in section 2, several studies evaluate the importance of supply-side determinants of trade flows but not generally in the context of RTAs. Research in this area is remarkably scarce considering the rapid proliferation of RTAs and the commitment to facilitate the participation of developing countries into the global economy. The lack of empirical findings in this area, which could inform both international trade negotiations and national trade and development policies, has motivated the research question of this study.

5 Empirical Strategy

This section presents the empirical strategy chosen to analyse whether the trade effects of RTAs vary with the level of ethnic diversity, including a brief discussion on the interpretation of the interaction terms used. Moreover, it motivates the chosen estimation technique in light of the evolution of estimation methods, and introduces the relevant data.

5.1 Model Specifications

To explore the impact of ethnic diversity on the intra-bloc trade creation effects of RTAs, this study employs variations of the gravity model using panel data for 184 countries over the period 1988 to 2008. First introduced by Tinbergen (1962), who recognised that the volume of bilateral trade is similar to the force of gravity between objects, the gravity model is commonly used to assess the trade effects of various trade policies. In its simplest form, this model relates trade flows to the size of trading partners, the distance between them, as well as a range of other factors reflecting bilateral trade costs such as whether countries share a border, were ever in a colonial relationship, or speak a common language (Leamer and Levinsohn, 1995; McCallum, 1995; UNCTAD and WTO, 2012). Considering the many adaptations of the gravity model, it is imperative to design a specification suitable for the research question and the nature of the data available.

5.1.1 Static Analysis

To investigate the potential impact of RTAs, and the interaction effects of diversity and RTAs on bilateral trade flows, I define the following model specification:

$$M_{ijt} = exp[\beta_0 + \beta_1 RTA_{ijt} + \beta_2 Divers_j + \beta_3 RTA_{ijt} * Divers_j + \mathbf{X'}_{it}\beta_4 + \mathbf{Z'}_{jt}\beta_5 + \gamma_{ij} + \pi_t]\varepsilon_{ijt} \quad (4)$$

where the dependent variable, M_{ijt}, is the value of bilateral merchandise trade between country $i = 1, ..., n$ and country $j = 1, ..., n$ with $i \neq j$ at time $t = 1, ...T$, as measured by the imports of country i from country j.

RTA_{ijt} is a dummy variable taking the value 1 if both country i and country j are members of the same FTA or CU in a given year, and 0 otherwise. Hence, in the absence of the interaction term, the coefficient β_1 measures the average intra-RTA trade creation effect. Recalling the theoretical discussion in section 2.1, this coefficient is expected to be positive. $Divers_j$ represents measures of ethnic diversity in exporting country j as described in section 3. $RTA_{ijt} * Divers_j$ is an interaction term intended to capture whether the RTA effect varies with the level of diversity. While the direct impact of diversity on trade flows cannot be estimated in this framework, its impact is expected to be negative according to the mechanisms set out in section 2.3. However, it follows that diversity is expected to enter with a negative sign also in the interaction effect, so that the trade creation effect of RTAs is constrained by higher levels of diversity. Note that there is, at this point, no hypothesis regarding different effects depending on the measure of diversity, as both measures have exhibited negative relationships with various outcome variables at the country level in previous literature.

The use of an interaction model effectively means that the coefficients of the "main" effects (the coefficients of RTA_{ijt} and $Divers_j$) cannot be interpreted in their usual manner, since they are in a sense meaningless without their interaction counterparts. For instance, there is no one effect of RTAs, but a separate effect of RTAs for each value of the continuous diversity indices. The interpretation of an interaction model is greatly facilitated by the use of marginal effects. A key part of the analysis is to investigate how RTAs impact bilateral trade patterns depending on the level of ethnic heterogeneity. Note that Equation (4) can be rewritten as:

$$M_{ijt} = exp[\beta_0 + RTA_{ijt}(\beta_1 + \beta_3 Divers_j) + \beta_2 Divers_j ...] \tag{5}$$

The marginal effect of RTAs on imports is then given by $\partial M_{ijt}/\partial RTA_{ijt} = \beta_1 + \beta_3 Divers_j$, which implies that the overall impact of RTAs on imports now depends on the level of ethnic diversity, which is what we wanted the model to be able to capture. By constructing confidence intervals for the marginal effects, it is possible to illustrate whether the marginal effect of RTAs is statistically significantly different from zero at various levels of diversity.

$\mathbf{X'}_{it}$ and $\mathbf{Z'}_{jt}$ are vectors of time-varying covariates taken from the gravity literature and include GDP and population for country i and j in year t. It is perhaps unlikely that these variables are sufficient proxies for all time-varying country-specific factors affecting bilateral trade; the ideal model would therefore have included importer – and exporter-time effects, further accounting for the theoretically founded multilateral resistance terms as emphasised by Anderson and van Wincoop (2003). However, this model would have been overly restrictive for the research question considering the mechanisms through which ethnic heterogeneity is expected to impact export performance as discussed in section 2.3.[11]

[11] Running this hypothetical model without the interaction term confirms that the coefficient on RTA is indeed inflated in Equation (4), but the sign and significance levels remain unchanged across specifications.

As thoroughly discussed by Baier and Bergstrand (2007), RTAs are rarely exogenous as unobserved characteristics may explain why countries explore preferential trading arrangements; these factors are most likely correlated with the level of trade. γ_{ij} is a country-pair effect intended to capture all time-invariant factors specific to each bilateral pair and, thus, any omitted variables explaining bilateral trade patterns (Baier and Bergstrand, 2007; Baldwin and Taglioni, 2006; Magee, 2008). Note that γ_{ij} absorbs all time-invariant pair-specific variables commonly used in gravity models, such as distance and common borders. π_t is a time effect capturing the impact of factors common to all countries but specific to year t, intended to control for common shocks such as changes in oil prices or cyclical irregularities (Carrère, 2006). ε_{ijt} is the error term.

In addition to the continuous diversity indices introduced in section 3, Equation (4) is also estimated for different groups of country pairs characterised by low, medium or high ethnic diversity in the exporting country. Exporters are grouped into the three categories based on their percentile ranks, acknowledging that what constitutes low and high diversity is entirely relative. A percentile rank between 0 and 33 corresponds to low diversity and a percentile rank between 66 and 99 implies high diversity. This categorisation is further considered in the robustness analysis. The specification looks as follows:

$$M_{ijt} = exp[\beta_0 + \beta_1 RTA_{ijt} + \beta_2 RTA_{ijt} * MED_j + \beta_3 RTA_{ijt} * HIGH_j + \mathbf{X'}_{it}\beta_4 + \mathbf{Z'}_{jt}\beta_5 + \gamma_{ij} + \pi_t]\varepsilon_{ijt} \tag{6}$$

where MED_j and $HIGH_j$ are dummy variables taking the value 1 for membership of the medium-diversity and high-diversity group, respectively, and 0 otherwise. The low-diversity group is the reference category. This exercise is mainly performed to facilitate interpretation, but also in recognition that there may not be enough variation in the index variables to capture an interaction effect.

5.1.2 Allowing for "Phasing-in" Effects

Several authors, see e.g. Anderson and Yotov (2016), Baier and Bergstrand (2007), Baier et al. (2019) and Magee (2008), suggest that the 0-1 RTA variable constructed using the "date of entry into force" is unlikely to capture the full effect of RTAs due to the institutional design of these agreements. Most RTAs are "phased in" over a number of years and will not reach their full effect until much later. In addition, terms-of-trade effects induced by changes in trade policy are often delayed. Therefore, the static analysis is perhaps not able to capture the full treatment effect. Baier et al. (2019) confirm that lagged effects of RTAs are more likely to be positive than their corresponding initial effects. Furthermore, there are reasons to believe that also the marginal impact of diversity varies with the treatment period. I, hence, follow previous literature and introduce lagged RTA variables enabling the obtainment of cumulative RTA – and interaction – effects. Equations (4) and (6) become:

$$M_{ijt} = exp[\beta_0 + \sum_{s=0} (\beta_{1,s} RTA_{ij(t-s)} + \beta_{2,s} RTA_{ij(t-s)} * Divers_j) + \mathbf{X'}_{it}\beta_3 + \mathbf{Z'}_{jt}\beta_4 + \gamma_{ij} + \pi_t]\varepsilon_{ijt} \quad (7)$$

$$M_{ijt} = exp[\beta_0 + \sum_{s=0} (\beta_{1,s} RTA_{ij(t-s)} + \beta_{2,s} RTA_{ij(t-s)} * MED_j + \beta_{3,s} RTA_{ij(t-s)} * HIGH_j) + \mathbf{X'}_{it}\beta_4 + \mathbf{Z'}_{jt}\beta_5 + \gamma_{ij} + \pi_t]\varepsilon_{ijt} \quad (8)$$

where $s = 0$ is the first year of the RTA. Baier et al. (2019) experiment with a number of different lag lengths, concluding that the majority of the trade impact of RTAs seems to occur within the first 5-6 years following their entry into force. Since my sample is similar to theirs, I adopt their inclusion of a single 5-year lag as a reasonable approximation of the overall timing of trade effects, also minimising the issue of multicollinearity among the lagged RTA-variables. Hence, Equations (7) and (8) are estimated for $s = 0$ and $s = 5$. Alternative lag lengths are considered in the robustness analysis.

5.2 Estimation Issues

Considering the extensive use of the gravity model in the trade literature, as well as within studies of remittances and migration flows, the empirical estimation techniques available are constantly evolving. The gravity model is traditionally estimated in its log-linearized form using standard OLS. This approach is supposedly chosen due to its straightforward interpretation - the coefficients representing elasticities. However, the process of log-linearization effectively excludes all observations where trade flows are zero, as $ln(0)$ is undefined.[12] Commonly, trade statistics only report positive trade values. However, if missing values actually represent zero trade flows, they could be economically important. Hence, depending on the number of missing values in the data, this is potentially a severe limitation. When using disaggregate trade data at the sectoral or product level, the issue is even more pronounced (UNCTAD and WTO, 2012). The gravity model should, thus, preferably be estimated in its original multiplicative form.

[12] While it is possible to replace the zeroes with some arbitrary small positive value, this introduces an unnecessary bias (Westerlund and Wilhelmsson, 2011).

Moreover, log-linearization has been shown to produce severely biased estimates in the presence of heteroskedasticity, affecting the conclusions drawn from statistical inference (Santos Silva and Tenreyro, 2006; Westerlund and Wilhelmsson, 2011). As such, recent literature recommends a non-linear estimator, avoiding the drawbacks of OLS.

To overcome these estimation issues, there are two main types of alternative estimators. The first option is to use a Heckman-type selection model, correcting for bias arising from non-randomly selected samples. Helpman et al. (2008) propose such a two-step estimation procedure applied to the gravity equation. In the first stage, the decision to trade or not is modelled in a probit regression describing the relationship between the probability of positive trade and a set of observed explanatory variables. The results from the first stage are then used in the second stage gravity estimation. However, similarly to an instrumental variables design, the estimation approach suggested by Helpman et al. (2008) requires that the exclusion restriction is satisfied: one must find at least one variable predicting selection into trade in the first stage, that is uncorrelated with the dependent variable in the second stage. It is difficult to envision such a variable (UNCTAD and WTO, 2012; Westerlund and Wilhelmsson, 2011).[13] In addition, there is no straightforward way to apply this estimation method to panel data; among other reasons, the fixed effect probit estimator has several undesirable statistical properties (Greene, 2004; Shepherd, 2016).[14] Moreover, while this approach accounts for sample selection, it does not correct for heteroskedasticity.

Alternatively, Santos Silva and Tenreyro (2006) recommend the Poisson-Pseudo-Maximum-Likelihood (PPML) estimator. Due to its ability to deal with both sample selection bias and heteroskedasticity, the PPML estimator is today used frequently in the gravity literature.[15] Because we are dealing with a pseudo-ML estimator, the data need not follow a Poisson distribution. The PPML estimator is consistent with the presence of fixed effects and to a large proportion of zeroes in the sample (Santos Silva and Tenreyro, 2011). In light of the above discussed estimation issues, this study will use the PPML fixed effects estimator with robust standard errors. Standard errors are further clustered at the country-pair level to account for serial correlation within panels (Egger and Tarlea, 2015).

[13] Helpman et al. (2008) propose variables likely to represent mainly fixed rather than variable costs, such as business entry procedures, common religion or common language.

[14] Martínez-Zarzozo et al. (2014) attempt to extend the Helpman et al. (2008) framework to panel data, with a two-step procedure estimating separate probit models for each year in the panel (a "panel-probit") and then proxying sample selection with the inverse Mills ratio (the ratio of the probability density function to the cumulative distribution function) in the outcome equation. This is arguably not straightforward.

[15] See e.g. Anderson and Yotov (2016), Baier et al. (2019) and Magee (2008).

5.3 Data

5.3.1 Data Description

For the empirical analysis, I use a balanced panel of 184 (potential) bilateral trade partners over the period 1988 to 2008. This time period is chosen to (a) maximise variation in the RTA variable considering the surge in ratifications of RTAs during especially the 1990s and (b) minimise the potential endogeneity of the diversity variables by not diverging more than 20 years from the sampling year (mid-1990s for a majority of countries) as suggested by Alesina et al. (2003). A list of the countries is available in Table A.1. Both aggregate and sectoral bilateral trade flows in USD are collected from the UN COMTRADE database using the Standard International Trade Classification (SITC) at the 1-digit level (United Nations, 2020). A list of the SITC 1-digit categories is available in Table A.2. Considering the extensive trade flow matrix, there are many missing values even for aggregate imports. If missing values are preceded by positive trade flows, they are kept as missing, otherwise they are replaced by zeroes.[16] If a country did not yet exist a certain year, trade flows are kept as missing. The zero-trade issue is further treated in the robustness analysis. The data on RTAs comes from the CEPII Gravity database and includes every FTA and CU notified to the WTO.[17] Also the control variables come from the CEPII Gravity database (CEPII, 2020).

As suggested in sections 2 and 3, the theoretical literature is undecided on which type of ethnic heterogeneity that induces potential conflict and is of greater importance for growth and development, with particularly fractionalisation and polarisation arising as competing measures of diversity. Therefore, Alesina et al. (2003) state that which type of heterogeneity that matters most for a certain outcome variable is altogether an empirical question. Since diversity has not been previously analysed empirically in the context of trade, I am interested in the relative contribution of each measure. Consequently, this study employs the measures of ethnic fractionalisation and ethnic polarisation in separate regressions, thus further exploring the functional form of the potential relationship between ethnic heterogeneity and the effectiveness of trade preferences, and whether the definition of "diversity" matters.

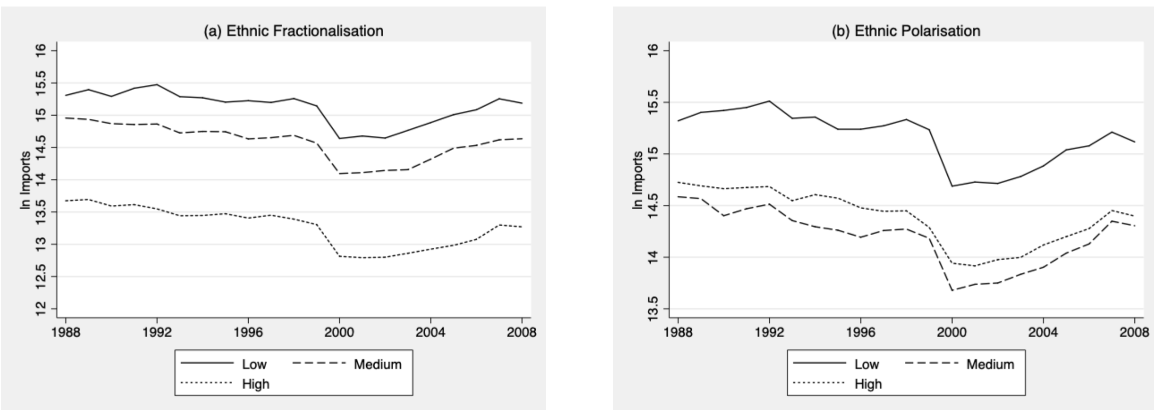
[16] Arguably, gaps in trading relations are more likely to actually represent missing input values.

[17] Partial Scope Agreements (PSAs) are not included, since they cover only certain (often difficult to discern which) products.

5.3.2 Patterns of Trade and Diversity

Figure 4 illustrates the patterns of trade for bilateral pairs where the exporting country is characterised by low, medium, or high ethnic diversity, classified by percentile ranks. The mean of the natural logarithm of imports is plotted over the sample period.[18] All three groups follow similar trends over time, where aggregate bilateral imports decreased during the 1990s to then pick up at the beginning of the 21st century. Notably, the group of relatively homogeneous countries perform better for both measures of diversity. Hence, both high levels of fractionalisation and polarisation are related to inferior export performance during the entire sample period. Furthermore, the high diversity group performs especially bad when looking at the fractionalisation measure, where the gap to the medium fractionalised group is large; considering the geographical patterns demonstrated in Figure 2, there is likely a connection to the stage of development. A similar pattern as in Figure 3, however, emerges regarding polarisation, where the level of development is possibly no longer the main driver of observed differences; being a very polarised or slightly less polarised country does not seem to be of great importance.

The patterns of trade and diversity largely confirm the relevance of the research question, and inquire whether these patterns remain relevant in the context of RTAs. Moreover, they suggest that we should perhaps not expect identical impacts of the different heterogeneity measures, which warrants the distinction between fractionalisation and polarisation in the empirical analysis.



(a) Fractionalisation (b) Polarisation

Figure 4: Patterns of Trade and Diversity, 1988-2008.

[18] A logarithmic scale is used to account for the skewness towards very large trade values for certain country-pairs.

6 Results and Discussion

In this section, I present the results of the empirical analysis and discuss the findings in the context of existing literature. The results for aggregate merchandise trade are followed by a brief analysis using sectoral trade flows.

6.1 Aggregate Trade

Table A.3 shows the regression estimates of the baseline estimation without any interaction terms and including the constant and all control variables, which for brevity are not reported elsewhere. As expected, the GDP of both the importing and exporting country are important predictors of trade flows; larger countries trade more. The population of the exporting country is not significantly related to trade flows, while the population of the importing country has a negative impact on bilateral trade, which is highly significant. The direction of the relationship between population size and bilateral trade flows is not definitive, as a more populated country could export more because of economies of scale or export less because of the absorption effect; an analogous reasoning holds for imports (Martínez-Zarzoso and Nowak-Lehmann, 2003).

6.1.1 Fractionalisation

Table 2 presents the results of the fixed effects PPML estimation with aggregate imports as dependent variable with fractionalisation as the diversity measure. The table is structured as follows. Column (1) shows the results without the interaction term, and is the same specification as in Table A.3, but control variables are not reported. Column (2) presents the results with the interaction term between RTA and the fractionalisation index from Equation (4) while Column (3) shows the results of the dummy specification from Equation (6). Columns (4) and (5) present the results with the lagged RTA variable as introduced in Equations (7) and (8), respectively. Cumulative effects are reported at the end of the table.

In Column (1), the RTA dummy is positive and statistically significant at the 1 percent level; on average, entering into an RTA increases bilateral trade with approximately 27.1 percent.[19] Even though the coefficient is somewhat smaller, this is in line with previous research (Baier and Bergstrand, 2007; Magee, 2008). The coefficient estimate of the interaction variable in Column (2) is positive but insignificant, meaning that fractionalisation measured as a continuous variable does not, on average, impact the relationship between RTAs and trade flows. In Column (3),

[19] Calculated as $(e^{coef-1}) * 100$.

however, the coefficient estimate for the medium fractionalisation group is negative and (weakly) significant. This implies that the RTA effect is significantly different for exporters characterised by a medium level of fractionalisation compared to exporters with a low level of fractionalisation (the reference group). Recalling that the RTA effect for the interacted groups is the sum of the estimates of the reference group and either the medium or highly fractionalised group, it follows that having a medium rather than low level of fractionalisation lowers the impact of RTAs with approximately 20.2 percentage points.

To further investigate how the relationship between RTAs and fractionalisation is related to trade flows, I illustrate the results from Columns (2) and (3) graphically. Figure 5 and Figure 6 depict the marginal effects of RTAs on imports for various levels of fractionalisation, as described in Equation (5). The 95 percent confidence intervals are indicated by the dashed lines. The vertical dashed line indicates the mean of the fractionalisation index. In Figure 5, we see that the marginal effect of RTAs on imports is significantly positive for all levels of fractionalisation. Moreover, there is no significantly different impact depending on the level of fractionalisation, as confirmed in Table 2. In Figure 6, the corresponding plot for the dummy specification shows that the marginal effect for the medium fractionalisation group is just significant at the 5 percent level, meaning that there is close to no convincing trade creation effects of RTAs for this group. The effect for the highly fractionalised group, however, does not significantly differ from the reference group. Overall, for the static analysis, it seems that the specification from Equation (4) is unsuccessful in capturing the intended effects, while the specification from Equation (6) performs better.

Turning now to the results when accounting for the "phasing in" of RTAs, the results in Columns (4) and (5) suggest that the simple 0-1 RTA dummy is unable to capture the full treatment and interaction effects. Note that remaining concerns with multicollinearity (although not perfect) means that coefficients should be considered jointly (Magee, 2008). Again, fractionalisation as a continuous index does not seem to impact the effectiveness of RTAs in increasing intra-bloc trade even over time. The cumulative effect $\sum(RTA + RTA * FRACT)$ is positive and even though the lagged interaction effect indicates a (weakly) significant difference, the cumulative effect does not. Hence, this pattern corresponds to the static analysis, and highlights the inability of this specification in capturing the desired effects also in the cumulative analysis. The dummy specification in Column (5) reinforces the indication that the medium fractionalisation group experiences smaller trade effects of RTAs. In fact, five years after entering into force, the

Table 2: Regression Estimates of RTA and Fractionalisation on Imports.

Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)
RTA$_{ij,t}$	0.2397***	0.2185***	0.2964***	0.0627	0.1581***
	(0.000)	(0.005)	(0.000)	(0.360)	(0.003)
RTA$_{ij,t} * FRACT_j$		0.0006		0.0024	
		(0.733)		(0.189)	
RTA$_{ij,t} * MED_{dum}$			-0.1626*		-0.1174
			(0.059)		(0.176)
RTA$_{ij,t} * HIGH_{dum}$			0.1954		0.3429**
			(0.272)		(0.028)
RTA$_{ij,t-5}$				0.1389***	0.1333***
				(0.001)	(0.000)
RTA$_{ij,t-5} * FRACT_j$				-0.0020*	
				(0.099)	
RTA$_{ij,t-5} * MED_{dum}$					-0.1359**
					(0.024)
RTA$_{ij,t-5} * HIGH_{dum}$					0.0203
					(0.848)
$\sum(RTA + RTA * FRACT)$				0.202[a]	
$\sum(RTA)$					0.291[a]
$\sum(RTA + RTA * MED)$					0.038[b]
$\sum(RTA + RTA * HIGH)$					0.655[a,b]
Number of country pairs	26,780	26,277	26,277	25,793	25,793
Number of observations	451,257	444,415	444,415	334,855	334,855

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. [a] indicates that the coefficients are statistically significant at the 5 percent significance level or better. [b] indicates significant difference from reference level at the 5 percent significance level or better.

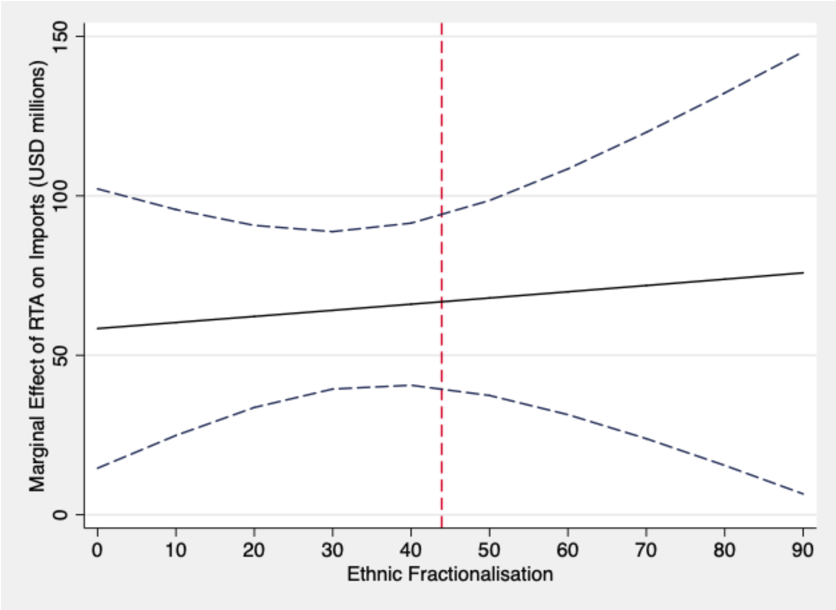


Figure 5: Marginal Effects of Fractionalisation on Imports Given RTA=1 (Index).

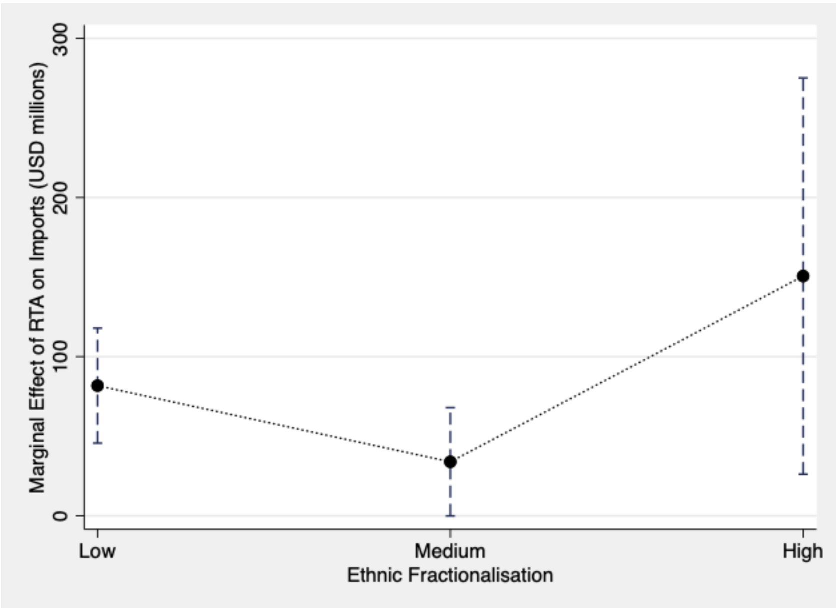


Figure 6: Marginal Effects of Fractionalisation on Imports Given RTA=1 (Groups).

average RTA does not increase bilateral trade among country pairs in this group at all at any conventional significance level, indicated by the cumulative effect $\sum(RTA + RTA * MED)$. In contrast, country pairs in the highly fractionalised group deepen their trading relations significantly more than pairs characterised by low fractionalisation. This non-monotonic pattern was not as clearly present in the static analysis. While the low fractionalisation group experiences an, on average, 33.8 percent increase in exports over the first five years, the corresponding increase for the highly fractionalised group is 92.5 percent. Can we envisage a plausible explanation as to why very heterogeneous exporters seem to be particularly advantaged? It is possible that the presence of transnational ethnic networks is strong enough to drive this relationship (Gören, 2014). Nevertheless, in Sub-Saharan Africa (where most highly fractionalised countries are located), trade at the boundaries between ethnic groups due to ethnic specialisation could be a more likely channel (Montalvo and Reynal-Querol, 2020).

All in all, the results in Table 2 indicate that country pairs where the exporting country is neither very homogeneous nor very heterogeneous do not profit from their trade agreements in terms of increased trade to the same degree as the other country pairs in the sample. While this may seem odd, it is in line with the idea of a non-monotonic relationship between fractionalisation, potential conflict and economic performance as argued by Collier (2001). Proponents of this reasoning maintain that there are less problems in societies with either very few or very many different ethnic groups; very high diversity may even carry additional advantages. It is instead societies situated somewhere in the middle range, where some larger groups dominate others, that experience the most adverse consequences of diversity (Montalvo and Reynal-Querol, 2005). Should this be the dominant explanation, we should instead expect limited trade creation effects of RTAs for highly polarised exporters.

6.1.2 Polarisation

Table 3 presents the corresponding results with polarisation as the diversity measure. Tables and figures are organised identically to the results for fractionalisation. Notably, the interaction coefficient in Column (2) is negative but insignificant, suggesting that, on average, polarisation measured as a continuous variable does not impact the relationship between RTAs and trade flows. However, the marginal effects plotted in Figure 7 allow for a more detailed discussion. For values of polarisation above approximately 80, the marginal effect is no longer significantly different from zero. Hence, we are unable to conclude that very polarised countries increase their exports when joining an RTA. This pattern is further reinforced by the results in Column (3).

While the medium polarisation group experiences insignificantly smaller trade effects relative to the group with low polarisation, the negative interaction effect for the highly polarised group is significantly different from the reference group at the 5 percent level. As seen in Figure 8, we are unable to reject the possibility that the marginal effect of RTAs is zero for this group. Hence, while the average marginal effect for a country in the low polarisation group is an increase in exports of approximately 100 million USD, the corresponding increase for the average highly polarised country is most likely negligible.

Taking into account the lagged RTA and interaction variables, the results are similar to the static analysis but the patterns are arguably strengthened. The cumulative effect in Column (4) again suggests no statistically significant average impact of the interaction. In Column (5), however, while a low-to-medium polarised country increases their bilateral exports by between 28 and 36 percent (not statistically different from each other) over a five-year period, we cannot reject the possibility of null effects for highly polarised countries over the same period. The cumulative coefficient $\sum(RTA + RTA * HIGH)$ of 0.034 is significantly different from the coefficient of the reference group but not from zero. Also for polarisation are there indications that the specifications from Equations (6) and (8) outperform the ones using the continuous index. While the negative influence of high ethnic polarisation is to a certain degree visible when looking at the continuous index, the specifications with diversity groups show signs of greater reliability, both for the static analysis and when allowing for the phasing-in of RTAs.

In summary, the results in Table 3 signal that highly polarised exporters experience smaller trade creation effects of their RTAs in terms of bilateral trade flows, than exporters in the sample characterised by lower levels of polarisation. These effects are also economically important, as experiencing no (statistically verified) expansion of exports in response to RTA formation is surely an unsatisfactory outcome. It, thus, appears as though the definition of diversity as the tension between a few ethnic groups, as opposed to simply a large number of groups, takes precedence in the context of international trade. As argued in section 6.1.1, this corresponds to the non-monotonic hypothesis as submitted by Collier (2001), Montalvo and Reynal-Querol (2004), Montalvo and Reynal-Querol (2005) and others.

Table 3: Regression Estimates of RTA and Polarisation on Imports.

Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)
$\text{RTA}_{ij,t}$	0.2397***	0.3035***	0.2920***	0.0605	0.0865
	(0.000)	(0.002)	(0.000)	(0.503)	(0.184)
$\text{RTA}_{ij,t} * POLAR_j$		-0.0021		0.0013	
		(0.221)		(0.442)	
$\text{RTA}_{ij,t} * MED_{dum}$			-0.0439		0.1359
			(0.602)		(0.121)
$\text{RTA}_{ij,t} * HIGH_{dum}$			-0.2140**		0.0017
			(0.030)		(0.987)
$\text{RTA}_{ij,t-5}$				0.2388***	0.1560***
				(0.000)	(0.000)
$\text{RTA}_{ij,t-5} * POLAR_j$				-0.0036***	
				(0.003)	
$\text{RTA}_{ij,t-5} * MED_{dum}$					-0.0744
					(0.209)
$\text{RTA}_{ij,t-5} * HIGH_{dum}$					-0.2099***
					(0.003)
$\sum(RTA + RTA * POLAR)$				0.297[a]	
$\sum(RTA)$					0.243[a]
$\sum(RTA + RTA * MED)$					0.304[a]
$\sum(RTA + RTA * HIGH)$					0.034[b]
Number of country pairs	26,780	20,227	20,227	19,800	19,800
Number of observations	451,257	344,994	344,994	257,111	257,111

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. [a] indicates that the coefficients are statistically significant at the 5 percent significance level or better. [b] indicates significant difference from reference level at the 5 percent significance level or better.

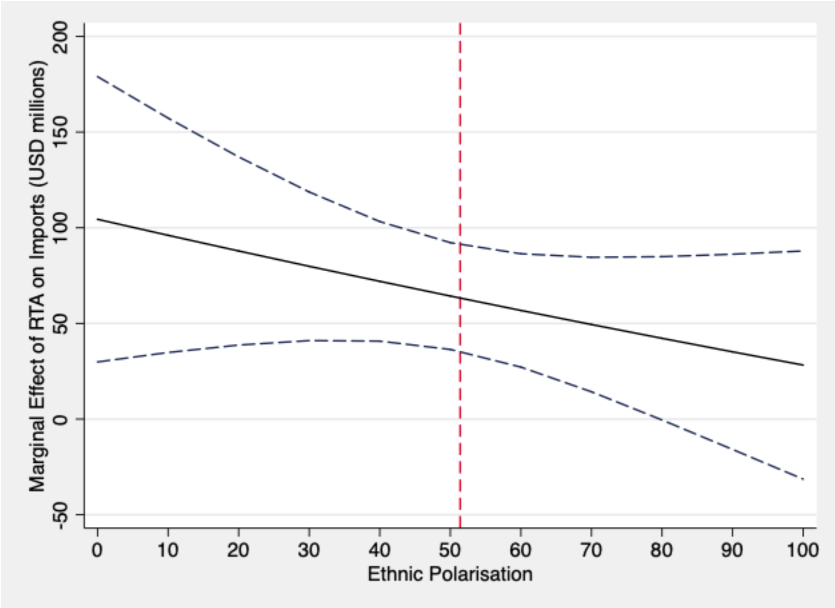


Figure 7: Marginal Effects of Polarisation on Imports Given RTA=1 (Index).

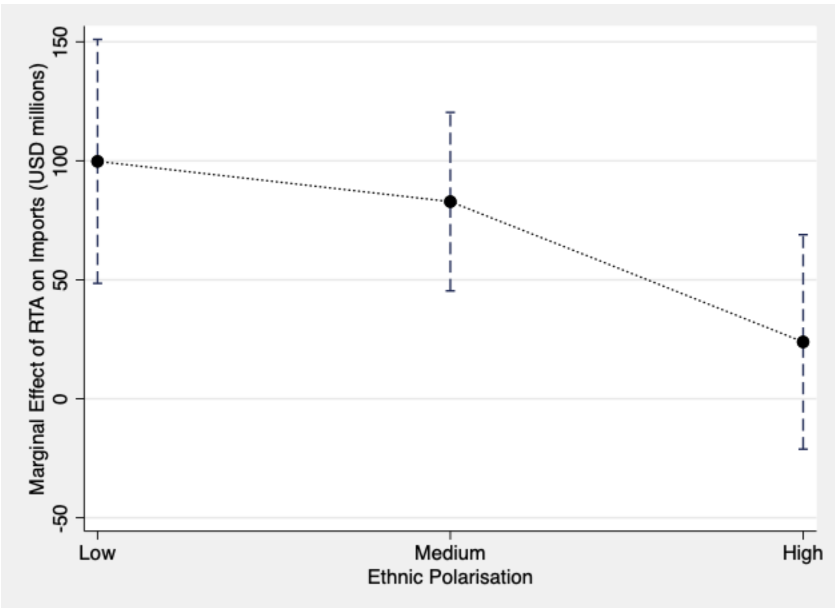


Figure 8: Marginal Effects of Polarisation on Imports Given RTA=1 (Groups).

6.1.3 Key Findings

The empirical results on the relationship between preferential trade, ethnic diversity and trade flows can be summarised in three main points. Firstly, in line with theoretical predictions and previous empirical research, RTAs seem to increase members' international trade at the aggregate level - on average. Secondly, in accordance with Baier et al. (2019), effects are not homogeneous. There are indications that the trade effects of RTAs vary with the level of diversity, even though this conclusion is perhaps not definitive as significance levels tend to fluctuate across specifications. Lastly, it appears that the non-monotonic relationship between diversity and economic performance dominates the link between diversity and trade.

Particularly, it is mainly a medium level of fractionalisation and a high level of polarisation that are detrimental to export performance. This pattern seems reasonable, recalling the relationship between fractionalisation and polarisation in Figure A.1; it is precisely those countries that are neither very homogeneous nor very heterogeneous in terms of fractionalisation that are highly polarised. These findings are in line with those in Montalvo and Reynal-Querol (2005) and Reynal-Querol (2002), where polarisation is the primary cause of potential conflict, institutional deficiency and slow economic growth. Accordingly, they are in opposition to previous research maintaining that it is diversity in its conventional definition – a multitude of groups deemed dissimilar by some criteria – that obstructs development, see for example Alesina et al. (2003) and Easterly and Levine (1997). In addition, these findings raise the possibility that the observed negative relationship between ethnic diversity and the trade effects of RTAs is not necessarily driven by underdevelopment, as polarisation does not exhibit the same level of correlation with income per capita as fractionalisation. Among the 15 countries in the sample with a polarisation index exceeding 80 – indicated to benefit the least from preferential trade – there is considerable spread both across regions and income levels. This angle is further explored in the sensitivity analysis.

6.2 Sectoral Trade Flows

Section 2.3.4 raised the possibility of differentiated impacts depending on sector or type of good. Mainly, there is theoretical support for particular significance of ethnic diversity for trade in manufactured goods, as well as certain commodities. To explore this possibility, I extract agricultural commodities and manufactured goods from total aggregate imports and use them in separate regressions. These groupings of the SITC-categories are based on the definitions by Eurostat (2020). Naturally, it would have been interesting to consider also fuel and mineral products, due to their intrinsic connection to ethnic and civil conflict. However, trade in natural resources is inherently different from trade in other goods and these commodities are, therefore, often excluded in empirical work. The majority of fuel and mineral exports originate in only a few countries, they are often traded on commodity exchanges, and both domestic and international prices are regularly manipulated by policies beyond the control of the WTO (Ruta and Venables, 2012).

Table 4 shows the regression estimates for both fractionalisation and polarisation. Only the specification in Equation (6) is used; this specification was deemed more successful in capturing the interaction between RTAs and ethnic diversity in the main analysis, and additionally offers the most straightforward interpretation. Columns (1) and (4) are the same as in the main analysis, reported to facilitate comparison. Columns (2) and (3) report the results for agricultural and manufactured goods, respectively, with fractionalisation as the diversity measure. For both types of goods, there is no negative correlation with fractionalisation. In fact, highly fractionalised exporters increase their agricultural exports with almost 80 percent, which is significantly different from the reference level. That highly fractionalised exporters see larger trade effects of RTAs than exporters with low fractionalisation was in the main analysis discovered when allowing for phasing-in effects. Potentially, this reflects that many countries relying on agricultural exports are highly fractionalised, and/or trade across ethnic boundaries as suggested by Montalvo and Reynal-Querol (2020). For manufactured goods, fractionalisation does not seem to matter, as the RTA dummy is highly significantly positive for all three groups.

Columns (5) and (6) present the corresponding results with polarisation as the measure of diversity. The negative impact of polarisation is most clearly visible for manufactured goods. The trade effect of RTAs for low polarisation countries is slightly higher than for aggregate trade while being very polarised significantly decreases the effect of RTAs to the point where it is no longer positive. Complex global supply chains and intermediate good-intensive production most likely have limited feasibility in very polarised settings, restricting the ability to quickly scale up production in response to preferential trading opportunities. All in all, it is ethnic polarisation rather than a large number of ethnic groups that presents a barrier to the effectiveness of RTAs in increasing intra-bloc trade also for sectoral trade flows. This seems particularly relevant for the performance of the manufacturing sector, where a high level of polarisation poses an even greater constraint to trade creation than for aggregate trade flows.

Table 4: Regression Estimates with Disaggregated Trade Flows.

	Fractionalisation			Polarisation		
Dependent variable:	(1) Aggregate Imports	(2) Agriculture	(3) Manufactured Goods	(4) Aggregate Imports	(5) Agriculture	(6) Manufactured Goods
$\text{RTA}_{ij,t}$	0.2964***	0.1626***	0.3264***	0.2920***	0.1859***	0.3096***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\text{RTA}_{ij,t} * MED_{dum}$	-0.1626*	0.0460	-0.1628	-0.0439	-0.1209*	0.0369
	(0.059)	(0.438)	(0.104)	(0.602)	(0.072)	(0.706)
$\text{RTA}_{ij,t} * HIGH_{dum}$	0.1954	0.4151**	0.2148	-0.2140**	0.1051	-0.2392**
	(0.272)	(0.014)	(0.333)	(0.030)	(0.185)	(0.042)
Number of country pairs	26,277	21,221	25,543	20,227	16,986	19,681
Number of observations	444,415	343,171	426,554	344,994	278,836	331,195
F-statistic (p-value)$^{\text{med}}$	0.040	0.000	0.036	0.000	0.182	0.000
F-statistic (p-value)$^{\text{high}}$	0.003	0.000	0.009	0.285	0.000	0.426

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). Agriculture refers to SITC categories 0 and 1; manufactured goods refers to SITC categories 5, 6, 7, and 8 (Eurostat, 2020). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. F-statistic (p-value) tests $RTA + RTA * Group = 0$.

7 Sensitivity Analysis

In this section, I test the robustness of my results by performing various sensitivity analyses. First, I address the issue of zero trade flows. Then, I check whether the results hold for different subgroups of the sample. Finally, I experiment with lag lengths and group divisions. All results are available in Appendix B.

7.1 Zero Trade Flows

How to handle zeroes in trade data is one of the most important estimation issues in analyses using the gravity framework. To see whether the results are sensitive to the handling of zeroes, I re-run the aggregate analysis for two extreme scenarios: all missing import values are replaced with zeroes and all missing values are discarded. Table B.1 presents the results for fractionalisation. The coefficients of the specification with all zeroes are almost identical to those in the main analysis. Some changes, however, appear in the coefficients when all missing values are thrown out. While most qualitative conclusions remain, two coefficients become insignificant; the negative impact of fractionalisation for the medium-level group is no longer as conclusive as in the static analysis. When allowing for phasing-in effects, this pattern is nonetheless once again present. The cumulative effects (not reported) follow similar patterns as in Table 2.

Table B.2 displays the corresponding results for polarisation. Again, the estimates when all missing import values are exchanged for zeroes are very similar to the estimates in Table 3. There are no qualitative discrepancies. The same holds when all missing values are discarded. While some coefficients are slightly altered when phasing-in effects are accounted for, the cumulative effects are almost interchangeable with those in the main analysis. In summary, the handling of zeroes does not generally seem to be driving the results. The main disparity emerges for fractionalisation when all missing values are removed. It should be noted that it is highly unlikely that there are practically no zeroes in the data set. Helpman et al. (2008) report that approximately half of the country pairs in their sample of 158 countries do not trade with each other. Nevertheless, it is difficult to know for certain, which is why several possibilities are reported.

7.2 Subsamples

To begin exploring whether the baseline results hold for different subgroups of the sample, I first remove different regional groups from the sample and then see whether the results hold for country groups with different levels of economic development. The division into both regional and income groups follows the classification used by the World Bank (2019).

Removing the group of Sub-Saharan African (SSA) countries could alter the results, as this is the most fractionalised region in the world. However, the coefficients in Columns (1)-(3) of Table B.3 and Table B.4 suggest that the main results are remarkably stable to the exclusion of this large group of countries. The main difference is that the negative impact of polarisation is reinforced; polarisation measured as a continuous variable now significantly changes the impact of RTAs on average, and Figure B.4 reveals that already at a polarisation index of approximately 70 is the marginal RTA effect not significantly distinct from zero. Moreover, excluding the group of Latin American and Caribbean (LAC) countries could affect the results since this is the most polarised region in the sample. Nonetheless, the main findings remain qualitatively unaffected, as seen in Columns (4)-(6). Asia and the Pacific (APAC) is a diverse group of countries, including both advanced economies such as Japan and Australia, as well as many developing nations such as Bangladesh and Nepal. They also vary in their levels of ethnic heterogeneity. Removing this region with some of the world largest trading economies could change the main results. Regarding fractionalisation, the results are almost identical to those of the full sample. For polarisation, the patterns are reinforced when the APAC countries are excluded. Observing the marginal effects in Figure B.6, the negative impact of polarisation on the average RTA effect is clear, even though the effect of RTAs remains significantly positive for all levels of polarisation, which was not the case for the full sample.

The non-monotonic relationship between ethnic diversity and the trade effects of RTAs indicated by the main results introduced the possibility of a relationship not exclusively driven by levels of economic development. To further explore this speculation, I experiment with excluding either low-income or high-income economies from the sample.[20] As seen in Table B.5 and Figure B.9, removing the group of high-income countries results in a smaller RTA effect and insignificant marginal effects for low levels of fractionalisation, probably arising from the fact that high-income economies trade more generally. More interesting, however, is that the patterns discovered in the main analysis hold when the low-income countries are dropped from the sample, considering that many highly fractionalised countries fall within this income group. The results for polarisation, presented in Table B.6, are rather sensitive to dropping the group of high-income countries, where all levels of polarisation are now more or less associated with insignificant trade effects

[20] Low Income: GNI/capita $\leq$ \$1,035; high income: GNI/capita $\geq$ \$12,536 (World Bank, 2019).

of RTAs. Again, removing the group of low-income countries does not considerably alter the results. The fact that the baseline results are stable to the exclusion of low-income countries reinforces the possibility that a low level of development is perhaps not the only mechanism present.

7.3 Alternative Lag Lengths

Next, I explore how the cumulative effects vary under different specifications of the timing of the RTA effects, noting that there are several approaches to managing "phasing-in" effects in the literature. Therefore, Equations (7) and (8) are re-run with various different lag lengths, similarly to the simulations in Baier et al. (2019). The results are available in Table B.7 and Table B.8, where Columns (1) and (2) introduces 2 and 4 year lags, Columns (3) and (4) introduces 3 and 6 year lags, and so forth. As expected, moving further away from the year of entry into force reduces the size of the phasing-in effects. Overall, nonetheless, there are very few discrepancies in the cumulative effects and their patterns compared to the baseline results, suggesting that the use of a single 5 year lag is most likely a reasonable approximation.

7.4 Alternative Diversity Groups

The countries in the sample are divided into groups depending on their levels of fractionalisation and polarisation, respectively. In the main analysis, this division is relative with a customary number of groups (low, medium, high). Here, I assess whether the choice of categorisation influences the results. First, I keep the relative definition but extend the number of groups to four. The results are available in Table B.9 and Figure B.11. With fractionalisation as the measure of diversity, the static analysis shows no significant difference from the reference level for any of the groups. Since this division exercise reduces the number of exporters in each group, the rather weak effect picked up in the main analysis may not be visible. The addition of another group has, moreover, reduced the precision of the estimates, as seen in Figure B.11. When accounting for phasing-in effects, however, the general pattern returns; countries with both medium and medium-to-high fractionalisation experience insignificant effects of RTAs. For polarisation, it is mainly the medium-to-high group that encounters limited trade effects of RTAs, both in the cumulative and one-off specifications.

I then depart from the relative categorisation to an arbitrary partition based on the absolute values of the diversity indices. This arguably produces an even clearer pattern than in the main analysis, particularly for the measure of fractionalisation. The negative interaction effect for the medium fractionalisation group in Column (5) is now highly significant. Overall, there are no large inconsistencies depending on whether the groups are chosen based on relative or absolute values of diversity. Nonetheless, I prefer the use of a relative classification, thereby avoiding discretionary selection by the author.

8 Conclusion

In this paper, I evaluate the relationship between preferential trading opportunities, ethnic diversity, and trade flows for a large sample of trading economies over the period 1988 to 2008. The panel data model utilised exploits time variation in trade preferences and cross-country variation in ethnic diversity and captures their joint impact on trade flows by the inclusion of interaction terms. The nature of the relationship between heterogeneity and trade is studied by contrasting the measures of ethnic fractionalisation and ethnic polarisation, thus investigating whether it is many different ethnic groups or proximity to ethnic bipolarity that are potential barriers to export performance. The analysis is undertaken for both aggregate and relevant sectoral trade flows using the PPML estimator as proposed by Santos Silva and Tenreyro (2006).

In line with previous empirical work on the implications of ethnic diversity for economic growth and development that identifies negative relationships at the country level, see e.g. Alesina and Zhuravskaya (2011), Easterly and Levine (1997) and Montalvo and Reynal-Querol (2004), I discover a primarily adverse impact also regarding the trade effects of RTAs. While I find that the average RTA increases trade for the average signatory country, in line with most previous research within the trade literature using similar empirical strategies, the trade effects are not necessarily symmetric but seem to vary with the degree of ethnic heterogeneity. However, the findings indicate that it is mainly ethnic polarisation that has a negative impact on export performance, thus endorsing the view of a non-monotonic influence of ethnic diversity as maintained by Collier (2001), Reynal-Querol (2002) and others. Montalvo and Reynal-Querol (2005, p.798) express that the "highest risk is associated with the middle range of ethnic diversity". Accordingly, this paper upholds that exporters characterised by a medium level of fractionalisation are (a) generally those that are also highly polarised as previously shown by e.g. Gören (2014), and (b) largely those that see limited trade effects of RTAs. In contrast, exporters that are either very homogeneous or very heterogeneous see larger benefits of RTAs; there are even signals of supplementary advantages to high ethnic fragmentation.

Moreover, the premise introduced by Easterly and Levine (1997) - that high ethnic fragmentation explains a significant part of Sub-Saharan Africa's "growth tragedy" - finds limited support in the case of export performance in response to trade preferences in this paper, as having the national distribution of ethnic groups approach the bimodal distribution is not restricted to neither Sub-Saharan Africa nor low-income countries. In addition, agricultural exports - representing the bulk of exports from many both less developed and highly fractionalised countries - are largely unaffected by ethnic fractionalisation.

Yet, the conclusions should be considered in the context of the limitations of the study. The complexity of the concept of *ethnicity* should not be overlooked, and the time-invariability of the diversity measures poses certain limitations to the gravity model. Additionally, the absence of a solid precedent further renders it difficult to assess the accuracy and reliability of the results obtained. Nonetheless, the novelty of the research question is perhaps the main contribution of this paper. Close to every single economy in the world is party to at least one RTA, and has a national interest in maximising their value. Concurrently, as a consequence of the standstill of multilateral negotiations, developing countries must predominantly rely on both reciprocal and unilateral preferential trade. Understanding the barriers to the successful performance of such arrangements is essential for both countries themselves as well as the international community that has vowed to facilitate their access to the benefits of a globalised economy.

While the findings in this paper suggest that the trade effects of RTAs seem to vary with the level of ethnic heterogeneity, future research could aim to more rigorously evaluate the causal link between diversity and trade flows. Moreover, the potential divergence regarding the effects of ethnic heterogeneity depending on the scale of analysis could favourably be explored as regional data becomes available, as already initiated by e.g. Alesina et al. (2016) and Montalvo and Reynal-Querol (2020). Acknowledging that empirical research can only discover patterns based on existing measures of ethnic diversity, the continuation of the sourcing of improved data - respecting the sensitivity of the topic - is further recommended. An empirical exploration into the possible mechanisms suggested by theory could also offer a superior understanding of the relationship between diversity and trade, with the ultimate objective to ensure a well-functioning international trading system and an equitable integration into the world economy for countries at all levels of development.

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Appendix A

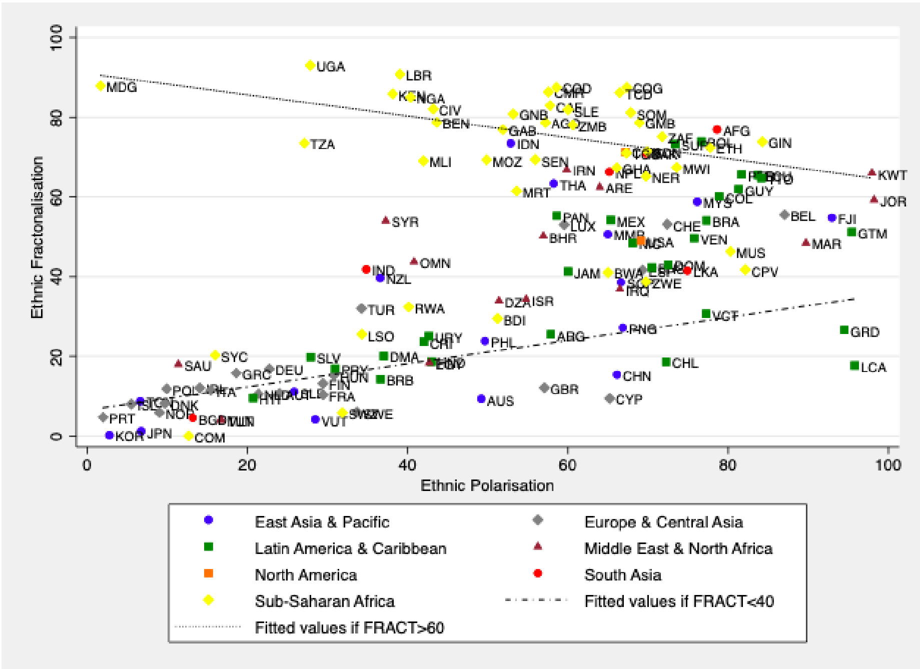


Figure A.1: Relationship between Ethnic Fractionalisation and Ethnic Polarisation.

Table A.1: Trading Countries.

Afghanistan	Albania	Algeria	Andorra	Angola	Antigua and Barbuda
Argentina	Armenia	Australia	Austria	Azerbaijan	Bahamas
Bahrain	Bangladesh	Barbados	Belarus	Belgium	Belize
Benin	Bhutan	Bolivia, Plurinational State of	Bosnia Herzegovina	Botswana	Brazil
Brunei Darussalam	Bulgaria	Burkina Faso	Burundi	Cabo Verde	Cambodia
Cameroon	Canada	Central African Republic	Chad	Chile	China
Colombia	Comoros	Congo, Republic of	Costa Rica	Côte d'Ivoire	Croatia
Cuba	Cyprus	Czech Republic	Congo, Democratic Republic of	Denmark	Djibouti
Dominica	Dominican Republic	Ecuador	Egypt	El Salvador	Equatorial Guinea
Eritrea	Estonia	Eswatini	Ethiopia	Fiji	Finland
France	Gabon	Gambia	Georgia	Germany	Ghana
Greece	Grenada	Guatemala	Guinea	Guinea-Bissau	Guyana
Haiti	Honduras	Hungary	Iceland	India	Indonesia
Iran	Iraq	Ireland	Israel	Italy	Jamaica
Japan	Jordan	Kazakhstan	Kenya	Kiribati	Kuwait
Kyrgyzstan	Lao, People's Democratic Republic	Latvia	Lebanon	Lesotho	Liberia
Libya	Lithuania	Luxembourg	Madagascar	Malawi	Malaysia
Maldives	Mali	Malta	Marshall Islands	Mauritania	Mauritius
Mexico	Micronesia, Federated States of	Mongolia	Morocco	Mozambique	Myanmar
Namibia	Nepal	Netherlands	New Zealand	Nicaragua	Niger
Nigeria	North Macedonia	Norway	Oman	Pakistan	Palau
Panama	Papua New Guinea	Paraguay	Peru	Philippines	Poland
Portugal	Qatar	Republic of Korea	Republic of Moldova	Romania	Russian Federation
Rwanda	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines	Samoa	São Tomé and Príncipe
Saudi Arabia	Senegal	Seychelles	Sierra Leone	Singapore	Slovakia
Slovenia	Solomon Islands	Somalia	South Africa	Spain	Sri Lanka
Sudan	Suriname	Sweden	Switzerland	Syria	Tajikistan
Tanzania, Republic of	Thailand	Togo	Tonga	Trinidad and Tobago	Tunisia
Turkey	Turkmenistan	Tuvalu	United States	Uganda	Ukraine
United Arab Emirates	United Kingdom	Uruguay	Uzbekistan	Vanuatu	Venezuela
Viet Nam	Yemen	Zambia	Zimbabwe		

Table A.2: SITC Product Categories (1-digit).

SITC Section	Products	Product Group
0	Food and live animals	Agriculture
1	Beverages and tobacco	Agriculture
2	Crude materials, inedible, except fuels	Raw Materials
3	Mineral fuels, lubricants, and related materials	Energy Products
4	Animal and vegetable oils, fats and waxes	Raw Materials
5	Chemicals and related products	Chemicals
6	Manufactured goods classified chiefly by material	Manufactured Goods
7	Machinery and transport equipment	Manufactured Goods
8	Miscellaneous manufactured articles	Manufactured Goods
9	Commodities and transactions not classified elsewhere in SITC	N/A

Source: Eurostat (2020).

Table A.3: Regression Estimates Including Control Variables.

Dependent variable: Imports	(1)
$\text{RTA}_{ij,t}$	0.2397***
	(0.000)
$\ln\text{GDP}_{it}$	0.7546***
	(0.000)
$\ln\text{GDP}_{jt}$	0.6855***
	(0.000)
$\ln\text{POP}_{it}$	-0.5435***
	(0.001)
$\ln\text{POP}_{jt}$	0.0221
	(0.868)
Constant	-14.7152
	(0.000)
Number of country pairs	26,780
Number of observations	451,257

Note: All estimations include pair fixed effects and time fixed effects. P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1.

Appendix B

Table B.1: Handling of Zeroes - Fractionalisation

	All Zeroes					All Missing				
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$RTA_{ij,t}$	0.2521***	0.2369***	0.3087***	0.0347	0.1371**	0.1532***	0.1598***	0.2027***	0.0865	0.1240**
	(0.000)	(0.001)	(0.000)	(0.603)	(0.010)	(0.000)	(0.009)	(0.000)	(0.184)	(0.013)
$RTA_{ij,t} * FRACT_j$		0.0005		0.0034*			-0.0002		-0.0002	
		(0.789)		(0.053)			(0.897)		(0.896)	
$RTA_{ij,t} * MED_{dum}$			-0.1624**		-0.0723			-0.1086		-0.1033
			(0.047)		(0.414)			(0.179)		(0.206)
$RTA_{ij,t} * HIGH_{dum}$			0.1934		0.4103***			0.0267		0.0461
			(0.274)		(0.008)			(0.737)		(0.665)
$RTA_{ij,t-5}$				0.1807***	0.1602***				0.1610***	0.1297***
				(0.000)	(0.000)				(0.000)	(0.000)
$RTA_{ij,t-5} * FRACT_j$				-0.0035**					-0.0027**	
				(0.012)					(0.010)	
$RTA_{ij,t-5} * MED_{dum}$					-0.1990***					-0.1096*
					(0.006)					(0.057)
$RTA_{ij,t-5} * HIGH_{dum}$					-0.0643					-0.0926
					(0.549)					(0.106)
Number of country pairs	26,843	26,337	26,337	25,999	25,999	24,716	24,293	24,293	23,983	23,983
Number of observations	539,213	529,863	529,863	408,685	408,685	302,591	299,008	299,008	257,106	257,106

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1.

Table B.2: Handling of Zeroes - Polarisation

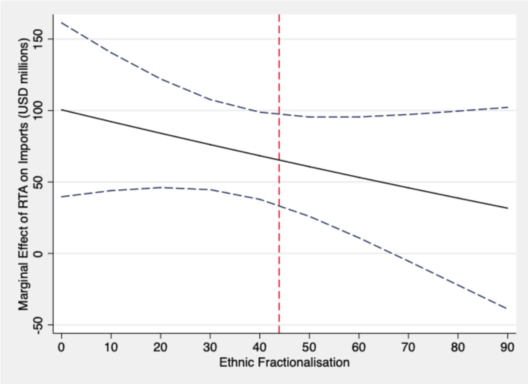
	All Zeroes					All Missing				
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
RTA$_{ij,t}$	0.2521***	0.3293***	0.3115***	0.0393	0.0669	0.1532***	0.2112***	0.1971***	0.0476	0.0451
	(0.000)	(0.000)	(0.000)	(0.651)	(0.286)	(0.000)	(0.009)	(0.000)	(0.562)	(0.419)
RTA$_{ij,t} * FRACT_j$		-0.0024		0.0018			-0.0012		0.0006	
		(0.122)		(0.289)			(0.435)		(0.695)	
RTA$_{ij,t} * MED_{dum}$			-0.0666		0.1568*			0.0550		0.1684**
			(0.406)		(0.070)			(0.487)		(0.037)
RTA$_{ij,t} * HIGH_{dum}$			-0.2214**		0.0404			-0.1577*		-0.0481
			(0.017)		(0.708)			(0.072)		(0.597)
RTA$_{ij,t-5}$				0.2663***	0.1741***				0.2488***	0.1746***
				(0.000)	(0.000)				(0.000)	(0.000)
RTA$_{ij,t-5} * FRACT_j$				-0.0044***					-0.0035***	
				(0.002)					(0.001)	
RTA$_{ij,t-5} * MED_{dum}$					-0.1317*					-0.0804*
					(0.061)					(0.060)
RTA$_{ij,t-5} * HIGH_{dum}$					-0.2666***					-0.2160***
					(0.003)					(0.000)
Number of country pairs	26,843	20,287	20,287	19,979	19,979	24,716	18,871	18,871	18,594	18,594
Number of observations	539,213	411,970	411,970	313,863	313,863	302,591	241,755	241,755	204,154	204,154

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1.

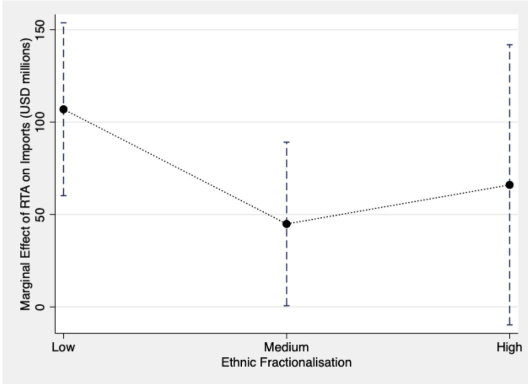
Table B.3: Subsamples - Regions: Fractionalisation

	SSA Excluded			LAC Excluded			APAC Excluded		
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$RTA_{ij,t}$	0.2141***	0.2806***	0.2977***	0.2482***	0.2314***	0.3133***	0.3550***	0.3880***	0.4205***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
$RTA_{ij,t} * FRACT_j$		-0.0020			0.0005			-0.0009	
		(0.258)			(0.800)			(0.691)	
$RTA_{ij,t} * MED_{dum}$			-0.1618*			-0.1979**			-0.1681**
			(0.060)			(0.039)			(0.048)
$RTA_{ij,t} * HIGH_{dum}$			-0.1037			0.1855			0.3549
			(0.389)			(0.320)			(0.407)
Number of country pairs	20,174	19,789	19,789	21,978	21,475	21,475	21,843	21,577	21,577
Number of observations	344,149	338,539	338,539	368,739	361,897	361,897	369,987	366,695	366,695

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1.

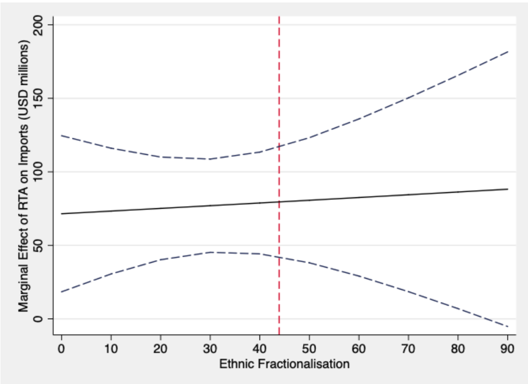


(a) Index

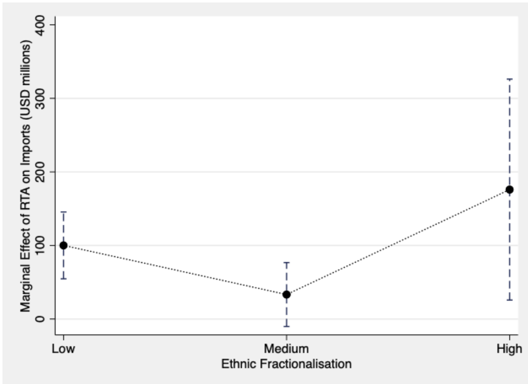


(b) Dummies

Figure B.1: Marginal Effects of Fractionalisation excluding Sub-Saharan Africa.

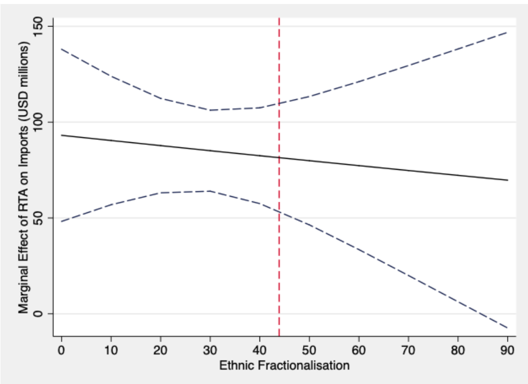


(a) Index

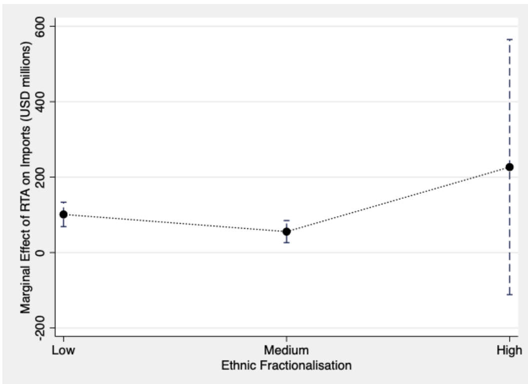


(b) Dummies

Figure B.2: Marginal Effects of Fractionalisation excluding Latin America and the Caribbean.



(a) Index



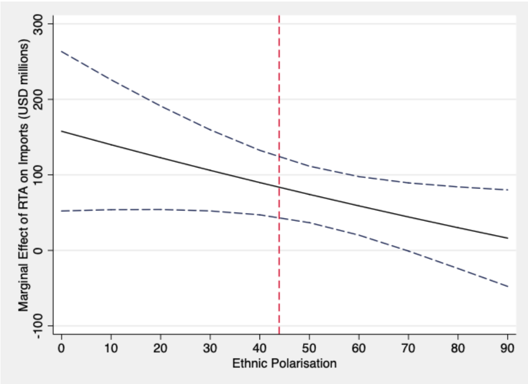
(b) Dummies

Figure B.3: Marginal Effects of Fractionalisation excluding Asia and the Pacific.

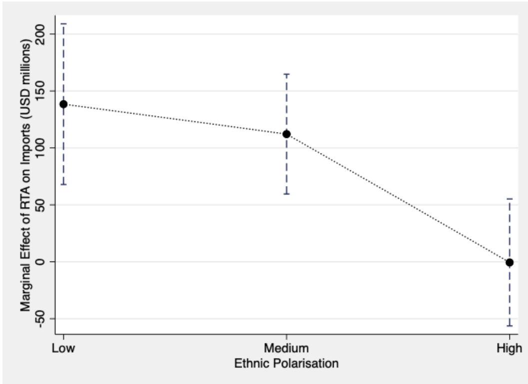
Table B.4: Subsamples - Regions: Polarisation

	SSA Excluded			LAC Excluded			APAC Excluded		
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RTA$_{ij,t}$	0.2141***	0.3274***	0.2924***	0.2482***	0.3238***	0.3030***	0.3550***	0.5314***	0.4522***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
RTA$_{ij,t} * POLAR_j$		-0.0032*			-0.0026			-0.0044***	
		(0.061)			(0.159)			(0.007)	
RTA$_{ij,t} * MED_{dum}$			-0.0493			-0.0621			-0.1939**
			(0.559)			(0.521)			(0.036)
RTA$_{ij,t} * HIGH_{dum}$			-0.2938***			-0.2249**			-0.2536***
			(0.002)			(0.031)			(0.008)
Number of country pairs	20,174	14,243	14,243	21,978	15,976	15,976	21,843	16,738	16,738
Number of observations	344,149	247,365	247,365	368,739	271,506	271,506	369,987	286,445	286,445

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1.

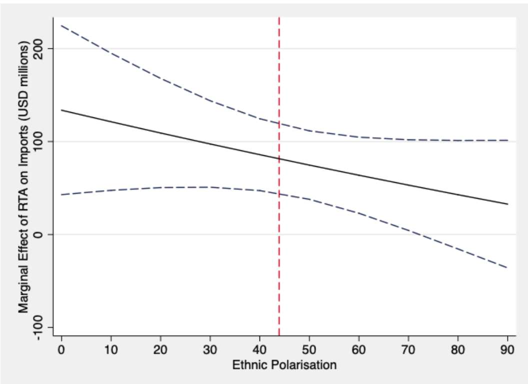


(a) Index

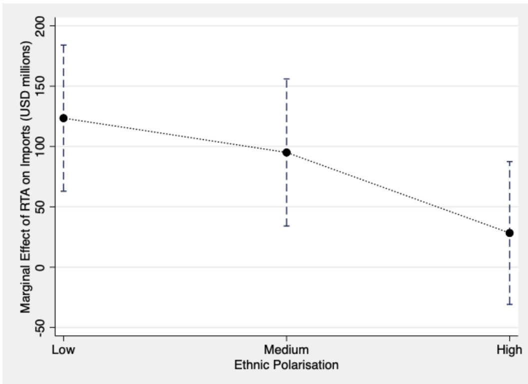


(b) Dummies

Figure B.4: Marginal Effects of Polarisation excluding Sub-Saharan Africa.

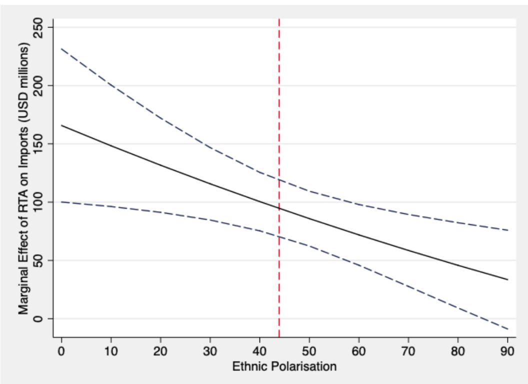


(a) Index

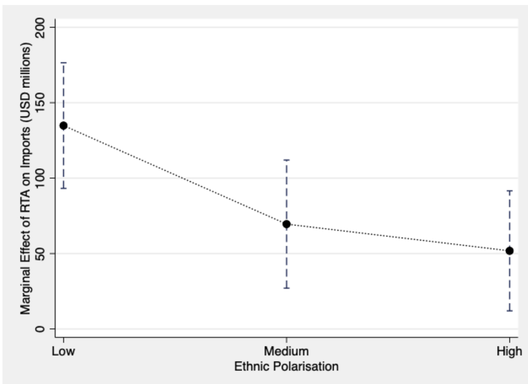


(b) Dummies

Figure B.5: Marginal Effects of Polarisation excluding Latin America and the Caribbean.



(a) Index



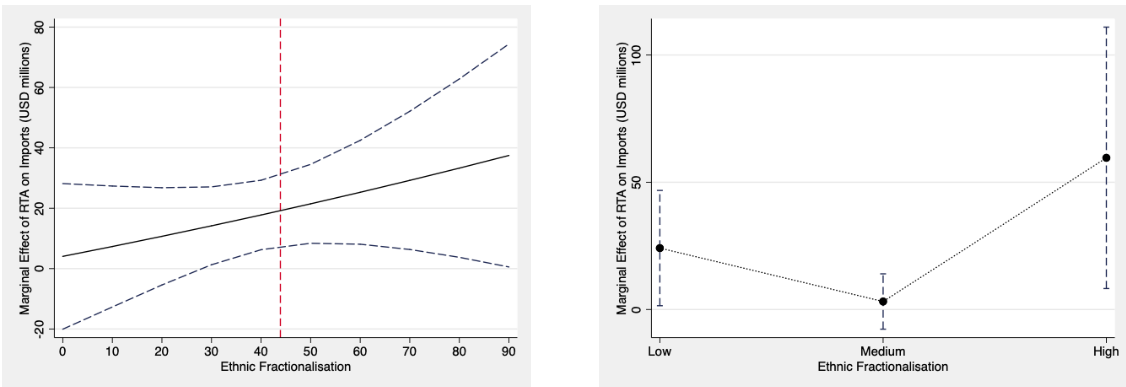
(b) Dummies

Figure B.6: Marginal Effects of Polarisation excluding Asia and the Pacific.

Table B.5: Subsamples - Income Groups: Fractionalisation

	High-Income[†] Excluded			Low-Income[‡] Excluded		
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)
$\text{RTA}_{ij,t}$	0.1764***	0.0400	0.2149**	0.2398***	0.2187***	0.2964***
	(0.001)	(0.737)	(0.022)	(0.000)	(0.005)	(0.000)
$\text{RTA}_{ij,t} * FRACT_j$		0.0031			0.0006	
		(0.238)			(0.734)	
$\text{RTA}_{ij,t} * MED_{dum}$			-0.1842*			-0.1617*
			(0.084)			(0.061)
$\text{RTA}_{ij,t} * HIGH_{dum}$			0.2502			0.1934
			(0.186)			(0.279)
Number of country pairs	18,002	17,499	17,499	23,030	22,675	22,675
Number of observations	296,610	289,768	289,768	394,278	389,496	389,496

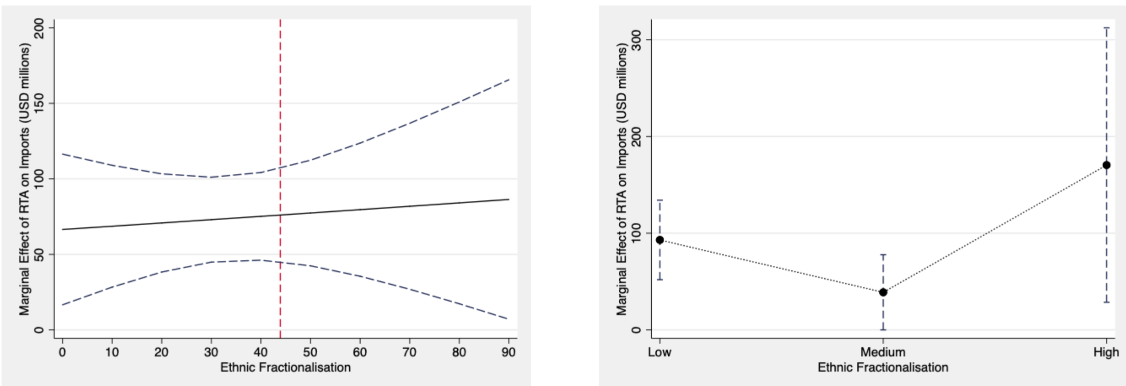
Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. † GNI/capita ≥ \$12,536 (2019). ‡ GNI/capita ≤ \$1,035 (2019).



(a) Index

(b) Dummies

Figure B.7: Marginal Effects of Fractionalisation excluding High-Income Countries.



(a) Index

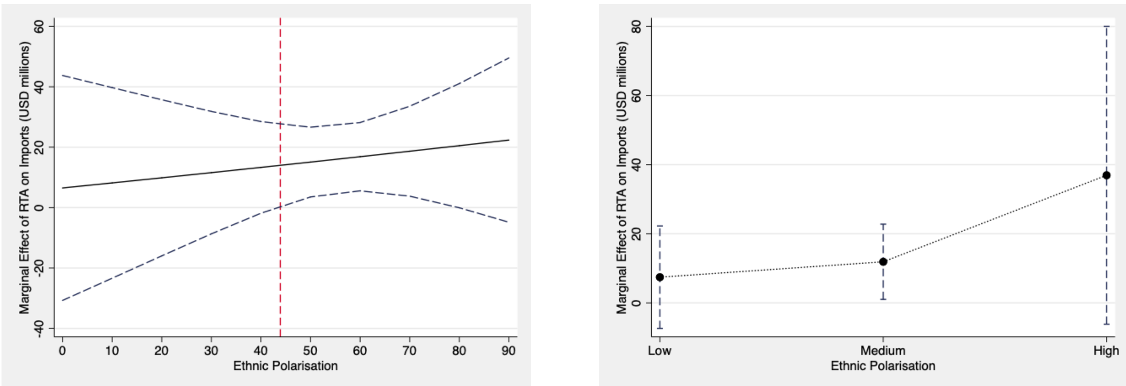
(b) Dummies

Figure B.8: Marginal Effects of Fractionalisation excluding Low-Income Countries.

Table B.6: Subsamples - Income Groups: Polarisation

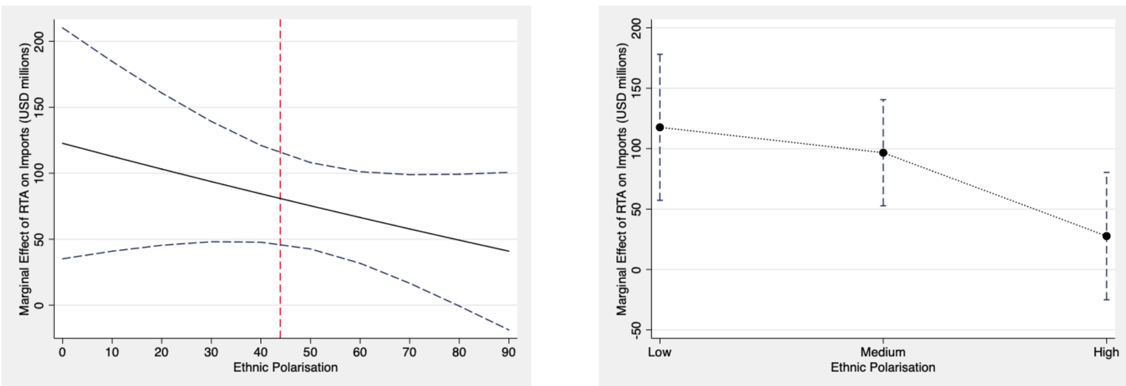
	High-Income† Excluded			Low-Income‡ Excluded		
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)
$\text{RTA}_{ij,t}$	0.1764***	0.0555	0.0632	0.2398***	0.3045***	0.2941***
	(0.001)	(0.725)	(0.311)	(0.000)	(0.002)	(0.000)
$\text{RTA}_{ij,t} * POLAR_j$		0.0360			-0.0466	
		(0.613)			(0.218)	
$\text{RTA}_{ij,t} * MED_{dum}$			0.0360			-0.0466
			(0.615)			(0.581)
$\text{RTA}_{ij,t} * HIGH_{dum}$			0.2173			-0.2167**
			(0.171)			(0.029)
Number of country pairs	18,002	13,241	13,241	23,030	16,844	16,844
Number of observations	296,610	219,174	219,174	394,278	293,733	293,733

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. † GNI/capita ≥ \$12,536 (2019). ‡ GNI/capita ≤ \$1,035 (2019).



(a) Index (b) Dummies

Figure B.9: Marginal Effects of Polarisation excluding High-Income Countries.



(a) Index (b) Dummies

Figure B.10: Marginal Effects of Polarisation excluding Low-Income Countries.

Table B.7: Varying Lag Lengths - Fractionalisation.

	2 & 4 year lag		3 & 6 year lag		4 & 8 year lag	
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)
RTA$_{ij,t}$	0.0638	0.1443***	0.0464	0.1338**	0.0608	0.1394**
	(0.333)	(0.007)	(0.508)	(0.019)	(0.380)	(0.012)
RTA$_{ij,t} * FRACT_j$	0.0017		0.0017		0.0011	
	(0.313)		(0.347)		(0.540)	
RTA$_{ij,t} * MED_{dum}$		-0.1280		-0.1681**		-0.1809**
		(0.108)		(0.046)		(0.027)
RTA$_{ij,t} * HIGH_{dum}$		0.2891*		0.3076**		0.2474*
		(0.056)		(0.040)		(0.075)
RTA$_{ij,t-2}$	0.0384	0.0550				
	(0.388)	(0.126)				
RTA$_{ij,t-2} * FRACT_j$	0.0007					
	(0.510)					
RTA$_{ij,t-2} * MED_{dum}$		0.0268				
		(0.603)				
RTA$_{ij,t-2} * HIGH_{dum}$		0.1113				
		(0.352)				
RTA$_{ij,t-3}$			0.0302	0.0398		
			(0.448)	(0.250)		
RTA$_{ij,t-3} * FRACT_j$			0.0006			
			(0.535)			
RTA$_{ij,t-3} * MED_{dum}$				0.0221		
				(0.611)		
RTA$_{ij,t-3} * HIGH_{dum}$				0.0881		
				(0.350)		
RTA$_{ij,t-4}$	0.1075***	0.1171***			0.0565	0.0484*
	(0.010)	(0.000)			(0.139)	(0.094)
RTA$_{ij,t-4} * FRACT_j$	-0.0012				-0.0004	
	(0.323)				(0.712)	
RTA$_{ij,t-4} * MED_{dum}$		-0.1164*				-0.0173
		(0.058)				(0.727)
RTA$_{ij,t-4} * HIGH_{dum}$		0.0611				0.0942
		(0.507)				(0.267)
RTA$_{ij,t-6}$			0.1281***	0.1124***		
			(0.002)	(0.000)		
RTA$_{ij,t-6} * FRACT_j$			-0.0031**			
			(0.012)			
RTA$_{ij,t-6} * MED_{dum}$				-0.1923***		
				(0.002)		
RTA$_{ij,t-6} * HIGH_{dum}$				-0.0468		
				(0.702)		
RTA$_{ij,t-8}$					0.0767*	0.0494
					(0.066)	(0.133)
RTA$_{ij,t-8} * FRACT_j$					-0.0035***	
					(0.006)	
RTA$_{ij,t-8} * MED_{dum}$						-0.1710***
						(0.004)
RTA$_{ij,t-8} * HIGH_{dum}$						-0.1239
						(0.255)
$\sum(RTA + RTA * FRACT)$	0.211[a]		0.204[a]		0.191[a]	
$\sum(RTA)$		0.316[a]		0.286[a]		0.237[a]
$\sum(RTA + RTA * MED)$		0.099[b]		-0.052[b]		-0.132[b]
$\sum(RTA + RTA * HIGH)$		0.778[a,b]		0.635[a,b]		0.455[a]
Number of observations	356,790	356,790	313,761	313,761	271,431	271,431

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. [a] indicates that the coefficients are statistically significant at the 5 percent significance level or better. [b] indicates significant difference from reference level at the 5 percent significance level or better.

Table B.8: Varying Lag Lengths - Polarisation.

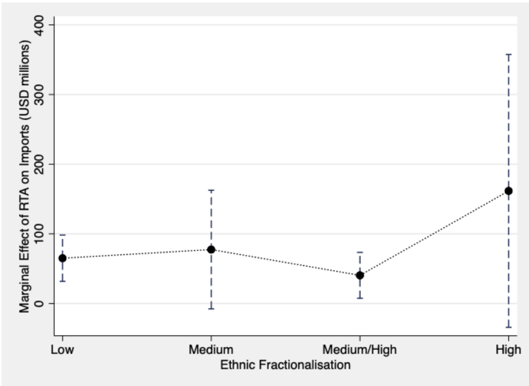
	2 & 4 year lag		3 & 6 year lag		4 & 8 year lag	
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)
$\text{RTA}_{ij,t}$	0.0556	0.0761	0.0467	0.0559	0.0671	0.0752
	(0.507)	(0.212)	(0.603)	(0.404)	(0.472)	(0.292)
$\text{RTA}_{ij,t} * FRACT_j$	0.0012		0.0012		0.0007	
	(0.464)		(0.491)		(0.691)	
$\text{RTA}_{ij,t} * MED_{dum}$		0.1326		0.1589*		0.1152
		(0.110)		(0.081)		(0.200)
$\text{RTA}_{ij,t} * HIGH_{dum}$		-0.0009		0.0088		-0.0235
		(0.993)		(0.933)		(0.822)
$\text{RTA}_{ij,t-2}$	0.0542	0.0564				
	(0.368)	(0.146)				
$\text{RTA}_{ij,t-2} * FRACT_j$	-0.0005					
	(0.674)					
$\text{RTA}_{ij,t-2} * MED_{dum}$		-0.0323				
		(0.610)				
$\text{RTA}_{ij,t-2} * HIGH_{dum}$		-0.0486				
		(0.388)				
$\text{RTA}_{ij,t-3}$			0.0397	0.0627*		
			(0.415)	(0.062)		
$\text{RTA}_{ij,t-3} * FRACT_j$			-0.0003			
			(0.732)			
$\text{RTA}_{ij,t-3} * MED_{dum}$				-0.0980*		
				(0.068)		
$\text{RTA}_{ij,t-3} * HIGH_{dum}$				-0.0325		
				(0.500)		
$\text{RTA}_{ij,t-4}$	0.1962***	0.1352***			0.0907**	0.0809***
	(0.000)	(0.000)			(0.036)	(0.004)
$\text{RTA}_{ij,t-4} * FRACT_j$	-0.0026**				-0.0012	
	(0.034)				(0.204)	
$\text{RTA}_{ij,t-4} * MED_{dum}$		-0.0516				-0.1377***
		(0.432)				(0.008)
$\text{RTA}_{ij,t-4} * HIGH_{dum}$		-0.1454**				-0.0552
		(0.044)				(0.397)
$\text{RTA}_{ij,t-6}$			0.2298***	0.1138***		
			(0.000)	(0.000)		
$\text{RTA}_{ij,t-6} * FRACT_j$			-0.0041***			
			(0.002)			
$\text{RTA}_{ij,t-6} * MED_{dum}$				-0.0372		
				(0.618)		
$\text{RTA}_{ij,t-6} * HIGH_{dum}$				-0.2279***		
				(0.002)		
$\text{RTA}_{ij,t-8}$					0.1511***	0.0480
					(0.002)	(0.117)
$\text{RTA}_{ij,t-8} * FRACT_j$					-0.0037***	
					(0.001)	
$\text{RTA}_{ij,t-8} * MED_{dum}$						-0.0081
						(0.847)
$\text{RTA}_{ij,t-8} * HIGH_{dum}$						-0.2307***
						(0.000)
$\sum(RTA + RTA * FRACT)$	0.304[a]		0.313[a]		0.305[a]	
$\sum(RTA)$		0.268[a]		0.232[a]		0.204[a]
$\sum(RTA + RTA * MED)$		0.316[a]		0.256[a]		0.174[a]
$\sum(RTA + RTA * HIGH)$		0.073		-0.019[b]		-0.105[b]
Number of observations	274,087	274,087	240,844	240,844	208,605	208,605

Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. [a] indicates that the coefficients are statistically significant at the 5 percent significance level or better. [b] indicates significant difference from reference level at the 5 percent significance level or better.

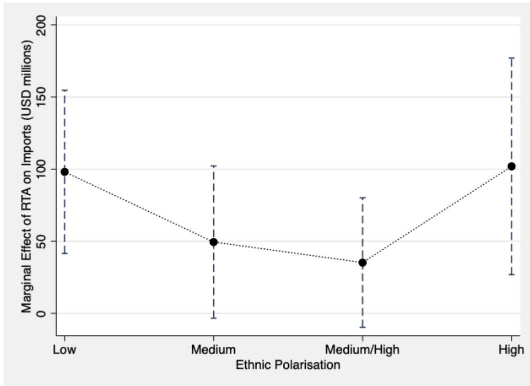
Table B.9: Alternative Diversity Groups.

	Relative - 4 groups				Absolute - 3 groups			
	Fractionalisation		Polarisation		Fractionalisation		Polarisation	
Dependent variable: Imports	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{RTA}_{ij,t}$	0.2412***	0.1342**	0.2887***	0.0801	0.3323***	0.1599***	0.2887***	0.0799
	(0.000)	(0.014)	(0.000)	(0.262)	(0.000)	(0.002)	(0.000)	(0.263)
$\text{RTA}_{ij,t} * MED_{dum}$	0.0402	-0.0911	-0.1328	-0.0061	-0.2362***	-0.1124	-0.0471	0.0860
	(0.785)	(0.501)	(0.222)	(0.956)	(0.006)	(0.197)	(0.607)	(0.385)
$\text{RTA}_{ij,t} * MED/HIGH_{dum}$	-0.0845	-0.0143	-0.1752*	0.0314				
	(0.307)	(0.860)	(0.089)	(0.780)				
$\text{RTA}_{ij,t} * HIGH_{dum}$	0.2765	0.4726*	0.0098	0.2081*	0.1783	0.4382	-0.1808*	0.0551
	(0.291)	(0.084)	(0.937)	(0.072)	(0.488)	(0.101)	(0.072)	(0.603)
$\text{RTA}_{ij,t-5}$		0.1201***		0.1566***		0.1480***		0.1566***
		(0.001)		(0.000)		(0.000)		(0.000)
$\text{RTA}_{ij,t-5} * MED_{dum}$		0.0523		-0.0191		-0.1900***		-0.0568
		(0.403)		(0.807)		(0.001)		(0.344)
$\text{RTA}_{ij,t-5} * MED/HIGH_{dum}$		-0.1815***		-0.1869***				
		(0.005)		(0.007)				
$\text{RTA}_{ij,t-5} * HIGH_{dum}$		0.0309		-0.1077*		0.0077		-0.2177***
		(0.817)		(0.097)		(0.954)		(0.002)
$\sum(RTA)$		0.254[a]		0.237[a]		0.308[a]		0.237[a]
$\sum(RTA + RTA * MED)$		0.216		0.211[a]		0.006[b]		0.266[a]
$\sum(RTA + RTA * MED/HIGH)$		0.059[b]		0.081				
$\sum(RTA + RTA * HIGH)$		0.758[a]		0.337[a]		0.754[a]		0.074
Number of country pairs	26,277	25,793	20,227	19,800	26,277	25,793	20,227	19,800
Number of observations	444,415	334,855	344,994	257,111	444,415	334,855	344,994	257,111

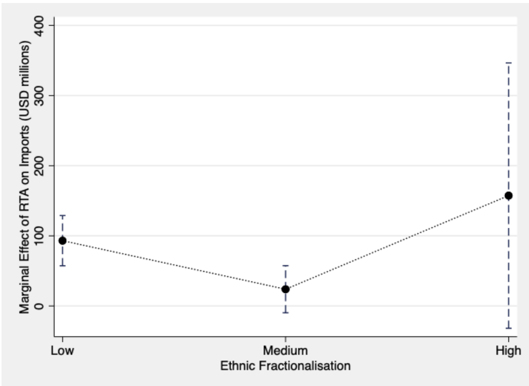
Note: All estimations include pair fixed effects, time fixed effects and controls as described in equation (4). P-values in parenthesis. Significance level: ***p<0.01, **p<0.05, *p<0.1. [a] indicates that the coefficients are statistically significant at the 5 percent significance level or better. [b] indicates significant difference from reference level at the 5 percent significance level or better.



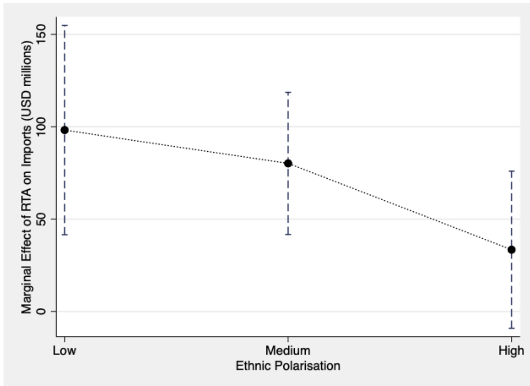
(a) 4 Groups (Relative) - Fractionalisation



(b) 4 Groups (Relative) - Polarisation



(c) 3 Groups (Absolute) - Fractionalisation



(d) 3 Groups (Absolute) - Polarisation

Figure B.11: Marginal Effects - Alternative Diversity Groups.