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ESTIMATING THE IMPACT OF NORTH-SOUTH AND SOUTH-SOUTH REGIONAL TRADE AGREEMENTS ON SOUTH AFRICAN BILATERAL TRADE

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Abstract
This paper uses the cross-sectional gravity model to examine the impact of regional trade agreements on bilateral trade between South Africa and 38 countries. The results demonstrate that the SACU-EFTA agreement improves bilateral trade by 141%, whereas the EU-SADC agreement improves bilateral trade by 161%. However, when fixed effects are applied, the estimation results produce coefficients with negative signs that are not statistically significant. According to the estimations for 2018, the EU increases trade by 68%, but when fixed effects are introduced, it increases bilateral trade by 58%. In both estimations (1995 and 2018), GDPs improve bilateral trade, whereas distance decreases. In fact, the negative impact of distance on bilateral trade grew between 1995 and 2018.

1. Introduction

The past 20 years have seen a steep rise in the number of regional trade agreements (RTAs). As of 2021, there were 351 RTAs in force [43]. RTAs can be divided into four types: free trade areas, customs unions, common markets, and economic unions [4]. Free trade areas eliminate tariffs and trade barriers between member countries while allowing individual countries to maintain an independent external trade policy. Customs unions eliminate tariffs and form a common external trade policy. Common markets are not only focused on trade but also cover the free movement of the factors of production. Finally, economic unions coordinate all the economic policies of member countries [4]. The formation of any RTA can either generate trade creation or trade diversion effects [40]. Trade creation occurs when high-cost imports from a non-member country are displaced by lower-cost imports from a member country. Trade diversion occurs when low-cost imports from a non-member country are displaced by high-cost imports from a member country. The overall effects of RTAs are most likely positive because trade creation often exceeds trade diversion [22]. When estimating the effects of RTAs, country-specific economic structures should be considered [28].

According to Figure 1, between 2000 and 2009, South Africa's nominal export growth rate outperformed the rest of the world on average. However, between 2010 and 2019, the export growth rate decreased by more than half. Moreover, exports have grown much slower than the rest of the world. The decline is due to an export basket that is mainly dominated by commodity products, high dependency on a limited number of large and mature export markets, high costs, and the worsening business environment in the country [38].

Exports generate foreign reserves that finance imports like energy and investment goods. These goods are critical for capital formation and stimulating economic growth. Exports have a positive impact on the balance of payments and create vital employment opportunities [24]. Keen on improving its export performance, South Africa has formed several regional trade

agreements (RTAs) with countries from different geographical regions. This paper examines the impact of those RTAs.

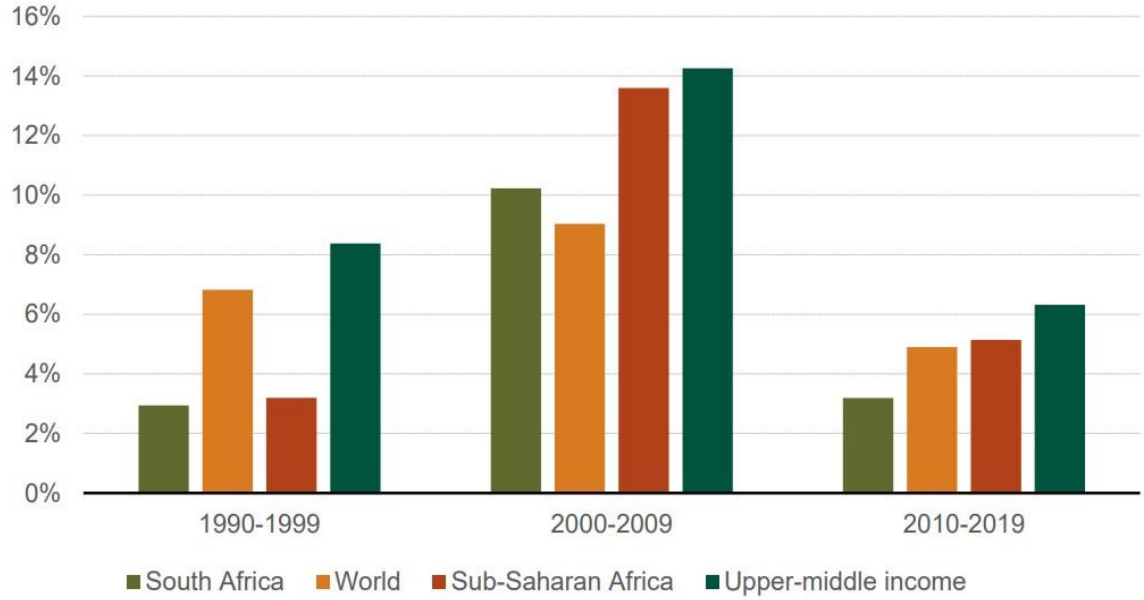

Figure 1. Nominal export growth rate

Source: [38]

1.1 Regional Trade Agreements in South Africa

The Trade, Development, and Cooperation Agreement (TDCA) was signed in 1999 and came into force in 2004. It granted South Africa better access to the EU market by liberalizing 95% of the EU's imports from South Africa within ten years and 86% of South Africa's imports from the EU within 12 years (EU-Lex, 2018). The TDCA ensured close cooperation on a wide range of topics connected to trade, which included customs services, free movement of services and capital, and certification and standardization [19].

Fast forward to June 2016, when South Africa and five other Southern African countries signed the EU-SADC EPA with the European Union, thus replacing the TDCA. The new agreement includes improved trade terms for wine, sugar, fishery products, flowers, and canned fish [20]. The EU-SADC EPA is a great example of a North-South Regional Trade Agreement (RTA). A North-South RTA is a deeper version of the Uruguay Round's bargain, in which developing countries gain access to developed countries' markets, anticipating improved inflows of foreign direct investment, at the expense of their "policy space" [37].

As a member of the Southern African Customs Union (SACU), South Africa also participates in the preferential trade agreement between the Common Market of the South (MERCOSUR) and SACU, signed in 2008. The agreement entered into force in 2016 and covers agriculture, chemical, mineral, and textile products [36]. The SACU-MERCOSUR is a great example of a South-South RTA because it is designed to improve trade relations and the sharing of knowledge and technology in certain sectors between developing countries.

The European Free Trade Association (EFTA) has four members, namely: Iceland, Liechtenstein, Norway, and Switzerland. This trade bloc formed a free trade agreement with the Southern African Customs Union (SACU) that came into force in 2008. Under this agreement, industrial goods, including fish and other marine products, are granted duty-free access to EFTA markets [15]. The EFTA-SACU RTA is also an example of a North-South RTA because it grants access to developed countries' markets for developing countries.

2. 2. Theorical Literature

In the theoretical literature, one of the most important papers concentrates on the utility gains from an RTA between a country pair and presents three economic factors as the main determinants of an RTA. First, countries are more likely to create an RTA if their transportation costs are low. Countries with low transportation costs trade more with each other. The formation of an RTA between such countries will further improve their trade intensity. Second, large economies are more likely to create an RTA. The RTA between two large economies increases trade volumes more than an RTA between small countries. Third, the higher the similarity of the economic sizes of countries, the greater the utility gains from an RTA [9].

Other researchers view the style of governance as a determinant factor in RTAs. The first argument demonstrates that democratic countries are more likely to join RTAs than autocratic countries. This is because in a democracy, leaders can remain in power only if they improve their voters' welfare. Signing a regional trade agreement is a signal to the constituency that a leader is committed to implementing welfare-enhancing policies and is avoiding rent-seeking behavior [31]. The above argument is further modified by claiming that developing nations form RTAs with the European Union and the United States to improve the legitimacy of economic reform and generate domestic political support [8].

How can signing RTAs with the European Union and the United States improve the fortunes of new leaders in democratizing countries? First, RTAs come with legally binding provisions that incentivize the leader to stay committed to reforms. Not upholding these provisions would result in reputational damage. Second, in a country where interest groups against economic reform are more vocal, RTAs can help tilt the balance in favor of economic reform. That is, the leader can simply list the costs that would be incurred if reforms are not carried out [8]. Moreover, this type of RTAs (North-South), generate economies of scale and assist firms that participate in offshoring activities [12].

RTAs create advantages for their signatories while creating disadvantages for non-member countries. This pushes nonmember countries to protect themselves by signing RTAs. For example, the formation of NAFTA motivated Japan and the European Union to sign RTAs with Mexico [14] [29]. Exporters that are exposed to trade diversion because they are non-members of an RTA will pressure their governments to sign a trade agreement with the country in which their exports are threatened [6]. This has led to the proliferation of RTAs since the 1990s.

Interest groups play an important role in the formation of RTAs and determine the flexibility of their provisions. More specifically, import-competing industries prefer trade agreements with escape clauses so that they can protect their market share. Exporters, on the other hand, are in favor of limiting flexibility, which results in increased uncertainty in trade relations and thus generates costs for export industries and firms [26]. RTAs are also tools utilized by multinational corporations (MNCs) to discriminate against their competitors. MNCs do this by advocating for the inclusion of provisions that protect investment and intellectual property and liberalize services so that they can gain the upper hand over their competitors from other countries [30]. MNCs are not only focused on tariff reductions but also value strong dispute settlement procedures to protect their assets in foreign markets [25]. Given this, RTAs with more veto players will not be favorable because more veto players indicate low commitments, greater flexibility, and ineffective dispute settlement mechanisms [3].

3. Empirical literature

Empirical studies on the impact of RTAs in different geographical areas show varying results. In Africa, [33] estimates the gravity with PPML and establishes that among African RTAs, the ECOWAS has the highest trade creation effect. Furthermore, SADC and COMESA improve intra-regional trade by seven and three-fold. [1] evaluates the impact of regional integration and commercial diplomacy on trade between 45 African countries. Furthermore, he investigates whether there is a trade-off or a complementary relationship between commercial diplomacy and RTAs. His estimation results demonstrate that bilateral diplomatic

exchange is a stronger export determinant than RTAs. However, bilateral diplomatic exchange loses its trade-improving feature between countries that belong to the same RTA.

In Asia, [41] utilizes the gravity model to examine the effects of the ASEAN Free Trade Area (AFTA) on the trade of manufactured goods between ASEAN countries and non-member countries. OLS estimations with fixed effects indicate that AFTA had trade creation effects on exports. Years later, [42] also establishes that the ASEAN-China Free Trade Agreement (ACFTA) improves trade with intra- and extra-bloc countries.

In North America, [23] examines the likely effects of NAFTA on a selected number of countries. She estimates her gravity model by using OLS with fixed effects. The dummy variable representing intra-NAFTA trade has a positive coefficient but is statistically insignificant. At the same time, exports from NAFTA to non-member countries are 38.8% less than normal levels, suggesting that NAFTA has trade diversion effects. [27] takes re-exports into account and then evaluates the impact of NAFTA on trade. Their estimation results indicate that the importance of Mexico and Canada as trade partners for the US has been overestimated in previous papers. Having said that, they still find positive effects.

In Europe, [32] analyzes the impact of establishing the euro on the trade of new and old European Monetary Union (EMU) members. The estimation results demonstrate that the euro has a statistically significant and positive effect on the trade of new members. Meanwhile, the trade of old member countries is negatively impacted by the adoption of the euro. [18] examines the effects of the EMU on the bilateral trade of the founding countries and Greece. The PPML estimations with fixed effects show no positive trade effects. However, when intranational trade data is considered, significant positive effects are present, highlighting the downward bias of not considering intranational data.

4. Methodology

This paper utilizes the gravity model of international trade to examine the impact of RTAs on South African bilateral trade flows. The model is deemed the workhorse of international trade research because it is empirically robust and has great explanatory power [21]. As a derivative of Newton's law of gravity, the model predicts that trade between country pairs is a function of their economic sizes and the distance between them [35] and [39]. Accordingly, bilateral trade is expected to be positively related to the country pair's respective economic sizes (GDPs) and negatively related to the distance (transport cost proxy) between them. Equation 1 demonstrates the basic structure of the gravity model. The model is open to further modifications to meet different research needs. Xij in equation 1 denotes exports from country i to country j. Yi and Yj represent the respective country pairs' economic sizes (GDP). Dij represents the distance between country pairs, a proxy for transportation costs.

$$Xij = (AYi\ Yj\ )/Dij \quad (1)$$

The log-linearization of equation 1 with the inclusion of population variables and the stochastic error term gives us the baseline model presented below:

$$\ln Xij = a0 + \beta 1 \ln Gdpi + \beta 2 \ln Gdpj + \beta 3 \ln Popi + \beta 4 \ln Popj + \beta 5 \ln Distanceij + eij \quad (2)$$

Other variables are generally incorporated to highlight trade costs between countries, such as dummies for a common language, colonial ties, a shared border, and existing trade agreements [34]. In this framework, countries with similar features, such as a common language or colonial ties, will trade more with each other due to a better understanding of each other's business practices than firms from less similar settings [5].

I modified equation (2) by introducing the three South African RTAs: SACU-EFTA, SACU-MERCOSUR, and SADC-EU. This, in turn, generated equation (3). Equation (3) is estimated by OLS and OLS with fixed effects. The estimations are separated by year. First, I start with the year 1995 and then proceed to the year 2018.

$$\ln X_{ij} = a_0 + \beta_1 \ln Gdp_i + \beta_2 \ln Gdp_j + \beta_3 \ln Pop_i + \beta_4 \ln Pop_j + \beta_5 \ln Distance_{ij} + \beta_6 \text{SACU-EFTA} + \beta_7 \text{SACU-MERCOSUR} + \beta_8 \text{SADC-EU} + e_{ij} \quad (3)$$

lnXij = log of trade flow from country i to country j
lnGdpi = log of a Gross Domestic Product of the exporter country in current USD
lnGdpj = log of a Gross Domestic Product of the importer country in current USD
lnDistanceij = log of a Distance between exporter and importer country in kilometers
lnPopi = log of population size of exporter country
lnPopj = log of population size of importer country
SACU-EFTA = for each year, if a country pair is part of the SACU-EFTA, I assign 1, else 0
SACU-MERCOSUR = for each year, if a country pair is part of the SACU-MERCOSUR, I assign 1, otherwise 0
SADC-EU = for each year, if a country pair is part of the SADC-EU, I assign 1, otherwise 0
eij = error term

I introduced country-pair fixed effects, γ_{ij}, to absorb possible time-invariant bilateral trade costs [2] [16]. The introduction of time-invariant fixed effects means that time-invariant variables in our model will be omitted (e.g., distance). Also, to mitigate the endogeneity problems related to time-varying policy variables [10], I introduce the importer-time ($\pi_{i,t}$) and exporter-time ($\chi_{j,t}$) fixed effects. This means that variables that vary over time, like GDP and population, will be omitted. The application of these measures improves the robustness of the estimation results.

$$\ln Ex_{ij} = a_0 + \beta_6 \text{SACU-EFTA} + \beta_7 \text{SACU-MERCOSUR} + \beta_8 \text{SADC-EU} + \gamma_{ij} + \pi_{i,t} + \chi_{j,t} + e_{ij} \quad (4)$$

This paper utilizes cross-sectional data for 1995 and 2018 and focuses on 39 countries. Annual Gross Domestic Product (GDP) data (in current USD) and population data (in thousands) are from the World Bank Development Indicator (WDI) database. The trade flow data (Xij) was collected from the World Trade Integrated Solution (WITS) database. Geographic data on distance (Dij) is from the Distance Calculator [13]. Data on RTA dummy variables comes from the WTO regional trade agreement database [43].

5. Results

Table 1 presents the estimation results for equation (3) using data from 1995. The data covers trade flows between thirty-nine countries (South Africa and its trade partners). After 1482 observations, the estimation generated an R-squared value of 0.78. The coefficient of R-squared indicates that the explanatory variables can explain seventy-eight percent of the variations in the dependent variable. Estimation results for equations 3 and 4 produced coefficients that are in line with the theoretical predictions of the gravity model. According to the gravity model, trade is expected to be positively related to the country pairs' respective economic sizes (GDPs) and negatively related to the distance between them. The results demonstrate that the coefficients for GDPs are positive and statistically significant. Specifically, a 1% increase in the exporter's GDP improves trade intensity by 1.2%, whereas a 1% increase in the importer's GDP increases bilateral trade by 0.98%. This highlights that an increase in the GDP of South Africa and that of its trade partners significantly improves bilateral trade.

Population coefficients for importer and exporter countries are negative and statistically significant. Showing that a 1% increase in the exporter country's population lowers the trade intensity by 0.182%, whereas increasing the importer country's population by 1% decreases bilateral trade by 0.154%. Overall, population increases experienced by either South Africa or its trade partners result in the deterioration of trade intensity.

The distance variable is a proxy for transport costs, and it has an expected negative coefficient. Keeping all else constant, if the distance between exporter and importer countries

increases by 1%, trade intensity is expected to decrease by 1.07%. This means that South Africa trades less with distant trade partners.

As highlighted in the theoretical literature, participating in a regional trade agreement is expected to significantly improve bilateral trade. Having said that, in 1995, South Africa was not part of any of the RTAs of interest. However, we can comment on the EU and Mercosur because they existed in that year. The coefficient for intra-trade in the EU is a positive 0.2 but is not statistically significant. Meanwhile, the coefficient for Mercosur is 0.46 and statistically significant ($p < 0.01$). Showing that Mercosur improved intra-trade by $(e0.46 - 1) * 100 \approx 58\%$. After introducing three sets of fixed effects, dummies for both the EU and Mercosur are statistically significant. The coefficient for the EU is 0.444 and statistically significant ($p < 0.001$), implying that the EU improved bilateral trade by $(e0.44 - 1) * 100 \approx 55\%$. Whereas the coefficient for Mercosur is 1.064 and significant ($p < 0.05$), suggesting that the RTA improved bilateral trade by $(e1.064 - 1) * 100 \approx 189\%$.

Table 1. Estimations of the gravity model (1995)

Variables	OLS estimations	OLS with fixed effects estimations
lnGdpi	1.208782***	omitted
lnGdpj	.9886467***	omitted
lnPopi	-.1823183***	omitted
lnPopj	-.1548105***	omitted
lnDistanceij	-1.071368***	omitted
SACU-EFTA	omitted	omitted
SACU-MERCOSUR	omitted	omitted
EU-SADC	omitted	omitted
EUij	0.2034266	0.444***
MERCOSURij	0.4611853***	1.064**
R^2	0.78	0.027
N	1482	1482

Source: Author's estimations

I repeat the same estimations using 2018 cross-sectional data. The estimations of equations 3 and 4 are reported in Table 2. It is noticeable that the R-squared value increased from 0.78 to 0.82 between 1995 and 2018. An R-square value of 0.82 shows that the explanatory variables can explain eighty-two percent of the variations in the dependent variable. The coefficients for GDPs of exporter and importer countries are positive and statistically significant ($p<0.01$). Holding all else constant, a 1% increase in the exporter country's GDP improves bilateral trade by 1.01%, while a 1% rise in the importer country's GDP increases bilateral trade by 0.77%. This suggests that an increase in the GDP of South Africa and that of its partners generates more bilateral trade. However, compared to 1995, the power of GDP to improve trade intensity has decreased in 2018.

Contrary to the results of 1995, the coefficients for population sizes of importer and exporter countries have positive signs. But only the coefficient for the population of the importer country is statistically significant. Holding all else constant, a 1% increase in the importer's population boosts bilateral trade by 0.15%. The population coefficient for an importer country can be positive because a large population in an importer country improves the competitiveness of imported goods against domestic goods and compensates exporters for the cost of export activities [11].

Table 2. Estimations of the gravity model (2018)

Variables	OLS estimations	OLS with fixed effects estimations
lnGdpi	1.019072 ***	omitted
lnGdpj	.7773802 ***	omitted
lnPopi	.0574759	omitted
lnPopj	.1506597***	omitted
lnDistanceij	-1.213213***	omitted
SACU-EFTA	.8805458***	-0.396
SACU-MERCOSUR	.0459437	-0.533
EU-SADC	.9606208***	-0.151
EUij	.5270979***	0.456***
MERCOSURij	.4401413***	0.877**
R^2	0.82	0.040
N	1482	1482

Source: Author's estimations

In 2018, the distance coefficient is still negative and statistically significant ($p < 0.01$). However, its size has grown from 1.07 to 1.2. That is, if all other variables are held constant, a 1% increase in the distance between the exporter and importer country decreases bilateral exports by 1.2%. This suggests that greater distance between South Africa and a trade partner weakens the trade intensity.

South Africa participates in three RTAs, namely: SACU-EFTA, SACU-MERCOSUR, and EU-SADC. Out of the three, only SACU-EFTA and EU-SADC have positive coefficients that are significant ($p < 0.01$). SACU-EFTA and EU-SADC are deep regional trade agreements between the developed countries of the North and developing countries of the South (North-South RTA), whereas SACU-MERCOSUR is a shallow agreement between two developing Southern regions (South-South RTA).

According to the estimation results of the gravity model, the SACU-EFTA agreement increases bilateral trade between South Africa and other member countries by (e0.88 -1) * 100 ≈ 141%. Meanwhile, the EU-SADC agreement improves bilateral trade between South Africa and other member states by (e0.96 – 1) * 100 ≈ 161%. After introducing three sets of fixed effects to improve the robustness of my estimations, the coefficients became negative and statistically insignificant.

As my data set contains both the EU and Mercosur countries, I also evaluate the impact of these trade blocs on the bilateral trade of their members. The coefficient for the EU dummy is 0.52 and statistically significant at $p < 0.01$, suggesting that it increases bilateral trade by (e0.52 – 1) ≈ 68%. However, when the three sets of fixed effects are introduced to improve the robustness of estimations, the agreement suddenly increases bilateral trade by (e0.456 – 1) ≈ 58%. The Mercosur dummy variable has a positive coefficient and is statistically significant ($p < 0.01$), improving bilateral trade by (e0.44 -1) * 100 ≈ 55%. After employing the fixed effects, the agreement improves bilateral trade by (e0.87 – 1) ≈ 138%.

6. Conclusion

This paper utilizes cross-sectional data from 1995 to 2018 on the gravity model to examine the impact of regional trade agreements on bilateral trade between South Africa and 38 countries. The gravity model is initially estimated by ordinary least squares (OLS). But OLS on its own does not generate robust results. Thus, OLS with three sets of fixed effects is also

applied. The R-squared value increased from 0.78 in 1995 to 0.82 in 2018, indicating that the data fits the regression model very well.

Moving on to the RTAs of interest, this paper establishes that only the SACU-EFTA and EU-SADC coefficients are positive and statistically significant. More specifically, the SACU-EFTA agreement increases bilateral trade between South Africa and other member countries by (e0.88 -1) * 100 ≈ 141%, whereas the EU-SADC agreement improves bilateral trade between South Africa and member states by (e0.96 - 1) * 100 ≈ 161%. When three sets of fixed effects are introduced, the estimation results produce coefficients with negative signs that are not statistically significant.

My data set contains both the EU and Mercosur countries. This allowed me to estimate their impact on bilateral trade. The coefficient for the EU dummy is 0.52 and statistically significant, indicating that membership in the EU increases bilateral trade by (e0.52 – 1) ≈ 68%. However, when fixed effects are introduced, the trading bloc suddenly increases bilateral trade by (e0.456 - 1) * 100 ≈ 58%. On the other hand, the Mercosur dummy variable boosts bilateral trade by (e0.44 -1) * 100 ≈ 55%. After employing the fixed effects, the agreement improves bilateral trade by (e0.87 - 1) * 100 ≈ 138%.

The estimations of other gravity model variables are in line with the theoretical predictions. Based on my results, an increase in the GDP of South Africa and that of its trade partners generates more bilateral trade. However, the influence of GDP on bilateral trade diminished between 1995 and 2018. Distance is a proxy for transport costs and is expected to have a negative impact on bilateral trade. My estimations agree with this theoretical prediction in both 1995 and 2018. Moreover, the influence of distance on bilateral trade increased between 1995 and 2018. The population coefficient is positive and statistically significant for importer countries because a large population of importers improves the competitiveness of imported goods against domestic goods and compensates exporters for the cost of export activities.

Based on the results of this paper, I would recommend that South Africa sign more regional trade agreements with large economies like China. This would further boost bilateral trade between the two nations. In other regions, concluding RTAs with nearby countries improves bilateral trade. But this might not work in Africa. Even though South Africa has a more stable economy with proper infrastructure and sound institutions, her neighbors are poor in these areas. This diminishes any possible gains from RTAs.

In the future, this paper can be improved by utilizing panel trade data and increasing the number of observations. Even though I chose the OLS estimator, it suffers from some bias because it omits zero values in the data. Therefore, the Poisson Pseudo Maximum Likelihood (PPML) is more robust because it deals well with zero trade flows. When intranational trade data is not considered, the estimations have a downward bias. Utilizing intranational trade data can enhance the significance of coefficients. Moreover, I can expand the gravity model by including other variables such as common language, shared borders, and colonial history. This could help improve the R-squared value. Any final comment on the impact of an RTA can only be made ten years after it goes into force [17]. Therefore, no final conclusions can be drawn about the EU-SADC EPA because it has just entered its seventh year.

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