Estimating Effects of the AfCFTA in Tanzania: Application of Poisson Pseudo Maximum Likelihood

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Abstract

Using bilateral trade data for 157 countries and applying a General Equilibrium Poisson Pseudo Maximum Likelihood (GEPPML) model, we estimate the effects of the African Continental Free Trade Agreement (AfCFTA) on Tanzania's trade/exports and welfare. The baseline estimates on the international border suggest that all else equal, the international border decreases trade by 97 percent. The empirical results show that the AfCFTA could raise Tanzania's trade/exports growth by 57% under the conditional general equilibrium (the direct effects) and by 75% more under the full endowment general equilibrium (allowing both for direct and indirect effects) in 2019. The estimated trade effects for Tanzania are relatively higher as compared to most other African countries, the fourth behind the three top countries. Allowing for the removal of the international border under both scenarios, we find that most of Tanzania's trade will be diverted from RoW to RoA with which Tanzania does not have a trade agreement by about 23 percent, while that to the EAC market by 18 percent and to SADC market by 19 percent under both scenarios. Furthermore, the estimates show that under ceterius paribus, Tanzania trade (exports) to RoW will fall significantly from the baseline share of 77.2 to 16 percent, equivalent to a 61 percent drop. Furthermore, our estimates show that the full endowment general equilibrium effects on real GDP due to AfCFTA are large; as Tanzania will experience an increase in real GDP by 30 percent from its current baseline outputs in the year 2019. The effects on producer prices will be about a 14 percent increase from its current price level. Clearly, our estimates show that Tanzania will significantly gain in terms of increase in trade/exports, real GDP, and producer prices following ratification and implementation of AfCFTA agreement.

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1. Introduction

The old dream has become a new reality, regional integration among African economies. The question, of why countries integrate their national economies and open up their borders to trade and factors from abroad is an old question that has an old answer that draws heavily from the conventional trade theory. According to classical and neo-classical trade theories by Ricardian and Hecksher-Ohlin trade models more open economies can profit more significantly from the benefits of the international division of labour, from the comparative advantages of international specialization, and a balancing exchange of surplus here and scarcity there. Following these arguments, economic integration should not stop somewhere (Krugman and Obstfeld 1994).

Thus, the theory of regional economic integration as formally developed in the early fifties by economists such as Leopold Kohr (1949), Jacob Viner (1950), James Meade (1955), and Richard Lipsey (1960) argued for the politically feasible regional integration of nations in close geographic proximity that might increase welfare by overcoming the inefficiencies of nationally segmented economies. The dismantling of barriers to trade, the abolition of restrictions on international capital flows, and the reduction of obstacles to international migration were supposed to take place more easily within regional areas.

Motivated by what regional integration can do, for over half a century now, African countries have been grappling with the issue of forming regional integration as an important strategy for their growth and economic development. Africa, therefore, has a long history of regional integration initiatives, dating back to the establishment of the South African Customs Union (SACU) in 1910 and the East African Community (EAC) in 1919 (Alemayehu and Kibret, 2002, Jenkins 2000). After independence in the 1960s, inward-looking integration reflected the desire of most countries in Africa to develop independently from the former colonial rulers. Even though, the early attempts to industrialize efficiently using import-substitution failed.[1] This, and the formation of the European Economic Community (EEC) in 1957, gave rise to the notion of regional integration to facilitate structural transformation in Africa. As the result, African countries have embraced regional integration as an important component of their development strategies primarily driven by the economic rationale of overcoming the economic constraints imposed by small and fragmented economies working in isolation (Negasi, M., Y., 2009; Trudi, H., 2011).

Notwithstanding the efforts, history shows that regional integration in Africa has been a process of trial, error, and failure (compared to what was achieved in the EEC

[1]The history has shown that the ISI policies not only failed in individual countries but also in the regional integration groupings. Such arrangements launched to fallout of fashion in the 1970s, in part because the first experiences were not successful (William *et al,* 1997).

integration) in negotiations that were often fraught with political difficulties and followed up by renewed efforts (Ezenwe, 1983; Söderbaum, 1996; Herman *et al*., 2011). Following the economic crises of the late 1970s and early 1980s, most countries, beginning mid-1980s pursued major economic reforms, where trade policy reforms in terms more outward-looking took the centre stage. As the result, from the mid-1990s onwards, there has been renewed momentum to invigorate the process of regional integration among African economies. As a consequence of the many initiatives and different fortunes of regional integration initiatives, the African landscape is complex, to say the least with many and intersecting memberships of the many regional blocs. To date, there are about eight AU-recognized regional blocks and other seven preferential trade agreements, making a total of about fifteen initiatives in the region (AEO, 2019).

Despite the efforts, in global terms, Africa, and especially sub-Saharan Africa (SSA), has exhibited poor trade and growth performance for decades now. Yeats, A and Amjadi, A (1996) noted that from the mid-1950s to the 1990s, SSA share of global trade fell from 3.1% for exports (2.9 % for imports) in 1950 to 1.2 % for exports (1.1%for imports) in 1980 before picking to 3% in 1990. It fell from 3.1 % for exports (2.7 % for imports) in 1990 to 2.3% for exports (2.1 percent for imports) in 2000 (Morrissey *et al*, 2004). Since then, the continent's share of global trade has been hovering at 4.5% (AfDB and Afreximbank, 2020). Furthermore, intra-regional trade in Africa has remained minuscule, accounting for around 12 % of cross-border trade and on average for 5.3 % of gross domestic product (Soko, 2006). Another analysis of intra-African trade by the ECA, AUC, and AfDB confirms that the performance has remained at about 10 % for many years now, with limited signs of improvement (ECA, AUC, and AfDB, 2010). Yet more recently, studies have shown that formal sector intra-regional trade also remains low, sitting at around 18% of total African trade, in 2020 (Mold and Chowdury, 2021).

Even though, more recently, African countries have come to realize that the effects of forming a regional integration that arises from the removal of behind-the-border measures (non-tariff barriers to trade) rather than border measures (tariffs barriers to trade) could be considerably higher than the losses which may arise from removing border measures since that could lead to deeper market integration (Lawrence, 1996). Thus, the formation of a regional integration bloc that moves from shallow integration into deep integration is expected to significantly expand the market in terms of population size and GDP per capita (or GNI) on the one hand[2] and significantly lower trade costs, on the other hand[3], allowing firms to take advantage of consumers' desire for variety and economies of scale to expand production and so exports. As a result,

[2] That is, the size effect: larger producers will export more to all destinations, big/rich markets will import more from all sources, and trade flows between countries *i* and *j* will be larger the more similar in the size the trading partners are.

[3]That is, the trade cost effect, which captures the total effects of trade costs that drive a wedge between realized and frictionless trade.

more firms will enter the market and compete in producing similar but slightly differentiated products. This affects the number of products each firm produces and technology transfer across countries, enhancing competition and export diversification. This process alters the trade pattern structure from inter-industry trade to intra-industry trade and increases trade volumes (exports and imports); an indicator of an improved term of trade and trade performance.

While regional integration is still a work in progress, recent efforts saw the launch of the African Continental Free Trade Area (AfCFTA), reflecting the African Union's (AU) Agenda 2063, its 50-year vision launched on the 50th anniversary of the AU. The elimination of tariff and non-tariff barriers and harmonization of standards called for under the AfCFTA represents a unique opportunity to boost intra-regional trade and investment, allowing companies and farmers to tap into rapidly growing markets that connect almost 1.3 billion people across 54 African countries, both within the region and in other parts of Africa. The agreement thus aims to create a single market for goods and services to deepen the economic integration of Africa. The trade area could have a combined gross domestic product of around $3.4 trillion, but achieving its full potential depends on significant policy reforms and trade facilitation measures across African signatory nations. The agreement was brokered by the AU and was signed by 44 of its 55 member states in Kigali, Rwanda on March 21, 2018. As of February 2022, 41 of the 54 signatories had deposited their instruments of ratification with the chair of the AU Commission, making them state parties to the agreement.

Besides the efforts, fear of potential losses and uncertain benefits continue to delay the signing and ratification of trade and investment agreements in many countries in Africa, including Tanzania, hampering meaningful regional integration. For, instance Tanzania has signed but has not ratified the Tripartite for Free Trade (that brings EAC, SADC, and COMESA) and has just ratified the AfCFTA in 2021 after a long delay since 2018, out of concerns regarding potential losses from opening the country to trade. Partly attributed to the slow ratification of the agreements, Tanzania's rating of 0.312 in 2019 on the Africa Regional Integration Index (ARII) was lower than Africa's average of 0.327 (0 is the lowest and 1 is the highest). Furthermore, the country's ARII score of 0.51 in the EAC in 2019 was lower than the EAC regional average of 0.54, while in the SADC block, it scored 0.29 compared to the regional average of 0.34 (Leyaro, *et al.*, 2021).

In an attempt to understand the costs and benefits of regional integration in Tanzania and help demystify some of the country's fears, this study quantifies the potential effects of Tanzania's ratifying and implementing the AfCFTA. This is critical, as the implementation of signed and ratified regional protocols is slower in Tanzania compared to its regional peers; and non-tariff barriers are still prevalent, increasing the costs of cross-border trade. In addition to the introduction in this section, the remaining part of this study is organized as follows. Efforts toward regional integration in Africa and Tanzania are provided in Section 2 while Tanzanian trade performance both in the regional and global is provided in Section 3. Section 4 provides the

empirical strategy and data deployed while Section presents the discussion of the main findings of the impact of AfCFTA in Tanzania. The conclusion and implication of the key findings is provided in Section 6.

2. Regional Integration Efforts in Africa and Tanzania

2.1 History of Regional Integration in Africa

Africa has a long history of regional integration initiatives, dating back to the establishment of the South African Customs Union (SACU) in 1910 and the East African Community (EAC) in 1919 (Alemayehu and Kibret, 2002, Jenkins 2000). By 1949 SACU was the only regional block in the region, and by 1961 EAC was the second regional bloc. After independence, in the 1960s and 1970s, inward-looking integration reflected the desire of most countries to develop independently from the former colonial rulers. However, the early attempts to industrialize efficiently using import substitution failed[4], giving rise to the notion of regional integration as a means to facilitate structural transformation in Africa. Furthermore, following the formation of the EEC in 1957 and the European Free Trade Area (EFTA) in 1960, most countries in the developing world pursued regional integration agreements as well. As a result, African countries have embraced regional integration as an important component of their development strategies primarily driven by the economic rationale of overcoming the economic constraint imposed by small, fragmented, and landlocked economies working in isolation (Negasi, M., Y., 2009; Trudi, H., 2011).

The question of why countries integrate their national economies and open up their borders to trade and factors from abroad is an old question that has an old answer that draws heavily from the conventional trade theory. According to the classical and neo-classical trade theories by Ricardian and Hecksher-Ohlin trade models, the argument goes that more open economies might profit more strongly from the benefits of the international division of labor, from the comparative advantages of international specialization and a balancing exchange of surplus here and scarcity there. Thus, more openness is (almost always) better than less. Following these arguments, economic integration should not stop somewhere.

Even though, the existence of politico-economic factors (among other factors such as culture, socially defined values, and norms) and the insights that slow steps might be more realistic than big jumps have been the midwife of economic integration theory

[4]The history has shown that the ISI policies not only failed in individual countries but also in the regional integration groupings. Such arrangements launched to fallout of fashion in the 1970s, in part because the first experiences were not successful (William et al, 1997).

in the early fifties. It is an attempt to optimize the economic benefits of open markets and the political pressure of structural change as a consequence of opening borders. As the result, the theory of regional economic integration has been developed by economists like Leopold Kohr (1949), Jacob Viner (1950), James Meade (1955) and Richard Lipsey (1960); who directed their argument toward the politically feasible regional integration of nations in close geographic proximity and not towards welfare improving worldwide integration. The basic idea was merely about increasing welfare by overcoming the inefficiencies of nationally segmented economies. The dismantling of barriers to trade, the abolition of restrictions on international capital flows and the reduction of obstacles to international migration was supposed to take place more easily within regional areas.

Starting from the mid-1980s (towards the 990s and 200s) following the major economic reforms of which trade policy reforms in terms of trade liberalization played a big part, Africa regional integration initiatives entered a second, more outward-looking phase under the Abuja Treaty (that became operational in 1994)[5]. Since then, several regional economic communities have been formed across the continent. However, they failed as had other countries in Asia and Latin America. History shows that regional integration in Africa has been a process of trial and error in negotiations that were often fraught with political difficulties and followed up by renewed efforts (Ezenwe, 1983; Söderbaum, 1996; Herman *et al.,* 2011). As a consequence of the many initiatives and different fortunes of regional integration initiatives, the African landscape is complex, to say the least with many and intersecting memberships of the many regional blocs. The rising wave of regionalism on the continent, especially from 1975 onwards, gives credence to Bhagwati and Panagariya's (1999) coined term of "spaghetti bowl" of regional economic communities in the world. The African version of the crisscrossing regional economic communities is as described by Yang and Gupta (2005) as the 'African Galaxy'.

Thus, since the end of the cold war and with the emergence of powerful trading blocs, there has been a renewed interest in Africa concerning the need to create strong regional economic integration (REI) mechanisms to promote economic growth (Baldwin, 1997). All regional integration has ambitious and wide-ranging objectives that reflect the desire to accommodate interests across members and accelerate industrial development. They deal with removing tariffs and nontariff barriers, implementing trade facilitation measures, and harmonizing rules of origin when several regional economic blocks are included. At a deeper level, integration requires cooperation between governments and people: to foster peace and security, conserve

[5] The Abuja Treaty, which established the African Economic Community, was signed on June 3rd, 1991, and entered into force in 1994. It set the plan for the creation of an African economic and monetary union (with a common currency) to 2028 through the subsequent implementation of six stages. The main motive for the creation of the AEC was the need to reduce the economic dependence of African countries from third countries and to stimulate economic development and economic growth. The AEC provides for the creation of the African Central Bank and for the establishment of the African Court of Justice (which, however, occurs only in 2003 under the African Union).

shared natural resources, develop, and manage regional infrastructure, and share systems of rules and policy regimes. Integration thus provides regional public goods.

To date, there are about eight AU-recognized regional economic communities: Arab Maghreb Union (AMU); Common Market for Eastern and Southern Africa (COMESA); Community of Sahel-Saharan States (CEN-SAD); East African Community (EAC); Economic Community of Central African States (ECCAS); Economic Community of West African States (ECOWAS); Southern African Development Community (SADC); and West African Economic and Monetary Union (WAEMU). And other seven preferential trade agreements: Agadir Agreement; Central African Economic and Monetary Community (CEMAC); Gulf Cooperation Council (GCC); Intergovernmental Authority on Development (IGAD); Pan-Arab Free Trade Area (PAFTA); Southern African Customs Union (SACU) and West African Monetary Zone (WAMZ).

More recently, African countries have come to realize that the effects of forming a regional integration that arises from the removal of behind-the-border measures (non-tariff barriers to trade) rather than border measures (tariffs barriers to trade) could be considerably higher than the losses which may arise from removing border measures, as that could lead to deeper market integration (Lawrence, 1996). Hence, the formation of a regional integration bloc that develops into a customs union and thereafter a single customs territory(that moves from shallow integration into deep integration) will significantly expand the market in terms of population size and GDP per capita (or GNI) on the one hand[6] and significantly lower trade costs, on the other hand,[7] allowing firms to take advantage of consumers' desire for variety and economies of scale to expand production and so exports. As a result, more firms will enter the market and compete in producing similar but slightly differentiated products. This affects the number of products each firm produces and technology transfer across countries, enhancing competition and export diversification. This process alters the trade pattern structure from inter-industry trade to intra-industry trade and increases trade volumes (exports and imports); an indicator of an improved term of trade and trade performance.

As the result, the latest phase of regional integration in Africa saw the launching and signing of the African Continental Free Trade Area (AfCFTA) agreement on 21stMarch 2018 in Kigali by 44 AU Member States represents a milestone toward achieving the longstanding goal of closer African economic and political integration. The importance of a united continent has long been recognized by African leaders. During his address to the South African Parliament in October 1997, Tanzania's founding father, Mwalimu Julius K. Nyerere emphasized that "*...we should all encourage Africa to get that realization more and more that we have to depend upon ourselves, both at national level*

[6] That is, the size effect: larger producers will export more to all destinations, big/rich markets will import more from all sources, and trade flows between countries *i* and *j* will be larger the more similar in the size the trading partners are.

[7] That is, the trade cost effect, which captures the total effects of trade costs that drive a wedge between realized and frictionless trade.

and at the collective level, we all enhance our capacity to develop if we work together…" (SARDC, 2014). The AfCFTA will potentially cover the 55 Member States of the AU, making it the world's largest free trade area (by the number of participating countries) since the formation of the World Trade Organization (WTO) in 1994. To date, 44 out of 55 AU Member States have signed the agreement – something that represents a remarkable degree of consensus in a large, diverse continent. Though it is called a 'free trade' area, its scope is wider than that of a traditional free trade area.

The main objectives of the AfCFTA are to create a single continental market for goods and services, with free movement of businesspersons and investments, and lay the foundations for the establishment of a Continental Customs Union. According to Article 4 of the AfCFTA, for purposes of fulfilling and realizing the objectives of the agreement, Member States shall: progressively eliminate tariffs and non-tariff barriers (NTBs) to trade in goods; progressively liberalize trade in services; cooperate on investment, intellectual property rights and competition policies; cooperate on all trade-related areas between State Parties; cooperate on customs matters and the implementation of trade facilitation measures; design a mechanism for the settlement of disputes concerning their rights and obligations; and establish and maintain an institutional framework for the implementation and administration of the Continental Free Trade Area.

The AfCFTA is an ambitious trade pact to form the world's largest free trade area by connecting almost 1.3bn people across 54 African countries with a combined gross domestic product of around $3.4 trillion, but achieving its full potential depends on significant policy reforms and trade facilitation measures across African signatory nations. As of 10 February 2022, 41 of the 54 signatories had deposited their instruments of ratification with the chair of the African Union Commission, making them state parties to the agreement.

2.2 Efforts towards Regional Integration in Tanzania

For more than two decades Tanzania has embarked on a marked liberalization of its trade regime where the country sees international integration at the global and regional level to achieve higher economic efficiency, productivity, export diversification, and international competitiveness. On regional integration efforts, Tanzania is engaged in two regional economic integrations, namely the EAC and the SADC; and the country withdrew from COMESA in 2000 for which it joined in 1994.Tanzania has also joined in 2015, and is negotiating, a Tripartite Free Trade Area that brings together the EAC, SADC and COMESA (TFTA) and has in 2022 ratified AfCFTA that was launched in March 2018, of which AfCFTA is likely to replace the TFTA negations. Tanzania is also negotiating the WTO Trade Facilitation Agreement (WTFA) that was entered into force in 2017, following ratification by two-thirds of the WTO membership.

On EAC, Kenya and Uganda first formed a customs union in 1917, which the then Tanganyika joined in 1927. Subsequently, the three countries had close economic relationships in the East African High Commission (1948-1961), the East African Common Services Organization (1961-1967), and the East African Community (1967-1977). However, due to different political and economic ideologies, the change of the government in Uganda in 1971, sustained perception of disproportionate allotment of benefits accruing from economic integration among the members, and inadequate compensation mechanism to address this situation, the first EAC collapsed in 1977. In 1993, the Permanent Tripartite Commission for reviving regional cooperation was established which was tasked with the establishment of East African Co-operation in 1996. As the result of these efforts, the Treaty for the establishment of the East African Community (EAC) came into force in 2000, hence the protocols for the establishment of the EAC Customs Union (EAC-CU) in 2005, EAC Common Market (EAC-CM) in 2010 and a single customs territory (EAC-SCT) in 2014. In 2013 the block signed the protocol for the establishment of the EAC Monetary Union (EAC-MU) and the Partners States are aspiring to form a Political Federation in the future. Table 2 presents the protocols that Tanzania has signed and ratified within the EAC Treaty and for those that it has ratified which ones it has implemented.

Tanzania is also an active member in SADC, which in 1992 grew out of the Southern African Development Coordination Conference. SADC's trade protocol, which was signed in 1996 and came into effect in2000, aims to remove intra-regional trade barriers, and turn the Community into a free trade area for 85 percent of goods by 2008, and for all goods by 2012. Tariff reductions are asymmetrical, with domestic market protection vis-à-vis South Africa (and indirectly the entire SACU area) staying in place for longer than vis-àvis other SADC countries. Plans for the formation of a customs union and a common market have been under discussion for quite some time.

Tanzania used to be a member of COMESA, which had been founded in 1994. One of the main objectives of this regional initiative was to establish a free trade area, which was (partly) achieved in October 2000, when nine of COMESA's members removed their intra-regional trade barriers. Tanzania is no longer a member of COMESA as it withdrew from COMESA membership in 2000, and the withdrawal decision was based on an assessment that multiple regional integration memberships were too resource-consuming, and that Tanzania's regional integration interests were better served by its membership in both EAC and SADC.

Even though it is now negotiating a Tripartite Free Trade Area that brings together the EAC, SADC and COMESA (TFTA). The process of negotiating TFTA has come a long way that began with the Kampala Communique of the Tripartite Summit of 22 October2008 under which the Heads of States and Governments representing the three regional blocks agreed, inter alia, to establish a single Customs Union beginning with a Free Trade Area. The negotiations for the establishment of the TFTA were launched in Johannesburg, South Africa, on 12 June 2011 and the Memorandum of Understanding was signed on 19 January, 2011. The Tripartite negotiations are under way under two

phases. The Tripartite Member/Partner States undertake to conclude negotiations on outstanding issues under Phase I as set out in Annex I on elimination of Customs Duties, Annex II on Trade Remedies and Annex IV on Rules of Origin after the launch of the Tripartite Free Trade Area.

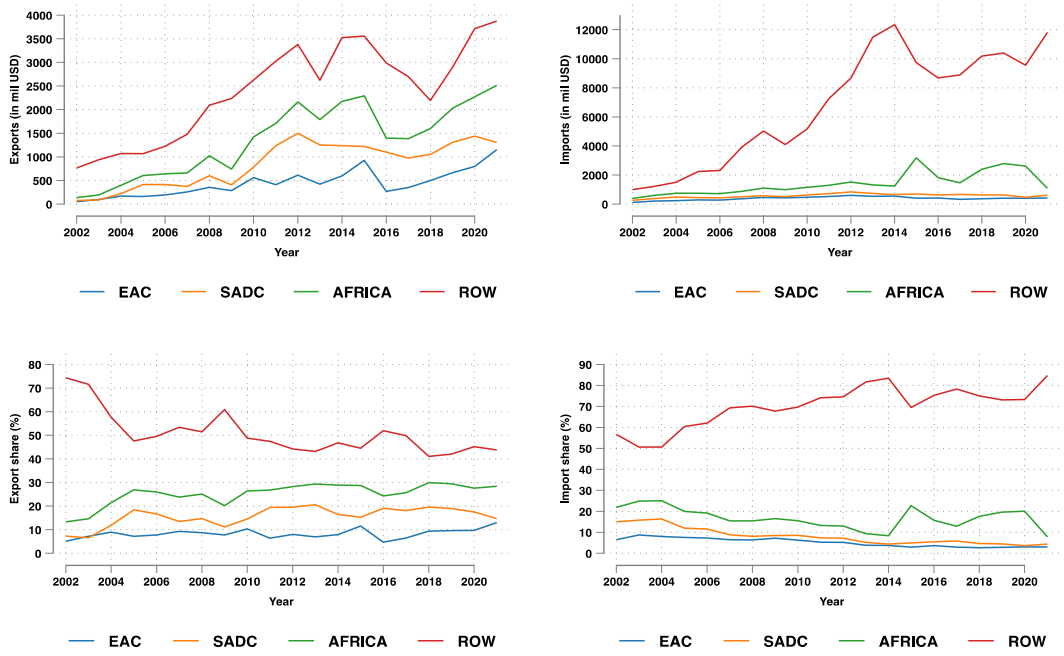
On 9th September 2021 Tanzania became the 39th country in Africa to deposit its instrument of ratification of the AfCFTA, making all EAC member countries except for South Sudan to ratify the agreement. The relevance of ratification is that it is the necessary legal instrument for a country to be bound to an international agreement; in particular, much as an international agreement may have entered into force. In the context of AfCFTA, it implies in brief that to liberalize 90% of tariff lines, meaning that Tanzania will reduce, and ultimately eliminate, tariffs on 90% of products traded under the AfCFTA. And Tanzania's categorization as one of the "Least Developed Countries" ("LDCs") implies to a longer 10-year period to accomplish this; by contrast, non-LDCs have a five-year period. Further, Tanzania can provide a list of sensitive products capped up to 7% of tariff lines, which will be fully liberalized over an even longer period - namely 13 years (while non-LDCs are provided with 10 years). In addition, 3% of tariff lines will be excluded from tariff liberalization. So far 41 countries have submitted their schedules of tariff concessions and have agreed on approximately 81 percent of tariff lines.

3. Tanzania Trade Performance in Africa and in a Global Context

There is more to forming and joining a regional integration than trade gains. Thus, Tanzania forming and joining EAC and SADC in early 2000's and currently signing and negotiating joining and ratifying TFTA and AfCFTA have, and will have, significant implications and gains on the side of Tanzania that ranges from trade in goods and services, movement of persons and business, infrastructure networks, cross border investment and ownership of assets, and movement of capital, to mention a couple. We review and analyze some of the trade gains on Tanzania side as the result of forming and joining regional integration in this section.

We begin the assessment of the benefits of regional integration by assessing the effect on trade in goods. The formation of EAC and SADC in 2000, and Tanzania signing and negotiating the TFTA and AfCFTA is expected to increase the market size in terms of population size and per capita expenditure (i.e. GNI or GDP) for Tanzania exports in the one hand and lower trade costs for Tanzania exports into and imports from these markets in the other hand. As this allows firms from Tanzania take advantage of these opportunities in the form of more firms entering (i.e. export diversifications) and competing in these markets which is then expected to increase Tanzania merchandise exports and imports volume; which by extension enhances economic growth.

Figure 1: Exports and Imports Value and Share: Africa (EAC, SADC &RoA) versus RoW, 2001-2021



***Source**:* Author's Compilation based on ITC Trade Map Data

***Note**:* RoW means Rest of World (excluding African countries).

As shown in Appendix Table A1 and Figures 1, while the share of Tanzania exports to the RoW (Non-African countries) have been falling, as it dropped from 85 percent in 2002 to 61 percent in 2021, the share of export to African countries have been rising, as it rose from 15 percent in 2002 to about 39 percent in 2021. Even though, Tanzania exports are still with markets outside Africa. For instance, for the past two decades (20002 – 2021) on average 67 percent of the exports were with the RoW while the African countries accounted about 33 percent on average. Of the exports to Africa, the biggest share, about 99 percent, are to the countries that Tanzania has formed and joined regional integration with, that is 20 percent to SADC and 11 percent to EAC countries. This implies that only about 2 percent on average of Tanzania exports is to the remaining 35 Non-PTA African countries out of 55 countries, which are neither in EAC nor in SADC. This therefore has significant ramifications for Tanzania signing, ratifying and implementing both the TFTA and AfCFTA agreements.

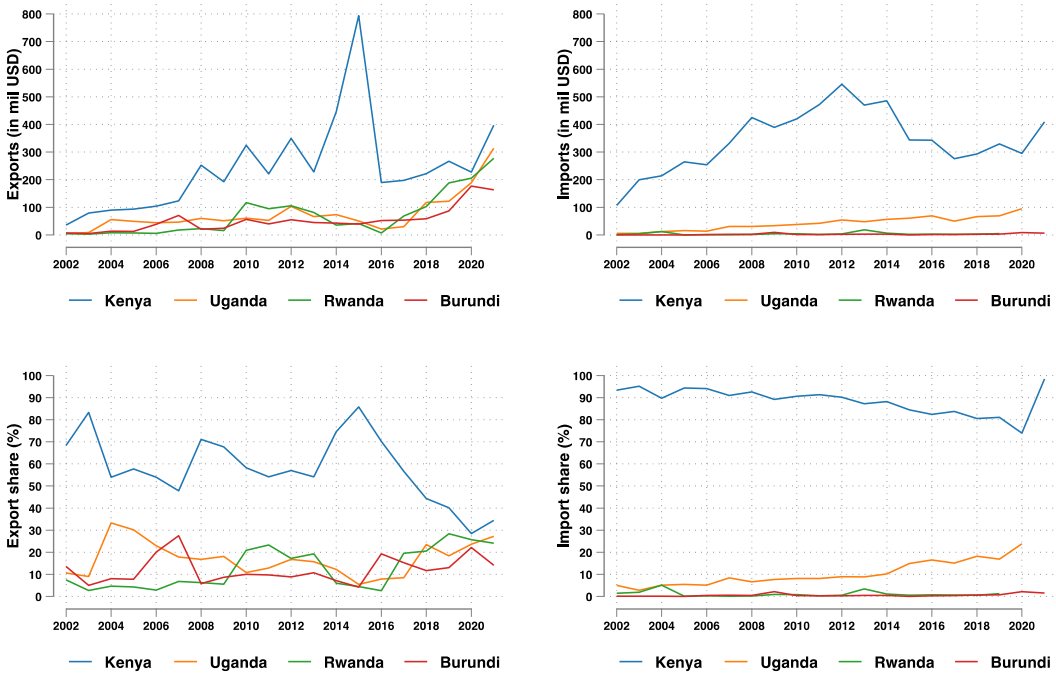
While imports from African markets have fallen significantly, from about 27 percent in 2002 to about 8.5 percent in 2021, imports from the markets outside Africa are significantly large and have been rising modestly from about 72.1 percent in 2002 to about 91 percent in 2021; on average accounting to about 85 percent of all imports to Tanzania. Only about 15 percent of imports on average are from African countries, and just as for the case of exports, most of the imports, about 99 percent, are from countries that Tanzania has formed a regional block with, that is 10 percent from SADC and 4 percent to EAC; only 1 percent is from non-regional blocks countries. This too will have significant ramifications for Tanzania signing, ratifying, and implementing the TFTA and AfCFTA agreements.

At the same time, Tanzania exports into EAC markets increased significantly for the past two decades (2002 and 2021); from about 6 percent in 2002 to about 18 percent in 2021. On the other hand, the total imports from EAC markets declined during the period as it dropped from about 8 percent in 2002 to about 2 percent in 2015 and then rose slightly to 4 percent in 2021. According to the EAC Trade and Investment Reports, Tanzania total intra-EAC trade in goods have increased from about 60 to 100 million US dollars in early 1990s to about 1,200 million US dollar in between 2012 and 2015, equivalent to 1,900 increments; and have been hovering around 700 million US dollars since then. Furthermore, the reports have also shown that the intra-EAC trade has significantly increased from about 16 percent since mid-1990s to about 24 percent and 30 percent since mid-2000s. The same is the case when coming to SADC, as exports to SADC during this period as it increased significantly from 8 percent in 2002 to about 20 percent in 2021; while at the same imports have fallen significantly from about 19 percent in 2002 to about 5 percent in 2021.

Thus, following Tanzania forming and joining regional integration (EAC and SADC) its share of exports to African countries comparing to the RoW have increased substantially, from 15 percent in 2002 to nearly 40 percent while that of imports have

been falling from about 28 percent in 2002 to 8.5 percent in 2021. On average for the past two decades, Africa markets accounts about 33 percent of Tanzania exports while the RoW account about 67 percent. At the same time Africa markets account about 15 percent of imports while the RoW account about 85 percent. This is in line with empirical literature abound have shown that, comparing to other regions, Africa significantly lags behind when it comes to intra-regional trade leave alone intra-industry trade (World Bank, 2002; Brulhart 2009; UNCTAD, 2011; Gonzalez, J.L and Cirera, X, 2012).What this says is that with an exception of SADC and EAC that account about 99 percent of Africa trade with Tanzania, Tanzania exports or imports are significantly outside African continent; hence both the TFTA and AfCFTA offer even more substantial opportunities for Tanzania to expand trade in the continent.

Figure 2: Tanzania Total Export and Import Share (%) to and from EAC Partner States



***Source**:* Computation from UN COMTRADE data

Furthermore, as shown Figures 2-3, Kenya has remained a major trading partner for Tanzania in the EAC markets, as on average, for the entire period it accounted to about 70 percent of all exports into and 90 percent of all imports from EAC markets; and South Africa for the case of SADC where it accounts to about 60 percent of all exports into SADC markets and 85 of all imports from SADC markets. However, the patterns of trade have been very erratic in nature with significant changes after every few years suggesting that exports to and imports from trading partners in the regional markets are driven by business cycle of demand and supply, and climatic weather changes.

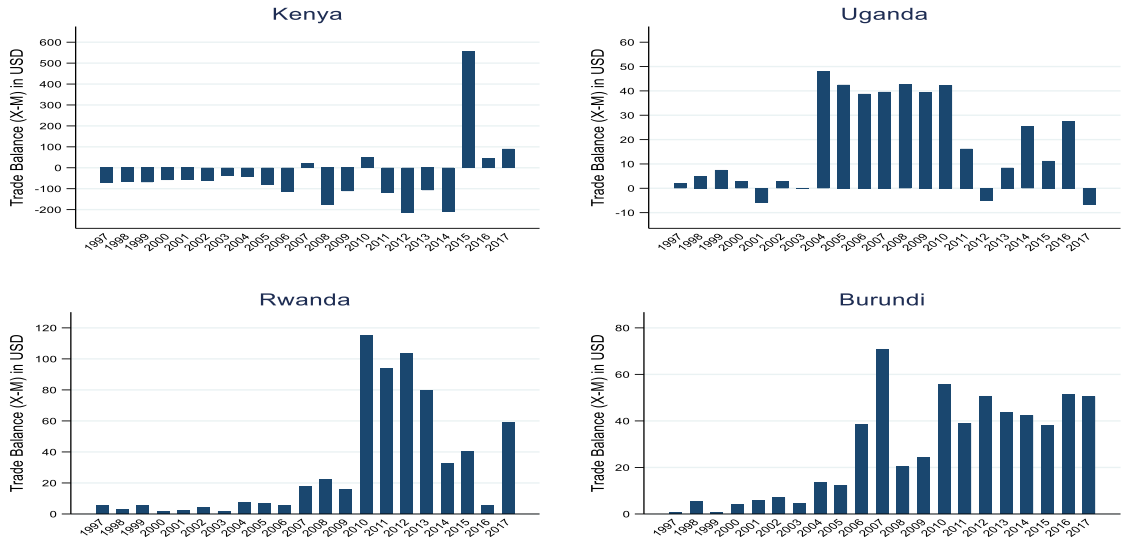
Figure 3: Tanzania Export and Import Share (%) to and from SADC Member Countries

***Source**:* Computation from UN COMTRADE data

Although for the greater part of this period (2001 to 2021), as shown in Figures 4 – 5, Tanzania has been maintaining a trade deficit with both South Africa and Kenya, however, that changed significantly from 2012 for the case of South Africa and from 2015 for the case of Kenya, as from these years Tanzania began to maintain significant trade surplus balance with both South Africa and Kenya, signaling improved trade balance (not necessarily improved terms of trade). Overall, as shown, Tanzania have been maintaining trade surplus with the rest of other trading partners in EAC and SADC during this period signaling better trade balance in both in the EAC and SADC markets.

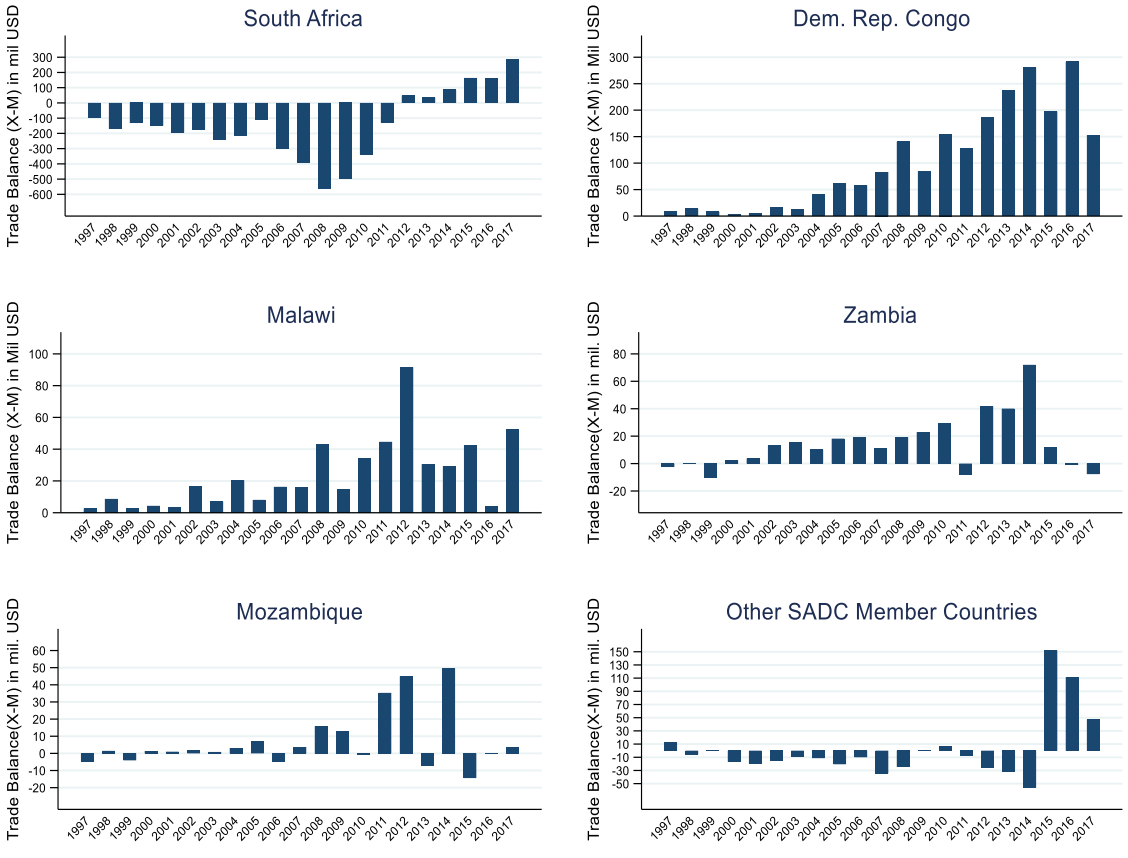
More importantly is to assess whether the Tanzania trade performance as the result of forming and joining EAC and SADC have altered, and so will be the joining of the TFTA and AfCFTA, Tanzania trade structure in the African markets from more of inter-industry trade (exporting and importing dissimilar products) to more of intra-industry trade (exporting and importing similar products) as a measure of both export diversification and competitiveness (a good measure of trade performance of any country). We start by decomposing the type of products at 6 HS code digits Tanzania have been trading in EAC and SADC markets over time (2001 – 2021) in Figures 6 for EAC and 7 for SADC.

Figure 4: Tanzania Trade Balance with EAC Partners States



***Source**:* Computation from UN COMTRADE data

Figure 5: Trade Balance for Traded Goods between Tanania and SADC



***Source**:* Computation from UN COMTRADE data

As shown in Figure 6 for the case of Kenya (the dominant trading partner in EAC markets) the top five exported products are: vegetable products, textiles, food stuffs,

animal and animal products, and wood and wood products; while the top five imports are: chemical and allied industries, metals, plastics and rubbers, foodstuffs and machinery and electrical. As seen, there is a substantial trade mismatch between what Tanzania export into, and imports from Kenya markets, signaling a lack of significant structural change in Tanzania economy.

Figure 6-A: Top Exports Products by Types to Kenya

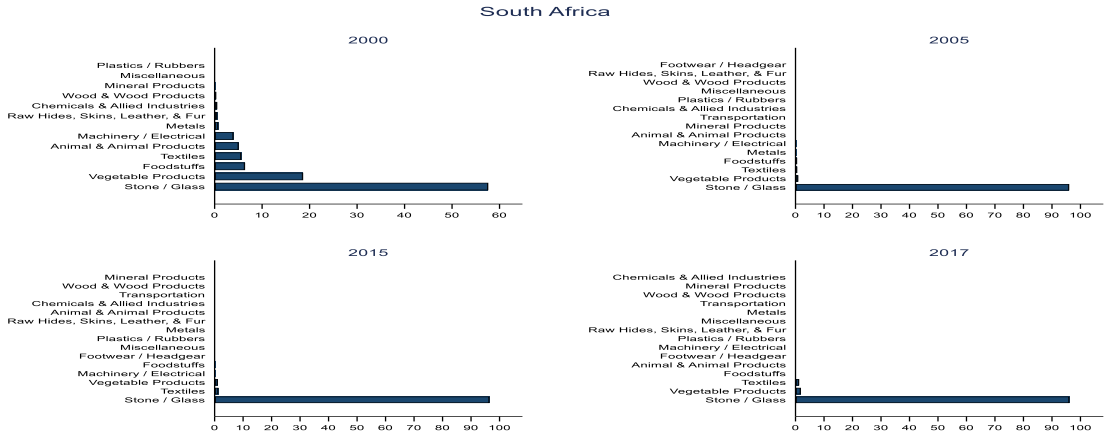
***Source**:* Computation from UN COMTRADE data

Figure 6-B: Top Imports Products by Types from Kenya

***Source**:* Computation from UN COMTRADE data

The case is even worse when coming to the case of South Africa (the dominant trading partner in SADC markets) as shown in Figure 11. For the big part of this period Tanzania has been having only one major export to South Africa, that is stones and glass that accounts on average to about 90 percent. When it comes to imports, the story in nearly to what Tanzania is importing from Kenya, as the top imports from South Africa are: metals; machinery and electrical; transportation; wood and wood products; chemical and allied industries, mineral products and plastics and rubbers; signaling a significant trade mismatch between what Tanzania export into, and imports from South Africa markets which again by extension signal a significant lack of structural change in Tanzania economy and so trade structure.

Figure 7A: Top Exports Products by Types to South Africa



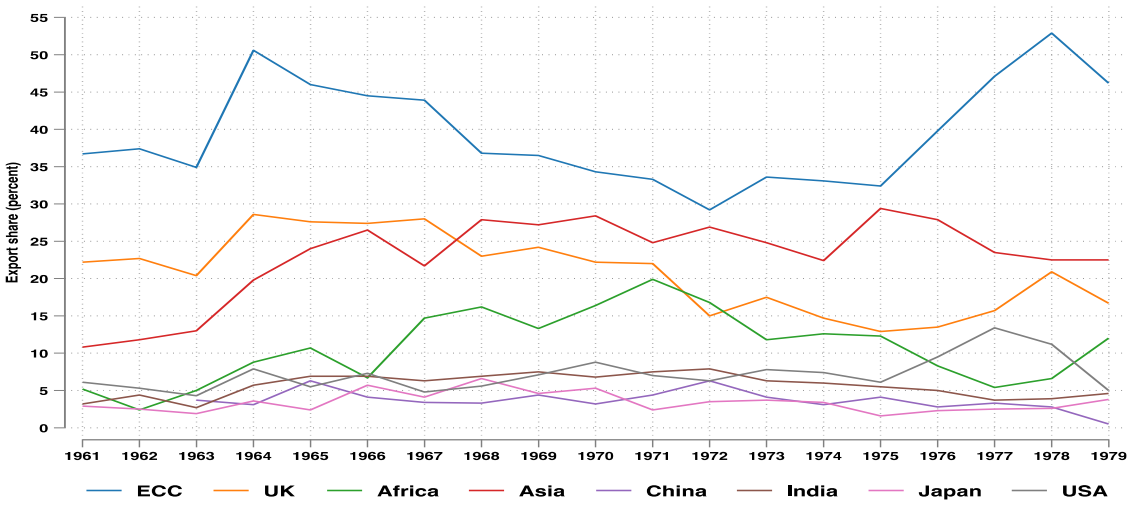
***Source**:* Computation from UN COMTRADE data

Figure 7B: Top Imports Products by Types to South Africa

***Source**:* Computation from UN COMTRADE data

Furthermore, we investigate what has been the destination and sources of Tanzania export and imports overtime, and whether that has changed. As shown in Figure 8, from 1960s to 1980s, European Economic Community (EEC, which is now EU) has been the major market destination for Tanzania exports as it accounted between 40 and 50 percent of total exports. Of these, UK has been the single most important market destination for Tanzania exports during this period compared to other countries, both within and outside the EEC, as it accounted between 20 and 28 percent of total exports; implying that Tanzania exports markets were highly concentrated as they heavily relied on EEC and UK markets. Other major export market destinations during this period include Asia and Ocean in particular India, Hong-Kong, Japan and China Mainland, Africa in particular Kenya, Uganda and Zambia and America in particular USA.

Figure 8: Tanzania's Exports by Country of Destination, 1960 to 1980



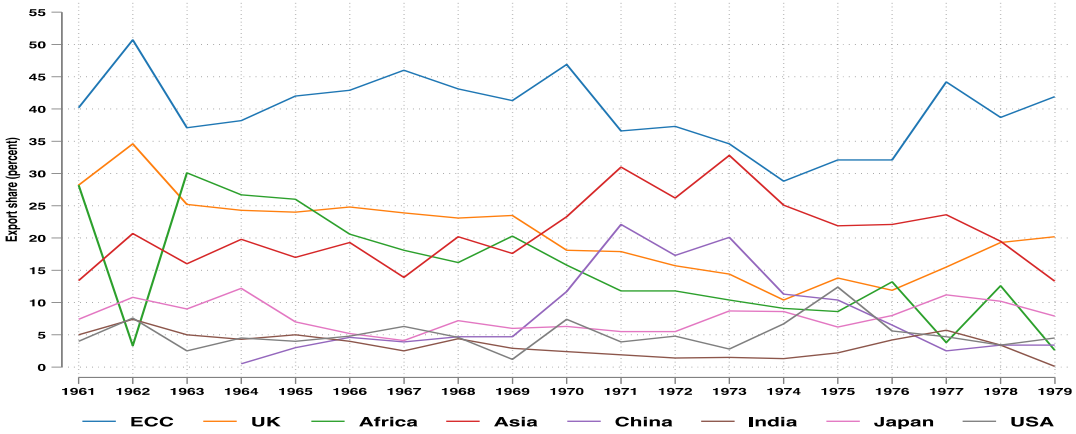
Source: Authors own compilation based on BoT data, 1961 – 1980.

However, the export patterns for Tanzania markets destination have overtime changed substantially, especially from 1990s and 2000s onwards. As shown in Figure 10, from 2014 to 2018 the top 15 destination markets for Tanzania exports that accounted to about 85 percent of total exports have been (in sequence of importance) India (20 percent), South Africa (15 percent), Kenya (10 percent), China (8 percent), Switzerland, Germany, Netherlands, Belgium, UAE, Japan, Uganda, DRC, USA, Zambia, and Vietnam.

When coming to the sources of Tanzania imports, as it has been for the case for exports, during the period from 1960s to 1980s, the major source of Tanzania imports has been EEC that accounted between 40 and 50 percent of total imports. As shown in Figures 11, of this, UK has been a single country that accounted for the largest share of total imports as it accounted between 20 and 30 percent of total imports. Other

major source of imports during this period includes for Asia and Oceania – China, Japan, and India, for Africa – Kenya, Uganda, and Zambia and for America – USA.

Figure 9: Tanzania's Imports by Country of Origin, 1960 to 1980



Source: Authors own compilation based on BoT data, 1961 – 1980.

Over time, however, as it has been for the case of export markets destination, there has been a significant change for the Tanzania import markets source, especially from 1990s and 2000s onwards. As shown in Figure 12, the top 16 sources of Tanzania imports that accounted to about 80 percent of total imports (in the sequence of importance) have been China (20 percent), India (15 percent), UAE (10 percent), South Africa (5 percent), Kenya (4 percent), Switzerland, Netherlands, Japan, Turkey, USA, Malaysia, Indonesia, UK, Thailand, and Russia. In its place, the top source of Tanzania for the past five years is China, India, UAE, and South Africa.

4. Empirical Strategy and Data

4.1 Empirical Specification

From Jan Tinbergen in 1962 who was the first to postulate gravity-like equations[8], which despite its huge intuition its earlier applications did not have a theoretical underpinning, to Anderson J. E. in 1979 who was the first to develop theoretical models that lead to gravity-like equations[9]; to Anderson and van Wincoop in 2003 who introduced the concept of Multilateral Trade Resistance (MTR) in the gravity model – the development of gravity model has come a long way.

A more complete formulation of theoretical models with gravity-style bilateral trade patterns was derived using the idea of monopolistic competition in differentiated products. Bergstrand (1985, 1989) and Helpman and Krugman (1985) pushed the argument of a theoretical foundation for the gravity model further by postulating that the model is a direct inference to a model of trade based on monopolistic competition developed by Krugman (1979, 1980).[10] Later, Deardorff (1998) derived a gravity-type relationship from the Heckscher-Ohlin model of trade based on factor endowments while Eaton and Kortum (2001) showed how the Ricardian model of trade from comparative advantage can also lead to a gravity equation. Thus, in addition to Bergstrand (1989, 1990) who extended the model to its very complicated border effects index, making people dodging serious treatment of the model; Anderson and van Wincoop (2003), however, significantly simplify that complexity, making the equation to provide more useful interpretations of the findings, leading to the structural gravity model:

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma}, \tag{1}$$

$$P_j^{1-\sigma} = \sum_{i=1}^{N} \frac{Y_i}{Y}\left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma}. \tag{2}$$

[8]Tinbergen postulated that the level of trade between two countries is directly proportional to the product of the masses (proxied by their economic size, i.e. GDP or GNI) and inversely proportional to the distance (i.e. trade cost or trade barriers[8]) between them. Take logs to arrive at estimable equation

[9] Anderson showed that because of the Armington assumption, indeed countries would trade more on the basis of their size, and that the level of trade would be curtailed by the transport costs that increase with distance, hence the gravity like model.

[10] Just like in Andersons explanation of the gravity model, Bergstrand (1985) shows that countries with large incomes would most likely trade more and their consumers have larger preferences (because they can afford to pay for them) than poorer countries. The volume of trade however would be curtailed by distance, which acts like a tax on trade. Bergstrand (1985), asserts that, typically, the log-linear gravity model equation specifies that economic forces at a trade flow's origin, economic forces at the flow's destination, and economic resistance forces either aiding or resisting the trade movement from origin to destination can explain a trade flow from origin i to destination, j.

$$\Pi_i^{1-\sigma} = \sum_{j=1}^{N} \frac{E_j}{Y} \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma}, \quad (3)$$

$$p_j = \frac{Y_j^{\frac{1}{1-\sigma}}}{\gamma_j \pi_j} \quad (4)$$

where, X_{ij} denotes the value of shipments at destination prices from the region of origin i to region of destination j. The order of double subscripts denotes origin to destination. E_j is the expenditure at destination j from all origins and Y_i denotes the sales at destination prices from i to all destinations. $t_{ij} \geq 1$ denotes the variable trade cost factor on shipments of goods or services from i to j, σ is the elasticity of substitution across varieties, and $\gamma_j > 0$ is the CES share parameter.

P_j is the inward multilateral resistance (IMR), which aggregates the incidence of trade costs on consumers in each country, and the CES price index of the demand system. Π_i is the outward multilateral resistance (OMR), which from (3) aggregates i's outward trade costs relative to destination price indexes. Multilateral resistance is a conditional general equilibrium concept, since $\{\Pi_i, P_j\}$ solve equations (2) - (3) for given $\{Y_i, E_j\}$. Also note that (2) - (3) solves for {Πi, Pj} only up to a scalar. If $\{\Pi_i^0, P_j^0\}$ is a solution then so is $\{\lambda\Pi_i^0, P_j^0/\lambda\}$. Thus, a normalization of one of the multilateral resistances is needed to obtain a unique solution for (2) - (3). Hence, equation (4) is derived from the market clearance:

$$Y_i = \sum_{j=1}^{N} X_{ij}, \quad (5)$$

P_i is the exporter's supply price of country i. Using Equation (3) leads to Equation (4). Gravity equations are recommended to be estimated with importer and exporter fixed effects by Feenstra (2004), a recommendation followed by most of the subsequent literature. In addition, many recent papers follow the recommendation of Santos Silva and Tenreyro (2006) who argue in favor of the PPML estimator for gravity regressions to account for heteroskedasticity and to take advantage of the information contained in the zero trade flows. Taking these considerations into account, many recent studies employ a version of the following empirical gravity model:

$$X_{ij} = exp^{(T_{ij}\beta + \pi_i + \chi_j) \mathrm{x} \varepsilon_{ij}} \quad (6)$$

where, Tij is the vector of trade cost variables, β is a vector of coefficients and ε_{ij} is an error term, assumed to be independent of the regressors, with conditional expectation equal to one. The treatment of the error term as additive or multiplicative does not, in principle, affect the implementation of the GEPPML procedure. However, ε_{ij} enters equation (6) multiplicatively because this treatment will enable us to implement our hybrid method to construct '*estibrated*' trade costs. Importantly, we note that, while most PPML applications in the literature use an additive error term, the multiplicative error term treatment is perfectly valid too (for more detail see Santos Silva and

Tenreyro, 2006; Anderson, Larch and Yotov, 2017). PPML, as a Pseudo Maximum-Likelihood estimator, only assumes the correct specification of the conditional expectation function, which is assumed to be the same in the additive and multiplicative case.[11]

π_i is an exporter fixed effect that accounts for the outward multilateral resistances and for sales/outputs, and χ_j is an importer fixed effect that accounts for expenditures and for the inward multilateral resistances. To avoid perfect collinearity, we either have to drop one exporter and one importer fixed effect or one fixed effect and the constant. Our choice is to drop one importer fixed effect, χ_0, and the constant, implying that all other fixed effects are identified relative to χ_0. Further, note that solving the system (2) - (3) requires normalizing one of the multilateral resistances. By choice, we normalize the multilateral resistance that corresponds to the dropped importer fixed effect, $\widetilde{P_0}$ = 1. With the normalized $\widetilde{P_0}$ = 1, the theoretical interpretation of the importer fixed effect $\tilde{\chi}_0$ is E_0, but since it is dropped, $\tilde{\chi}_0$ = 0. Then, the theoretical interpretation of all other fixed effects is relative to E_0. Fally (2015) demonstrates that the PPML estimates of the fixed effects from gravity estimations are perfectly consistent with the structural gravity terms.

It should be emphasized that the correct solution of the IMRs and OMRs does not depend on any statistical properties or necessary assumptions of the PPML estimator. It merely uses underlying theory to derive the relationship between the fixed effects and the IMRs and OMRs. Hence, if we have consistent estimates for trade costs, whether obtained with PPML, OLS, or Gamma PML, to name just some prominent examples, we will get the corresponding proper IMRs and OMRs due to the PPML properties. We capitalize on this property of PPML in the next section, where we also exploit the full structure of system (1) - (4) to develop our GEPPML procedure.

4.2 Estimation Procedure

To perform the general equilibrium gravity analysis this section describes procedure developed by **Anderson, Larch and Yotov (2017),** which builds on the properties of PPML to obtain the general equilibrium effects of trade policy with the PPML estimator. This entails simple 3-stages procedures.

Stage 1: '*Baseline*' *Scenario*. This step derives the 'Baseline' estimates and 'Baseline' general equilibrium indexes, which consists of two sub-steps (estimate of baseline gravity and construct of baseline general equilibrium indexes).

Step one of stage one estimates the baseline gravity uses the PPML estimator to estimate gravity with exporter and importer fixed effects, as specified in equation (6). We chose PPML as our preferred estimator in this step for consistency with the rest of our procedure and due to its appealing properties for gravity estimations (Santos Silva

[11]Additional discussion of the use of additive vs. multiplicative error formulations can be found in Mullahy (1997) and Windmeijer and Santos Silva (1997).

and Tenreyro, 2006, 2011). This procedure can readily accommodate three alternative and widely used approaches to treat bilateral trade costs and their elasticities in the existing literature.

It has been emphasized that any estimator can be employed to obtain the estimates of the trade cost elasticities β in a preliminary step. However, we do note that this procedure can be implemented with estimates of the trade costs elasticities that are obtained with any estimator of choice. In fact, the β's can even be borrowed from other studies, which may not even use the same trade flows data, as is routinely done in the literature. PPML will ensure that the estimates of the fixed effects adjust, so that the corresponding multilateral resistances are consistent with the chosen trade cost elasticities. In principle, we think that it is valuable to obtain trade costs elasticities with the same data that will be used for the counterfactual analysis; and this is what is done in this study.

However, sometimes it is not possible to estimate certain parameters directly within the gravity framework. Hence, this procedure can also be applied when the whole trade cost vector is obtained externally, for example with the tetrads methods of Romalis (2007) or with any other ratio methods that are used in the literature (see Anderson, Larch and Yotov (2017). Furthermore, our methods can be used to obtain trade costs from a hybrid estibration procedure, which enables us to estimate key elasticities of interest, and simultaneously to construct a vector of bilateral trade costs that matches the trade flows data perfectly, i.e. to calibrate trade costs. As in the previous two cases, this procedure can be implemented with an intermediate step that treats the error term from specification in equation (6) as an accurately observed component of the vector of trade costs.

Step two of stage one that construct baseline general equilibrium indexes uses the estimates of the fixed effects from equation (6) together with data on outputs and expenditures to construct the multilateral resistances according to

$$\Pi]^{1}{}_{i}{}^{-\sigma} = E_0 Y_i \exp(-\pi_{e} i), \qquad (7)$$

and

$$\Pi]^{1}{}_{i}{}^{-\sigma} = E_0 Y_i \exp(-\pi_{e} i), \qquad (8)$$

where, by construction, Yi = Pj Xij and Ej = Pi Xij. Construct any other baseline GE indexes of interest (e.g. predicted exports, $P_j 6{=}i\ Xe_{ij}$, $\forall_i$).

Note that in order to be able to perform counterfactual analysis, we need values for all inward and outward multilateral resistance terms, in addition to the inward multilateral resistance which is normalized. This is only possible if, after dropping one importer fixed effect and the constant, PPML does not drop any additional fixed effects or observations. If additional fixed effects are dropped, one may need to check and adjust

the data in order to avoid the dropping of fixed effects by PPML. For example, one may drop countries with zero reported exports or imports to all trading partners.

Stage 2: '*Conditional' Scenario*. Stage derives the 'conditional' gravity estimates and 'conditional' general equilibrium indexes, which allow for changes in the IMRs and OMRs in response to changes in trade costs, but do not take output and expenditure changes into account. As it has been for the first stage, stage two too consists of two sub-steps:

Step one of stage 2 estimate 'Conditional' Gravity start by redefining the policy variable(s) of interest to reflect any desired trade policy changes and uses PPML to estimate:

$$X_{ij} = \exp\left(\mathbf{T}_{ij}^{c}\widetilde{\boldsymbol{\beta}} + \pi_i^c + \chi_j^c\right) \times \epsilon_{ij}^c \quad (9)$$

where T_{ij}^{c} is the vector of counterfactual trade policy covariates. For example, an indicator for Regional Trade Agreements (RTAs) can be amended to eliminate an existing agreement or to introduce a new one;[12] the tilde on β indicates the fact that the trade cost coefficients are constrained to the estimated values from the baseline specification in equation (6); and the superscript *c* denotes counterfactual variables. Notice that the data remains the same in this counterfactual exercise: X_{ij} remains the same and thus so do Y_i and E_j. The experiment infers the fixed effects (multilateral resistances) that are consistent with the original data with the counterfactual trade costs T^{c}_{ij}.

Step two of stage 2 estimate 'Conditional' Gravity by repeating the step two of stage one with the new fixed effects estimates from equation (9) and the original data on outputs and expenditures to construct the 'conditional' general equilibrium values of the multilateral resistances and construct any other general equilibrium indexes of interest. The differences, in percentage, between the baseline indexes from step two of stage one and the counterfactual indexes from this step measure the 'conditional' general equilibrium effects of the simulated trade policy. Specifically, the percentage change in welfare in the 'conditional' general equilibrium scenario can be calculated by the change in real GDP, i.e.,

$$\widehat{W}_i = \frac{Y_i^c/\widetilde{P}_i^c}{Y_i/\widetilde{P}_i} = \frac{\widetilde{P}_i}{\widetilde{P}_i^c}, \ \forall i, \quad (10)$$

where moving from the middle to the rightmost equality recognizes that output is kept exogenous in the 'Conditional' scenario, i.e. $Y_i^c = Y_i$. We obtain power transforms of the inward multilateral resistances according to equation (9). Therefore, to construct real GDP, we use a standard value for the elasticity of substitution σ = 7. In principle, σ can also be estimated directly from an empirical gravity model that includes as a

12 Our methods will also hold if we adjust estimates in the vector of the trade cost elasticities, β.

covariate any direct price shifter, e.g. tariff. See for an overview of varies ways to obtain estimates for the elasticity of substitution Head and Mayer (2014).

Stage 3: *'Full Endowment' Scenario.* This step derives the 'full endowment' gravity estimates and 'full endowment' general equilibrium indexes, which in addition to changes in the IMRs and OMRs capture changes in output and expenditure. Again, as for the stage 1 and 2, stage 3 too consists of two sub-steps.

Step one of stage 3 estimate 'full endowment' gravity by allowing for endogenous response in the value of outputs/incomes and expenditures, which are given by $Y_i^c = (p_i^c/p_i)Y_i$ and $E_i^c = (p_i^c/p_i)E_i$ in an endowment economy where trade imbalance ratios $\varphi_i = E_i/Y_i$ are assumed to stay constant in the counterfactual for each country *i* (allowing for balanced trade as a special case). The endogenous changes in output/income and expenditure will trigger additional changes in the multilateral resistance (MR) terms and so forth. As the PPML estimator with the appropriate fixed effects ensures that the sum of fitted values of GDPs and expenditures is equal to the sum of observed values of GDPs and expenditures, changes in output/income and expenditure cannot be directly calculated in one step with PPML. Therefore, we use the structural gravity Equation (1) to translate the changes in output and expenditure, triggered by the changes in factory-gate prices, into changes in trade flows:

$$\widetilde{X}_{ij}^c = \frac{\left(\widetilde{t_{ij}^{1-\sigma}}\right)^c}{\widetilde{t_{ij}^{1-\sigma}}} \frac{\widetilde{Y}_i^c \widetilde{E}_j^c}{Y_i E_j} \frac{\widetilde{\Pi_i^{1-\sigma}} \widetilde{P_j^{1-\sigma}}}{\left(\widetilde{\Pi_i^{1-\sigma}}\right)^c \left(\widetilde{P_j^{1-\sigma}}\right)^c} X_{ij} \tag{10}$$

$$\text{where } \widetilde{t_{ij}^{1-\sigma}} = \exp\left(\mathbf{T}_{ij}\widetilde{\boldsymbol{\beta}}\right) \text{ and } \left(\widetilde{t_{ij}^{1-\sigma}}\right)^c = \exp\left(\mathbf{T}_{ij}^c\widetilde{\boldsymbol{\beta}}\right). \tag{11}$$

Note that all ratios on the right-hand side of (11) can be expressed only in terms of the estimates of the exporter and of the importer's fixed effects. Using equations (7) and (8), new multilateral resistances are obtained as functions of the estimates of the fixed effects and of the new values of income and expenditure:

$$\left(\widetilde{\Pi_i^{1-\sigma}}\right)^c = E_0^c \widetilde{Y}_i^c \exp\left(-\widetilde{\pi}_i^c\right), \tag{12}$$

and

$$\left(\widetilde{P_j^{1-\sigma}}\right)^c = \frac{\widetilde{E}_j^c}{E_0^c} \exp\left(-\widetilde{\chi}_j^c\right). \tag{13}$$

In turn, the new values for outputs and expenditures, $\widetilde{Y}_i^c$ and E_j^c, are obtained by using the market clearing conditions$p_i = \left(\frac{Y_i}{Y}\right)^{\frac{1}{1-\sigma}} \frac{1}{\gamma_i \Pi_i}$ to translate the 'Conditional' general equilibrium effects on the MR terms into 'first-order' changes in factory-gate prices, i.e.

$$\widehat{p_i^c/p_i} = \left[\exp\left(\widetilde{\pi}_i^c\right)/\exp\left(\widetilde{\pi}_i\right)\right]^{\frac{1}{1-\sigma}}, \tag{14}$$

where, as imposed in Stage1, the vector of prices $\{p_i^c\}$ is normalized by $P_0 = \sum_i \left(\gamma_i p_i t_{i0}\right)^{1-\sigma} = 1$Note that the changes in trade implied by Equation (18) are not the 'Full Endowment' general equilibrium changes. The reason is that they only reflect the 'Conditional' OMR changes and do not allow for immediate changes in the value of outputs. This is why we label these initial changes in the factory-gate prices and in trade 'first order'. Thus, in effect, the methods that we represent here are an interactive procedure that corresponds to the 'exact hat' procedures from Dekle, Eaton and Kortum (2007, 2008). When trade costs are '*estibrated*', as described earlier in this section, our procedure and the methods from Dekle, Eaton and Kortum (2007, 2008) deliver identical results.

Step two of stage 3 construct 'full endowment' general equilibrium indexes of interest following the procedures from step two of stage one. The differences, in percentage, between the baseline indexes from Step 1.b and the counterfactual indexes from this step measure the 'Full Endowment' GE effects of the simulated trade policy. The percentage change in welfare in the 'Full Endowment' GE scenario can again be calculated by the change in real GDP, i.e.,

$$\widehat{W_i} = \frac{\widetilde{Y}_i^c/\widetilde{P_i^c}}{Y_i/\widetilde{P}_i}, \ \forall i. \tag{15}$$

Note that with balanced trade or constant shares of trade imbalances, the change in output and expenditure are identical for each country. Hence, real GDP changes correspond to changes in real expenditures. Further, Arkolakis, Costinot and Rodrguez, Clare (2012) demonstrates that the welfare/real consumption gains from trade liberalization obtained from a wide class of trade models with alternative microfoundations can all be expressed as a combination of two sufficient statistics including intra-national trade as a share of total expenditures (X_{ii}/E_i) and the trade elasticity of substitution ($1 - \sigma$). This holds for our framework. These three steps can be performed with any statistic/econometrics software that is able to estimate a constrained Poisson model and is capable of handling loops. Specifically, no non-linear equation solver is necessary. Hence, it can be easily applied by anyone working empirically.

Our procedures closely resemble the 'exact hat' algebra procedures from Dekle, Eaton and Kortum (2007, 2008). They differ quantitatively from the usual practice in using the predicted value of bilateral trade instead of the observed value of trade. But, as demonstrated earlier, the latter can be accommodated by using calibrated or

estibrated trade costs. Otherwise, as is well understood now, in the one good case the Armington CES endowments model is an equivalent representation of the structural gravity model. The CES parameter $1 - \sigma$ is alternatively interpreted as a Frechet distribution parameter and the sales variable $Y_i = p_i Q_i$ is interpreted as the wage bill $w_i L_i$.

4.3 Data Sources and Descriptive Statistics

Three main data sources, the COMTRADE database, World Development Indicators and the CEPII Gravity database are used for this study. The data on the bilateral trade flow comes from the COMTRADE database. Our dataset contains bilateral trade flow for 157 countries. We construct the intra-national trade from World Development Indicators on the country output (GDP) and value of exports both at current market values in USD figures. Consistent with other studies, we compute the country's intra national trade by subtracting export values from the gross domestic products (GDP). We also use the data from the CEPII Gravity database which contains data of standard gravity controls including the bilateral distance, contiguity, common religion, common colony, common language, and dummy on regional trade agreements (RTAs). For this study, we only use bilateral distance (DIST), contiguity (CNTG) and regional trade agreement (RTA) to proxy bilateral trade costs. Table 1 presents descriptive statistics of the main variables used in general equilibrium analysis.

Table 3: Summary Statistics

	Observations	Mean	SD	Min	Max
Trade	147894	2922.68	137260.43	0	1.89e+07
DIST	147894	7770.90	4471.94	2	19815
CNTG	147894	0.02	0.13	0	1
RTA	147894	0.20	0.40	0	1
Africa	147894	0.08	0.26	0	1

Notes: Trade are in million USD. Africa is the dummy for bilateral trade between African countries

Source: Author's computation

5. Impact of AfCFTA in Tanzania: Discussions of Results

5.1 Baseline Gravity Model Estimates

Before presenting the main results, on the implications of AfCFTA on Tanzania's a trade and welfare (GDP and prices), we first present the baseline estimates of the gravity model corresponding to step 1 of the baseline scenario. We present the baseline estimate to gauge and provide the plausibility of the estimated baseline coefficients which constitutes an important step in the general equilibrium analysis that follows. The estimates from the baseline specifications are further used to construct baseline general equilibrium indexes such as trade cost elasticities (refer to section 4.2 for further details). In this study, we are interested in simulating the effects of removing the international border for the bilateral trade between Tanzania and other African economies (while preserving the effect of geography and international border with other non-African countries) due to the creation of the so-called AfCFTA. As noted by Yotov *et al.,* (2016), the counterfactual scenario gives the potential effects of full integration of African economies (with no difference in consumers and producers apart from geographical differences) following the ratification of AfCFTA. In the counterfactual, we, therefore, simulate the effects by assuming no international borders between Tanzania and other African states while maintaining a border with other non-African countries and other geographical factors such as bilateral distance and contiguity.

In the baseline, we proxy the bilateral trade costs by the logarithm of bilateral distance and an indicator variable for contiguity and international borders. We also control for exporter and importer fixed effects to account for multilateral resistance, exporter's output, and importer's expenditures. In GE analysis, we estimate the effects for each year separately (using cross-section data as suggested by Yotov et al., (2016)) from 2017 to 2020. We also report the PPML estimator of the baseline gravity model estimate for each corresponding cross-section sample.

The baseline estimates are shown in Table 4. The standard errors clustered at countries' pair levels are reported in parentheses. Each column presents the PPML estimator for the respective year. In all estimations, we include the exporter and importer fixed effects and control for year fixed effects. Column 1 estimates the baseline gravity model utilizing the entire panel data from 2017 to 2020 and in additional controls for year fixed effects. All our subsequent analyses are based on the corresponding PPML estimator with exporter and importer fixed effects (as presented in Columns 2-5 of Table 4). It needs to be kept in mind that the use of an international border dummy offers two advantages, exogeneity and the ability to capture the effects of all determinants of trade. However, the use of a border dummy assumes common border effects across all countries' pairs (not accounting for heterogeneity border effect) as its main disadvantage (Yotov *et al.,* 2016).

All estimates are in accordance with the prior expectations and resonate to a larger extent with other previous studies. The estimates of the coefficients of the bilateral

distance variable are negative, statistically significant, and closer to 1, the effects found in most other previous studies; and as expected the effects of contiguity is positive and statistically significant. Also, as expected the effects of regional trade agreement are positive and statistically significant. This is line with what Afesorgbor, S. K., (2016) found for Africa using PPML estimator. The effect of international borders on bilateral trade, the variable of our interest, is negative with large magnitude and statistically significant, even after controlling for geography and regional trade agreements. The estimates are also stable when using cross-section estimation (Columns 2 – 5) and controlling for importer and exporter fixed effects, in addition to controlling for year fixed effects in panel data (Column 1). The estimated coefficient on the international border of – 3.4 is comparable to finding in other previous studies such as the coefficient of – 2.5 of the study by Yotov *et al.,* (2016). Our estimates on the international border suggest that all else equal, the international border decreases trade by 97 percent[13] (based on PPML estimates in Column 4 for the year 2019).

Table 4: Baseline Gravity Model: PPML Estimates

	(1)	(2)	(3)	(4)	(5)
		2017	2018	2019	2020
International Border (INTB)	-3.462***	-3.476***	-3.396***	-3.485***	-3.432***
	(0.173)	(0.183)	(0.182)	(0.168)	(0.152)
Log Distance (DIST)	-0.720***	-0.716***	-0.716***	-0.703***	-0.747***
	(0.051)	(0.053)	(0.053)	(0.050)	(0.046)
Contiguity (CONT)	0.414***	0.382***	0.390***	0.400***	0.455***
	(0.151)	(0.148)	(0.148)	(0.147)	(0.160)
Regional Trade Agreement (RTA)	0.402***	0.441***	0.413***	0.421***	0.352***
	(0.079)	(0.086)	(0.084)	(0.079)	(0.090)
Exporter fixed effects	Yes	Yes	Yes	Yes	Yes
Importer fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	No	No	No
Observations	147894	24649	24649	24649	24649

***Notes*:** Standard errors are clustered by country pair and are reported in parentheses. *, ** and *** denote statistically significant at 10, 5, and 1 significant level, respectively

[13] $[\exp(\beta) - 1] * 100 = [\exp(-3.485) - 1] * 100 = 96.9$

Source: Author's estimation

5.2 Effects of AfCFTA on Tanzania Trade (Exports)

Table 5 presents the implication of AfCFTA on Tanzania's trade (exports). For comparisons purpose and to address the fact that the most current period in our dataset, the year 2020 is likely to be affected by the Covid-19 pandemic, we estimate the effects for each year from 2017 to 2020 and base our analysis and discussion on the year 2019. Panel A in Table 5 presents the Conditional General Equilibrium (CGE) effects and Panel B presents the Full Endowment General Equilibrium (FEGE) effects. Furthermore, the effects of removing the international border following AfCFTA on other African countries is presented in the Appendix Table A4. The results in Appendix Table A4 exclude other non-African countries (that are not part of AfCFTA negotiations) as they are weakly affected directly or indirectly.

Under the CGE scenario effect, our estimates, as shown in Table 5, show that Tanzania will experience trade growth of 57 percent from its baseline exports in 2019 following the removal of the international border due to the ratification and implementation of AfCFTA (the results are 55% for 2017, 51% for 2018 and 65% for 2020). These effects are, however, relatively smaller when compared to FEGE scenario effect, which show that the effect for Tanzania will be 75 percent of its total trade in 2019 (the results are 73% for 2017, 68% for 2018 and 85% for 2020). As compared with other previous studies, Yotov *et al.,* (2016) show that member countries of NAFTA experienced an increase in exports ranging from 15 to 42 percent of their respective total exports. More recently, Fofack, H. *et al.,* (2021) show that the AfCFTA could raise intra-African trade by 24% in the short term and slightly more in the long run. Much earlier study from the meta-analysis by Afesorgbor, S. K., (2016) found a general positive effect of African RTAs of about 27% –32%. As highlighted in Yotov *et al.*, (2016), the higher FEGE effects suggest that the decline in bilateral trade costs due to the creation of AfCFTA translates into additional gains for the producers in Tanzania and other member countries who enjoy higher producer prices.

Table 5: Effects of AfCFTA on Tanzania Trade/Exports

	2017	2018	2019	2020
Panel A: Conditional GE				
X (Baseline)	28378.59	31283.69	31535.86	31311.46
X (Conditional GE)	43933.58	47174.08	49463.53	51741.36
% Δ Exports	54.8	50.8	56.8	65.2
Panel B: Full Endowment GE				
X (Baseline)	28378.59	31283.69	31535.86	31311.46

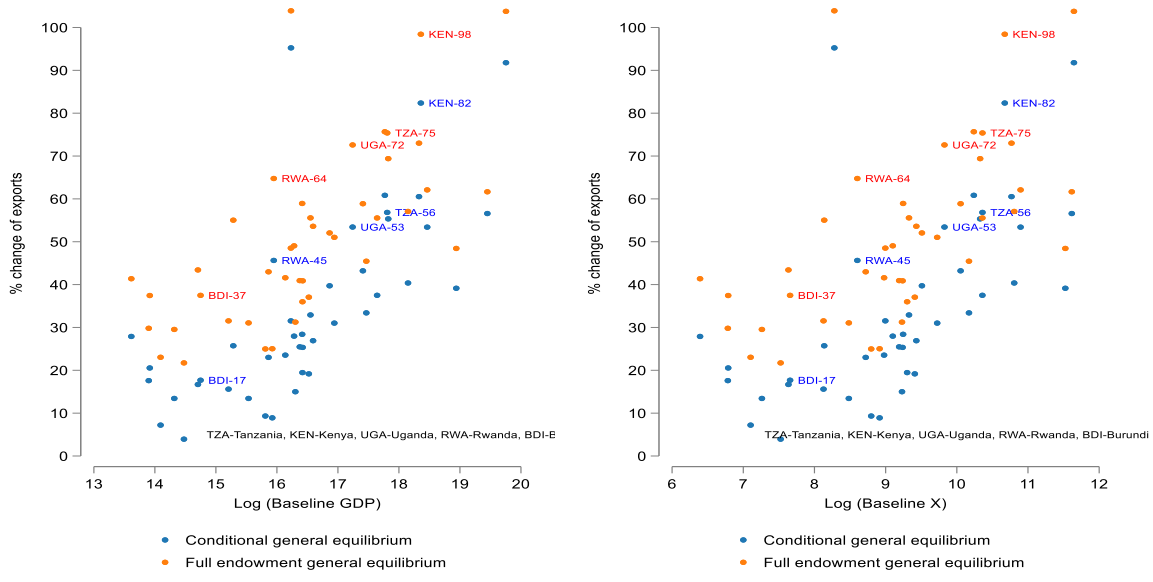
X (Full GE)	49127.52	52490.56	55313.00	57957.40
% Δ Exports	73.1	67.8	75.4	85.1

Source: Authors' own estimation

Notes: The table reports the conditional and full endowment general equilibrium (GE) effect of AfCFTA on Tanzania's total Trade-X (expresses as percentage change from the baseline exports). X is in millions of USD. For comparison and since the most current period in our dataset (the year 2020) is likely to be interrupted by covid-19 pandemic, we estimate the effects for each year from 2017 to 2020. The conditional GE effects on trade (panel A) take into account the direct and indirect trade costs but hold the GDP constant. The full endowment GE estimates (Panel B) takes into account the general equilibrium income effects.

Furthermore, Figure 10 depicts the trade effects of both Conditional and Full Endowment GE estimates as the percentage change in exports against the log of the baseline National Outputs (GDP) and baseline exports. We also show the position of trade effects for other countries in the East Africa Community (EAC), namely Kenya, Uganda, Rwanda, and Burundi. As shown in the Figure 10, the estimated trade effects show that the effects for Tanzania are relatively higher as compared to most other African countries except for Kenya and the other two other countries (probably Nigeria and South Africa). The estimates also suggest that relatively richer economies will experience larger trade gains than relatively small countries (in terms of GDP and baseline exports). Our results are consistent with those found by Yotov *et al.*, (2016) simulations on the effect of the removal of all international borders in the world, which shows that high-income countries benefit more from the removal of borders in terms of exports than low-income countries.

Figure 10: Conditional and Full Endowment Effects of AfCFTA on Trade/Exports



Source: Authors' own estimation

In Table 6, we present the implication of AfCFTA on the Tanzania trade/exports pattern, and shares (in parentheses). The estimated effect on trade patterns is based on the 2019 data (the most recent year prior Covid-19 pandemic). The first column presents the baseline total trade (exports) and exports share by region of destination, Column 2 presents the trade pattern based on CGE scenario and Column 3 presents the effects on trade patterns based on FEGE scenario. We consider four main destination regions: the EAC market, the SADC market, the Rest of Africa (RoA)[14] market and the Rest of the World (RoW) market. As shown in the baseline scenario after accounting for geography (bilateral distance and contiguity), the RoW market dominates Tanzania's export destination, accounting for about 77 percent of total exports. This is followed by EAC and RoA, which each account for about 8, and then by the SADC market which accounts for about 7 per cent.

Allowing for the removal of the international border, under a Conditional GE in Column 1 and Full Endowment GE in Column 2, our estimates shows that most of Tanzania's trade will be diverted from RoW to RoA with which Tanzania does not have a trade agreement (such as EAC and SADC). The trade diversion from RoW to RoA will amount to about 23 percent under both conditional and full endowment general equilibrium scenarios. Tanzania will respectively experience a shift in export share from RoW to EAC market by 18 percent and from SADC market by 19 percent under both conditional and full endowment general equilibrium scenarios. The estimates are in line with the fact that trade gain will be higher for countries where Tanzania has small baseline bilateral trade to begin with. Furthermore, the estimates show that under ceterius paribus, Tanzania trade (exports) to RoW will fall significantly from the baseline share of 77.2 to 17.1 percent under conditional and to 15.9 percent under full endowment equilibrium, equivalent to a 60.7 (= 61%) percent drop.

Table 6: The Implication of AfCFTA on Tanzania Trade Pattern

	(1)	(2)	(3)
	Baseline	Conditional GE	Full Endowment GE
Market Destination by Region			
East Africa Community (EAC)	2568.4	13236.3	15717.8
	(8.1)	(25.9)	(26.6)
Southern Africa Development Cooperation (SADC)	2114.1	13087.6	15323.7

[14]RoA means all African countries not a member of East Africa community (EAC) or Southern Africa Development Cooperation (SADC).

	(6.6)	(25.6)	(26.0)
Rest of Africa (RoA)	2584.0	16000.0	18594.8
	(8.1)	(31.3)	(31.5)
Rest of the World (RoW)	24545.5	8739.6	9353.0
	(77.2)	(17.1)	(15.9)
Total Exports	31812.1	51063.4	58989.2
	(100.0)	(100.0)	(100.0)

Source: Authors' own estimation

Notes: The table reports the implication of AfCFTA on the Tanzania trade pattern, exports, and shares (in parentheses). We estimate the effects on trade patterns are estimated from 2019 data (the most recent year in our dataset). The first column reports the total trade (exports) and shares by region of destination in the baseline scenario, column 2 reports the effects for conditional general equilibrium and column 3 reports the effects for full endowment general equilibrium. All export values are in millions of USD and shares are in percentages.

5.3 The Effects of AfCFTA on Welfare (GDP) and Prices

We present the Full Endowment General Equilibrium effects of removing international borders due to AfCFTA on welfare (as measured by the percentage change in GDP) and producer's prices in Table 7. As before, we estimate the effects for the years 2017 to 2020 separately for comparative analysis, but the analysis and discussion is based on the year 2019 (the latest year prior to the Covid-19 pandemic). Our estimates in Table 7 shows that the Full Endowment General Equilibrium effects on real GDP due to AfCFTA are large as Tanzania will experience an increase in real GDP by 30 percent from its current baseline outputs in the year 2019. The effects on producer prices will be about 14 percent increase from their current price level in 2019. Overall, the estimates show a significant gain in terms of welfare for Tanzania as a whole, and producers are likely to gain more due to an increase in producer prices. We also report the full endowment equilibrium effects on real GDP and producer prices for other African countries in Appendix Table A4 based on the year 2019. Our results are also consistent and comparable to that found by Yotov et al., (2016), which show that when the entire world turns borderless the effect in increase in real GDP across countries will range from 20 percent to 80 percent.

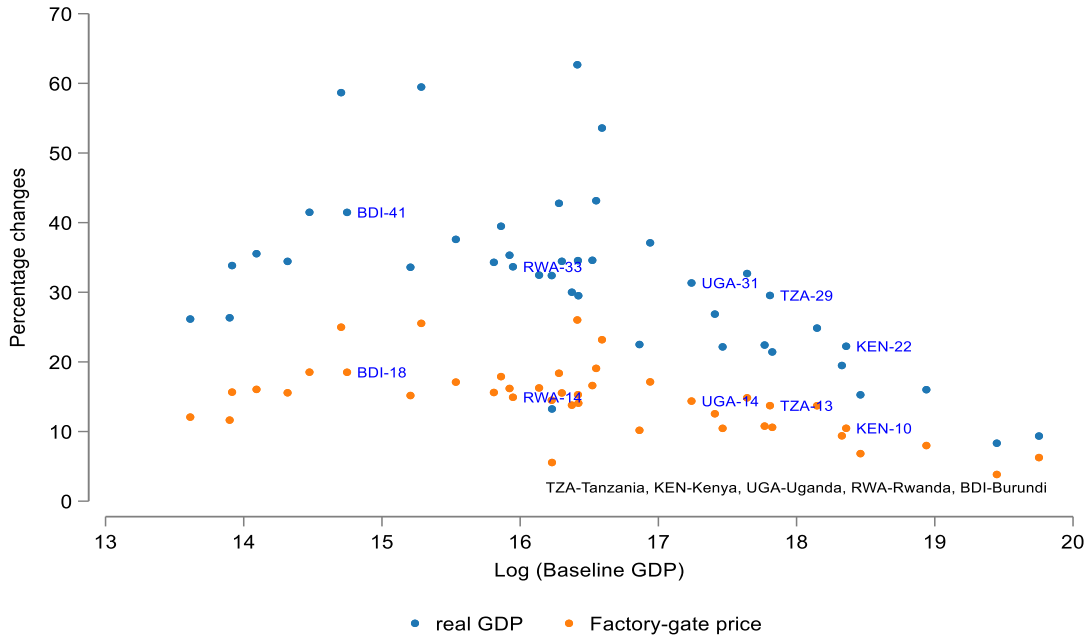
Table 7: The Effects of AfCFTA on Welfare (Change in Real GDP and *Prices)*

	2017	2018	2019	2020
GDP (Baseline)	48113.94	51562.92	54117.25	56951.03
GDP (Full GE)	54708.84	58412.47	61547.25	64848.40
% Δ in real GDP	29.0	28.5	29.6	29.9
% Δ in prices	13.7	13.3	13.7	13.9
% Δ in IMR	-11.8	-11.8	-12.2	-12.3
% Δ in OMR	-12.8	-12.4	-12.8	-12.9

Source: Authors' own estimation

Notes: The table reports the full endowment general equilibrium (GE) effects of the AfCFTA on Tanzania's real GDP and factory gate price (expresses as a percentage change). For comparison and because the most current period in our dataset (the year 2020) is likely to be interrupted by covid-19 pandemic, we estimate the effects for each year from 2017 to 2020.

Figure 11: The *Effects* of AfCFTA on GDP and Factory-gate Price



***Source**:* Authors' own estimation

Figure 11 depicts the Full Endowment General Equilibrium effects on real GDP and producer prices against the country's baseline outputs, in the log form. We only plot the estimates for African economies that are directly and indirectly affected by AfCFTA. Contrary to the previous findings, which show a higher gain in terms of exports, our

estimates show that small countries (in terms of baseline GDP) are more likely to gain in terms of an increase in GDP and producer prices. Our results are also consistent and comparable to that found by Yotov *et al.,* (2016), which shows that relatively small countries tend to gain more in terms of increase in GDP and producer prices following the hypothetical removal of all international borders. Tanzania, like a couple of countries in Africa with relatively higher baseline GDP, will experience much lower GDP and producer's prices effects relative to those countries with relatively lower GDP. Relative to other EAC economies, Tanzania's gains are lower than that of Burundi, Rwanda, and Uganda but slightly higher than that of Kenya.

6. Conclusions and Implications

Besides the efforts toward forming and joining regional integration, fear of potential losses and uncertain benefits continue to delay the signing and ratification of trade and investment agreements in many countries in Africa, including Tanzania, hampering meaningful regional integration. For, instance Tanzania has signed but has not ratified the Tripartite for Free Trade (that brings EAC, SADC, and COMESA) and has just ratified the AfCFTA in 2021 after a long delay since 2018, out of concerns regarding potential losses from opening the country to trade. Partly attributed to the slow ratification of the agreements, Tanzania's rating of 0.312 in 2019 on the Africa Regional Integration Index (ARII) was lower than Africa's average of 0.327 (0 is the lowest and 1 is the highest). Furthermore, the country's ARII score of 0.51 in the EAC in 2019 was lower than the EAC regional average of 0.54, while in the SADC block, it scored 0.29 compared to the regional average of 0.34 (Leyaro, *et al.,* 2021).

To understand the costs and benefits of regional integration in Tanzania and help demystify some of the country's fears, this study quantifies the potential effects of Tanzania's ratifying and implementing the AfCFTA. This is critical, as the implementation of signed and ratified regional protocols is slower in Tanzania compared to its regional peers; and non-tariff barriers are still prevalent, increasing the costs of cross-border trade. As the result, this study finds that, Tanzania's trade with African countries following forming and joining regional blocs have increased significantly from about 11% of its total trade in 2001 to about 33% in 2021. Most of the trade (about 98%), however, are within the countries that it has formed regional blocs (i.e., EAC and SADC) and only 2% with the rest of other African countries. Even within these regional blocks most of trade is within a couple of countries or so, Kenya for the case of EAC and South Africa for the case of SADC.

Drawing on a General Equilibrium Poisson Pseudo Maximum Likelihood (GEPPML) model, we estimate the effects of the African Continental Free Trade Agreement (AfCFTA) on Tanzania's trade/exports and welfare. The baseline estimates on the international border suggest that all else equal, the international border decreases trade 97 percent in the year 2019. The empirical results show that the AfCFTA could raise Tanzania trade growth by 57% under the conditional general equilibrium scenario (the direct effects) and by 75% more under the full endowment general equilibrium scenario (allowing both for direct and indirect effect) in 2019. In addition, the estimated trade effects show that the effects for Tanzania are relatively higher as compared to most other African countries except for Kenya and the other two other countries (probably Nigeria and South Africa). These estimates are by far higher than that found by Fofack, H. *et al.,* (2021) for Africa as whole which show that the AfCFTA could raise intra-African trade by 24% in the short term and slightly more in the long run.

Allowing for the removal of the international border, under both conditional and full endowment general equilibrium, our estimates shows that most of Tanzania's trade will be diverted from RoW to the RoA, with which Tanzania does not have a trade

agreement. The trade diversion from RoW to RoA will amount to about 23 percent under both scenarios. Tanzania will respectively experience a shift in export share from RoW to EAC market by 22 and to SADC market by 19 percent under conditional, and by 19 percent for both EAC and SADC markets under full endowment general equilibrium. The estimates are in line with the fact that trade gain will be higher for countries where Tanzania has small baseline bilateral trade to begin with. Furthermore, the estimates show that under ceterius paribus Tanzania trade (exports) to RoW will fall significantly from the baseline share of 77.2 to 17.1 percent under conditional and to 15.9 percent under full endowment equilibrium, equivalent to a 60.7 (= 61%) percent drop.

Allowing for the removal of the international border under both conditional and full endowment general equilibrium scenarios, our estimates shows that most of Tanzania's trade will be diverted from RoW to RoA with which Tanzania does not have a trade agreement (such as EAC and SADC). The trade diversion from RoW to RoA will amount to about 23 percent under both scenarios. Tanzania will respectively experience a shift in export share from RoW to EAC market by 18 percent and to SADC market by 19 percent under both scenarios. The estimates are in line with the fact that trade gain will be higher for countries where Tanzania has small baseline bilateral trade to begin with. Furthermore, the estimates show that under ceterius paribus, Tanzania trade (exports) to RoW will fall significantly from the baseline share of 77.2 to 17.1 percent under conditional and to 15.9 percent under full endowment general equilibrium, equivalent to a 60.7 (about 61%) percent drop.

Furthermore, our estimates show that the full endowment general equilibrium effects on real GDP due to AfCFTA are large as Tanzania will experience an increase in real GDP by 30 percent from its current baseline outputs in the year 2019. The effects on producer prices will be about 14 percent increase from its current price level in 2019. Contrary to the previous findings, which show a higher gain in terms of exports, our estimates show that small countries (in terms of baseline GDP) are more likely to gain in terms of an increase in GDP and producer prices. Indeed, this is the case for Tanzania, which is relatively large country by African standard, and so likely to gain less. As the result, Tanzania, with relatively higher baseline GDP like a couple of countries in the region will experience much lower GDP and producer's prices effects. Thus, relative to other EAC economies, Tanzania's gains are lower than that of Burundi, Rwanda, and Uganda but slightly higher than that of Kenya. Clearly, our estimates show that Tanzania, as a whole, will gain significantly n in terms of increase in trade/exports, real GDP and producer prices following ratification and implementation of AfCFTA agreement.

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APPENDIX

Table A1: Trade Value and Share: Africa (EAC, SADC & RoA) versus RoW, 2002-2021

	Export Value (Share)					Import Value (Share)				
	EAC	SADC	RoA	AFRICA	RoW	EAC	SADC	RoA	AFRICA	RoW
2002	52.3	74.9	9.8	137.0	764.1	114.7	263.8	7.3	385.8	998.9
	(5.8)	(8.3)	(1.1)	(15.2)	(84.8)	(8.3)	(19.1)	(0.5)	(27.9)	(72.1)
2003	94.8	86.2	10.5	191.5	940.2	209.9	382.5	8.1	600.5	1222.1
	(8.4)	(7.6)	(0.9)	(16.9)	(83.1)	(11.5)	(21.0)	(0.4)	(32.9)	(67.1)
2004	167.2	220.9	11.4	399.6	1073.2	238.2	487.4	21.8	747.5	1508.7
	(11.4)	(15.0)	(0.8)	(27.1)	(72.9)	(10.6)	(21.6)	(1.0)	(33.1)	(66.9)
2005	162.0	412.9	28.3	603.2	1068.0	280.2	443.6	15.0	738.8	2236.0
	(9.7)	(24.7)	(1.7)	(36.1)	(63.9)	(9.4)	(14.9)	(0.5)	(24.8)	(75.2)
2006	192.2	412.9	36.0	641.1	1223.1	269.7	430.2	15.3	715.1	2311.1
	(10.3)	(22.1)	(1.9)	(34.4)	(65.6)	(8.9)	(14.2)	(0.5)	(23.6)	(76.4)
2007	258.0	372.5	28.5	659.0	1478.0	364.8	496.7	13.3	874.8	3920.9
	(12.1)	(17.4)	(1.3)	(30.8)	(69.2)	(7.6)	(10.4)	(0.3)	(18.2)	(81.8)
2008	355.7	600.3	67.5	1023.5	2095.0	458.7	580.3	64.4	1103.5	5026.6
	(11.4)	(19.3)	(2.2)	(32.8)	(67.2)	(7.5)	(9.5)	(1.1)	(18.0)	(82.0)
2009	285.0	407.8	49.3	742.0	2235.3	436.6	512.8	46.7	996.1	4096.2
	(9.6)	(13.7)	(1.7)	(24.9)	(75.1)	(8.6)	(10.1)	(0.9)	(19.6)	(80.4)
2010	558.0	780.9	83.7	1422.6	2626.4	463.6	632.6	57.4	1153.6	5167.5
	(13.8)	(19.3)	(2.1)	(35.1)	(64.9)	(7.3)	(10.0)	(0.9)	(18.2)	(81.8)
2011	409.0	1238.6	59.8	1707.4	3025.7	517.5	723.3	58.0	1298.8	7271.6
	(8.6)	(26.2)	(1.3)	(36.1)	(63.9)	(6.0)	(8.4)	(0.7)	(15.2)	(84.8)
2012	613.3	1497.9	53.2	2164.4	3382.8	604.7	835.6	72.4	1512.7	8667.4
	(11.1)	(27.0)	(1.0)	(39.0)	(61.0)	(5.9)	(8.2)	(0.7)	(14.9)	(85.1)
2013	421.6	1251.8	115.5	1788.9	2623.6	539.2	730.9	47.2	1317.2	11491.1
	(9.6)	(28.4)	(2.6)	(40.5)	(59.5)	(4.2)	(5.7)	(0.4)	(10.3)	(89.7)
2014	598.1	1237.6	339.3	2175.1	3526.4	550.9	652.0	40.5	1243.4	12345.3
	(10.5)	(21.7)	(6.0)	(38.1)	(61.9)	(4.1)	(4.8)	(0.3)	(9.1)	(90.9)

2015	924.9	1219.3	150.3	2294.5	3559.4	406.8	686.4	2087.5	3180.7	9736.5
	(15.8)	(20.8)	(2.6)	(39.2)	(60.8)	(3.1)	(5.3)	(16.2)	(24.6)	(75.4)
2016	269.8	1098.2	29.2	1397.1	2989.4	416.2	625.7	772.5	1814.4	8688.0
	(6.1)	(25.0)	(0.7)	(31.9)	(68.1)	(4.0)	(6.0)	(7.4)	(17.3)	(82.7)
2017	349.5	976.8	60.8	1387.1	2697.8	329.2	664.4	473.4	1467.0	8887.4
	(8.6)	(23.9)	(1.5)	(34.0)	(66.0)	(3.2)	(6.4)	(4.6)	(14.2)	(85.8)
2018	500.7	1050.0	49.6	1600.3	2196.5	364.4	631.6	1402.3	2398.2	10193.4
	(13.2)	(27.7)	(1.3)	(42.1)	(57.9)	(2.9)	(5.0)	(11.1)	(19.0)	(81.0)
2019	663.9	1307.9	58.5	2030.2	2902.5	406.5	629.1	1756.3	2792.0	10402.3
	(13.5)	(26.5)	(1.2)	(41.2)	(58.8)	(3.1)	(4.8)	(13.3)	(21.2)	(78.8)
2020	798.2	1438.8	33.5	2270.6	3714.3	398.7	470.3	1744.5	2613.5	9564.2
	(13.3)	(24.0)	(0.6)	(37.9)	(62.1)	(3.3)	(3.9)	(14.3)	(21.5)	(78.5)
2021	1152.3	1303.4	58.1	2513.9	3877.0	416.3	615.2	58.4	1089.9	11805.7
	(18.0)	(20.4)	(0.9)	(39.3)	(60.7)	(3.2)	(4.8)	(0.5)	(8.5)	(91.5)

Notes: Export and import values are in millions UDS. Figures in parentheses are shares (in percentage). RoW means Rest of World and RoA means Rest of Africa other than EAC and SADC

Source: Author's Compilation based on ITC Trade Map Data

Table A2: Trade Value and Share to and from the EAC Market: 2002-2021

	Export value (share)				Import value (share)			
	Kenya	Uganda	Rwanda	Burundi	Kenya	Uganda	Rwanda	Burundi
2002	35.7	5.6	3.9	7.1	107.1	5.8	1.7	0.1
	(68.3)	(10.6)	(7.5)	(13.6)	(93.4)	(5.0)	(1.5)	(0.1)
2003	78.9	8.5	2.6	4.8	199.6	5.8	4.1	0.3
	(83.3)	(9.0)	(2.7)	(5.0)	(95.1)	(2.8)	(1.9)	(0.2)
2004	90.2	55.7	7.8	13.5	213.7	12.2	12.2	0.2
	(54.0)	(33.3)	(4.7)	(8.1)	(89.7)	(5.1)	(5.1)	(0.1)
2005	93.5	48.9	7.0	12.7	264.4	15.4	0.2	0.1
	(57.7)	(30.2)	(4.3)	(7.8)	(94.4)	(5.5)	(0.1)	(0.0)
2006	103.8	44.2	5.6	38.7	253.8	13.7	0.9	1.3
	(54.0)	(23.0)	(2.9)	(20.1)	(94.1)	(5.1)	(0.3)	(0.5)

2007	123.4	46.1	17.6	70.9	331.7	30.6	0.5	2.0
	(47.8)	(17.9)	(6.8)	(27.5)	(90.9)	(8.4)	(0.1)	(0.5)
2008	252.7	59.8	22.5	20.6	424.9	30.5	1.2	2.2
	(71.1)	(16.8)	(6.3)	(5.8)	(92.6)	(6.7)	(0.3)	(0.5)
2009	192.9	51.7	15.8	24.6	389.3	33.8	4.1	9.5
	(67.7)	(18.1)	(5.5)	(8.6)	(89.2)	(7.7)	(0.9)	(2.2)
2010	324.9	60.2	116.8	56.1	420.2	37.6	4.0	1.8
	(58.2)	(10.8)	(20.9)	(10.1)	(90.6)	(8.1)	(0.9)	(0.4)
2011	221.3	52.6	95.2	39.8	472.4	42.2	1.5	1.4
	(54.1)	(12.9)	(23.3)	(9.7)	(91.3)	(8.2)	(0.3)	(0.3)
2012	349.7	103.2	105.8	54.6	545.4	54.0	3.3	2.1
	(57.0)	(16.8)	(17.3)	(8.9)	(90.2)	(8.9)	(0.5)	(0.3)
2013	228.4	66.5	81.5	45.3	470.2	48.0	18.4	2.6
	(54.2)	(15.8)	(19.3)	(10.7)	(87.2)	(8.9)	(3.4)	(0.5)
2014	446.0	73.3	35.8	43.0	485.8	56.0	6.4	2.7
	(74.6)	(12.3)	(6.0)	(7.2)	(88.2)	(10.2)	(1.2)	(0.5)
2015	793.9	50.5	41.3	39.2	343.7	60.8	2.3	0.1
	(85.8)	(5.5)	(4.5)	(4.2)	(84.5)	(14.9)	(0.6)	(0.0)
2016	189.5	21.3	7.0	52.0	343.0	68.9	3.1	1.3
	(70.2)	(7.9)	(2.6)	(19.3)	(82.4)	(16.5)	(0.7)	(0.3)
2017	197.9	29.8	68.3	53.5	275.9	49.8	2.3	1.3
	(56.6)	(8.5)	(19.5)	(15.3)	(83.8)	(15.1)	(0.7)	(0.4)
2018	221.9	117.7	102.7	58.4	293.5	66.3	2.1	2.5
	(44.3)	(23.5)	(20.5)	(11.7)	(80.5)	(18.2)	(0.6)	(0.7)
2019	266.6	122.1	188.5	86.8	329.5	68.8	5.0	3.2
	(40.2)	(18.4)	(28.4)	(13.1)	(81.1)	(16.9)	(1.2)	(0.8)
2020	227.3	188.7	205.3	177.0	295.0	95.1	.	8.6
	(28.5)	(23.6)	(25.7)	(22.2)	(74.0)	(23.9)	(.)	(2.2)
2021	397.2	314.0	277.8	163.3	409.8	.	.	6.5
	(34.5)	(27.3)	(24.1)	(14.2)	(98.4)	(.)	(.)	(1.6)

Notes: Export and import values are in millions UDS. Figures in parentheses are shares (in percentage).

Source: Author's Compilation based on ITC Trade Map Data

Table A3: Trade Value and Share to and from the SADC Market: 2002-2021

	Export value (share)		Import value (share)	
	South Africa	Other SADC	South Africa	Other SADC
2002	16.7	41.8	192.4	71.0
	(28.5)	(71.5)	(73.0)	(27.0)
2003	37.8	35.8	248.9	132.9
	(51.3)	(48.7)	(65.2)	(34.8)
2004	122.2	56.1	342.9	143.9
	(68.5)	(31.5)	(70.4)	(29.6)
2005	294.8	55.6	418.5	24.3
	(84.1)	(15.9)	(94.5)	(5.5)
2006	274.6	79.5	398.5	30.9
	(77.6)	(22.4)	(92.8)	(7.2)
2007	204.0	84.4	382.9	113.1
	(70.7)	(29.3)	(77.2)	(22.8)
2008	265.5	189.7	505.1	73.3
	(58.3)	(41.7)	(87.3)	(12.7)
2009	187.9	132.1	443.1	67.7
	(58.7)	(41.3)	(86.7)	(13.3)
2010	433.7	187.0	558.0	73.1
	(69.9)	(30.1)	(88.4)	(11.6)
2011	857.6	252.4	575.4	146.6
	(77.3)	(22.7)	(79.7)	(20.3)
2012	982.8	267.0	603.7	157.7
	(78.6)	(21.4)	(79.3)	(20.7)
2013	764.6	244.3	511.7	208.9
	(75.8)	(24.2)	(71.0)	(29.0)
2014	689.2	266.0	495.0	155.0
	(72.1)	(27.9)	(76.2)	(23.8)
2015	675.4	330.9	544.3	137.4
	(67.1)	(32.9)	(79.8)	(20.2)
2016	624.5	315.6	444.2	178.8

	(66.4)	(33.6)	(71.3)	(28.7)
2017	700.5	161.6	453.2	210.7
	(81.3)	(18.7)	(68.3)	(31.7)
2018	743.9	158.6	444.0	183.0
	(82.4)	(17.6)	(70.8)	(29.2)
2019	958.9	185.6	478.5	149.2
	(83.8)	(16.2)	(76.2)	(23.8)
2020	1145.5	150.5	335.1	134.6
	(88.4)	(11.6)	(71.3)	(28.7)
2021	916.7	177.1	459.9	155.3
	(83.8)	(16.2)	(74.8)	(25.2)

Notes: Export and import values are in millions UDS. Figures in parentheses are shares (in percentage)

Source: Author's Compilation based on ITC Trade Map Data

Table A4: General Equilibrium Effects of AfCFTA

		(1)	(2)	(3)	(4)	(5)	(6)
		Conditional GE	**Full Endowment GE**				
ISO	**Country**	**% Δ Exports**	**% Δ Exports**	**% Δ real GDP**	**% Δ real Price**	**% Δ IMRs**	**% Δ OMRs**
AGO	Angola	40.39	57.08	24.86	13.72	-8.93	-12.80
BDI	Burundi	17.70	37.50	41.48	18.52	-16.23	-16.88
BEN	Benin	31.55	48.52	32.41	14.50	-13.52	-13.54
BWA	Botswana	28.41	58.94	62.68	26.03	-22.53	-22.75
CAF	Central African Rep.	3.95	21.74	41.50	18.53	-16.23	-17.00
CIV	Côte d'Ivoire	55.35	69.40	21.44	10.61	-8.91	-10.03
CMR	Cameroon	43.23	58.89	26.87	12.56	-11.28	-11.81
COD	DRC	37.52	55.56	32.70	14.85	-13.45	-13.79
COM	Comoros	20.56	37.47	33.84	15.67	-13.58	-14.61
CPV	Cabo Verde	17.61	29.81	26.34	11.65	-11.63	-11.19
DZA	Algeria	39.16	48.45	16.02	8.00	-6.91	-7.75
EGY	Egypt	56.60	61.67	8.33	3.84	-4.15	-3.52
ETH	Ethiopia	60.54	73.02	19.49	9.39	-8.45	-8.92
GAB	Gabon	19.19	37.08	34.60	16.61	-13.36	-15.36
GHA	Ghana	60.84	75.68	22.43	10.79	-9.51	-10.16
GIN	Guinea	25.49	40.95	30.02	13.80	-12.47	-12.98
GMB	Gambia	13.44	29.55	34.44	15.57	-14.04	-14.58
GNB	Guinea-Bissau	7.23	23.05	35.55	16.06	-14.38	-15.00
GNQ	Equatorial Guin	23.55	41.61	32.47	16.27	-12.23	-15.04
KEN	Kenya	82.38	98.44	22.26	10.48	-9.63	-9.80
LSO	Lesotho	16.70	43.43	58.68	24.99	-21.23	-22.02
MAR	Morocco	53.42	62.11	15.28	6.84	-7.32	-6.58
MDG	Madagascar	25.35	40.90	29.51	14.08	-11.91	-13.26
MLI	Mali	19.48	36.01	34.55	15.29	-14.31	-14.32
MOZ	Mozambique	26.92	53.62	53.60	23.19	-19.79	-20.64
MRT	Mauritania	9.34	24.99	34.31	15.62	-13.91	-14.68

MUS	Mauritius	95.25	103.90	13.25	5.56	-6.79	-5.14
NAM	Namibia	27.99	49.06	42.78	18.38	-17.09	-16.85
NER	Niger	15.01	31.26	34.45	15.55	-14.06	-14.56
RWA	Rwanda	45.65	64.77	33.67	14.93	-14.02	-13.82
SEN	Senegal	39.73	52.07	22.51	10.19	-10.05	-9.71
SLE	Sierra Leone	15.62	31.55	33.60	15.18	-13.79	-14.20
SOM	Somalia	13.44	31.07	37.60	17.11	-14.90	-15.86
SWZ	Eswatini	25.74	55.05	59.48	25.54	-21.28	-22.35
SYC	Seychelles	27.91	41.39	26.16	12.08	-11.16	-11.51
TCD	Chad	8.92	25.05	35.33	16.19	-14.14	-15.12
TGO	Togo	23.02	43.00	39.49	17.90	-15.48	-16.40
TUN	Tunisia	33.42	45.47	22.16	10.47	-9.57	-10.13
TZA	Tanzania	56.85	75.40	29.55	13.73	-12.21	-12.79
UGA	Uganda	53.45	72.60	31.35	14.38	-12.92	-13.37
ZAF	South Africa	91.79	103.77	9.36	6.27	-2.83	-5.61
ZMB	Zambia	31.02	51.04	37.11	17.14	-14.56	-15.71
ZWE	Zimbabwe	32.93	55.59	43.16	19.08	-16.82	-17.37

Notes: The table reports the conditional and full endowment general equilibrium effect of AfCFTA on trade, real GDP, price, and inward and outward multilateral trade resistance. For brevity, we only report the effects for African countries only and we use the 2019 bilateral trade data. The conditional GE effects on trade/country's exports (columns 1) take into account the direct and indirect trade costs but hold the GDP constant. The full endowment GE estimates (column 2-6) takes into account the general equilibrium income effects. Column 2 reports the average percentage change in exports, column 3 reports the average effects on real GDP and column 4 reports the percentage change in producer's prices. The last two columns (5) to (6) report the corresponding average change in inward and outward multilateral trade resistance.

Source: Authors' calculations