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# Institutions and intra-sub-regional trade: the ECOWAS Case

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## Abstract

Extensive evidence has been found in literature for the role of institutions in determining the outcomes of a number of macroeconomic variables. This evidence is however inconclusive in the case of trade. In this paper, the gravity model of trade is employed in an empirical assessment of the relationship between institutions and intra-sub-regional trade. In this regard, the overall impact of the quality of institutions is examined, as well as the impact of the difference in quality of institutions between trading countries, on bilateral trade within the ECOWAS (Economic Community of West African States) region. The empirical results show evidence of significant impact of differences in the quality of institutions on intra-sub-regional trade.

Keywords: Institutions, Intra-regional Trade, ECOWAS, Gravity model

JEL Codes: E02 P48 Q37 F14

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## 1. Introduction

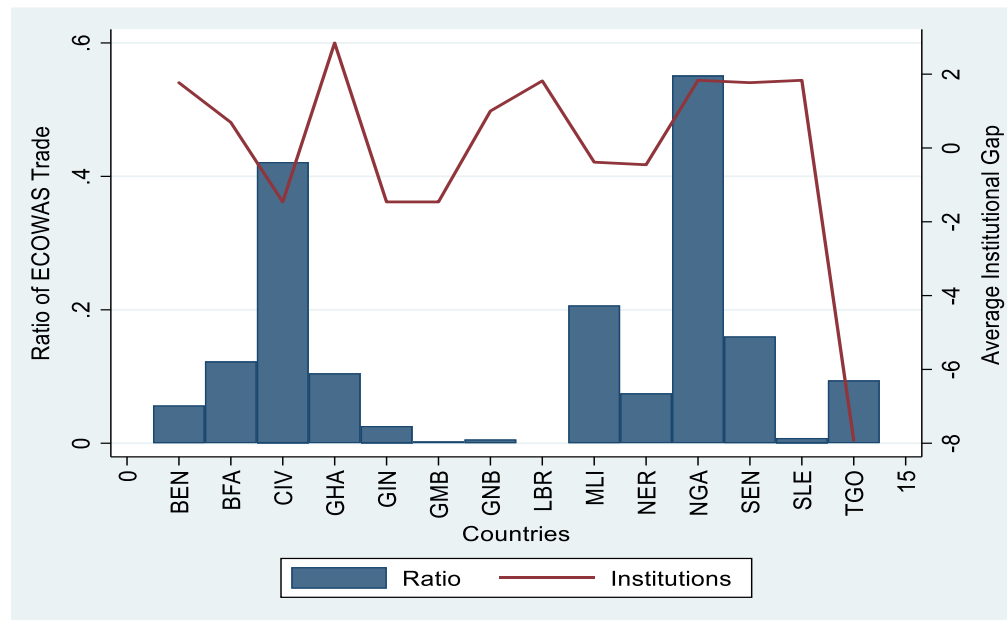
The recent push for increased regionalisation in sub-Saharan Africa (SSA) has led to a revisiting of the debate on the positives and potential ills of regional integration. An increasing body of evidence suggests that an increase in intra-sub-regional trade has the potential to induce increased growth for countries in the ECOWAS (Odularu 2009; Akpan 2014, Okoro et al., 2020), in line with the Krugman (1991) assertion. This expected growth stems from export-led economic growth theories, which, in the global context, is well evidenced for (Fosu, 1990; Giles & Williams 2000; He & Zhang 2010; Lorde 2011; Ee 2015), and to a lesser extent in the ECOWAS context (Odularu 2009). While the evidence for the role of increased intra-regional trade in improving economic growth is plenty, research identifying the determinants, and avenues through which intra-sub-regional trade can be improved is sparse. Within the context of ECOWAS, studies have explored geography, openness, as possible determinants (Shuaibu 2015; Zannou 2010). While many avenues through which within-ECOWAS trade can be improved have been explored, and the subsequent link between intra-sub-regional trade and economic growth evidenced for, not much has been done to explore the role of institutions in intra-sub-regional trade.

In the context of institutional economics, consensus in the literature is that institutions are important for economic growth, however, the role of institutions in determining the extent export-led growth, or more specifically, intra-sub-regional trade (ECOWAS) in Africa has not been extensively tested. A common problem that often arises when dealing with the relationship between institutions and economic outcomes, is the abstract nature of institutions, and the lack of a clear conceptualization of the nature of institutions being explored in the study. In this regard, the institutions considered here follow the operating definition put forth by North (1990), which defines institutions as humanly devised constraints that guide human interactions.

That is institutions are rules that help facilitate transactions between humans. Therefore, in the presence of 'good institutions' transactions occur freely, whereas with 'bad institutions', transactions are stymied. Within this context, the rules that set the guidelines for trade to occur in an inhibited a manner as possible within the ECOWAS become pertinent. More specifically, the terms of trade, and harmonization thereof within the ECOWAS over the period of the data used in this study will help put the analysis in perspective. The main interest of this paper is if first, institutions play a significant role in determining intra-ECOWAS trade, and second, if differences in the quality of institutions between member states have any impact on intra-ECOWAS trade.

Given the wealth of resources in SSA (some ECOWAS countries included), the wealth of human capital, and the potential for growth on the continent, the observed growth and development over the past few decades have been underwhelming. Across many macroeconomic measures and economic development considerations, ECOWAS countries have consistently performed below its potential.

Figure 1: Ratio of ECOWAS exports to total exports, and Institutional gap.

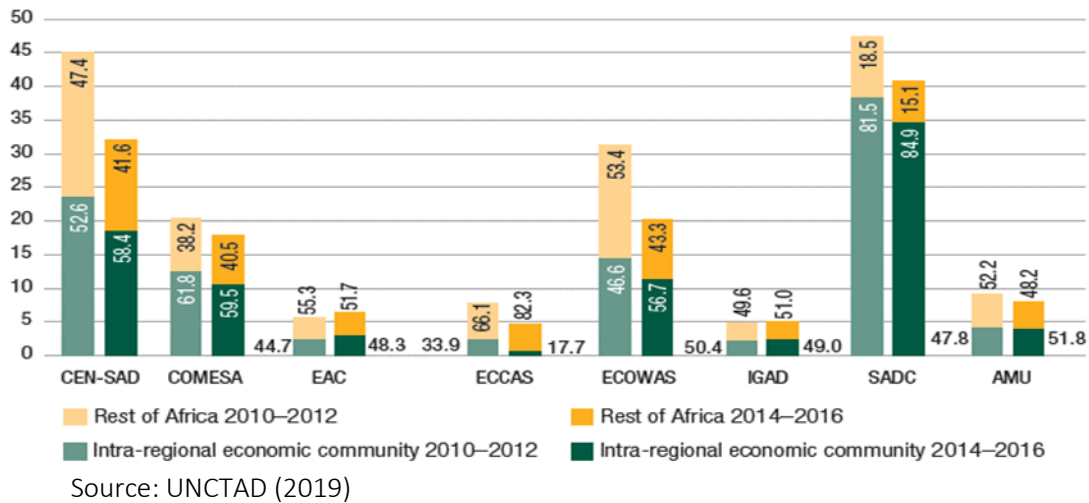


Source: IMF DOTS data set

Despite these unimpressive development outcomes in the ECOWAS, trade between countries in the region has seen a steady increase over the past decade (See Figure 1). Bearing in mind, the initial state of intra ECOWAS was almost negligible, small spurts may be exaggerated in data outcomes. Nevertheless, intra-sub-regional (economic community) trade in the Africa is often not much larger than extra-sub-regional trade (to the rest of Africa), as shown in Figure 2. In a 2019 UNCTAD report, it was shown that ECOWAS ranks 4<sup>th</sup> of all 8 economic communities, with 57% in 2016. Although this 57% signals a increase from about 47% in previous years. This is all in light of the fact that, in 2017, intra-regional trade made up 17% of Africa’s exports, far lower than 59% in ASIA and 69% in Europe.

Lastly, if the best and worst performing countries, in terms of intra-Africa trad, are considered, none of the ECOWAS countries feature in the best performing top 10, while 4 feature in the 10 worst performing countries (Guinea at 1.6%; Cabo Verde at 3.6%; Guinea Bissau at 4.7%; and Liberia at 5.1%). These numbers show that ECOWAS, while improving the level of trade within, still falls behind many of its African counterparts (UNCTAD 2019). Nevertheless, improving trade within ECOWAS will impact on overall trade with Africa, while also enabling export led growth for member states, and the region. How such effort can be enabled or hampered by the quality of institutions, and how different member states across ECOWAS are impacted by the quality of intstitutions and differences thereof is what this paper is concerned with.

Figure 2: Intra-Economic vs. Extra-Economic Community trade in Africa



The two areas of interest in this paper form pseudo complements in terms of avenues through which the growth trajectory of SSA can be turned around. The quality of institutions, both political and economic, are considered as factors that have undermined several developmental efforts, while on the other hand, intra-regional trade is considered a factor through which growth can be engendered at sub-regional levels on the continent. It would hence be beneficial to the literature and policy to explore the interrelations between the two factors. That is, do institutions play an important role in determining the extent of intra-sub-regional trade? And if so, is the convergence (i.e. coming together of the quality of institutions in countries within a region) a factor?

Studies have explored the role of phenomena such a trade liberalization (Shuaibu, 2015), Exports diversification (Odularu, 2009), geography, remoteness, infrastructure (Akpan, 2014), on intra-regional trade. These especially in the context of ECOWAS and some other regions within the SSA. However, the role of institutions as a determinant of intra-regional trade is not well explored. This is curious given political integration is one of the highest levels on regional integration, and as such, it would be worthwhile to see if the convergence from an institutional perspective, has any significant role to play in the extent of intra-regional trade, with a focus on the ECOWAS region.

While there is relative consensus that institutions are important for economic growth (North, 1990; Acemoglu, 2001, Knaack & Keefer, 1999; Glaeser, 2004; Acemoglu, 2013), and exports are important for economic growth (Giles & Williams 2000), often, the role played by institutions is an indirect one. That is, institutions tend to impact a variable, which in turn significantly impacts economic growth. This indirect relationship between institutions and intra-sub-regional trade, is the focus of this paper. In this regard, the aim of this paper is to explore whether the difference

in the quality of institutions between two trading partners matters for the level of trade between them.

The rest of this paper is organized as follows: The next section provides a brief overview of the ECOWAS, Institutions, and intra-regional trade; Section 3 will give a brief overview of the gravity model and the data set used; Section 4 presents the models, results and discussions; and in Section 5, the paper is concluded.

## 2. Review of Literature on ECOWAS & Institutions

### 2.1 ECOWAS

ECOWAS, founded in 1975, is a group of countries in West Africa. It consists of a total of 15 countries, namely: Benin, Burkina Faso, Cape Verde, The Gambia, Ghana, Guinea, Guinea Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo. The formation of the ECOWAS came on the backdrop of the ECOWAS treaty, that was signed in Lagos in 1975. The overall objective of the ECOWAS is to foster economic integration between member countries. Integration in this context cut across several areas, including categories such as industry, transport, energy, agriculture, services, infrastructure, monetary issues, socio-economic issues, etc. With a majority of the countries already sharing language, currency (CFA Franc), state of development and high levels of human capital/labour, the formation of and facilitation of region economic, monetary, and political integration between the countries, presented an opportunity for economic relations that would foster collective growth for all.

The ECOWAS like many other ambitious regional economic integration agreements across the continent, has failed on numerous occasions to meet integration targets set by member states. This led to the revision of the ECOWAS treaty in 1997, in attempts to speed up the process of integration. Further initiatives to achieve higher levels of integration have occurred since then. The most deliberate being the establishment of the Vision 2020 in 2007. This has achieved tangible results, with the easing of movement between ECOWAS member countries, through the introduction of the ECOWAS passport. In response to these efforts by the ECOWAS, there has been significant improvement in intra-ECOWAS trade over the past decade (See Figure 3). While overall, as depicted in Figure 1, most ECOWAS member states still have more extra-Africa than intra-Africa trade, the improvements have been visible. However, other sub-regional agreements may threaten the improvements, as many of the ECOWAS French speaking countries are also members of WAEMU (The West African Economic Monetary Union).<sup>3</sup> As is often the case, overlapping membership in regional economic blocs and agreements, present possible conflicts and challenges of its own.

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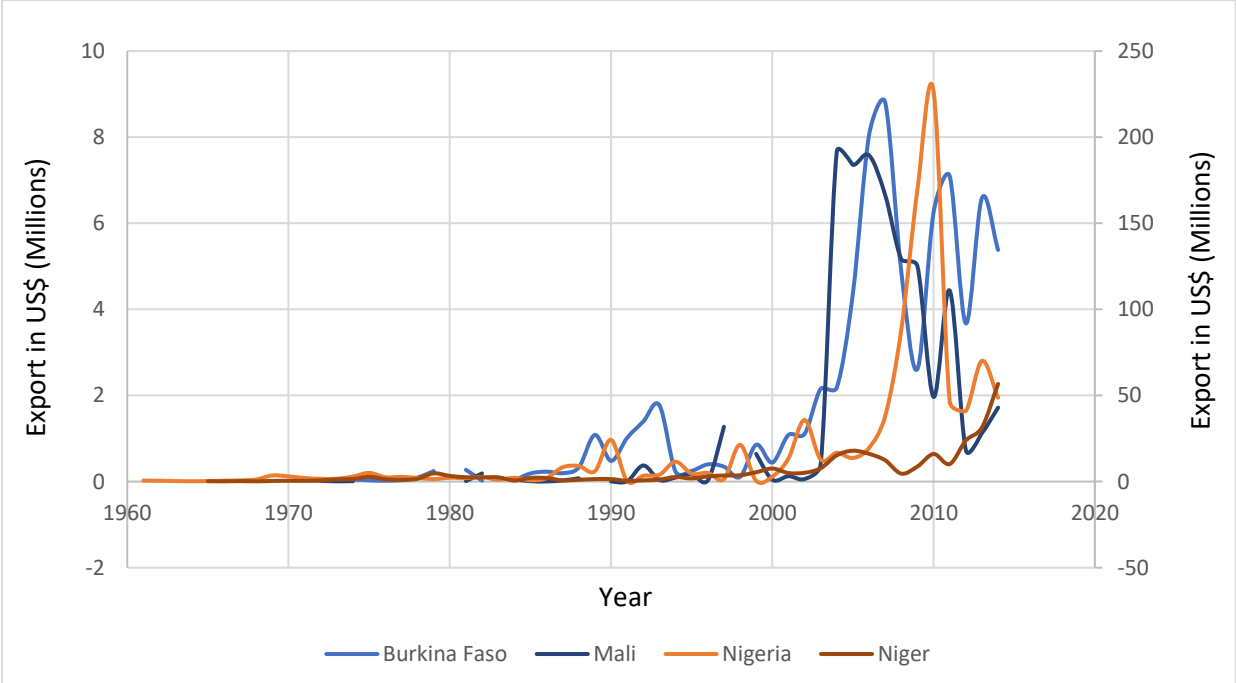
<sup>3</sup> Benin, Burkina Faso, Ivory Coast, Guinea Bissau, Mali, Niger, Senegal, and Togo, are all members of WAEMU. In addition to this, Guinea Bissau, Liberia, and Sierra Leone, Ivory Coast, are also members of another agreement (MRU- Mano River Union).

The present achievement or non-achievements of the ECOWAS can be linked to a number of issues, some not peculiar to ECOWAS as an economic community alone. In a 2019 UNCTAD report, the main causes were found to be weak productive capacities, tariff related trade cost, and non-tariff barriers. With regards to tariff related trade costs, ECOWAS has one of the highest within community tariffs at 6%, in comparison to 4% for the SADC, 2% for COMESA, and 0% for the EAC (UNCTAD 2019). Thus, ECOWAS, unlike some of the other economic communities in Africa may be hindered by such relatively high tariffs.

**2.2 Institutions and intra-sub-Regional trade**

The new institution economics (NIE) provides an alternative way to explore some of the issues that have plagued SSA from an economic growth and development perspective. While this area of research has been very innovative, there are pertinent issues that often have lead to empirical issues in the past. One such concern is the often abstract-like approach to institutions. In many cases, it is not clear what studies refer to as institutions. In addition to this, there is a tendency to employ institutional measures that are composite, rather than unbundled, especially in cases where unbundled categorization of institutions are available. Lastly, the lack of extensive data on the quality of institutions have limited most analysis of the institutions and growth nexus to cross-country studies, with only a few within country studies.

Figure 3: Exports from ECOWAS to ECOWAS countries



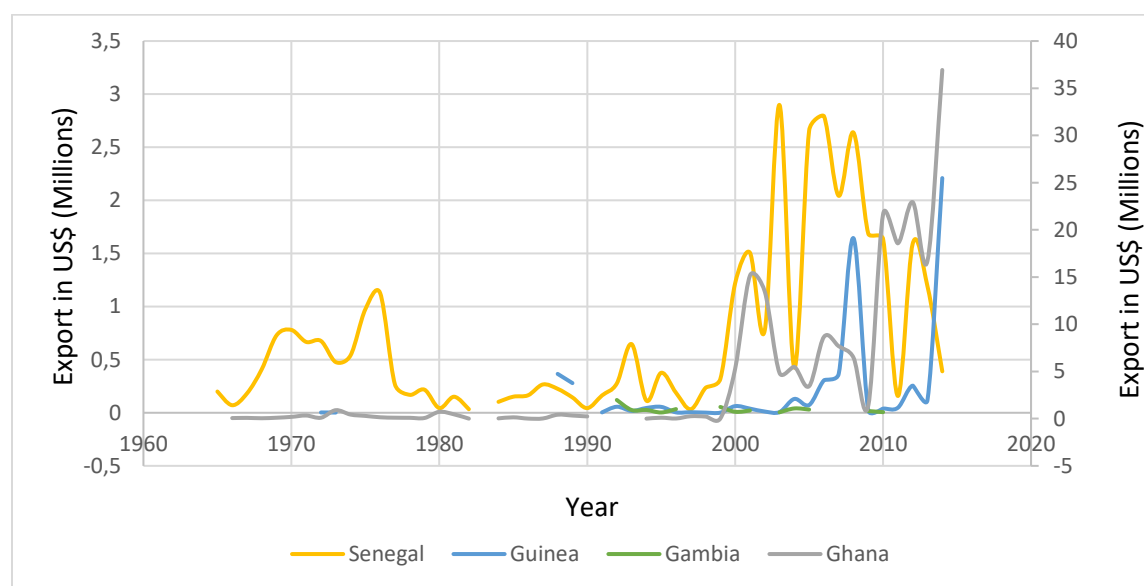
Source: IMF DOTS data set. \* Nigeria and Niger are measured on the right axis.

In as far as the relationship between institutions and intra-regional trade is concerned, there is not much evidence in literature. This may be due to the competing nature of the role played by



institutions and international trade in explaining economic performance (See Dollar & Kraay, 2003; Herger et al., 2008). However, in the few studies that have examined the relationship, they often found a positive relationship (Meon & Sekkat, 2007; Souva et al., 2008; Segura-Cayuela, 2006). Some have found evidence of negative relationship, depending on the nature of exports considered. For example, while Meon & Sekkat (2007) found a positive relationship between institutions and exports of manufactured goods, the same was not true for non-manufactured goods or total trade. Yu 2010, in a panel analysis of 157 countries found evidence supporting a significant impact of democracy on trade. In some cases, the outcome was inconclusive (Anderson, 2008). That there are no studies specifically looking at intra-regional trade and the role of institutions, highlights the need for empirical investigation in this area. It is this gap this paper will seek to begin to fill in the literature, with a focus on the ECOWAS countries.

Figure 4: Exports from ECOWAS to ECOWAS countries



Source: IMF DOTS data. \* Ghana is measured on the right axis

### 3. Theoretical Framework

#### 2.3.1 Institutions and Trade

North (1990) defines institutions as humanly devised constraints that shape human interaction. They are rules of the game within a market/society aimed at structuring incentives in human exchange. North further deliberates on institutions from a *transactions* perspective, whereby, in the presence of good institutions, there is greater incentive, or lower barriers to economic interaction between economic agents. This same conceptualization can be extended to the macro, national, or economic community level, to conceptualize interaction between and across countries. In the presence of good institutions, economic transactions (trade) between countries

tend to take place more smoothly, and hence occur more frequently, than when bad institutions are in place.

At a more nuanced level, a few avenues through which democracy in the form of improved quality of institutions can impact trade exist. For example, Barro (1996, 1999) and Rodrik (2000) argue that good institutions lead to the creation of fair and competitive, and freer markets, which in turn lead to strongly regulated regimes, that ensure high quality products. Such products are more attractive in the international markets. The contrast is poorly regulated trade markets, which brings about insecurity that cause some form of hidden tax on imports/exports (Anderson and Marcouiller, 2002). In a similar approach, Mehlum et al, (2004) conceptualize the role of institutions as one where good institutions promote productive activity, while bad institutions promote rent-seeking (or non-productive activities). Therefore, in a country where there is a reward to productive activities, then individuals within that system, become experts and flourish at being productive. Whereas, the opposite would be true for a system that rewards rent seeking. Hence in the presence of good institutions, productivity rises, leading to innovation, and increased variety of goods, which tend to promote export demand.

In considering the second objective of the study, whereby the difference in quality of institutions between trading partners are thought to matter for volume of transactions between them. In the same manner that good quality institutions result in strict regulations, low quality of institutions may lead to less and lax regulations, which can lead to poor quality products. However, because the low of quality (or difference in quality of institutions between countries), there aren't strict regulations that prevent the inflow of low-quality products from the exporting to the importing countries. For example, it is not uncommon to find low quality exports being accepted in many developing countries with poor quality institutions. In this sense, in the presence of similar state of institutions, two countries may be able to engage in trade, as within such a system, activities that subscribe to the similar institutional environments, get rewarded. Lastly, it is also possible that resource rich, but capital poor countries, may have elites that favour trade, but object to improved institutional quality, due the revenue loss that may arise from stronger regulations (Yu, 2010). Such raises the endogeneity issue, which will be addressed in this paper.

### 2.3.2 Gravity Framework

At a fundamental level, the gravity model espouses on the idea that trade volumes are determined by the incomes levels of two trading partners. That is, higher income countries are drawn to trade by GDP-induced gravitational pull (Depken II and Sonora, 2005). Given the nature of bilateral trade analysis, where each interaction between all potential trade partners are being analysed, the gravity model of trade comes in handy in this regard. The method borrows from the theory espoused in Newtons law of gravity, by making use of distance and space/volume in its analysis. This approach was first developed in the seminal papers by Tinbergen (1962) and Poyhonen (1963), and later theoretically conceptualised by Anderson (1979). The oft used

empirical specification put forth by Mátyás (1997), informs the specification used in the paper. Deriving its strengths from its ability to order the vast observed variation in interactions across space for both factors and trade. Thus, from a very simplistic perspective, the gravity model is based on the assumption that the level of trade is proportional to the output level of trading partners (Yu, 2010).

To incorporate institutions as a determinant of output into the gravity model, this paper adopts the theoretical proof provided in Yu (2010), where, a constant elasticity of substitutions (CES) production (which is widely accepted in this literature) is modified to incorporate institutions in the form of democracy. In this setup, each country (from  $i, \dots, j$ ) produces a wide of variety of a unique product from  $K$  industries. Such that, there are  $N_{ik}$  commodities available from industry  $k \in K$ . This is well represented in the CES utility function below:

$$U_j = \sum_{i=1}^j \sum_{k=1}^k \sum_{h=1}^{N_k} [f_k(z_i) C_{jk}^h]^{\frac{\sigma-1}{\sigma}}, (\sigma > 1)$$

In the above equation,  $C_{jk}^h$  is the total consumption in country  $j$ , from  $k$  industries, with  $h$  commodity varieties.  $z_i$  is the quality of institutions in the corresponding exporting country. The model assumes that the quality of products from any particular industry  $k$ , is increasing in  $z_i$ , as denoted by the function  $f_k(z_i)$ , which captures the quality of products from the exporting country. This function that captures the exporting country's institutions and quality of products, is assumed to be exponentially increasing in institutions. The exponential assumed is condition on the basis that  $f_k(z_i) = \theta_{ik} \exp(z_i)$ , where  $\theta_{ik}$  represents the responsiveness of the product quality to institutional quality change. Therefore, if it is assumed, as other studies in this literature in the past (Anderson & van Wincoop, 2003; Yu 2010), that trading country pairs have same price for varieties of the same product.

### 3. Data & Methodology

This study employs the gravity model for trade in its analysis, the data used is sourced from multiple sources. The data on national accounts, such as GDP, population, exchange rate, trade openness, were all obtained from the PENN world tables (Feenstra et al. 2015). Data on bilateral trade were obtained from the International Monetary Fund (IMF), Direction of Trade Statistics (DOTS) data set. These variables include trade flows from each member country. Data for the gravity variables such as distance between countries, common language, contiguity, were all obtained from the CEPII (*Centre d'Etudes Prospectives et d'Informations Internationales*). Lastly, the data on quality of institutions were obtained from the Polity V data set.

Variables used for the analysis are: real gross domestic product at constant 2005 national prices in million dollars (RGDPNA); population in millions (pop); exchange rate in national currency per US dollars (xr); share of merchandise exports at current purchasing power parity (csh\_x), ); share

of merchandise imports at current purchasing power parity (csh\_i); contiguity (contig); distance between the centre point of the exporting country to the importing country (dist); common language (comlang\_off), institutions (polity); difference in quality of institutions between exporting and importing country (inst\_gap), bilateral trade in exports from exporting country to importing country (outflow).

In terms of measuring institutions, three proxies are used in this study, names: Polity IV, freedom to trade internationally, and economic freedoms. The polity IV being one of the most commonly used measures of institutions in the literature, while the other two are better suited towards to the subject matter, i.e. trade. Polity IV captures the political atmosphere, and its scored on a scale of -10 to 10, with -10 signalling lack of political freedoms, and governance, while 10 signals the presence of a good polity, protection of political rights etc. For more details on how this os constructed, Marshall et al. (2020) should be consulted.

Both trade freedoms and economic freedom variables were obtained from the quality of government (QoG) data sets, which is a constructed by researchers with a focus on concepts related to quality of government, transparency, and public administration. The data is constructed from a survey carried out by the QoG institute, through a survey of experts on public administration around the world. Specifically, the economic freedom of the world index is founded on objective components which reflect the presence (or absence) of economic freedom within a country. There are a total of 21 components assessed, that make up the score . The score ranges form 0 - 10, whit 0 representing little economic freedom, and 10, high economic freedom (Dahlberg et al., 2021; Teorell et al., 2021). Similarly, the freedom to trade internationally (current) is scored from 0 – 10, with 0 representing low trade freedoms and 10, high trade freedoms. The index is measured objectively based on five components (Dahlberg et al., 2021).

### ***3.1. Institutional Gap***

The exploration of potential role for the gap in the quality of institutions is based on the idea of convergence, which is often associated with growth analysis, and the movement together of per capita income of countries (or different economic strata such as provinces, states, or cities), towards a steady state. In this paper, the theory of convergence is used as inference and applied to the process of institutional change across countries. Given the very nature of convergence (conditional or unconditional), speaks to the movement of countries towards a steady state of growth, the nature of institutions fits the same narrative, albeit in a limited form. Institutions cannot grow indefinitely, this is, institutions are not continuous, and it is possible to attain full achievement of institutional quality.<sup>4</sup> While this approach borrows from the growth convergence methodology, the institutional gap and its impact on the level of intra-regional trade is the

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<sup>4</sup> It is possible that the assessment of the full possibilities of institutional quality is limited to the knowledge of such possibilities in the present, without accounting for future concerns.

utmost focus. In this regard, the model to be estimated will include the difference in quality of institutions.

### 3.2 Empirical methodology

The main advantage of the gravity model stems from its ability to infer trade costs in a setting where such impediments to trade are often not observable to the analysts. As such, it makes it possible to tease out, with relative accuracy, the relationship between bilateral trade and other macroeconomic phenomena (Anderson, 2011).

The econometric specification of the gravity model, following Mátyás (1997), takes the form:

$$\ln EXP_{ijt} = \alpha_i + \beta_j + \gamma_t + \theta_1 \ln Y_{it} + \theta_2 \ln Y_{jt} + \theta_3 Dist_{ij} + \theta_i Z_{it} + \theta_{i+1} Z_{jt} + u_{ijt} \quad (1)$$

where:

$EXP_{ijt}$  is the trade flow or volume of trade from country  $i$  to country  $j$  at time  $t$ ;  $Y_{it}$  is the GDP of the exporting country  $i$  and  $Y_{jt}$  is the GDP of country  $j$  at both at time  $t$ .  $Z_{it}$  and  $Z_{jt}$ , are both vectors of control variables for country  $i$  and country  $j$  respectively, all at time  $t$ .  $Dist_{ij}$  is the distance between country  $i$  and country  $j$ . For this paper, the specification will include the variable of interest, which is institutions, as shown in equation 2 below:

$$\ln EXP_{ijt} = \alpha_i + \beta_j + \gamma_t + \theta_1 \ln Y_{it} + \theta_2 \ln Y_{jt} + \theta_3 Inst_{ijt} + \theta_5 Dist_{ij} + \theta_i Z_{it} + \theta_{i+1} Z_{jt} + u_{ijt} \quad (2)$$

The vectors  $Z_{it}$  and  $Z_{jt}$ , include the variables exchange rate and trade liberalisation. While in addition to distance, as a gravity measure, measures for contiguity and common language are also included. Lastly, and most important for this study, The gap in the quality of institutions is captured by  $Inst_{ijt} = Inst_{it} - Inst_{jt}$  for each country pair in the data.

There are a number of estimating techniques that can be used with the gravity model. It can be estimated using ordinary least squares (OLS) in the cross-sectional form, or in a pooled form. However, OLS will give biased estimates due to the inability to cater for heterogeneous behaviour of countries (Cheng & Wall, 2005; Zannou, 2010). However, an OLS can still be estimated by accounting for heterogeneity across countries, through controlling for country fixed effects. In addition to this, time effects will also be accounted for, to address potential changes only attributable to time, and rather than changes in the covariates of interest. In essence, it would be a fixed effects estimation being carried out. The fixed effects approach may however be hampered by issues of endogeneity, in that, countries that tend to trade more frequently with each other, seek to have similar quality of institutions. In addition, the fact that they all fall within the same regional economic community, with desires for long-term integration including economic, monetary, and political, may effect institutional changes similar

to their trading partners, to implicitly facilitate this process. In such a case, unobserved heterogeneity would be introduced into the analysis, leading to an endogeneity bias. Moreover, the normal fixed effects estimates is might also suffer from high dimensionality. The leads us to the and instrumental variable (IV) estimation technique, combined with a partialling out regression approach, which makes use of machine learning (ML) methods to best manage the nature of the model estimation here.

The partialling out is used to aid identification, given the large number of exogeneous covariates relative to the number of observations. This analysis has 1,018 observations, apart from the main gravity variables and institutional variables, there are 89 year and country pair dummies. This raises the issue of a high dimensionality in a model, i.e. models that have too many covariates relative to the sample size. Results in Belloni, Chernozhukov, and Hansen (2014) and Chernozhukov, Hansen, and Spindler (2015) show that, for a high-dimensional model, machine learning can be used for identification of structural parameters by assuming sparsity (i.e. the number of controls needed to reliably make the inference of interest is small relative to the number of covariates). Sparsity in our context means that not all year and/or country pair fixed effects is needed for reliable estimation of the model. Therefore, LASSO based regression (Tibshirani, 1996) can be used select which of these dummies should be included in the final model (if one can make argument for interaction terms i.e. interacting gravity variables with this dummies or each other that will strengthen this argument). An example of this approach is as follows. Consider a simple model

$$Y = \alpha + \beta x + \gamma w + \varepsilon$$

Where  $Y$  is the outcome  $x$  is the independent variable of interest and  $w$  is a high-dimensional set of possible controls. Including all of  $w$  in the estimation model will make inference on  $\gamma$  unreliable. The double selection approach proceeds by

- Use LASSO to select variables that are useful in predicting  $x$
- Use LASSO to select variables that are useful in predicting  $Y$
- Estimate  $\beta$  using OLS of  $Y$  on  $x$  and the union of the set of variables selected in the two variable selection steps

This approach has been extended to handle a model in which the variable of interest is endogeneous (Chernozhukov, Hansen, and Spindler, 2015; Chernozhukov et al. 2018). In this case selected variables are used to construct orthogonalized version of the exogeneous and/or endogenous casual variables of interest.

Note that in our analysis gravity variables are not subject to selection i.e. they are always included in the models since we want inference on them. However, year dummies, country pair dummies and interaction terms are subject to selection. Further our estimation provides only

one instrument (initial institutional gap) so LASSO is used only in selecting covariates for the outcome regression.

## Results & Discussion

Table 1: Test for underidentification, and validity of instruments

VARIABLES	Statistic
Underidentification test (LM statistic)	25.75
Chi-sq (1) p-value	0.00
Weak identification test (Wald F Statistic)	23.33
Stock-Yogo weak ID test critical value	23.33
Endogeneity test	7.179
Endogeneity p-value	0.007

To estimate the effect of institutional gap we follow Papaioannou (2009) in using initial level of institutional quality as instrument for institutional gap. Before discussing the main results, we discuss formal statistical tests associated with the use of IV methodology. Column 1 below shows that the instrument, `initial_inst_gap1` is positively correlated with endogenous variable. Further Underidentification test (LM statistic) and the Weak identification test (Wald F statistic) show that the excluded instrument is relevant (i.e. correlated with the endogenous variable). Lastly, the endogeneity test suggests that institutional gap cannot be treated as an exogenous variable in our model (note that the overidentification test is not conducted because the equation is exactly identified). Note that to aid identification of the model year and country pair dummies are partialled out the Frisch-Waugh-Lovell (FWL) theorem in IV, the coefficients for the remaining regressors are the same as those that would be obtained if the variables were not partialled out.

Outside of the checks to ensure validity of model, including the instrumental variables used, and overidentification, the coefficients on the explanatory variables mostly agree with theory. Keeping in mind that the panel unit of analysis are country pairs, since the subject matter is bilateral trade. The results in results in the first column of Table 2 shows very large role for most of the gravity variables, including common language, and contiguity. However, population and exchange rate come in as significant and negative. In any case, not much inference should be made from the coefficients in column 1, aside from the validation of the measures to circumvent endogeneity. In column 2, the regular partialled out regression is run, although the degrees of freedom, due to the high dimensionality of the model, makes any inference from it questionable.

Using LASSO, the high dimensionality issue is tackled by its implicit filtering process, which selects only the covariates deemed to play a role in explaining the bilateral trade flows. The covariates that make the final selected are then used in the analysis.

Table 2: LASSO analysis of the effects of institutions on intra-regional trade

VARIABLES	(1) First Stage	(2) Second Stage	(3) Second Stage (LASSO)
Institution Gap		-0.06** (0.03)	-0.21*** (0.05)
Trade Freedom Gap	0.19 (0.18)	-0.02 (0.02)	
Economic Freedom Gap	0.00 (0.03)	0.01 (0.00)	
GDP exporting	0.11 (0.12)	-0.02 (0.01)	-0.02 (0.05)
GDP importing	-0.02 (0.07)	0.01 (0.01)	-0.01 (0.03)
Population exporting	-2.38*** (0.70)	0.18* (0.11)	1.20*** (0.09)
Population importing	-2.61*** (0.83)	0.28** (0.11)	0.71*** (0.08)
Exchange Rate importing	-0.94* (0.53)	0.03 (0.06)	-0.06 (0.04)
Exchange Rate exporting	-0.88* (0.50)	0.01 (0.07)	-0.07* (0.04)
Contiguity	10.39*** (3.87)	0.24 (0.54)	0.53 (0.53)
Distance	0.00 (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Common language	7.99*** (1.87)	1.26*** (0.26)	1.40*** (0.29)
Trade Balance	-0.03 (0.11)	0.80*** (0.02)	
Initial Institutions Gap	0.43*** (0.09)		
Observations	1,018	1,018	1,864
R-squared	0.17	0.91	

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



The LASSO selection and regression results are presented in column 3. A negative and coefficient is obtained for the institutional gap between trading partners. This implies that, the difference, between the quality of institutions between two trading countries matters. The larger this difference, the lesser the two countries tend to trade. It is interesting the machine learning covariates filtering process filtered out economic freedoms, freedom to trade internationally, and trade balance. Indicating that these variables didn't add much value to the explanation of bilateral trade flows in the ECOWAS. Moreso, the coefficient for importing and exporting country populations, which were both negative in column 1, are negative and significant. In addition, the coefficient on contiguity which was significant in the first stage regression is no significant in the second stage. Comparing the second stage regressions with and without machine learning (column 3 vs. 2), the gravity covariates, common language and distance both feature significantly in affecting bilateral trade, however, common language has a slightly large coefficient.

There is often concern about large regional players driving regional results, when it comes to trade regressions. For example, a country like Nigeria, may be the driver of some of the results being observed. This can occur because Nigeria is a English speaking country, while most ECOWAS members are French speaking. Whereas as of 2021, the GDP of all ECOWAS was about \$687 billion while Nigeria's was about \$432 billion, account for more than 60% of ECOWAS's GDP. It is therefore conceivable that most of the result observed is being driven solely by Nigeria, and its terms of trade (ToT) with ECOWAS members. To account for this, we run the same regression, with Nigeria excluded. The results remain largely the same. The overidentification test and confirmation of endogeneity of suspected variables are passed. The second stage regression using LASSO machine learning also obtain the exact same coefficient for gap in the quality of institutions as obtained in the regressions with Nigeria, at 0.21. This indicates a genuine and consistent role for the inherent differences that may occur in the nature of governance among member states.

Table 3: Test for overidentification, and validity of instruments for sample excluding Nigeria

VARIABLES	Statistics
Underidentification test (LM statistic)	20.61
Chi-sq (1) p-value	0.00
Weak identification test (Wald F statistic)	17.51
Stock-Yogo weak ID test critical value	16.38
Endogeneity test	7.116
Endogeneity p-value	0.00764

The results obtained here are interesting for a number of reasons. For one, rather than having a panel study with individual countries as panel units, we use country pairs as our panel unit. This

provides a lot more between country variation than the regular panel type analysis, as each network of relationship between all ECOWAS member states is taken into account. In addition, the coefficients obtained have taken into account the unique and heterogenous nature of the relationship between each country and all 14 other member states.

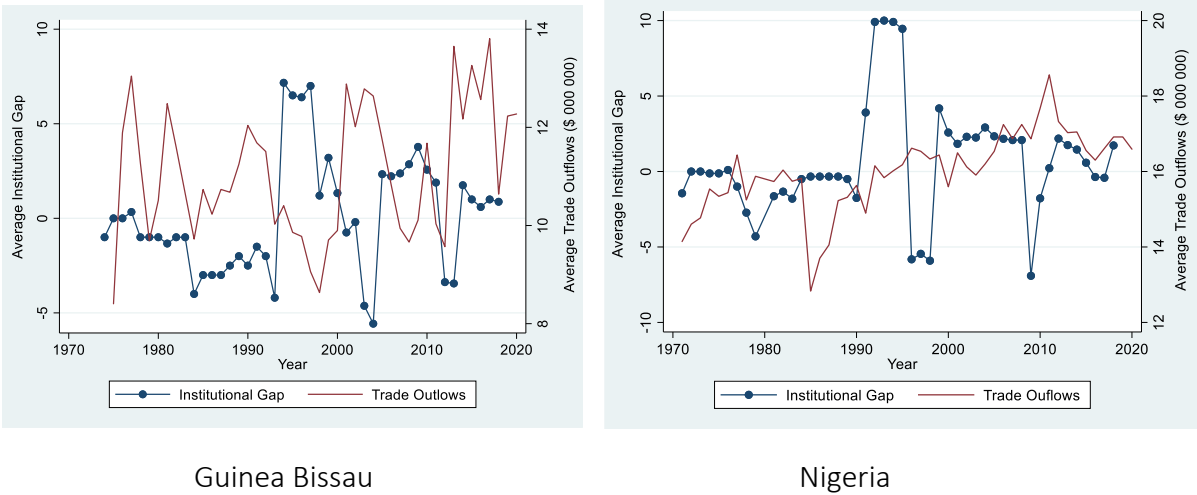
Table 4: LASSO analysis of the effects of institutions on intra-regional trade (Excluding Nigeria)

VARIABLES	(1) First Stage	(2) Second	(3) Second (LASSO)
Institution Gap		-0.07** (0.03)	-0.21*** (0.05)
Trade Freedom Gap	0.45** (0.19)	-0.02 (0.03)	
Economic Freedom Gap	0.05 (0.04)	0.01 (0.01)	
GDP exporting	0.13 (0.14)	-0.03* (0.02)	-0.02 (0.05)
GDP importing	-0.06 (0.08)	0.02 (0.01)	0.00 (0.04)
Population exporting	0.40 (3.97)	-0.99* (0.54)	1.68*** (0.18)
Population importing	0.96 (3.96)	-0.88 (0.55)	1.33*** (0.17)
Exchange Rate importing	-0.67 (0.57)	-0.01 (0.07)	-0.03 (0.06)
Exchange Rate exporting	-0.62 (0.55)	-0.03 (0.07)	-0.01 (0.05)
Contiguity	-4.84 (5.15)	0.83 (0.61)	0.74 (0.53)
Distance	-0.00 (0.01)	0.00 (0.00)	-0.00*** (0.00)
Common language	4.80 (4.87)	2.52*** (0.68)	1.42*** (0.37)
Trade Balance	-0.07 (0.12)	0.83*** (0.02)	
Initial Institutions Gap	0.39*** (0.09)		
Observations	871	871	1,529
R-squared	0.18	0.93	

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The graphical depiction of the gap in institutional quality when aggregated across all ECOWAS countries will be misleading, as this aggregates to almost zero, in a zero-sum type outcome. However, when we look at individual country pairs, the gaps become more evident. For example, in the graphs in figure 5, looking at two member states, guinea Bissau and Nigeria, the gap in quality of institutions is plotted, against the trade outflows from both countries. The gap ranges from a little below zero (-1) in the late 1970s to a high of about 7 in the early 1990s, while in Nigeria, the gap ranges from about -1 in 1971, to a high of about 10 in the mid-90s. Moreso, for both countries, gap drops down to almost 1 in 2021. If we look at the average institutional gap across all member states, however, the gap is almost inexistent. Therefore, the unbundling of the gap in quality of institutions between trading member states, is much more nuanced when assessing country pairs. This makes is a necessary addition to understanding the dynamics of integration and trade between ECOWAS member states, and within any type of regional integration arrangements in general.

Figure 4: Institutional gap and trade outflows for Guinea Bissau and Nigeria



Source: Authors computations

5. Conclusion

In this paper, we explore actual difference in quality of institutions and how it affects the level of trade between countries. Following some of the work by Akpalu (2018), which point out the role of institutions in determining trade outcomes, and Levchenko (2007), which speaks to institutional comparative advantages, and the welfare implications thereof. The results suggest that as countries become farther removed from each other, in terms of their political institutions, they tend to trade less.

Making use of panel, cross-sectional methods, and some machine learning techniques, we utilize the gravity model in combination with machine learning to tease out the role of

institutions in determining the effectiveness of regional integration efforts. With the ongoing efforts to increase intra-regional trade, as the implementation of the African continental free trade agreement (AfCFTA) edges closer, there is a need to understand the mechanisms that may pose an hindrance, or help accentuate the desired outcomes. Given that many regional agreements with intents to increase the level of integration overtime, already exist, any effort with a goal of achieving increased intra-regional as well as intra-Africa trade would do well to have a nuanced understanding of the role of governance in helping or curtailing those efforts. In this regard, we find that, almost in agreement with Levchenko (2007), differences in the quality of institutions do provide some sort of institutional comparative advantages to trade, and may potentially increase the gains from trade. In this regard, evidence from the ECOWAS supports some of the findings. The gap in quality of institutions between trading partners, while not as important as some of the gravity factors such as common language, its is actually more important than contiguity and distance.

The next step in understanding the role of institutions in determining intra-regional trade, would be trace out sectoral and firm dynamics of this institutional difference, first within the ECOWAS region, and further in other already existing regional integration agreements such as in Southern and Eastern Africa. This would help inform the nature of differentiated agreement within different regions in the ongoing AfCFTA integration efforts.

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