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Research Report

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**A COMPOSITE INDEX OF ECONOMIC INTEGRATION IN THE
WEST AFRICAN MONETARY ZONE (WAMZ)**

WAMI OCCASIONAL PAPER SERIES NO. 15

Prepared by:

Ngozi E. Egbuna (PhD)

Ismaila Jarju

Sani Bawa (PhD)

Ibrahima Diallo

Isatou Mendy

Ozolina Haffner

Kormay Adams

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A COMPOSITE INDEX OF ECONOMIC INTEGRATION IN THE WEST AFRICAN MONETARY ZONE (WAMZ)

*Ngozi E. Egbuna, Ismaila Jarju, Sani Bawa, Ibrahima Diallo, Isatou Mendy, Ozolina Haffner
and Kormay Adams*

Executive Summary

Empirical evidence suggests that regional economic integration plays a crucial role in accelerating growth and development, reducing poverty and economic disparity and boosting productivity and employment, in addition to expanding markets, maximising the efficiency of resource allocation and increasing investment opportunities. Consequently, countries across the globe, including those in Africa, participate in regional integration arrangements to derive the huge benefits associated with it. The Economic Community of West African States (ECOWAS) was, therefore, established in May 1975 to promote cooperation and integration among the countries of the West African sub-region. To fast-track the ECOWAS Monetary Cooperation Programme (EMCP), a two-track approach to monetary integration was adopted by the ECOWAS Authority, leading to the establishment of the West African Monetary Zone (WAMZ) in 2000. The second monetary zone was initially scheduled to kick-off in January 2003, but there have been several postponements due to the slow progress in meeting the macroeconomic convergence criteria by Member States.

In spite of the slow progress, evidence has shown that WAMZ countries have made considerable progress towards achieving economic integration in the sub-region. This called for the need to measure and assess Member countries' performance in the WAMZ integration process using a composite index. Against this background, the study seeks to develop an economic integration index to adequately measure the intensity and pace of regional economic integration in the Zone. The index would help to assess each Member State's efforts towards the WAMZ integration process.

The WAMZ Economic Integration Index (WEII) is composed of five dimensions – trade integration, regional infrastructure, compliance with ECOWAS trade-related protocols, compliance with WAMZ macroeconomic convergence criteria and financial integration. Twenty indicators were identified across the five dimensions to compute the composite index for the period 2015 - 2017. Index weights were obtained and assigned to each of the five dimensions using Principal Component Analysis.

Results from the analysis showed that the WAMZ trade integration index increased from 0.063 in 2015 to 0.073 in 2016, but declined to 0.032 in 2017. The result indicated that intra-regional trade was significantly low among the WAMZ economies compared to other regions across the world; thus, Member countries would need to expand their intra-regional trade volumes overtime to improve regional economic integration. The WAMZ regional infrastructure index, however, declined marginally from 0.382 in 2015 to 0.381 in 2016 before rising to 0.386 in 2017, with four Member States recording increases in both 2016 and 2017, while the other two recorded declines in 2016 before increasing in 2017. The WAMZ countries have recorded significant progress in their compliance with ECOWAS trade-related protocols, as the WAMZ

compliance index increased to 0.698 and 0.740 in 2016 and 2017, respectively, from 0.649 in 2015. Compliance with the WAMZ macroeconomic convergence criteria, however, has been slow, as the compliance index remained at 0.528 in both 2015 and 2016 before rising to 0.667 in 2017. The financial integration index declined from 0.955 in 2015 to 0.927 in 2016 before increasing to 0.943 in 2017.

The WAMZ economic integration index showed increased level of integration among Member States, as the index scores rose to 0.536 and 0.571 in 2016 and 2017, respectively, from 0.529 in 2015, indicating increased commitment to the WAMZ integration agenda. The under-performance by some of the Member States in the WAMZ-index is attributable to the twin shocks of the Ebola Virus Disease (EVD) and the fall in world commodity prices, in addition to the massive landslide in Sierra Leone in 2017. In terms of country performances, whereas Nigeria recorded the highest WAMZ-index depicting the country as the most integrated in the sub-region, the composite indexes of Sierra Leone and Liberia were the lowest with the indexes for Sierra Leone being below the sub-regional averages throughout the three years while that of Liberia was below the sub-regional average in 2017.

Key words: Economic Integration Index, trade integration, macroeconomic convergence, WAMZ.

JEL Classification: C38, C43, F15, O55.

1.0 INTRODUCTION

Regional economic integration plays a pivotal role in accelerating economic growth and development, reducing poverty and economic disparity, raising productivity and employment, and strengthening institutions. Deeper regional integration also expands markets, helps in maximizing the efficiency of resource allocation, and boosts productivity and investment opportunities – all of which helps to narrow development gaps between developing member economies (ADB, 2017). UN (2009) indicated that regionalism was pursued in Africa for two reasons – to enhance political unity at the pan-African level and to foster economic growth and development. It has also been employed as a means of solving some of the structural problems that the African economies were confronted with.

Nearly all countries or regional blocs across the world have been clamouring for one form of integration or the other given the huge benefits associated with it. In the same vein, African countries have a fairly long history of repeated attempts to group themselves to participate in regional integration arrangements across the continent. There are more regional organisations in Africa today than in any other continent and most African countries participate in more than one regional integration initiative (UN, 2009). Regional economic integration was boosted further in Africa with the signing of the treaty establishing the African Economic Community (AEC) in 1991 which committed the continent's long path to integration. The treaty calls for the establishment of AEC by 2027, with a common currency, full mobility of factors of production, and free movement of goods and services among African countries.

The Economic Community of West African States (ECOWAS) was established in May 1975 by fifteen West African countries¹. The objectives of ECOWAS are to promote co-operation and integration leading to the establishment of an economic union in West Africa in order to raise the living standards of its peoples; ensure economic growth; and foster relations among Member States and contribute to the progress and development of the African continent. The Community was designated as one of the regional pillars of the AEC. To achieve full economic integration and introduce a single regional currency, the Community adopted the ECOWAS Monetary Cooperation Programme (EMCP) in 1987 which was aimed at harmonizing the national monetary systems of member countries and creating a stable macroeconomic environment conducive to the introduction of the regional currency. Macroeconomic convergence criteria were, therefore, developed and were to be fulfilled by all member countries prior to the formal take-off of the Union.

To fast-track the EMCP in consideration of the already existing West African Economic and Monetary Union (WAEMU/UEMOA) which is pursuing the goals of monetary and economic integration among the eight-nation Francophone bloc since 1994, a two-track approach to monetary integration was adopted by the Authority of Heads of State and Government of the Economic Community of West African States (ECOWAS), culminating into the establishment of the West African Monetary Zone (WAMZ) in 2000. WAMZ comprises six Member States namely; The Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone, and was established to undertake preparatory activities leading to the

¹ Benin, Burkina Faso, Cote d'Ivoire, Gambia (The), Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger,

Nigeria, Senegal, Sierra Leone and Togo. Cape Verde joined in 1976 while Mauritania left in 2000.

introduction of a single currency and establishment of a common central bank. It was initially scheduled to commence in January 2003 but has been postponed several times due to the slow progress in achieving macroeconomic convergence.

In theory, economic integration evolves from different levels or stages ranging from free trade area (FTA), Customs Union, Common Market and Monetary Union before metamorphosing into a full blown economic integration which assumes the harmonisation of monetary, fiscal and social policies under an independent institution whose decisions are binding on members. The EU is a good example of a successful economic integration process which has progressively deepened the integration of nations within the EU bloc by gradually developing from a preferential trade agreement (PTA) in 1951 to a full blown economic and monetary union (EMU) in 1999. It has successfully gone through nearly all the Balassa stages of integration with the exception of fiscal and political integration.

Despite the relative consensus on the importance of regional economic integration, there is still a gap on how to adequately measure how countries are faring in an integration arrangement at a point in time. Given the growing trend in economic integration arrangements across the world, the need to measure and assess countries' participation and efforts in meeting the treaties, protocols, laws and macroeconomic convergence in regional integration arrangements becomes crucial. Utilizing a composite index – Economic Integration Index – would help in determining how Member countries of a monetary union are progressing towards achieving economic integration. The index seeks to measure the intensity and pace of economic integration within a regional bloc based on selected performance indicators.

Konig and Ohr (2013) developed the EU-index to measure the extent of economic integration among the European Union Member countries individually. However, Acharya, Rao and Sawchuk (2002) preceded with the construction of an economic integration index between Canada and the United States. In the African continent, the African Union Commission, the African Development Bank (AfDB) and the United Nations Economic Commission for Africa (UNECA) jointly developed the African Regional Integration Index (ARII) in 2016 to measure the continent's progress towards achieving regional integration. ARII was based on the eight AU-recognised Regional Economic Communities (RECs), including ECOWAS.

Although the West African Monetary Zone (WAMZ) has not fully achieved the objective of a single currency thus far, a lot of anecdotal evidence suggests that WAMZ Member States have made some progress towards economic integration. However, evidence-based research to measure the progress made by Member countries on the integration ladder using a composite index are non-existent. This study seeks to fill this gap by developing an economic integration index to measure the intensity and pace of regional economic integration in the WAMZ. The WAMZ-index would facilitate in assessing each WAMZ Member State's efforts at integrating with other countries of the zone to form the WAMZ.

The rest of the study is organized as follows. Section two reviews the empirical literature on economic integration index. Section three examines the methodological framework for computing the index, including the components and indicators of the index as well as the procedure to compute the index weights. Section four analyses the results of the computation of the WAMZ-index while section five concludes the study.

2.0 LITERATURE REVIEW

Empirical studies that assess the level of integration of countries in monetary unions across the world by computing composite indices of economic integration are limited. However, few studies exist that have computed such indices. For instance, Acharya *et al.* (2002) developed an index of economic integration between Canada and the United States. They identified three key dimensions of the index to include trade in goods and services, foreign direct investment and the flow of people. However, the study computed the index utilizing two of the three dimensions and about eight trade and FDI indicators across the two dimensions. Giving equal weights to each component in computing the composite indices for the period 1987 – 2000, the results indicated that the changes in the composite index was minimal in the 1990s owing to a significant increase in trade integration and a considerable decline in investment integration between the two countries during the period.

Bo and Woo (2008) constructed a composite index measuring economic integration in Asia-Pacific (AP) region utilizing data from 1990 – 2005. They used the two-stage principal component analysis (PCA) methodology to derive the composite indices. The first stage obtained the convergence index measuring the dispersion of Asia-Pacific sampled countries' main macroeconomic indicators. The second stage computed a composite index by using some economic indicators together with the convergence index to compute the composite index. The study revealed an increase in economic integration in the AP region with Singapore and Hong Kong being the most integrated countries in the region while Indonesia and China were the least integrated. In all, eight indicators were used to compute the composite indices for the seventeen

sampled countries of the Asia-Pacific region.

Konig and Ohr (2013) developed the European Union economic integration index consisting of 25 indicators grouped into four dimensions. The EU index measured the extent of economic integration for each EU Member State individually on an annual basis. The dimensions were EU conformity, which measures a country's compliance with the *Acquis Communautaire* (EU's treaties and laws – directives, regulations and decisions – declarations and resolutions, international agreements and the judgments of the Court of Justice); EU single market, which measures a country's level of integration with the European single market; EU symmetry, which measures the synchronization of business cycles among EU economies; and EU homogeneity, which capture the degree of economic convergence between Member States of the EU. Empirical results from the EU-index for 2010 for 14 EU countries indicated that Belgium was the most integrated country in the EU with a composite index of 77.3, closely followed by Austria and the Netherlands. Utilizing similar methodology, Konig (2015) computed the EU-index for 24 EU countries. The result of the composite index revealed significant differences in integration efforts and capabilities within the EU countries and with respect to the various aspects of the integration process. The 2012 composite indices showed that Belgium was the top performing country in economic integration with 75.3, followed by Ireland and Austria.

SELA (2016) came up with the Integration Index of Latin America and the Caribbean (IINTALC) to assess the progress made by Latin American and Caribbean economies towards regional integration. The index has five dimensions – economic, political,

social, cultural and environmental dimensions. While the economic dimension included indicators such as intra mechanism trade, trade concentration (Herfindahl index), cross-border trade and main macroeconomic variables including inflation, public debts and public expenditure, the political dimension assesses the institutional quality of countries and composed of indicators that measure the control of corruption, government effectiveness, political stability, regulatory quality, rule of law and accountability. About forty indicators were utilized across the five dimensions to arrive at IINTALC and PCA was used to derive the index weights. The study computed the composite indices for each of the countries in the region and identified the most integrated countries in each of the five sub-regional organisations identified in the study.

The African Union (AU) has been spearheading the African regional integration process as an all-inclusive development strategy for the continent. Consequently, the African Union Commission (AUC) in collaboration with the African Development Bank (AfDB) and the United Nations Economic Commission for Africa (UNECA) jointly constructed the African Regional Integration Index (ARII) in 2016 (AU Commission et al, 2016), which measures the continent's progress towards a more connected, competitive and business-friendly continent and gives a perspective of how the continent is faring in terms of regional integration and the challenges therein. The index comprises of five dimensions found to be key to Africa's integration – trade integration, productive integration, free movement of people, regional infrastructure and financial and macroeconomic integration. Sixteen indicators cutting across the five dimensions were utilized to obtain the ARII. The report computed index scores on each of the five dimensions for all AU Member countries and eight AU-

recognized regional economic communities (RECs). Results from the analysis showed that the East African Community (EAC) recorded the highest overall score in regional integration across all the RECs. The EAC also has the highest index scores in trade and productive integration. The Economic Community of West African States (ECOWAS), however, topped the index scores on free movement of people and financial and macroeconomic integration.

Following the ARII, the Asia-Pacific Regional Integration Index (APRII) assesses the level of integration in the Asia-Pacific region (Huh and Park, 2017). APRII compose of six dimensions – trade and investment integration, money and finance integration, regional value chains, infrastructure and connectivity, free movement of people and institutional and social integration. The study utilized twenty-six (26) indicators across the six dimensions. In addition to the 48 economies of the Asia-Pacific region, the study also constructed regional integration indices for the European Union, Latin American and African countries for comparison. Both the six-dimensional indices and the overall index of economic integration for each country were computed utilizing index weights derived using Principal Component Analysis (PCA). Empirical results from the analysis indicated that Singapore is the most integrated economy in the region with an APRII score of 0.63, closely followed by Malaysia (0.614) and Thailand (0.591). The study also found that the overall index scores for thirteen regional economies outperform the regional average score of 0.473. In comparison to other regions across the globe, the study considered EU as the world's most integrated region and considerably outperformed Asia and the other two regions considered. Asia performed below expectations due to its stern focus on trade and investment while neglecting the other dimensions.

Utilizing identical methodology and applying the same dimensions and indicators as Huh and Park (2017), ADB (2017) computed the Asia-Pacific Regional Cooperation and Integration Index (ARCII). Results from their analysis indicated that of the six sub-regions including the Pacific, Southeast Asia has the highest overall ARCII score largely driven by trade and investment integration and free movement of people. However, inadequate infrastructure and connectivity kept South Asia and Central Asia's overall index scores low. A similar comparison with the EU, Latin America and Africa showed that the EU has the highest index scores in all but one-dimensional indices and was the most integrated region.

3.0 METHODOLOGICAL FRAMEWORK AND DATA SOURCES

3.1 Components of the WEII

The WAMZ economic integration index (WEII) comprises five (5) dimensions that are considered important to regional integration.

3.1.1 Trade Integration

Regional economic integration strengthens trade integration in a region and has remained a tool for enabling free trade. Free trade enables lower prices for consumers, increased exports, benefits from economies of scale and a greater choice of goods, among others. Trade impacts on people's livelihoods, incomes and welfare. The small size of many African economies and their dependence on a narrow set of similar primary commodity exports have affected their participation in world trade. Thus, increased interconnectedness in trade could bring greater advantages to the countries and help mobilize their resources by finding markets for their goods, particularly if this is done through some regional groupings. This makes trade integration a key element in the region's ongoing journey to integration. Thus, we include trade integration as one of the components of WEII and measure it using two indicators – the share of intra-regional goods exports in total merchandise exports and the share of intra-regional goods imports in total merchandise imports.

3.1.2 Regional Infrastructure

Infrastructure plays a vital role in promoting rapid and more inclusive growth. It also facilitates the poor's access to basic services and helps increase their income-generating capacity. Physical connectivity through cross-border infrastructure development is also crucial for enhanced regional cooperation and

economic integration (Kuroda 2006). Infrastructure encompasses both “hardware” and “software” components, as the hardware component is only a part of the overall determinant of cross-border connectivity. The “software” component include impediments related to policies, regulations, procedures and standards that need to be addressed to promote free movement of people, goods and services within a region (quality of institutions, trade facilitation mechanisms, trade and investment policies, efficient and speedy customs procedures and border patrols). The “hardware” component is the physical infrastructure that facilitates physical connectivity and they include a comprehensive network of highways across borders, railroads, ports, airports, flights across countries, power plants, energy supply, and electricity and ICT infrastructure, among others. When regional infrastructure works better, business costs fall as transport corridors speed up goods across boundaries. This study measures regional infrastructure using three indicators – Africa Infrastructure Development Index (AIDI), Doing Business Index (DBI) and Logistic Performance Index (LPI).

3.1.3 Compliance with ECOWAS Trade-related Protocols

ECOWAS aims to establish a monetary union in the West African region in order to raise the living standards of its people and enhance economic stability, foster relations among Member States and contribute to the progress and development of the region. To achieve these objectives, the Community undertook to establish a common market. Some of the activities in the process are: the liberalisation of trade among Member States via the abolition of customs duties on imports and exports, and the abolition of non-tariff barriers among Member States,

both are meant to establish a Free Trade Area at the Community level; adoption of a Common External Tariff (CET) and common trade policy and; removal of obstacles to the free movement of persons, goods, services and capital and the right of residence and establishment among Member States. The trade integration obligations were designed to deepen intra-regional trade and foster greater collaboration among Member States. To achieve these objectives, Member States committed themselves to some obligations through: ECOWAS Trade Liberalisation Scheme (ETLS), convention relating to Inter-State Road Transit (ISRT), Free Movement of Persons, Right of Residence and Establishment, ECOWAS Common External Tariff (CET), customs procedures and Economic Partnership Agreement (EPA). WAMZ countries were expected to comply with these protocols. The study measures this component by computing a compliance index for each of the seven indicators identified and averaging the compliance indices to obtain the overall index.

3.1.4 Compliance with WAMZ Macroeconomic Convergence Criteria

WAMZ Member States are required to satisfy some macroeconomic convergence criteria prior to the launch of a monetary union. These criteria include single digit inflation, fiscal deficit (including grants) of not more-than 3.0 percent of GDP, central bank financing of fiscal deficit of not more than 10 percent of previous year's tax revenue, and gross external reserves of not less-than 3.0 months of import cover. In addition, they are required to fulfil two secondary convergence criteria which are: nominal exchange rate appreciation/depreciation not exceeding 10 percent and public debt-to-GDP ratio not exceeding 70 percent. The study computes performance scores for each of the six indicators and calculated the mean score to

arrive at the overall index for this component.

3.1.5 Financial Integration

Regional financial integration broadens and deepens financial links within a region and is an important element of a regional integration process. Integrated financial markets would allow adjustments to asymmetric shocks, as it provides a risk-sharing mechanism for risks occasioned by a negative shock. Thus, negative shocks in one area could be mitigated by a compensating variation in the other areas. Similarly, the financial sector is also an important transmission mechanism for implementing monetary policy. An integrated financial market is, therefore, essential for an efficient and effective single monetary policy, as it ensures an even distribution of liquidity and similar levels of short-term interest rates across the currency zone. It could also promote financial stability, since financial risks could easily be shared in a union. We measured financial integration by obtaining a cross-sectional dispersion of two price-based indicators – interbank interest rates and 91-day treasury bill yields, as data on quantity-based measures are not readily available.

Table 1 below examined the indicators for each of the five dimensions in the WEII and described how those indicators and the underlying data were obtained. The data are annual and span the period 2015 – 2017.

Table 1: Components and Indicators for the WAMZ Economic Integration Index (WEII)

Dimension	Indicators	Description
1. Trade Integration	1a. Share of intra-regional goods exports in total goods exports	The indicator measures the value of merchandize exports to other members of the WAMZ as a ratio of total merchandize exports. Data were obtained from the Multilateral Surveillance and Trade Department of WAMI.
	1b. Share of intra-regional goods imports in total goods imports	The indicator measures the value of merchandize imports from other members of the WAMZ as a ratio of total merchandize imports. Data were obtained from the Multilateral Surveillance and Trade Department of WAMI.
2. Regional Infrastructure	2a. Africa Infrastructure Development Index	The indicator measures progress of infrastructure development in African countries and is composed of four main categories – transport, electricity, information and communication technology (ICT) and water and sanitation. The categories consist of nine indicators that have impact on productivity and economic growth. The indicator is computed by African Development Bank.
	2b. Doing Business Index	The indicator measures aspects of business regulations and their implications for firm establishment and operations. It presents results for two aggregate measure: the distance to frontier (DTF) score, which benchmark countries with respect to regulatory best practice by showing the absolute distance to the best performing country; and the ease of doing business ranking, which is based on the DTF score and compares countries with one another. The study adopted the DTF scores which is measured on a scale from 0 to 100, where 0 represents worst performance and 100 being the frontier (best performer). The indicator is computed by the World Bank.
	2c. Logistic Performance Index (LPI)	The index identifies the challenges and opportunities faced by countries in their performance on trade logistics and what they can do to improve their performance. The international LPI combines data on six core performance components – the efficiency of customs and border clearance, the quality of trade and transport infrastructure, the ease of arranging competitively-priced shipments, the competence and quality of logistics services, the ability to track and trace consignments and the frequency with which shipments reach consignees within scheduled or expected delivery times. It is measured on a scale of 1 to 5, with 1 being worst performer while 5 is the best performer. The LPI data are produced

		only in even years. Thus, the 2014 data were used in 2015 while the 2016 were adopted in 2017. The indicator is computed by the World Bank.
3. Compliance with ECOWAS Trade-related protocols	3a. Free movement of people	The protocol obliges ECOWAS countries to abolish all obstacles to the freedom of movement, right of residence and establishment of community citizens. It further guarantees the protection of these rights by governments of member countries. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant. The indicator is published by WAMI in the Trade Integration Report.
	3b. ECOWAS Trade Liberalization Scheme (ETLS)	This protocol provides that goods from ECOWAS countries that meet prescribed origin conditions are imported free of customs duties and taxes of equivalent effect and non-tariff barriers to another member country. It is the ECOWAS operational tool for promoting the region as a free trade area. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant. The indicator is published by WAMI in the Trade Integration Report.
	3c. Common External Tariff (CET)	The CET protocol establishes the same custom duties applicable to all goods entering the ECOWAS countries territory. It specified duty rates for about five broad category of goods and member countries have agreed to apply the CET rates. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant. The indicator is published by WAMI in the Trade Integration Report.
	3d. Inter State Road Transit (ISRT)	This convention allows the transportation of goods by road from one customs office in a Member State to another customs office in another Member State through one or more Member States free of duties, taxes and restrictions while in transit. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant with the convention. The indicator is published by WAMI in the Trade Integration Report.
	3e. Brown Card Scheme	The protocol guarantees the victims of road accident a prompt and fair compensation for damages caused by non-resident motorist from ECOWAS member states visiting their territory. It is an insurance scheme similar to the Europe's Green Card scheme. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant. The indicator is published by WAMI in the Trade Integration Report.

	3f. Customs Clearance	This protocol requires ECOWAS Member States to harmonise and automate customs clearance procedures in order to ensure predictability and reduced costs during clearance of goods. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant. The indicator is published by WAMI in the Trade Integration Report.
	3g. Yamoussoukro open skies	The African Union decision allows the multilateral exchange of up to fifth freedom air traffic rights between African Yamoussoukro Decision Party States using a simple notification procedure. WAMZ Member States focus on implementing the Yamoussoukro Decision on air transport liberalization through the adoption of ECOWAS Community Acts on the establishment of a common air transport legal framework. A compliance index was computed for WAMZ countries on a scale of 0 to 100, with 0 being least compliant and 100 being most compliant. The indicator is published by WAMI in the Trade Integration Report.
4. Compliance with the WAMZ Macroeconomic Convergence Criteria	4a. Single digit inflation rate	This criterion requires WAMZ countries to achieve a single-digit inflation rate on a sustained basis as a pre-requisite for the launching of a monetary union. The study computes performance scores for each country on the single-digit inflation criterion by assigning 100 for countries that attain an inflation rate of less than 10 percent in a particular year and 0 otherwise. Data were sourced from the WAMZ Macroeconomic Developments and Convergence Report.
	4b. Fiscal deficit of not more than 3% of GDP	This criterion requires WAMZ countries to attain a fiscal deficit (including grants) of not more than 3 percent of their nominal GDP in a year. The study computes performance scores for each country on the fiscal deficit criterion by assigning 100 for countries that attain a fiscal deficit of less than 3 percent of GDP in a particular year and 0 otherwise. Data were sourced from the WAMZ Macroeconomic Developments and Convergence Report.
	4c. Central Bank financing of fiscal deficit of not more than 10% of previous year's tax revenue.	This criterion requires that central bank financing of fiscal deficits in WAMZ countries be not more than 10 percent of previous year's revenue in any particular year. The study calculates performance scores for member countries on this criterion by assigning 100 for countries whose central banks does not finance government fiscal deficits or whose financing of those deficits were less than or equal to 10 percent of previous year's revenue, and 0 otherwise. Data were sourced from the WAMZ Macroeconomic Developments and Convergence Report.

	4d. Gross external reserves of not less than 3.0 months of import cover	The criterion obliges WAMZ member countries to hold adequate external reserves that is not less than 3 months of their imports. The study obtains performance scores for member countries on the international reserves criterion by assigning 100 to countries that have gross external reserves adequate to finance at least 3 months of their imports and 0 for countries otherwise. Data were sourced from the WAMZ Macroeconomic Developments and Convergence Report.
	4e. Exchange rate variability	This criterion requires that countries record a nominal exchange rate appreciation/depreciation of at most 10 percent in any year prior to the launching of the WAMZ. The study computes performance scores for each member country by assigning 100 to countries whose nominal exchange rate depreciation/appreciation is 10 percent or less and 0 otherwise. Data were sourced from the WAMZ Macroeconomic Developments and Convergence Report.
	4f. Public debt-to-GDP ratio not exceeding 70%.	This criterion obliges WAMZ countries to a public debt-to-GDP ratio of 70 percent or less, as a pre-condition for the WAMZ monetary union. The study calculates performance scores for member countries on the public debt criterion by assigning 100 to countries whose public debt were 70 percent of their nominal GDP or less and 0 otherwise. Data were sourced from the WAMZ Macroeconomic Developments and Convergence Report.
5. Financial Integration	5a. Cross-sectional dispersion of interbank interest rates.	The indicator measures how dispersed a country's interbank rates were from other countries' interbank rates. The indicator is published by WAMI in the Financial Stability Report.
	5b. Cross-sectional dispersion of 91-day treasury bill rates.	The indicator measures how dispersed a country's treasury bill yields were from other countries' interbank rates. The indicator is published by WAMI in the Financial Stability Report.

3.2 Constructing the WEII

We construct the WEII for each WAMZ Member State by assigning weights to each of its five components described above. We employ principal component analysis (PCA) to derive the weights of each of the components. The PCA is a multivariate statistical technique that transforms a set of correlated variables into a set of linearly uncorrelated variables, referred to as principal components, and which are ordered so that the first few retain most of the variation present in all the original variables (Jolliffe, 2002). The reasoning behind the PCA is to reduce the dimensionality of the data set and to transform interdependent coordinates into significant and independent ones.

PCA partitions the variance in a set of variables and uses it to determine weights that maximize the resulting principal component variation. The derived principal component is the variable that capture variations in data to the maximum extent possible.

Suppose a data vector comprises three variables, that is $X = (x_1, x_2, x_3)$. The principal component, Z_i , $i = 1, 2, 3$, is defined as;

$$Z_1 = \alpha'_1 X = \alpha_{11}x_1 + \alpha_{21}x_2 + \alpha_{31}x_3$$

$$Z_2 = \alpha'_2 X = \alpha_{12}x_1 + \alpha_{22}x_2 + \alpha_{32}x_3$$

$$Z_3 = \alpha'_3 X = \alpha_{13}x_1 + \alpha_{23}x_2 + \alpha_{33}x_3$$

Where the coefficient α_{ij} represents the weight for the i th variable and j th principal component, and

$$\sum_{i=1}^3 \alpha_{i1}^2 = \sum_{i=1}^3 \alpha_{i2}^2 = \sum_{i=1}^3 \alpha_{i3}^2 = 1$$

(Normalization).

Let data vector X have a correlation matrix with eigenvalue-eigenvector pairs $(\lambda_1, e_1), (\lambda_2, e_2), (\lambda_3, e_3)$, where $\lambda_1 \geq \lambda_2 \geq \lambda_3$. The variance for each principal component is given by the eigenvalue ($\text{Var}(Z_j) = \alpha'_j \Sigma \alpha_j = \lambda_j$). PCA seeks linear combinations of the original variables with maximum variance. Thus, the eigenvector corresponding to the largest eigenvalue λ_1 determines $e_1 = (\alpha_{11}, \alpha_{21}, \alpha_{31})$, and the first principal component $Z_1 = e'_1 X$ explains the largest possible variation in the data. Similarly, the second principal component is constructed using the eigenvector corresponding to the second largest eigenvalue λ_2 , that is $Z_2 = e'_2 X$.

All principal components are orthogonal to previous components, and each captures additional but progressively smaller variations in the data. Since total data variance is three (corresponding to the number of variables) and equals the sum of eigenvalues, the proportion of total data variance accounted for by the j th principal component is $\lambda_j/3$.

Suppose that the first two principal components (Z_1 and Z_2) are sufficient to characterize the data variation. Correlation coefficients between X and Z are called loadings and are given as $\text{Corr}(x_i, Z_j) = \rho_{ij} = e_{ij} \sqrt{\lambda_j}$, $i = 1, 2, 3$, and $j = 1, 2$, where e_{ij} is the i th element of the eigenvector j . The square of the loadings ρ_{ij}^2 represents the proportion of the variance in variable x_i explained by the principal component Z_j . Owing to the normalization equation above, the sum of the squared loadings of Z_1 and Z_2 are λ_1 and λ_2 , which are the variances of Z_1 and Z_2 , respectively. Thus, we normalized the squared loadings to unity sum, that is, $\bar{\rho}_{ij}^2 = \rho_{ij}^2 / \lambda_j$. We then

construct $\theta_j = \lambda_j / (\lambda_1 + \lambda_2)$, where $j = 1$ and 2 , to measure the proportion of explained variance in the data when considering only the first two principal

components. θ_1 and θ_2 would be the weights assigned to the respective principal components for aggregation.

The overall composite index (WEII) is computed using the composite indices of

the five dimensions and applying the weights derived from the PCA analysis. The computed WEII ranged between 0 and 1, with index values closer to 1 regarded as high integration and values towards 0 considered as low integration.

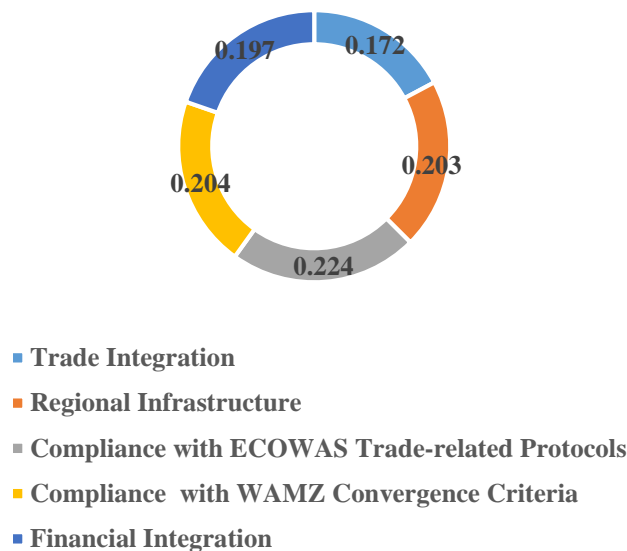
4.0 ANALYSIS OF THE WAMZ ECONOMIC INTEGRATION INDEX

4.1 PCA Index Weights

This study applied the PCA results to derive the weights for WEII composite index. Results from the PCA indicate that the first two principal components together explain 79.4 percent of total variation in the component indices and have eigenvalues of 2.753 and 1.215, respectively. The weights

obtained from the analysis were 0.172, 0.203, 0.224, 0.204 and 0.197 for dimensions one to five, respectively, that is, for Trade Integration, Regional Infrastructure, Compliance with ECOWAS Trade-Related Protocols, Compliance with WAMZ Macroeconomic Convergence Criteria, and Financial Integration, respectively.

Figure 1: Index Weights from Principal Component Analysis (PCA) Results



4.2 Trade Integration Index

Empirical results from the analysis showed that the WAMZ composite index increased to 0.073 in 2016, from 0.063 in 2015. However, the index declined to 0.032 in 2017. Three Member States – The Gambia, Guinea and Liberia performed relatively better than the other countries in 2015 and 2016, as their index scores were mostly higher than the WAMZ average score during the periods. Sierra Leone performed better than all the other Member States in 2017 owing to a huge increase in its intra-regional imports from other members of the Zone. Whereas Guinea's index score

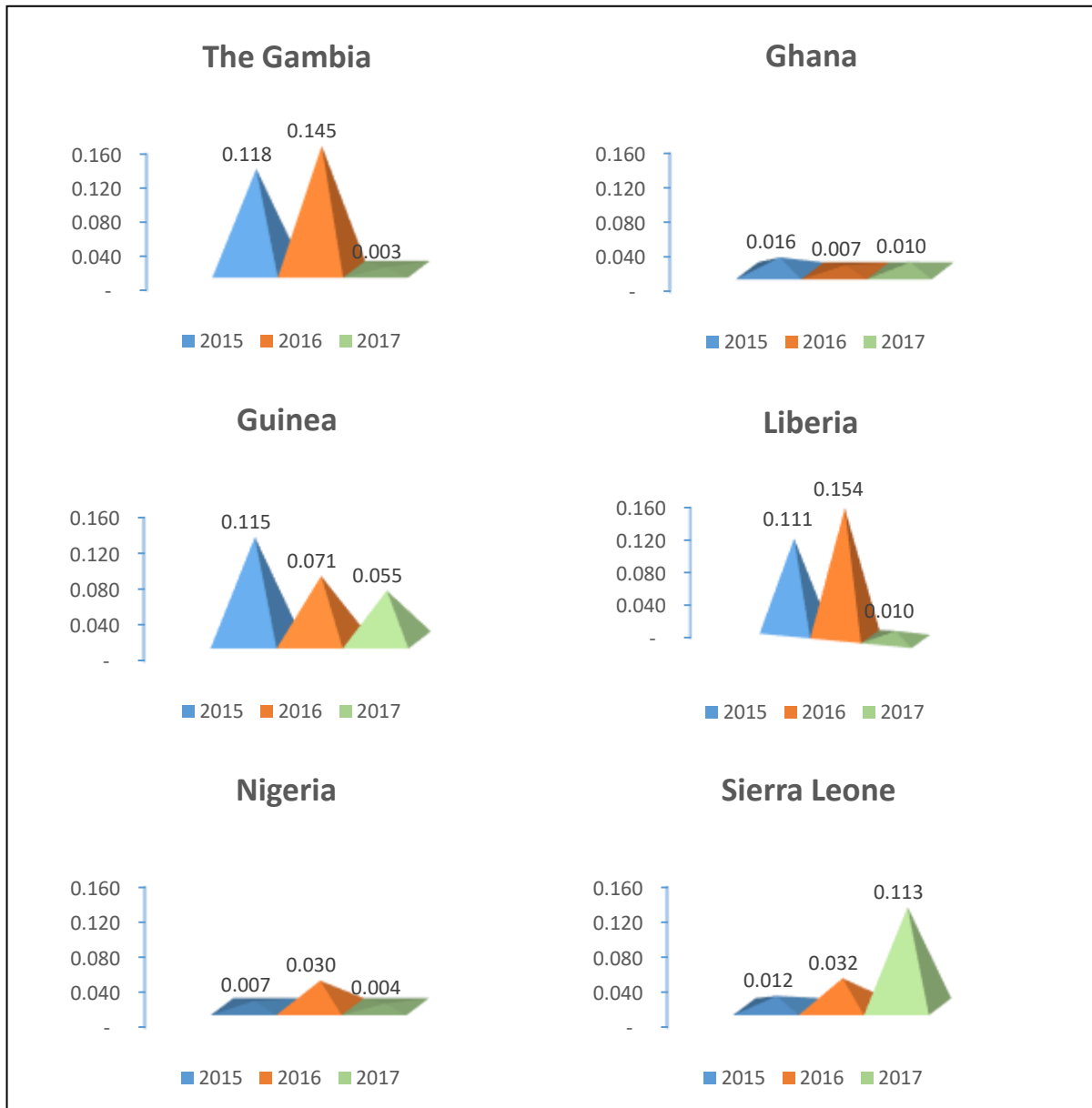
declined to 0.071 and 0.055 in 2016 and 2017, respectively, from 0.115 in 2015, the indices for Sierra Leone rose during the same period, indicating its increased commitment to intra-regional trade. Its indices rose to 0.032 and 0.113 in 2016 and 2017, respectively, from 0.012 in 2015. Index scores for The Gambia, Ghana, Liberia and Nigeria, however, recorded mixed movements during the period.

Overall, the analysis showed that intra-regional trade among WAMZ countries, at 7.3 and 3.2 percent in 2016 and 2017 respectively, were significantly low compared to 64.0 percent share of intra-EU trade in its total trade in 2017 (EU, 2018). As the expansion of trade among Member

States holds the key to faster growth and development and more successful regional integration, WAMZ countries may need to expand their intra-regional trade volumes overtime to improve regional integration.

This could be achieved through increased efforts at industrialisation and diversification of WAMZ economies to increase competitiveness.

Figure 2: Trade Integration Index in WAMZ Countries



Source: Authors' Computations

4.3 Regional Infrastructure

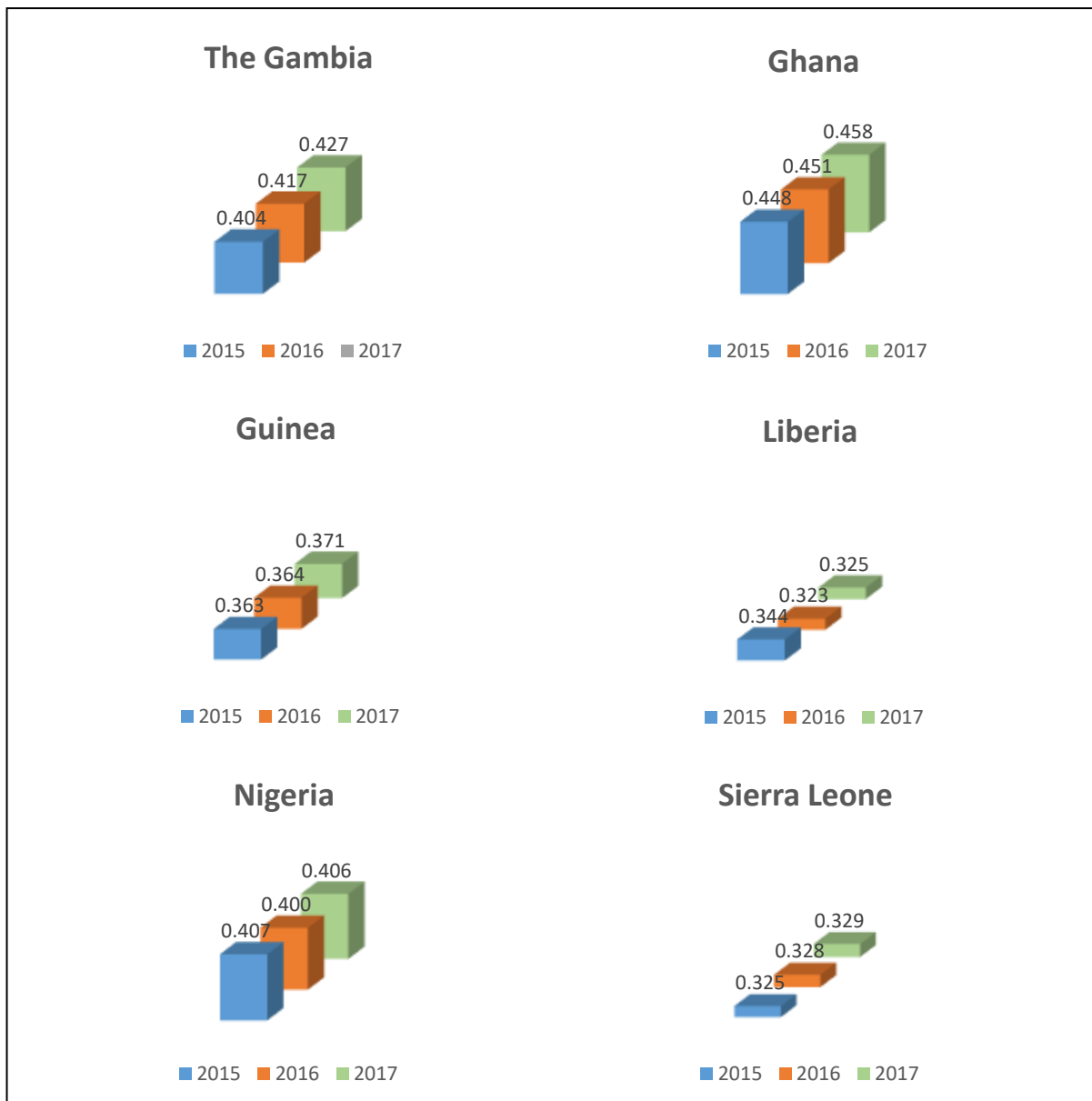
The WAMZ regional infrastructure index score declined insignificantly to 0.381 in 2016, from 0.382 in 2015, but increased marginally to 0.386 in 2017. The Gambia and Ghana index scores recorded marginal

increases to 0.417 and 0.451, respectively, in 2016. They rose further to 0.427 and 0.458 in that order in 2017. Similarly, Guinea and Sierra Leone index increased to 0.371 and 0.329, respectively, in 2017. However, the index scores for the other two Member States witnessed mixed

movements, as they declined in 2016 before recording marginal increases in 2017. Ghana recorded the highest scores in the regional infrastructure index occasioned by its higher scores in the Doing Business (DB) Index across the region. The Gambia, however, has higher index scores in the African Infrastructure Development Index (AIDI). Liberia trailed behind other

Member countries in the regional infrastructure composite index owing to the severe damage of its infrastructure by the country's long civil war. Overall, inadequate infrastructure and connectivity in the WAMZ resulted in the low performance of most economies in this area.

Figure 3: Regional Infrastructure Index in WAMZ Countries



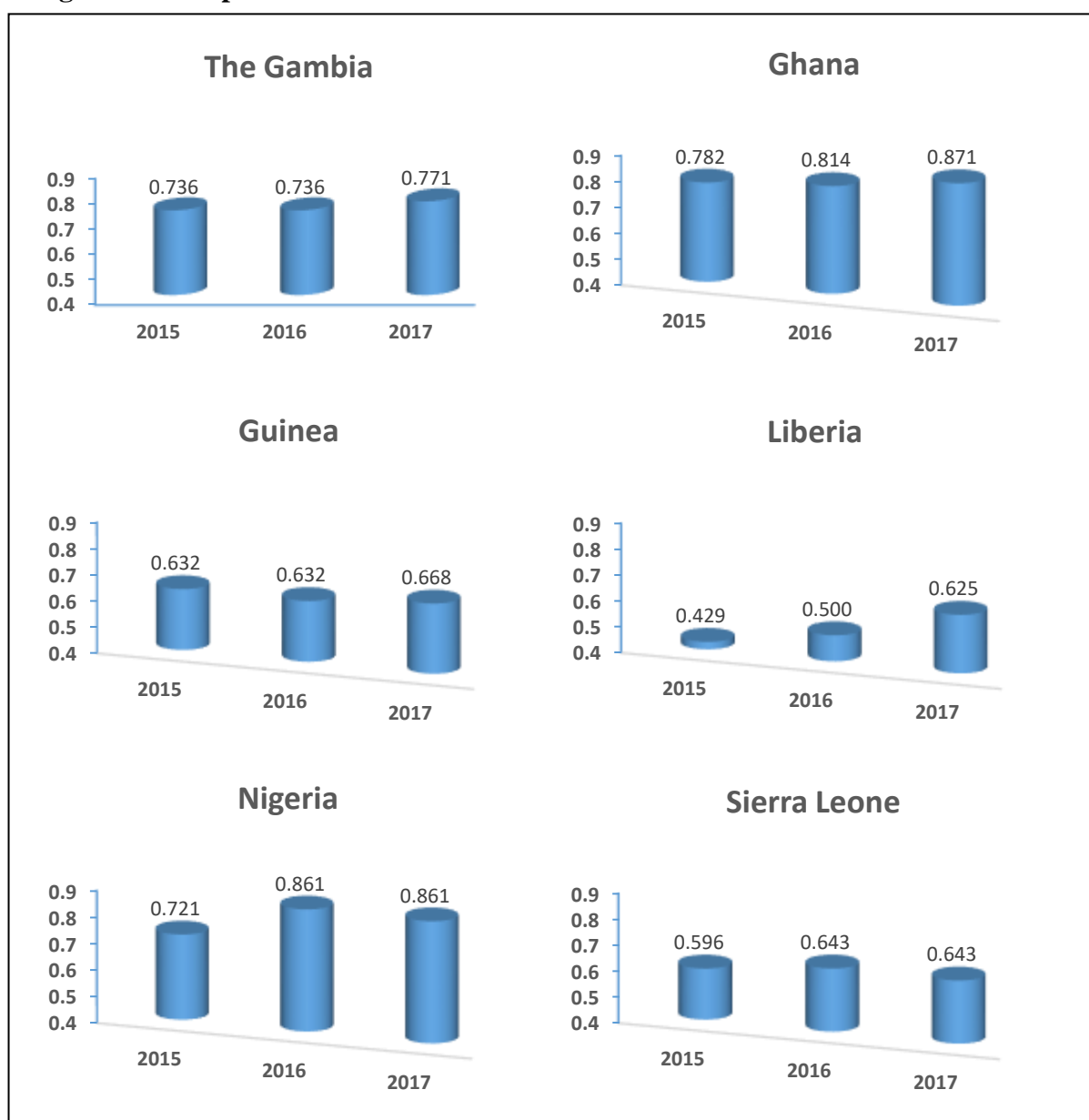
Source: Authors' Computations

4.4 Compliance with ECOWAS Trade-Related Protocols

The compliance composite index results showed that WAMZ Member States' compliance with ECOWAS trade-related protocols has improved overtime. The index increased to 0.698 and 0.740 in 2016 and 2017, respectively, from 0.649 in 2015. For the Member countries performance, Ghana and Liberia index scores increased

to 0.871 and 0.625 in 2017, respectively, from the respective indices of 0.814 and 0.500 in 2016 and 0.782 and 0.429 in 2015. The indices for The Gambia and Guinea in 2016 remained unchanged at their 2015 levels, but recorded increases to 0.771 and 0.668, respectively in 2017. Nigeria and Sierra Leone compliance index scores increased in 2016 relative to their 2015 levels, but remained unchanged in 2017 relative to 2016 levels.

Figure 4: Compliance with ECOWAS Trade-related Protocols in WAMZ Countries



Source: Authors' Computations

An analysis of compliance performance by countries indicate that Ghana and Nigeria performed better than other countries in 2017 indicating that they complied more with the trade-related protocols than the other countries. Liberia, however, recorded the least compliance index throughout the

4.5 Compliance with Macroeconomic Convergence Criteria

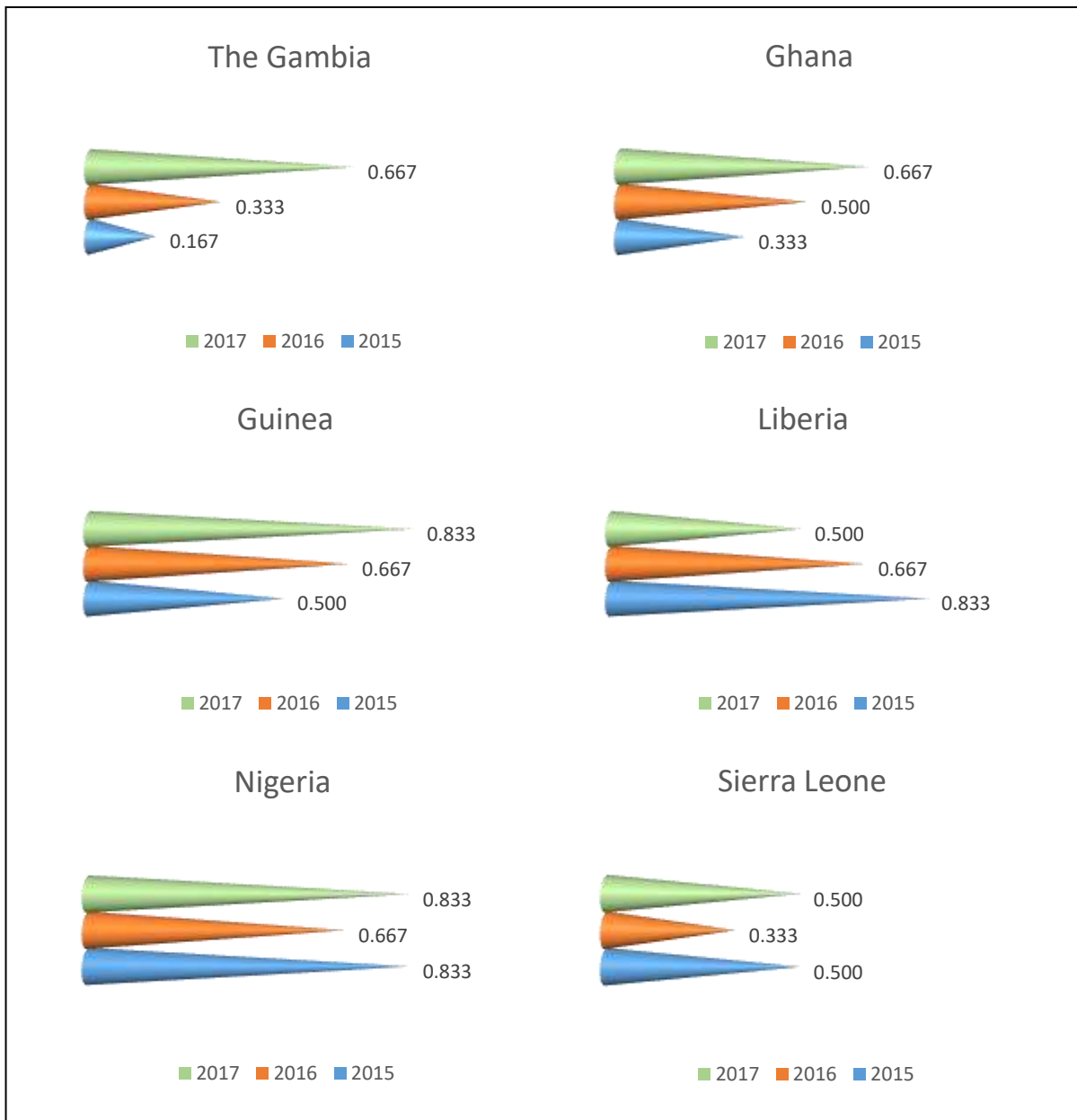
The average WAMZ composite index on Members' performance in meeting the macroeconomic convergence criteria indicated some improvements, as the index score increased to 0.667 in 2017, from 0.528 recorded in both 2015 and 2016. The Gambia, Ghana and Guinea recorded steady increases in their index scores overtime, while Nigeria and Sierra Leone witnessed mixed developments in meeting the convergence criteria.

While Nigeria's index declined to 0.667 in 2016 from 0.833 in 2015 before rising to 0.833 in 2017, Sierra Leone index fell to 0.333 in 2016 from 0.500 in 2015 but rose to 0.500 in 2017. The decline in Nigeria's performance score in 2016 largely resulted from the heightened inflationary pressures,

period. This is in spite of the fact that Liberia has ratified all the 54 ECOWAS protocols and conventions as at December 2016, relative to other Member States that have not ratify all (ECOWAS Commission, 2016).

with headline inflation doubling to 18.6 percent, and sharp depreciation of the national currency, hence its inability to meet the single-digit inflation and exchange rate stability criteria. Sierra Leone, however, could only meet two of the six criteria during 2016, compared with three criteria met in 2015, owing to inflationary pressures driven by the continued depreciation of the Leone, upward adjustment in domestic fuel pump prices and electricity tariffs. Liberia's performance score deteriorated to 0.667 and 0.500 in 2016 and 2017, respectively, from 0.833 in 2015. The country met five of the six criteria in 2015, but could meet only four and three in 2016 and 2017, respectively, due to rising inflation driven by pass-through effect of the depreciation of the Liberian dollar and a deterioration in its fiscal position accompanied by the Central Bank of Liberia's financing of those deficits beyond the statutory limit.

Figure 5: Compliance with Macroeconomic Convergence Criteria in WAMZ Countries



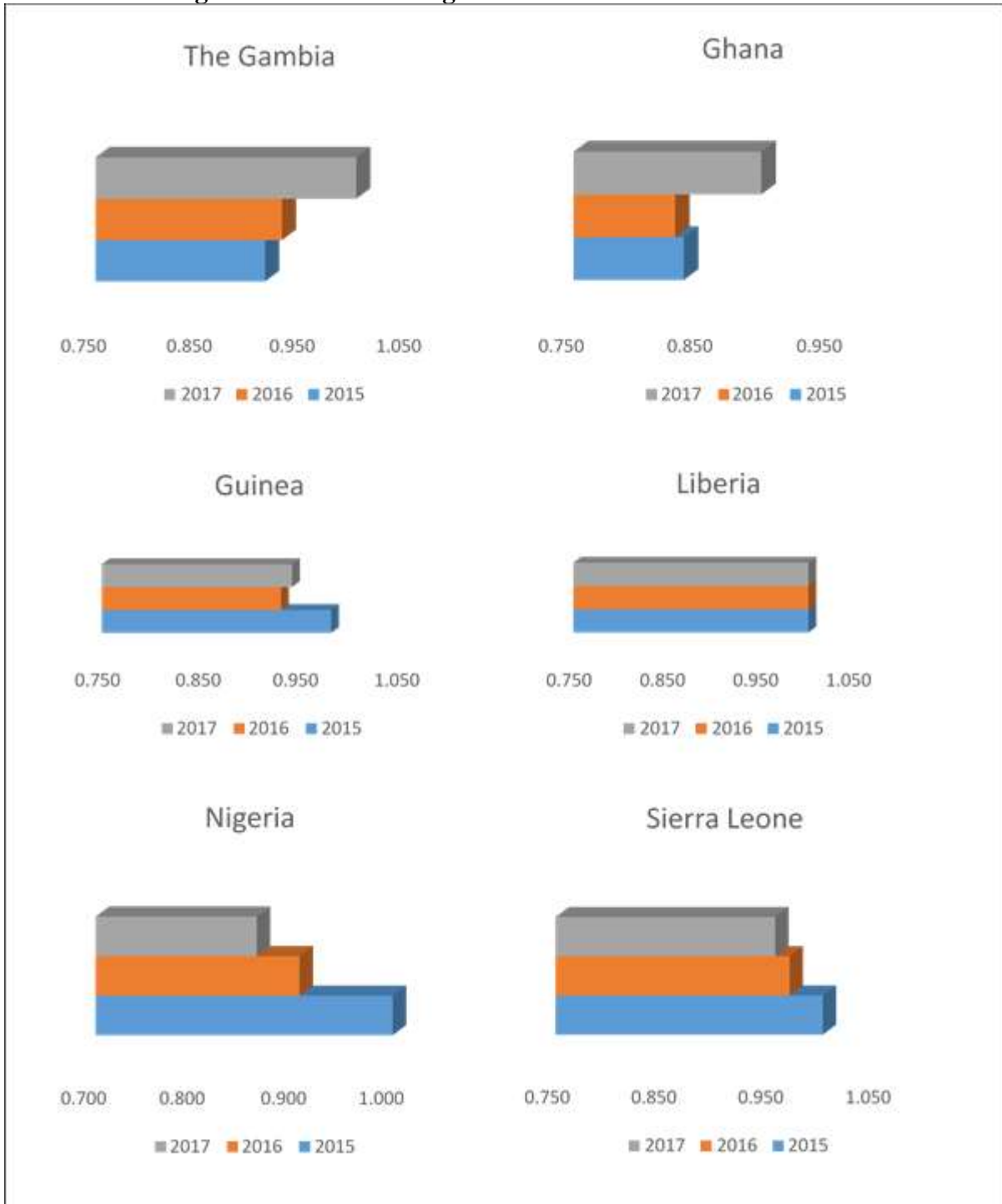
Source: Authors' Computations

4.6 Financial Integration

Results from the analysis indicated that the WAMZ financial integration index declined to 0.927 in 2016, from 0.955 in 2015. The index, however, increased to 0.943 in 2017. For the Member countries' performance, Liberia index scores remained unchanged at 1.000 throughout the period, while The Gambia's scores increased to 0.929 and 1.000 in 2016 and

2017, respectively, from 0.913 in 2015. The indices for Ghana and Guinea declined to 0.829 and 0.930 in 2016, from 0.836 and 0.980, respectively, in 2015. However, the indices for the two countries increased to respective 0.897 and 0.941 in 2017. In contrast, Nigeria and Sierra Leone index scores declined in both 2016 and 2017, largely reflecting the volatility of the two interest rates relative to other countries in the Zone during the period.

Figure 6: Financial Integration Index in WAMZ Countries



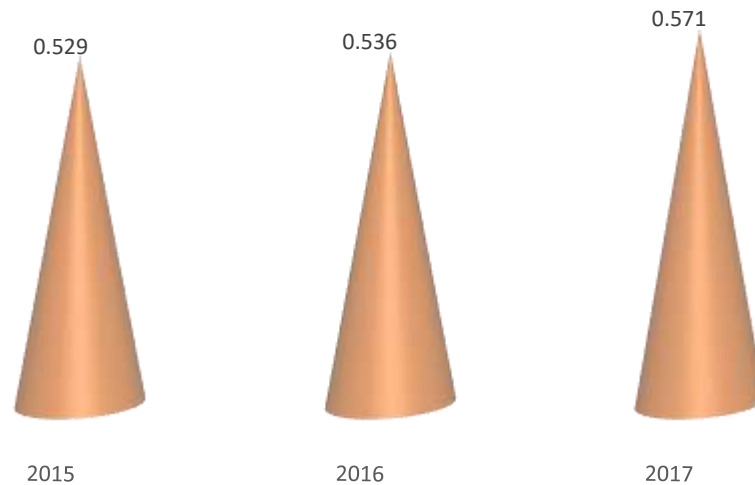
Source: Authors' Computations

4.7 WAMZ Economic Integration (Aggregate) Index

Results from the economic integration index indicated that WAMZ countries

recorded increased integration among them during the three-year period, as the scores rose by 0.007 and 0.035 index points to 0.536 and 0.571 in 2016 and 2017, respectively, from 0.529 in 2015.

Figure 7: Aggregate WAMZ Economic Integration Index

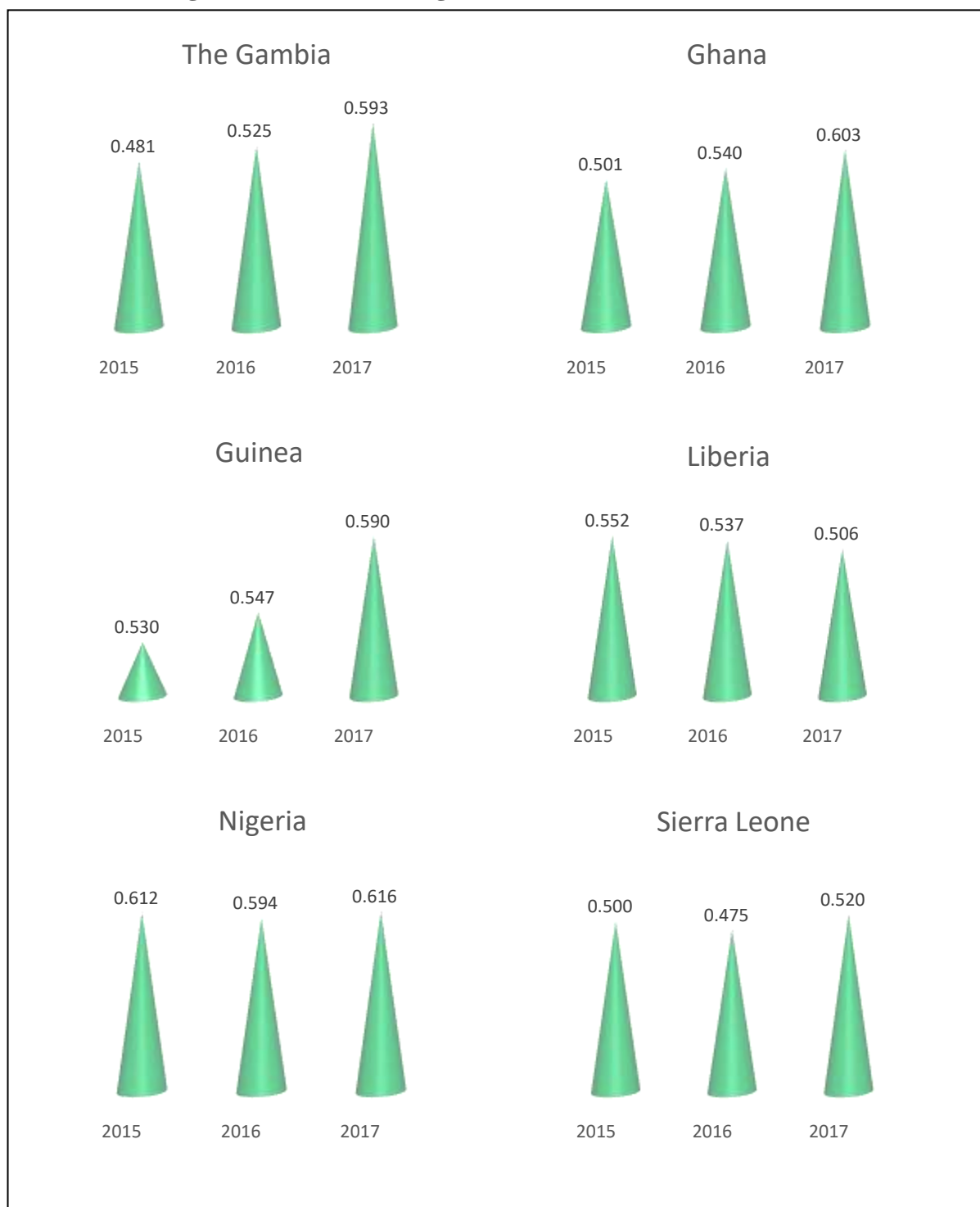


The Gambia, Ghana and Guinea recorded steady increases in their index scores overtime, indicating their increased integration with the rest of the WAMZ economies. Nigeria and Sierra Leone, however, witnessed mixed movements of their index scores, as Nigeria's score declined marginally in 2016 before rising in 2017. This could be attributable to the fall in crude oil prices in the international market in 2016, which led to a recession, rising inflationary pressures, exchange rate instability, fiscal imbalances and other economic challenges in 2016. Sierra Leone's index also fell, by 0.026 index points, in 2016 before picking up to 0.520 in 2017. The fall in 2016 resulted from a number of challenges largely emanating from the twin shocks – a fall in commodity prices and the Ebola Virus Disease (EVD) – hence declining performance in meeting the convergence criteria. Liberia, however, witnessed declines in its composite integration index scores overtime despite high scores in the financial integration

index, largely due to lower AIDI and declining LPI scores, significant fall in its intra-regional trade in 2017 and declining performance in achieving macroeconomic convergence.

Despite the mixed movements in its index score, Nigeria has the highest integration index score in all the years under review and its scores were consistently higher than the WAMZ average index scores. This is largely attributable to its impressive performance in complying with ECOWAS protocols and meeting the macroeconomic convergence criteria on a more sustained basis. Sierra Leone, however, lagged behind all the Member States in integration and its scores were consistently below the WAMZ average in the three years notwithstanding the marginal improvement recorded in 2017. The analysis indicate that Sierra Leone has the lowest AIDI and LPI scores leading to its poor performance in the regional infrastructure index, lower compliance with protocols and conventions, and lower performance in complying with the convergence criteria.

Figure 8: Economic Integration Index for WAMZ Countries



Overall, WAMZ Member States witnessed improvements in four of the five dimensions in 2017 relative to their 2016 levels, even though the indices fell in two dimensions in 2016 compared with 2015. The dimensions that witnessed

improvements in 2017 are regional infrastructure, compliance with ECOWAS trade-related protocols, compliance with macroeconomic convergence criteria and financial integration. However, trade integration declined in 2017 owing to

significant reduction in intra-regional trade share in total trade. Consequently, the WAMZ Economic Integration Index

increased in 2016 and 2017 implying improved economic integration among the countries.

5.0 CONCLUDING REMARKS

Anecdotal evidence suggests that WAMZ Member States have made considerable progress towards achieving regional economic integration since its establishment in 2000. The objective of this study was to empirically confirm the extent of integration among WAMZ countries. The study, therefore, developed an economic integration index to measure the intensity and pace of regional economic integration among the WAMZ economies. The WAMZ-index assesses the progress made by each Member State in integrating with other countries of the Zone to form the WAMZ monetary union. The index comprised five dimensions considered vital for economic integration – trade integration, regional infrastructure, compliance with ECOWAS trade-related protocols, compliance with the WAMZ macroeconomic convergence criteria and financial integration. Twenty indicators were identified across the five dimensions to compute the composite index, with index weights for each dimension determined using the principal component analysis methodology.

Empirical results from the analysis indicated that intra-regional trade among WAMZ countries was significantly low compared to other regions across the world especially the EU. The regional infrastructure index declined in 2016 before rising in 2017 with four Member countries witnessing increases through 2016 and 2017, while two others recording declines before increasing in 2017. Compliance with ECOWAS trade-related protocols has been quite impressive in all Member States, indicating increased commitment to the integration agenda. Compliance index on meeting the macroeconomic convergence

criteria showed mixed results characterised by improved compliance in three countries and successive decline in one. The financial integration index showed some mixed developments, declining in 2016 before increasing in 2017 depicting some divergence in interest rates.

The composite WAMZ-index showed that Member States witnessed increased integration among them during the period. Whereas three Member States recorded increases in their index overtime indicating strong commitment to the WAMZ integration agenda, the composite index for other three members recorded mixed outcomes owing to a number of shocks including the EVD and fall in world commodity prices as well as lower AIDI and declining LPI scores. Nigeria recorded the highest WAMZ-index scores and is, thus, the most integrated country in the sub-region. Sierra Leone's index scores, however, was the lowest and consistently fell below the regional average scores and second only to Liberia in 2017.

Consequently, countries in the zone may need to expand their intra-regional trade volumes overtime to improve regional integration. This could be achieved by removing tariff and non-tariff barriers to trade, ensuring improved transport interconnectivity across the sub-region and promoting value addition to primary products produced by Member States as well as encouraging diversification of export products. Similarly, countries should intensify efforts aimed at ratifying all the ECOWAS trade-related protocols, meeting the WAMZ macroeconomic convergence criteria and ensuring increased investment in infrastructure.

REFERENCES

- Acharya, R. C., Rao, S., & Sawchuk, G. (2002). Building a North American Economic Integration Index: An Exploratory Analysis. *Micro-economic Policy Analysis Branch Industry*. Canada.
- Africa Union Commission; African Development Bank; United Nations Economic Commission for Africa . (2016). *Africa Regional Integration Index Report* . Africa Development Bank.
- Asian Development Bank. (2017). *Asian Economic Integration Report*. Asian Development Bank.
- Balassa, B. (1961). *The Theory of Economic Integration*. Richard D. Irwin, Inc.
- Bo, C., & Woo, Y. P. (2008). *A Composite Index of Economic Integration in the Asia-Pacific Region*. Pacific Economic Cooperation Council's State of the Region Project.
- ECOWAS Commission. (2016). *2016 ECOWAS Convergence Report*. Abuja: ECOWAS Commission.
- European Union Commission. (2018). *Digital Trade Statistics Guide*. European Union.
- Huh, H.-S., & Park, C.-Y. (2017). Asia-Pacific Regional Integration Index: Construction, Interpretation and Comparison. *ADB Economic Working Paper Series No. 511*.
- Jolliffe, I. T. (2002). *Principal Component Analysis*. New York: Springer - Verlag New York, Inc.
- Konig, J. (2015). The EU Index of Integration Effort. *United Nations University Institute on Comparative Regional Integration Studies (UNU-CRIS) Working paper W-2015/4*.
- Konig, J., & Ohr, R. (2013). Different Efforts in European Economic Integration: Implications of the EU Index. *Journal of Common Market Studies* 51(6), 1074-1090.
- Kuroda, H. (2006). *Infrastructure and Regional Cooperation*. Annual Bank Conference on Development Economics (ABCDE) Tokyo.
- Prakash, a., & Hart, J. A. (2000). Indicators of Economic Integration. *Global Governance Volume 6*, 95-114.
- SELA;. (2016). Integration Index for Latin America and the Carribean. *Paper Prepared for the XLII Regular Meeting of the Latin American Council*. Caracas, Venezuela, 26 - 28 October, 2016.
- United Nations Economic Commission for Africa. (2012). *Assessing Regional Integration in Africa V: Towards an African Continental Free Trade Area*. United Nations Economic Commission for Africa.
- United Nations;. (2009). *Economic Development in Africa Report 2009 - Strengthening Regional Economic Integration for Africa's Development*. United Nations Conference on Trade and Development.

Annex A: Results from Principal Component Analysis (PCA)

Variable	Loadings		Squared Loadings		Rho bar Squared		Weights
	PC1	PC2	PC1	PC2	PC1	PC2	
Trade Integration	-0.595	-0.574	0.354	0.329	0.129	0.271	0.172
Regional Infrastructure	0.896	-0.044	0.803	0.002	0.292	0.002	0.203
Compliance with ECOWAS Trade-related Protocols	0.943	0.013	0.890	0.000	0.323	0.000	0.224
Compliance with WAMZ Convergence Criteria	-0.083	0.895	0.007	0.802	0.003	0.660	0.204
Financial Integration	-0.836	0.286	0.699	0.082	0.254	0.067	0.197
							1.000
Eigenvalue	2.753	1.215					
Proportion	0.551	0.243					
Cumm. Proportion	0.551	0.794					
Theta	0.694	0.306					

Annex B: WAMZ Countries Economic Integration Index Results

The Gambia				
		2015	2016	2017
1	Trade Integration	0.118	0.145	0.003
2	Regional Infrastructure	0.404	0.417	0.427
3	Compliance with ECOWAS Trade-related Protocols	0.736	0.736	0.771
4	Compliance with WAMZ Convergence Criteria	0.167	0.333	0.667
5	Financial Integration	0.913	0.929	1.000
	WAMZ Economic Integration Index (WEII)	0.481	0.525	0.593
Ghana				
		2015	2016	2017
1	Trade Integration	0.016	0.007	0.010
2	Regional Infrastructure	0.448	0.451	0.458
3	Compliance with ECOWAS Trade-related Protocols	0.782	0.814	0.871
4	Compliance with WAMZ Convergence Criteria	0.333	0.500	0.667
5	Financial Integration	0.836	0.829	0.897
	WAMZ Economic Integration Index (WEII)	0.501	0.540	0.603
Guinea				
		2015	2016	2017
1	Trade Integration	0.115	0.071	0.055
2	Regional Infrastructure	0.363	0.364	0.371
3	Compliance with ECOWAS Trade-related Protocols	0.632	0.632	0.668
4	Compliance with WAMZ Convergence Criteria	0.500	0.667	0.833
5	Financial Integration	0.980	0.930	0.941
	WAMZ Regional Integration Index	0.530	0.547	0.590
Liberia				
		2015	2016	2017
1	Trade Integration	0.111	0.154	0.010
2	Regional Infrastructure	0.344	0.323	0.325
3	Compliance with ECOWAS Trade-related Protocols	0.429	0.500	0.625
4	Compliance with WAMZ Convergence Criteria	0.833	0.667	0.500
5	Financial Integration	1.000	1.000	1.000
	WAMZ Economic Integration Index (WEII)	0.552	0.537	0.506
Nigeria				
		2015	2016	2017
1	Trade Integration	0.007	0.030	0.004
2	Regional Infrastructure	0.407	0.400	0.406
3	Compliance with ECOWAS Trade-related Protocols	0.721	0.861	0.861
4	Compliance with WAMZ Convergence Criteria	0.833	0.667	0.833
5	Financial Integration	1.000	0.906	0.863
	WAMZ Economic Integration Index (WEII)	0.612	0.594	0.616
Sierra Leone				
		2015	2016	2017
1	Trade Integration	0.012	0.032	0.113
2	Regional Infrastructure	0.325	0.328	0.329
3	Compliance with ECOWAS Trade-related Protocols	0.596	0.643	0.643
4	Compliance with WAMZ Convergence Criteria	0.500	0.333	0.500
5	Financial Integration	1.000	0.969	0.956
	WAMZ Economic Integration Index (WEII)	0.500	0.475	0.520
WAMZ Average				
		2015	2016	2017
1	Trade Integration	0.063	0.073	0.032
2	Regional Infrastructure	0.382	0.381	0.386
3	Compliance with ECOWAS Trade-related Protocols	0.649	0.698	0.740
4	Compliance with WAMZ Convergence Criteria	0.528	0.528	0.667
5	Financial Integration	0.955	0.927	0.943
	WAMZ Economic Integration Index (WEII)	0.529	0.536	0.571