DOI: http://dx.doi.org/10.20377/cgn-108

Monetary Convergence Across the Economic Community of West African States: Observing Convergence as Patterns

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Since its inauguration, the Economic Community of West African States has stressed its desire to advance regional integration through the establishment of a common single currency (the Eco). This policy has been considered advantageous given the economic benefits derived from the existence of one of the oldest sub-regional monetary unions across French-speaking West African Economies. For this reason, the West African Monetary Zone was created as a suggested second monetary zone consisting of English-speaking countries in the region in anticipation that in the long run, the two would converge. While empirical studies into the feasibility of achieving monetary integration in West Africa have provided some understanding of causal notions and possible effects, very few studies embrace complexity theory or attempt to use complexity-related conceptual notions in the identification and interpretation of patterns produced in longitudinal applications. Using both empirical and theoretical methods, this paper provides a unique longitudinal application of *Dynamic Patterns Synthesis* as an exploratory tool for observing the potential complexities that the proposed single currency arrangement across West Africa is likely to pose. The findings highlight multiple conjunctural causation in observing convergence and unpredictability across the Monetary Zone. These observations suggest more time is needed to achieve an established single currency.

Keywords: Complexity; Dynamic Pattern Synthesis; Monetary Convergence; ECOWAS

Introduction

Following the creation of the European Monetary Union, there has been a growing interest in regional monetary unification arrangements (Nkwatoh, 2018; Mati, Civcir, and Ozdeser, 2019). It is suggested that, in unified regional economies, member states can reduce risks amongst vulnerable economies, minimise wars, encourage intra-regional trade and allow complementarities, and entrench competitiveness across member states (Mogaji, 2017). This is seen to accelerate economic development and further improve living standards through trade stimulation (Abban, 2020). Over time, member states would be able to attract investment and deal with asymmetric shocks (such as those resulting from unsustainable debt or fluctuations in export commodity prices), as opposed to a nationalistic approach that may leave a nation vulnerable (Mundell, 1961). Indeed, the IMF (2005) indicated that the economic benefits of monetary cooperation are highlighted in the fact that 52 of its 184 members participate in such arrangements.

In West Africa, earlier attempts at currency cooperation date as far back as 1912 with the formation of the West African Currency Board under British colonial rule, which collapsed after decolonisation. Following the establishment of the Economic Community of West African States (ECOWAS) in 1975, ECOWAS has stressed its desire to advance regional integration through the establishment of a common single currency (the Eco). With the existence of an already established monetary union across French-speaking West African economies (Union Economique et Monetaire Ouest Africaine—WAEMU [1]), a two-track system was proposed (De Grauwe, 2020). This led to the creation of the West African Monetary Zone (WAMZ) as a suggested second monetary zone consisting of English-speaking countries in the region in anticipation that in the long run, the two would converge.

The two-track approach would suggest that monetary integration may not be linear across ECOWAS members. ECOWAS economies are broadly considered to have relatively weak and insufficiently diverse economies in certain cases. The region also has a legacy of political instability

[1] The West African Economic and Monetary Union (WAEMU) is also known as Union Économique et Monétaire Ouest-Africaine (UEMOA). It created the Communauté Française d'Afrique (CFA) Franc, which to date is still in use under the West African Economic and Monetary Union (WAEMU).

DOI: http://dx.doi.org/10.20377/cgn-108

and poor governance (Okafor, 2017). These dynamics are seen to impact inflation and monetary policy responses (Carmignani, 2003). Significant variations in existing currency regimes across WAMZ members also suggests a need for strong regulatory frameworks. These countries would have to undergo gradual structural and regulatory reforms in order to surrender their sovereignty and monetary autonomy, and eventually adopt the Eco. In some instances, their currencies may lose the competitive advantage they may have derived from the current situation. After a series of delays in earlier attempts to adopt the Eco (from 2005 to 2009 to 2015 to 2020 and now to 2027), it is clear that the complexities surrounding the West African monetary integration programme may seem more profound than previously anticipated. Evidently, there is a need to reflect on previous experiences within the region to draw lessons for future efforts.

While Mogaji (2017) studied the evaluation of macroeconomic indicators and the dynamics for monetary integration of West Africa—focusing specifically on WAMZ—those who attempt to assess ECOWAS convergence have focused on expansions in intra-trade relations and the possible effects of a currency union (see for instance, Ezekwesili, 2011; Abban, 2020; Ilyas, et. al., 2021). Alagidede, Coleman, and Cuestas (2012) applied fractional integration and cointegration econometric modelling to study the behaviour of inflation among WAMZ countries and discovered the existence of substantial heterogeneity. Houssa (2008) utilised a dynamic factor model to observe the asymmetric shocks of monetary union in West Africa and found that French-speaking countries experience more demand shocks. Through the use of correlation analysis, Fielding, Lee, and Shields (2004) found that the extent of macroeconomic integration across CFA Franc members is encouraged by monetary integration. Others have also applied Optimum Currency Area to examine the preparedness of ECOWAS members to form a monetary union and found that such aspirations may be impossible (Nkwatoh, 2018; Mati, et. al., 2019).

While these important studies have provided an understanding of causal notions and possible effects, very few studies embrace complexity theory or attempt to use such conceptual notions in the identification of patterns produced in longitudinal applications. However, a non-linear perspective that applies complexity related methodologies may be more fitting in observing how variables and cases interact over time (McEvoy and Richards, 2006; Zelli, Gerrits, and Möller, 2021). Complexity theory provides more thorough insights and observation of trajectories over time. The patterns that evolve are also useful in understanding the nature of complexity within the monetary union. Identifying these patterns over time also offers a degree of system predictability (order or chaos) and observed macro stability (convergence). To advance the observation of these complex patterns, this paper utilizes complexity theory as a methodological tool for understanding how the two monetary trajectories can be observed during five historical time points.

Monetary Convergence Across ECOWAS – A Complexity Perspective

Studies into the feasibility of achieving monetary convergence have revolved around the Optimum/Optimal Currency Area (OCA) theory. This theory holds that a country anticipating membership into a monetary union should satisfy a set of criteria as a condition for assimilation (Hsu, 2010; Regmi, Nikolsko-Rzhevskyy and Thornton, 2015). OCA is grounded on the concept of sigma convergence. Here, convergence is viewed as a decrease in the dispersion index of a variable across a group of cases over time (Hammouda et. al., 2009). Thereby demonstrating similar patterns of economic behaviour (for instance, in inflation expectancies and long-term interest rates). Empirical research on the macroeconomic effects of convergence often focus their analysis on a 'growing resemblance' to identify processes of catching up (beta-convergence), growing similarities (sigma-convergence), or movement towards exemplary models (delta-convergence) (Heichel, et. at., 2005). Such categorisation of cases into restricted parameters for observing case mobility can be limiting. Although convergence may occur over time, case movement may be haphazard and irregular.

In applying complexity theory, a social researcher sees society as dynamic, and not static. The predominant characteristics of this dynamism are the interactions that may transpire between and within systems. Over time, these interactions may produce patterns (Haynes, 2017). Nevertheless, although in a state of perpetual chaos and disorder, patterns may also result over time in societies

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quest for order. In macro-political economics, these changes occur in inconsistent ways at the micro, meso, and macro levels. Changes could be triggered by endogenous factors (e.g., changes in government spending) or as a result of external factors (e.g., changes in aggregate demand for export commodities) (see for instance Stone, 2008). As such, there are multiple interactions between and within systems. In this complex system, "the causal categories become intertwined in such a way that no dualistic language of state plus dynamic laws can completely describe it" (Rosen, 1987.p. 324). Bovaird (2008) also describes a complex system as a succession of subsystems. These complex systems are seen to exist with their own rules of behaviour, have external forces to deal with, and interact with each other (Klijn, 2008).

From this perspective, multiple systems can be identified in the context of ECOWAS currency convergence. A country can be regarded as a system having its own domestic policy values, priorities, and goals, inter alia, which define its interactions with other systems. In this country, numerous systems exist and interact with each other at all levels. From a broader perspective, the country also becomes a component of a larger system (in this case, a regional block—ECOWAS) that interacts with other systems. This picture becomes even more complex when one considers interactions at the continental and global levels (Cilliers, 1998; Nanz & Steffek, 2004; Stone, 2008)[2]. In this research, multiple systems are seen in the form of countries and their monetary systems (Howlett & Ramesh, 2002).

Figure 1 (below) attempts to provide a graphical representation of the complex interactions observed in the ECOWAS monetary system. From this, it is evident that each system is bounded by a dotted line. This suggests that systems are semi-permeable and factors within a system may influence activities within another system. This emphasises the assumption that no smaller social system exists in isolation and as such, they may have an influence on each other—and are also influenced by their external environment (Cilliers, 1998).

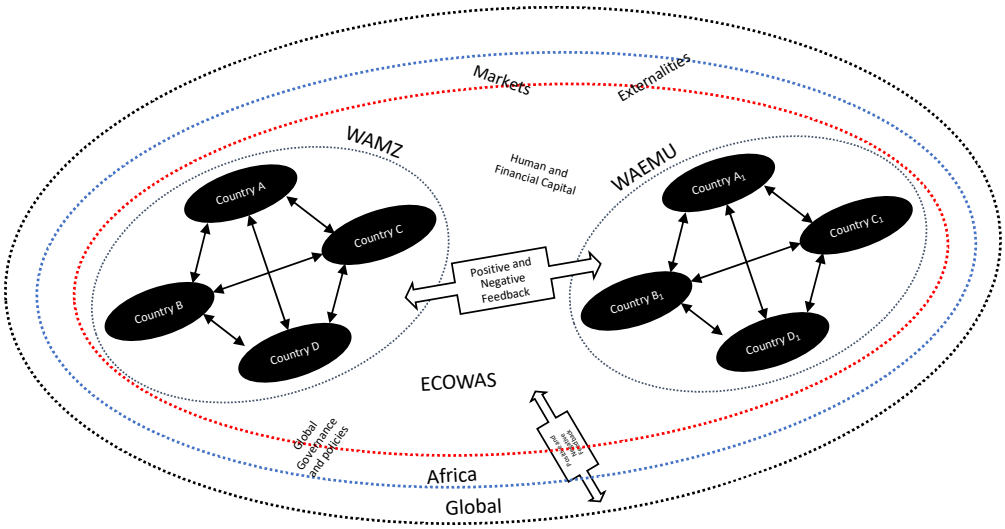

Figure 1. Complex interactions in the ECOWAS monetary system (developed by author).

Indeed, highlighted in the literature on currency convergence, in order to reduce complexity in monetary transactions and eliminate exchange rate uncertainty, among other things, countries adopt monetary cooperation (De Grauwe, 2000). Here, governments attempt to create "order" by identifying certain standards they seek to achieve over time. This is done in anticipation that, in the long run, their monetary systems can become more alike and merge into one larger system. For this reason, monetary cooperation requires a common "single" currency, a common central bank, and a common monetary policy (Plasmans et al., 2006)—thereby reducing the complexity in monetary transactions.

[2] Other systems also include intergovernmental cooperation, nongovernmental organizations, and market inflows that influence trade, labour, and capital flows into countries.

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The implementation of a convergence criterion is seen to promote aspects of certainty and stability, and to limit instability. While attempting to create order, patterns may emerge as a result of the interactions between and within cases, as well as their externalities over time. In such instances, the task is to understand the various journeys the cases may take over time, the patterns that may emerge, and how similar or different cases become. For such observations, causality becomes unpredictable as policy outcomes may vary across similar cases or outcomes may appear similar in divergent cases (Ragin, 1997; Byrne, 2002; Ragin, & Rihoux, 2009, Haynes, 2017). The interdisciplinary approach to the application of complexity has provided some conceptualisation of certain features that can be used to describe complex systems based on the properties they may exhibit (HMT, 2020). To contain the research within a manageable scope, focus is contextually placed on some fundamental temporal elements of complex systems that tend to be missed in the literature on ECOWAS convergence.

Observing Complex Dynamic Patterns Over Time

Neoclassical models on long-run macroeconomic convergence have focused on a growing similarity across a range of aggregate scores. Such methodological applications sometimes tend to be skewed by outliers or misrepresent changes in variable distribution across cases (Haynes and Haynes, 2016). It is for this reason that some scholars have highlighted the crucial role the spatial and time dimensions play in observing convergence (Knill, 2005; Heichel, et. al., 2005). For instance, in their assessment of convergence and heterogeneity across Euro-based economies, Haynes and Haynes (2016) provide some limitations in statistical techniques used to assess convergence. These scholars have highlighted the complex notion of observed convergence and challenged traditional reductionist models that tend to ignore the context and case sensitive nature of this growing similarity.

For some complexity scientists, the notion of a system moving from one stable state to another as a result of change is flawed. Instead, complex adaptive systems are typically non-linear and highly sensitive to initial conditions (Stacey, 1996). Here, the context within which interactions occur within, and between, systems at specific time points form the initial conditions for the emergence of future order. While monetary convergence turns to observe an aggregate growth in similarity between currency regimes over time, an application of complexity theory enables the researcher to observe the case-sensitive nature of convergence over time. For instance, in cases where multiple causalities are repeatedly reinforced by experiences associated with circular causality, when "effects" are fed back to alter "causes," a social researcher may observe the presence of feedback, feedback loops, or complex recurring patterns that may prompt logical paradoxes (Smith, 2005).

Feedback can be explained as the process in which a part of the response of a system is fed back to a cause (Martínez-García, and Hernández-Lemus, 2013). This could result in recursive "loops." Positive feedback increases dynamics or the divergence of a system to its original state, thus destabilizing the system. Negative feedback on the other hand does the opposite (Maturana, 1980). Contextually, periods of stability of government policies towards the achievement of a convergence criteria may come with occasional (and often abrupt) changes/events[3]. These changes may be explained by the presence of positive and negative feedback processes resulting from interactions with other systems, or with the external environment. Such interactions could disrupt convergence as national specific policy interventions may produce varying outcomes. In response to negative events, such as the Ebola outbreak or the Covid-19 pandemic, a country may forgo its ambition to meet a convergent standard in order to respond to domestic impacts. Additionally, nationalistic approaches to economic recovery could impact convergence. If this is understood, recognising self-organising patterns may result in better understanding and control of complex systems, and aid in the allocation of resources to combat such impacts (Baumgartner and Jones, 2002; Martínez-García, and Hernández-Lemus, 2013).

Given that complex systems can be sensitive to initial conditions, and as such, interactions within and between these complex systems could result in feedback loops, emergent complex patterns

[3] Nelson & Winter (1982) categorizes three types of events to understand the subtle differences between pure chance and apparent chance. These are Random, Unpredictable, and Deliberate.

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may develop over time (Smith and Jenks, 2006). New, unexpected features may start to develop over time from interactions between and within systems (Haynes, 2017). These patterns are not simple predictable outcomes, but complex patterns that may result from interactions within a given context and at a specific point in time. In the case of monetary convergence, these patterns should appear, provided that member states achieve the convergence criteria[4]. To observe these longitudinal interactions within the ECOWAS monetary system, this paper employs a new methodological tool that provides systematic comparative observations of variable and case patterns over time.

Methods and Data

Since this article integrates aspects of macro-political economy with complexity theory in its analysis of monetary convergence, an application of *Dynamic Pattern Synthesis* is utilised as an alternative methodological approach to the assessment of convergence. This is aimed at advancing the development of a new, combined longitudinal case-based configurational method. Dynamic Pattern Synthesis can be used as an exploratory tool to observe complex patterns within a system over time. It combines the use of hierarchical cluster analysis (HCA) with configurational modelling to examine similarities and differences between cases at different time points, as well as the extent to which such cases remain similar or different over time (Haynes, 2017).

HCA is used as an exploratory tool to observe patterns of similarity and differences across cases. It provides a focus on countries that maintain cluster grouping over time while highlighting cases that may appear at the periphery of case clustering (outliers). In longitudinal analysis, Dynamic Pattern Synthesis can also be used to identify the movement of cluster partnerships over time and the changes that may emerge based on the variables utilised in the modelling. The application of case-based configurational modelling also allows for careful observation of the trajectory of individual cases and the effects of variable influences on cluster groupings over time.

In this study, Dynamic Pattern Synthesis is applied to cases consisting of fifteen countries within the ECOWAS region in the period 2012-2016[5]. WAEMU members consist of eight economies: Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo. These countries use the CFA franc currency pegged to the Euro. However, unlike the WAEMU, members of the WAMZ have their individual currency regimes—WAMZ consists of six West African states: Cabo Verde, Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone. The period under analysis (2012 - 2016) was also chosen to reflect the possible impact of an event (the Ebola crisis).

ECOWAS assesses monetary convergence on the attainment of specific macroeconomic indicators and structural adjustments that illustrate a threshold level of convergence to become members of the Union[6]. This criterion contains two categories, primary and secondary (see Table 1.). The primary criteria consist of mandatory standards that members must meet to be integrated into the union, while the secondary criteria are desirable standards, but not mandatory. In this study, these markers are used as 'input descriptors' to assess convergence: that is to say, certain features of a system that can make this system complex (Zelli, et. al., 2021). These indicators highlight some relational qualities and timepoints that represent more than the sum of a system's components, thereby defying reductionist techniques. Data on each indicator was collected from the most recent ECOWAS Convergence Report (ECOWAS, 2017a). This report provided the most comprehensive dataset on the ECOWAS convergence situation during the period under discussion. The complete dataset can be found in Appendix 1.4. Indicators are measured as per the outlined standards in Table 1 below.

[4] It is from this perspective that methods like realist evaluation (Pawson and Tilley, 1997) and Qualitative Comparative Analysis (Rihoux & Ragin, 2009), amongst many others, are employed to evaluate the influences of the context, intervention's context, mechanism, and consistencies in outcomes.

[5] The period of choice is based on the most recent available online published 2017 ECOWAS Convergence Report (see. Economic Community of West African States, 2017a). This dataset was also found to be the most comprehensive data on the convergence situation at that time. While attempts were made by the researcher to update this dataset, data on some cases could not obtain as some countries do not publicly release data in a timely manner.

[6] For a detailed discussion on convergence criteria, Bukowski (2006) provides a detailed overview of the economic theory behind this.

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Variable Code	*Meaning*	*Standards*
	Primary Criteria	
BD	Ratio of Budget Deficit to Nominal GDP	≤ 3%
IR	Annual Average Inflation Rate	≤ 10% of target ≤ 5% in 2019
CBF	Central Bank Financing of Budget Deficit	≤ 10% of tax revenues of n-1
GER	Gross External Reserve	≥ 3months
	Secondary Criteria	
TPD	Ratio of Total Public Debt to GDP	≤ 70%
NERV	Nominal Exchange Rate Variation	± 10%

Table 1. List of Convergence Criteria, Standards, and Variable Codes

Hierarchical cluster analysis is applied using a combination of indicators on the primary and secondary convergence criteria (outlined in Table 1). Ward's linkage was considered to be the most appropriate clustering proximity method as it produced fewer mathematical artefacts in the data. Input variables were also standardised to *z* scores to lessen the impact of variables with greater variance. Pearson's correlation was also conducted to observe the possible influences of variables on each other over time (see Appendix 1.2. for correlation plots using correlograms, see Friendly, 2002). Annex 1.3. provides some complementary descriptive diagrams highlighting trends across the convergence indicators.

Cluster dendrograms (Figures 2 - 5 in the results section) offer a visual representation of the HCA results at each time point and are used as the starting point for observing changes that may emerge over the period under analysis. In this HCA presentation, cluster dendrograms are placed alongside each other to highlight emergent patterns across cases over time—cases that remain closely similar over one time point to another (i.e., contextually, these cases converge over t_0 –> t_1). The degree of similarity across clustering is also illustrated by the vertical and horizontal lines that join cases together. When these lines are represented by dashes or dots, this signifies higher dissimilarities. In contrast, tick/solid lines represent stronger similarities across cases. It is important to note that, unlike previous longitudinal applications of Dynamic Pattern Synthesis which have focused on the use of three-time intervals (see for instance: Haynes & Haynes, 2016; Haynes, 2018; Taylor, Haynes & Darking, 2020), this paper compares HCA dendrograms across five time points.

Following the observance of case interactions in cluster grouping over time, and applying the same dataset, configurational case-based modelling is used to identify the influence of associated variables on consistent and emergent clusters. This also allows for the observation of changes in variable patterns over time. Configurational case-based modelling approaches such as Qualitative Comparative Analysis (QCA) have been used in systematic analysis to observe the ways in which the impacts (outcome) of an intervention can be evaluated by the observance of configurational factors (see for instance Ragin, 2000; Schneider & Rohlfing, 2016; Ragin & Fiss, 2017; Kaimann, 2017). This approach recognises varying contributory factors that can lead to change and allows for the observation of 'multiple conjunctural causation' (Ragin, 1987; Berg-Schlosser, et. al., 2009; Haynes, 2017). In this application, individual variables are converted into dichotomous variables (threshold scores) based on the achievement of standards set in the convergence criteria. For cases where the achievement of the convergence criteria is met, data is shaded in the colour of the pattern in the HCA results (see Tables 5 - 10 in Annex 1.1.). Likewise, in cases where this is demonstrated across a set of convergent cases, indicators are in **"Bold"** and *"Italic."* The Boolean convention of UPPERCASE equals achieved criteria and lowercase equals did not achieve criteria (Rihoux & Ragin, 2009) is used in the analysis to highlight longitudinal trends and observe dynamic patterns across variables and cases over time. The results of the application of Dynamic Pattern Synthesis are presented below.

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Analysis and Results

Hierarchical Cluster Analysis:

Figure 2 (below) provides a comparative analysis of the convergence situation for the first time interval when the HCA dendrograms for the years 2012 and 2013 are put together. From the left side (representing 2012 and the right side representing 2013), Sierra Leone, Guinea, and Liberia are clustered together. However, the dotted line linking Sierra Leone to Guinea and Liberia suggests these two countries share more similarities. Below these cases, Burkina Faso, Mali, and Nigeria are clustered together. Similarly, the dotted line linking Burkina Faso and Mali to Nigeria suggests more similarities between the two cases. At the next stage of clustering, the two lines (a tick/solid line for Sierra Leone, Guinea, and Liberia and then a dotted line for Burkina Faso, Mali, and Nigeria) linking the two cluster groups together suggests more similarities between Sierra Leone to Guinea and Liberia as compared to Burkina Faso, Mali, and Nigeria—in this sense Nigeria can be seen as an outlier. This clustering sequence is repeated until all cases are grouped. In Figure 2, two larger/broader cluster formations are also seen to appear in 2012 with a dotted line linking them (i.e., from Sierra Leone to Nigeria and then from Guinea Bissau to Ghana). This shows that cases demonstrate more similarities within cluster members as compared to cases outside cluster memberships.

Placing HCA dendrograms alongside each other allows for the observation of case movement across clustering. For instance, in the top half of Figure 2, the HCA output shows that, while in 2012 Sierra Leone, Guinea, and Liberia shared some similarities, these similarities were stronger between Guinea and Liberia. However, in 2013 Guinea starts to show more similarities with Sierra Leone and differences with Liberia. This can aid in the observation of the stability (or otherwise) in the movement of cases over the period under analysis. In instances where cases remain clustered over time, emergent patterns begin to appear. For instance, between 2012 and 2013 three convergent clusters (emergent cases) can be observed (i.e., Guinea Bissau and Cote D'Ivoire; Togo and Senegal; and Cabo Verde, Gambia, and Ghana). These cases demonstrated strong similarities across the two time points as compared to the other cases. The same HCA application is repeated across the dataset (i.e., for 2013 - 2014, 2014 - 2015, etc.). The dendrograms for the subsequent time points are represented in Figures 3 to 5. For the purpose of this study, the HCA analysis would place attention on the emergence of case patterns that appear during the period under discussion.

Table 2 (below) provides a simple presentation of the emergence of case patterns in order of appearance over the period under discussion. An additional column is added to highlight the currency used by each country. Colour codes are also applied to highlight emergent case patterns. Based on the journeys travelled, complex case patterns begin to appear. While some patterns remained consistent throughout the period under discussion (e.g., Guinea Bissau and Cote D'Ivoire), others faded over time (e.g., Togo and Senegal). In some cases, the dendrograms may suggest their differences grew with time (e.g., Gambia, and Ghana). In other cases, convergent case patterns are seen to emerge and then grow apart over time (e.g., Guinea, Sierra Leone, and Liberia). Nevertheless, over time new patterns also begin to emerge (e.g., between 2015 - 2016 Burkina Faso and Mali, and Benin and Niger). This highlights the evolution of the ECOWAS system and its self-organising nature. HCA is used in this context to group cases on the basis of their similarities to observe case patterns over time. This is based on the actual values of macroeconomic indicators—not the achievement of the convergence criteria.

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Figure 2. HCA Dendrogram Comparing Convergence Situation in Year 2012 with 2013

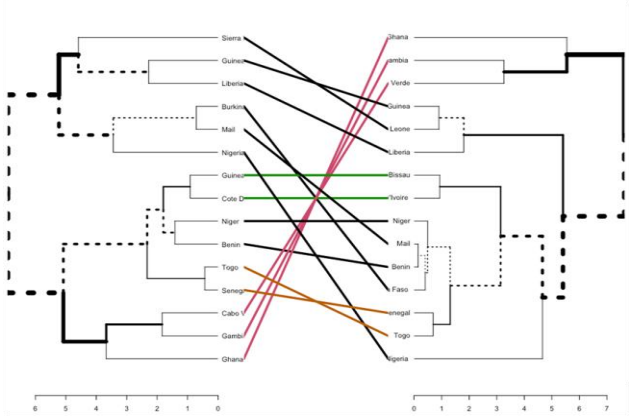


Figure 3. HCA Dendrogram Comparing Convergence Situation in Year 2013 with 2014

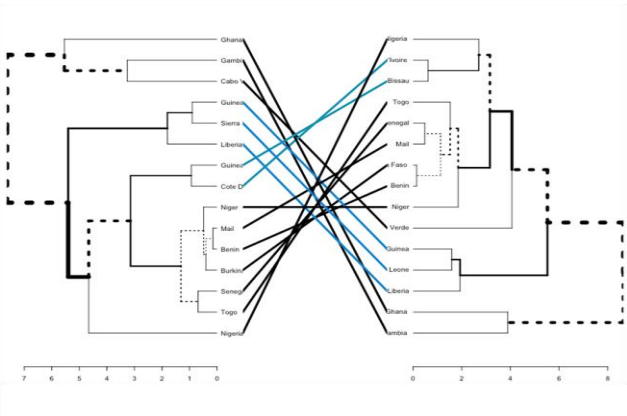


Figure 4. HCA Dendrogram Comparing Convergence Situation in Year 2014 with 2015

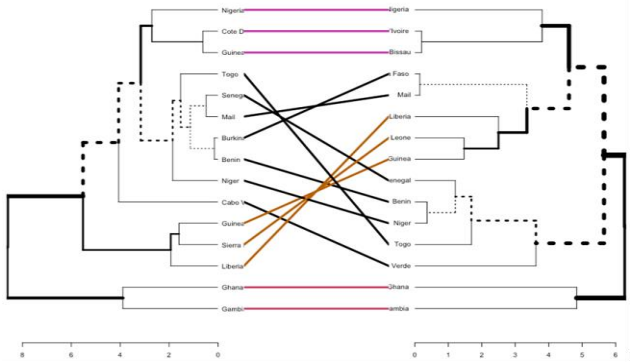
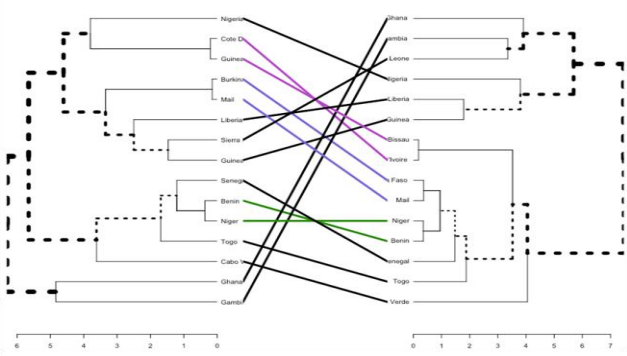


Figure 5. HCA Dendrogram Comparing Convergence Situation in Year 2015 with 2016



Currency	2012	2013	2014	2015	2016
CFA franc	Guinea Bissau	Guinea Bissau	Guinea Bissau	Guinea Bissau	Guinea Bissau
CFA franc	Cote D'Ivoire	Cote D'Ivoire	Cote D'Ivoire	Cote D'Ivoire	Cote D'Ivoire
Naira			Nigeria	Nigeria	
CFA franc	Togo	Togo			
CFA franc	*Senegal*	*Senegal*			
Escudo	Cabo Verde	Cabo Verde			
Dalasi	Gambia	Gambia	Gambia	Gambia	
Cedi	Ghana	Ghana	Ghana	Ghana	
Franc		Guinea	Guinea	Guinea	
Leone		Sierra Leone	Sierra Leone	Sierra Leone	
Dollar		Liberia	Liberia	Liberia	
CFA franc				*Burkina Faso*	*Burkina Faso*
CFA franc				*Mali*	*Mali*
CFA franc				*Benin*	*Benin*
CFA franc				*Niger*	*Niger*

Table 2. Emergent Case Patterns

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Configurational Model:

Following the observance of case interactions in cluster grouping, and applying the same dataset, configurational case-based modelling is used to identify associated variable influences on consistent and emergent clusters at each time point. Variable changes across cases are observed using the raw scores for each variable in the dataset. This is provided in Tables 5 - 10 (see Annex 1.1). Complementarily, Table 3 (below) provides a simplistic configurational model used to observe variable changes that may have influenced the emergence of case patterns over time.

As shown in Table 3 (below), Cote D'Ivoire and Guinea Bissau shared similar variable characteristics in the achievement of IR, CBF, GER, TPD, and NERV in 2012. Although Nigeria shared slight similarities in achieving CBF, GER, TPD, and NERV, it was not clustered with Cote D'Ivoire and Guinea Bissau (see Figure 2). In this year, Nigeria's annual average inflation rate (IR) was at 12.20% as compared to the single-digit inflation rates experienced by Cote D'Ivoire and Guinea Bissau. From 2013, Nigeria starts to show more similarities with Cote D'Ivoire and Guinea Bissau as they demonstrate similar variable characteristics for CBF, GER, TPD, and NERV. These similarities are further intensified as inflation rates stayed relatively stable in the 2013 - 2015 period. Similarities peak in 2014 when all three countries met all the convergence criteria. Despite remaining clustered together in 2015, dissimilarities start to appear as Nigeria is unable to reduce its central bank financing of budget deficit. This was attributed to a decline in total revenue and grants (ECOWAS, 2016). In 2016, Cote D'Ivoire and Guinea Bissau showed strong similarities in achieving five of the six criteria. Both countries were only unable to maintain their Ratio of Budget Deficit to Nominal GDP at a level equal to, or lower than, 3%. On the other hand, Nigeria was able to achieve BD but underperformed with its inflation rates and nominal exchange rate variations. The increase in the general level of prices for Nigeria could be explained by the depreciation of the Naira in 2016 (ECOWAS, 2016). For these cases, some aspects of feedback can be observed in the emergence and unpredictability of the Nigerian economy.

<table>
<tr><th>Currency</th><th>Country</th><th>2012</th><th>2013</th><th>2014</th><th>2015</th><th>2016</th></tr>
<tr><td rowspan="2">CFA franc</td><td>Guinea Bissau</td><td rowspan="2">IR*CBF*GER*TPD* NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*GER*TPD
*NERV</td><td>bd*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td>Cote D'Ivoire</td><td rowspan="2">BD*ir*CBF*GER*TPD*
NERV</td></tr>
<tr><td>Naira</td><td>Nigeria</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*ir*CBF*GER*TPD
*nerv</td></tr>
<tr><td rowspan="2">CFA franc</td><td>Togo</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*tpd
*NERV</td><td>BD*IR*CBF*GER*tpd
*NERV</td></tr>
<tr><td>Senegal</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td>Escudo</td><td>Cabo Verde</td><td rowspan="3">BD*IR*GER*NERV</td><td rowspan="3">BD*GER</td><td>BD*IR*CBF*GER*tpd
*NERV</td><td>BD*IR*CBF*GER*tpd
*NERV</td><td>BD*IR*CBF*GER*tpd
*NERV</td></tr>
<tr><td>Dalasi</td><td>Gambia</td><td rowspan="2">BD*cbf*GER*tpd
*NERV</td><td rowspan="2">BD*ger*tpd</td><td>BD*IR*cbf*ger*tpd
*NERV</td></tr>
<tr><td>Cedi</td><td>Ghana</td><td>bd*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td>Franc</td><td>Guinea</td><td>bd*ir*CBF*ger*TPD
*NERV</td><td rowspan="3">BD*CBF*TPD*NERV</td><td rowspan="3">BD*IR*NERV</td><td rowspan="3">BD*IR*CBR*TPD
*NERV</td><td>BD*IR*CBF*ger*TPD
*NERV</td></tr>
<tr><td>Leone</td><td>Sierra Leone</td><td>BD*ir*CBF*GER*TPD
*NERV</td><td>BD*ir*cbf*GER*TPD
*nerv</td></tr>
<tr><td>Dollar</td><td>Liberia</td><td>bd*IR*CBF*ger*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td rowspan="4">CFA franc</td><td>Burkina Faso</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td>Mali</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td>Benin</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td><td rowspan="2">BD*IR*CBF*GER*TPD
*NERV</td></tr>
<tr><td>Niger</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td><td>BD*IR*CBF*GER*TPD
*NERV</td></tr>
</table>

Table 3. Configurational Output. Note: Authors computation using Excel. Variable codes: Primary Criteria: BD - Ratio of Budget Deficit to Nominal GDP; IR - Annual Average Inflation Rate; CBF - Central Bank Financing of Budget Deficit; GER - Gross External Reserve. Secondary Criteria: TPD - Ratio of Total Public Debt to GDP; NERV - Nominal Exchange Rate Variation. UPPERCASE equals achieved criteria and lowercase equals did not achieve criteria.

For Togo and Senegal, both cases shared similar variable characteristics in the achievement of BD, IR, CBF, GER, TPD, and NERV between the years 2012 - 2014. In 2012, differences start to emerge

DOI: http://dx.doi.org/10.20377/cgn-108

in the ratio of public debt to GDP across cases. While Senegal's TPD dropped by 6% between 2012 and 2013, Togo's increased by 1.3% (see Table 6 in Appendix 1.1.). This disparity becomes profound in 2014 when Togo's ratio of debt to GDP rose to 66%. In the subsequent years, this continued to rise - moving from 76.8% in 2015 to 79.4% in 2016. According to the World Bank-IMF joint debt sustainability analysis (2019), Togo's high public debt is due to high deficits, contingent liabilities, and accumulated arrears amongst others. This has left little space to absorb external shocks. In this case, some adverse effects of the Ebola outbreak (2013 - 2015) destabilised the economy, demonstrating some aspects of sensitivity to initial conditions and path dependency in the Togolese economy—making it ineffective in its ability to absorb external shocks.

Highlighting the complexity within WAMZ, the configurational modelling of Cabo Verde, Gambia, Ghana, Guinea, Sierra Leone, and Liberia demonstrates complex interactions influencing the clustering of these economies. For Cabo Verde, Gambia, and Ghana, the HCA results showed that these cases shared strong similarities in 2012 and 2013. This is partially observed in the achievement of BD, IR, GER, and NERV in 2012, and BD and GER in 2013. In the subsequent years, Cabo Verde starts to diverge after failing to meet the convergence criteria for only TPD. While Ghana and Gambia remain converged, they continue to show some similarities in BD, CBF, GER, TPD, and NERV. With the Escudo pegged to the Euro, Cabo Verde was able to reach all the primary criteria and stabilize its nominal exchange rate variation. However, the economy of Cabo Verde is driven by tourism and was unable to stabilise its ratio of total public debt to GDP due to the adverse effects of the Ebola breakout. Nyarko, et. al., (2015) indicated that, in Africa, the Ebola crisis affected the travel and tourism sector almost more than any other sector. This is also emphasised by Rosselló, Santana-Gallego, and Awan (2017), who looked at the impacts of infectious diseases on international tourism. Evidently, Cabo Verde had earlier implemented an IMF intervention (2010 - 2012) to manage domestic government debt, increase international reserves, and promote structural reforms to improve debt management and strengthen the financial sector (Cabo Verde, 2010). In 2014, Gambia also experienced major shortages in rainfall, coupled with the Ebola breakout across neighbouring countries resulting economic shocks drastically increased its central financing of budget deficit in the subsequent years.

Likewise, although the emergence of Guinea, Sierra Leone, and Liberia may also suggest partial convergence within the region, these countries are predominately members of the Mano River Union. Nevertheless, the clustering of Guinea, Sierra Leone, and Liberia provides a noteworthy case of emergence resulting from an event (Nelson and Winter, 1982). The configurational model shows inconsistencies in meeting all the convergence criteria across the period under study. Yet, these cases start to show strong similarities in the clustering between 2013 - 2015. During this period, these countries were hit by the Ebola epidemic. CDC (2020) statistics suggest that they were the hardest hit countries with the highest death rates. Here, the impact of an epidemic can be seen to have had adverse effects on the monetary system of these countries. After the Ebola outbreak, Guinea, Sierra Leone, and Liberia do not cluster in 2016—to some extent highlighting nationalistic approaches to economic recovery. For Burkina Faso, Mali, Benin, and Niger, these countries met all the convergence criteria throughout the period under study. A detailed look at the indicators (Table 9 and Table 10 in Appendix 1.1.) would suggest that, over time, they become more similar. For instance, slight variations can be observed across the indicators for BD, IR, and TPD. Overall, these patterns provide a path understanding of case variable movement over time—while developing some theories of social change.

The configurational modelling also allows for the observation of 'multiple conjunctural causation' (Ragin, 1987; Berg-Schlosser, et. al., 2009; Haynes, 2017) in the Optimum/Optimal Currency Area (OCA) theory—which suggests that in satisfying a set of criteria countries begin to show similar economic patterns over time (sigma convergence). This is slightly evident across CFA franc members. For instance, Guinea Bissau, Cote D'Ivoire, and Nigeria (uses the Naira) showed similarities in meeting the convergence criteria in 2013, but these similarities peaked in 2014. Adverse effects are also observed when countries are unable to meet the convergence criteria (for instance, Guinea Bissau, Cote D'Ivoire, and Nigeria in 2015 - 2016; and Togo and Senegal in 2014 - 2015). Similarly, for cases where the achievement of all the convergence criteria was met throughout the period under discussion (i.e., Burkina Faso and Mali, and Benin and Niger) cases begin to show more similarities over time—

DOI: http://dx.doi.org/10.20377/cgn-108

eventually leading to some form of 'lock-in' (Unruh, 2000). These observations, to an extent, provide a demonstration of the Optimum/Optimal Currency Area (OCA) theory.

The clustering of Cabo Verde also provides some aspects of delta convergence. Despite its legacy of debt issues, as well as some adverse impacts from the Ebola outbreak on its tourism economy, Cabo Verde showed better resilience in meeting the primary criteria in the subsequent years as compared to Gambia and Ghana. This, to an extent, can be attributed to the fact that the Escudo is pegged to the Euro. Interestingly, during these years (2014 - 2016), Cabo Verde showed more similarities with WAEMU members (CFA Franc is also pegged to the Euro). This also suggests aspects of delta convergence (a movement towards an example model—in this case the Euro). Nevertheless, some systemic spill overs can also be observed when policy actions within one subsystem affects another subsystem (Howlett & Ramesh, 2002; Williams, 2009). This is seen in the form of global travel bans as a result of the Ebola outbreak having an impact on Cabo Verde's ability to meet a convergence criterion. Other complex interactions are also observed in the form of feedback effects in response to events—as with the case of the Ebola outbreak in Guinea, Sierra Leone, and Liberia; aspects of sensitivity to initial conditions in stable patterns observed between some CFA franc members, and path dependency in Togo's increasing public debt.

Longitudinal Configurational Model:

In the longitudinal application of Pattern Synthesis, data can also be coded to further highlight trends in variables and case patterns over time. Table 4 (below) shows a recoded configurational model highlighting the consistency/stability in achieving each criterion throughout the period under analysis. The model, to an extent, shows variations in patterns across and within the two monetary systems (reorder version highlighting disparities across the unions). From this, systemic instability can be observed within WAMZ—when case and variable patterns seem to be unstable over time. With the exception of Cabo Verde, patterns in variable trends and case patterns for WAMZ members is relatively unstable. Very few countries were able to meet all the convergence criteria during the period under study. In these cases, emergent cluster patterns were not directly observed as a result of achieving the convergence criteria, but rather as a result of other impacts. Such changes in case patterns are reflected in the instability of associated variable changes.

Observing Stability in achieving the ECOWAS Convergence Criteria: 2012 - 2016

Union	Country	BD	IR	CBF	GER	TPD	NERV	Variable Pattern	Case Pattern
WAMZ	**Gambia**	***MET***	***MET***			NOT MET		Unstable	Unstable
WAMZ	**Ghana**	***MET***							
WAMZ	**Cabo Verde**	***MET***	MET	MET	MET	NOT MET	MET	Stable with some conditions unmet	Unstable
WAMZ	**Guinea**			MET					
WAMZ	**Sierra Leone**	MET			MET	MET		Unstable	Unstable
WAMZ	**Liberia**		MET	MET		MET	MET		
WAMZ	**Nigeria**	MET			***MET***	***MET***		Unstable	Unstable
WAEMU	**Cote D'Ivoire**		***MET***	***MET***	***MET***	***MET***	***MET***	Largely stable	Stable
WAEMU	**Guinea Bissau**		***MET***	***MET***	***MET***	***MET***	***MET***		
WAEMU	**Burkina Faso**	***MET***	***MET***	***MET***	***MET***	***MET***	***MET***	Stable	Initially unstable but convergence was achieved in 2015/2016
WAEMU	**Mail**	***MET***	***MET***	***MET***	***MET***	***MET***	***MET***		
WAEMU	**Benin**	***MET***	***MET***	***MET***	***MET***	***MET***	***MET***		
WAEMU	**Niger**	***MET***	***MET***	***MET***	***MET***	***MET***	***MET***		
WAEMU	**Senegal**	***MET***	***MET***	***MET***	***MET***	MET	***MET***	Largely stable	Initially stable but diverged after 2014
WAEMU	**Togo**	***MET***	***MET***	***MET***	***MET***		***MET***		

Table 4. Longitudinal Configurational Output (authors computation using Excel).

DOI: http://dx.doi.org/10.20377/cgn-108

However, across WAEMU members, some form of stable dynamics can be observed—where variables and case patterns tend to remain stable over time. Variable patterns seem to be largely stable with the achievement of IR, CBF, GER, and NERV across all members throughout the period under discussion. A few members show inconsistencies in the achievement of BD (Cote D'Ivoire and Guinea Bissau) and TPD (Togo). In the WAEMU, members also tend to remain clustered over longer periods and in some cases, the same variables are associated with this clustering. For WAEMU members, the emergence of case patterns can be somewhat associated with the attainment of the convergence criteria or to the fact that these countries also have the pre-existing unified institutional and policy structures needed to ensure policy alignment. In the application of Pattern Synthesis, additional qualitative data can be used to interpret counterfactuals.

Conclusion: Observing System Change as Patterns

Complexity theory provides a multidimensional perspective to the assessment of monetary convergence and offers a better understanding and observation of trajectories over time. Case-based methods, such as *Dynamic Pattern Synthesis*, allow for the observation of case changes as well as the variable movements associated with such changes. These patterns are usually unpredictable, resulting from interactions within a given context and at a specific point in time. Over time, identifying these patterns offer some degree of system predictability based on the experiences of cases. In its longitudinal application, repeating Dynamic Pattern Synthesis across the same dataset ensures that the method theorises social change, thereby assessing changes against the irreversible dimension of time. This allows for observation of multiple conjunctural causation and consideration of the impact of events across the Monetary Zone. Combined with additional qualitative data, and knowledge of the context and cases, a researcher can interpret these patterns.

For instance, in this study, the findings suggest more efforts need to be focused on convergence across WAMZ members. This is evident in the unstable nature of variables and case patterns across these economies. With exception of Cabo Verde, no WAMZ member was able to meet all the primary convergence criteria during the period under discussion. This highlights the need for stronger institutional and regulatory alignment/compliance across WAMZ members—or what Buti and Turrini (2015) would term 'structural convergence.' If this is targeted towards a focus on encouraging the implementation of structural reforms to enhance technical preparedness, it is more probable to create stable patterns within the region—as with the case of WAEMU members.

The DPS method also allows for the exploration of exceptional cases. For instance, in the study, it becomes evident that Cabo Verdes' resilience in meeting all the primary criteria can be attributed to the fact that its currency is pegged to the Euro. This could add to the debate on the use of fixed/floating exchange rates within the region to minimise risks amongst vulnerable economies (Nathaniel, Oladiran & Oladiran, 2019). To strengthen regulatory alignment and encourage stable patterns, especially in cases of negative events (such as the Covid-19 pandemic), national actors can consider introducing fixed exchange rates—as against the current floating mechanism used amongst most WAMZ members—to aid in improving alignment and accelerating convergence. However, some adverse effects of this can, to an extent, become evident in less diversified economies—as reflected in Cabo Verde's dependence on tourism and growth in public debt.

External events also impact the convergence situation during the period under discussion. In such instances, utilising complexity theory, to an extent, can aid in predicting possible impacts of social change on aspects of a system over time. Evidently, while orthodox approaches may observe convergence as a 'growing resemblance'—identifying processes of catching up, growing similarities, or movement towards exemplary models (Heichel, et. at., 2005). This research demonstrates that, although convergence may occur over time, case and variable movement may be haphazard and irregular.

These findings and methodological applications highlight some complexities observed within the ECOWAS monetary region. This exposes areas of weaknesses or policy impacts within the system and can assist in the development of policy responses to support integration (such as the post-Covid-19 economic recovery), and in the long run, minimise individual risk of asymmetry shocks within the

DOI: http://dx.doi.org/10.20377/cgn-108

region. Other areas of possible application could focus on integration into the wider continental agreements (e.g., the African Continental Free Trade Area agreement).

References

Abban, S. (2020). *On the Computation and Essence of the Nominal Convergence Criteria for Africa Currency Union: ECOWAS in Perspective*. Munich Personal RePEc Archive.

Alagidede, P., Coleman, S., & Cuestas, J. C. (2012). Inflationary shocks and common economic trends: Implications for West African Monetary Union membership. *Journal of Policy Modeling*, *34*(3), 460-475.

Baumgartner, F. R., & Jones, B. D. (2002). Positive and negative feedback in politics. *Policy dynamics*, 3-28.

Boariu, A., & Bilan, I. (2007). Inflationary effects of budget deficit financing in contemporary economies. *Analele Þtiinþifice ale Universitāþii, "Alexandru Ioan Cuza" din iaþiTomul liv*.

Bovaird, T. (2008). Emergent strategic management and planning mechanisms in complex adaptive systems: the case of the UK Best Value initiative. *Public Management Review*, *10*(3), 319-340.

Bukowski, S. (2006). The Maastricht convergence criteria and economic growth in the EMU. *Quaderni del Dipartimento di Economia, Finanza e Statistica*, *24*, 1-19.

Buti, M. and Turrini, A. (2015). Three Waves of Convergence. Can Eurozone Countries Start Growing Together Again? VOX CEPR's Policy Portal.

Byrne, D. (2002). *Interpreting Quantitative Data*. Sage.

Byrne, D. S. (1998). *Complexity theory and the social sciences: An introduction*. Psychology Press.

Cabo Verde. (2010). *Letter of Intent, Memorandum of Economic and Financial Policies, and Technical Memorandum of Understanding*. Retrieved 3 August 2017, from. https://www.imf.org/external/np/cpid/default.aspx.

Carmignani, F. (2003). Political instability, uncertainty and economics. *Journal of Economic Surveys*, *17*(1), 1-54.

Cairney, P. (2012). Complexity theory in political science and public policy. *Political studies review*, *10*(3), 346-358.

CDC (2020). 2014-2016 Ebola Outbreak in West Africa | History | Ebola (Ebola Virus Disease) . Retrieved 27 October 2020, from https://www.cdc.gov/vhf/ebola/history/2014-2016-outbreak/index.html.

Cilliers, P. (1998) *Complexity and postmodernism understanding complex systems*. London Routledge.

Cilliers, P. (2001). Boundaries, hierarchies and networks in complex systems. *International Journal of Innovation Management*, *5*(02), 135-147.

Correia, A. F., Cunha, V. G., Heitor, F., Maria, J. R., & Saramago, L. (2007). Exchange Rate Cooperation Agreement between Portugal and Cabo Verde: characterisation, developments and challenges after 20 years. *future*, 1.

De Grauwe, P. (2000). Monetary policies in the presence of asymmetries. *JCMS: Journal of Common Market Studies*, *38*(4), 593-612.

De Grauwe, P. (2020). *Economics of the monetary union*. Oxford University Press, USA.

Dolowitz, D. P., & Marsh, D. (2000). Learning from abroad: The role of policy transfer in contemporary policy-making. *Governance*, *13*(1), 5-23.

Drezner, D. W. (2001). Globalization and policy convergence. *International studies review*, *3*(1), 53-78.

Economic Community of West African States. (2016). 2015 ECOWAS convergence report. Abuja: ECOWAS.

Economic Community of West African States. (2017). 2016 ECOWAS convergence report. Abuja: ECOWAS.

Ezekwesili, C. E. (2011). Can the monetary integration of ECOWAS improve intra-regional trade?

Fielding, D., Lee, K., & Shields, K. (2004). The characteristics of macroeconomic shocks in the CFA Franc zone. *Journal of African Economies*, *13*(4), 488-517.

Flier, B., Bosch, F. A. V. D., & Volberda, H. W. (2003). Co-evolution in strategic renewal behaviour of British, Dutch and French financial incumbents: Interaction of environmental selection, institutional effects and managerial intentionality. *Journal of Management Studies*, *40*(8), 2163-2187.

Foxon, T. J. (2011). A coevolutionary framework for analysing a transition to a sustainable low carbon economy. *Ecological Economics*, *70*(12), 2258-2267.

Friedman, M. (1997). The role of monetary policy American Economic Review (1968) 58, March, pp. 1–17. In *A Macroeconomics Reader* (pp. 176-191). Routledge.

Friendly, M. (2002). "Corrgrams: Exploratory Displays for Correlation Matrices." *The American Statistician* 56 (4): 316–24.

Hammouda, H. B., Karingi, S. N., Njuguna, A. E., & Jallab, M. S. (2009). Why doesn't regional integration improve income convergence in Africa? *African Development Review*, 21(2), 291-330.

Haynes, P. (2017). *Social synthesis: Finding dynamic patterns in complex social systems*. Routledge.

Haynes, P. (2018). *Complex policy planning: the government strategic management of the social care market*. Routledge.

Haynes, P., & Haynes, J. (2016). Convergence and Heterogeneity in Euro Based Economies: Stability and Dynamics. *Economics*. *4*(3), 16.

Held, D. (1997). Democracy and globalization. *Global Governance: A Review of Multilateralism and International Organizations*, *3*(3), 251-267.

Heichel, S., Pape, J., & Sommerer, T. (2005). Is there convergence in convergence research? An overview of empirical studies on policy convergence. *Journal of European public policy*, *12*(5), 817-840.

HM Treasury (2020) *The Magenta Book: Supplementary Guide. Handling Complexity in Policy Evaluation*. London: HMT

Houssa, R. (2008). Monetary union in West Africa and asymmetric shocks: A dynamic structural factor model approach. *Journal of Development Economics*, *85*(1-2), 319-347.

Howlett, M., & Ramesh, M. (2002). The policy effects of internationalization: A subsystem adjustment analysis of policy

change. *Journal of Comparative Policy Analysis*, *4*(1), 31-50.
Hsu, H.F. (2010). Is a common currency area feasible for East Asia? A multivariate structural vector autoregression approach. *Asian Economic Journal*, 24(4), pp. 391-411.
Jones, T., & Newburn, T. (2002). The transformation of policing? Understanding current trends in policing systems. *The British journal of criminology*, *42*(1), 129-146.
Kanga, D., Murinde, V., & Soumaré, I. (2020). Capital, risk and profitability of WAEMU banks: Does bank ownership matter? *Journal of Banking & Finance*, 105814.
Klijn, E. H. (2008). Governance and governance networks in Europe: An assessment of ten years of research on the theme. *Public management review*, *10*(4), 505-525.
Knill, C. (2005). Introduction: Cross-national policy convergence: concepts, approaches and explanatory factors. *Journal of European public policy*, *12*(5), 764-774.
Laidler, D. (1971). Some evidence of demand for money. *Journal of Political Economics*, Vol.74.
Martínez-García, M., & Hernández-Lemus, E. (2013). Health systems as complex systems. American Journal of Operations Research, Vol. 3 No. 1A, 2013, pp. 113-126. doi: 10.4236/ajor.2013.31A011.
Mati, S., Civcir, I., & Ozdeser, H. (2019). Ecowas common currency: HOW PREPARED ARE ITS MEMBERS? *Investigación económica*, *78*(308), 89-119.
Maturana, H. (1980). Introduction to Autopoiesis and Cognition: The Realization of the Living London; D.
McEvoy, P., & Richards, D. (2006). A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of research in nursing*, 11(1), 66-78.
Mogaji, P. K. (2017). Evaluation of Macroeconomic Indicators and Dynamics for Monetary Integration of West Africa: The Case of the WAMZ.
Mundell, R. A. (1961). A theory of optimum currency areas. *The American economic review*, *51*(4), 657-665.
Nanz, P., & Steffek, J. (2004). Global governance, participation and the public sphere. *Government and opposition*, *39*(2), 314-335.
Nathaniel, O. O., Oladiran, O. I., & Oladiran, A. T. (2019). Impact of Exchange Rate Regimes on Economic Integration in the ECOWAS (1980-2017). *African Journal of Economic Review*, *7*(2), 42-59.
Nkwatoh, L. S. (2018). Does ECOWAS Macroeconomic Convergence Criteria Satisfy an Optimum Currency Area? *Journal of Economics and Management Sciences*, *1*(2), p61-p61.
Nyarko, Y., Goldfrank, L., Ogedegbe, G., Soghoian, S., Aikins, A. D. G., & NYU-UG-KBTH, G. E. W. (2015). Preparing for Ebola Virus Disease in West African countries not yet affected: perspectives from Ghanaian health professionals. *Globalization and health*, *11*(1), 7.
Obi, K. O., & Uzodigwe, A. A. (2015). Dynamic impact of money supply on inflation: evidence from ECOWAS member states.
Okafor, G. (2017). The impact of political instability on the economic growth of ECOWAS member countries. *Defence and Peace Economics*, *28*(2), 208-229.
Oladipo, S. O., & Akinbobola, T. O. (2011). Budget deficit and inflation in Nigeria: A causal relationship. *Journal of Emerging Trends in Economics and Management Sciences*, *2*(1), 1-8.
Osberg, D., Biesta, G., & Cilliers, P. (2008). From representation to emergence: Complexity's challenge to the epistemology of schooling. *Educational Philosophy and Theory*, *40*(1), 213–227.
Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. *American political science review*, 251-267.
Pierson, P. (2004). Positive feedback and path dependence. *P. Pierson, Politics in Time. History, Institutions, and Social Analysis*, 17-53.
Plasmans, J. E., Engwerda, J., Van Aarle, B., Di Bartolomeo, G., & Michalak, T. (2006). *Dynamic modeling of monetary and fiscal cooperation among nations* (Vol. 8). Springer Science & Business Media.
Ragin, C. (1987). *The comparative method: Moving beyond qualitative and quantitative methods*. Berkeley: University of California.
Ragin, C. C. (1997). Turning the tables: how case-oriented methods challenge variable-oriented methods. *Comparative Social Research*, *16*(1), 27-42.
Ragin, C. C., & Becker, H. S. (Eds.). (1992). *What is a case?: exploring the foundations of social inquiry*. Cambridge university press.
Ragin, C. C., & Rihoux, B. (Eds.). (2009). *Configurational comparative methods: Qualitative comparative analysis (QCA) and related techniques*. Sage.
Regmi, K., Nikolsko-Rzhevskyy, A., and Thornton, R. (2015). To be or not to be: An Optimum Currency Area for South Asia? *Journal of Policy Modeling*, 37(6), pp. 930-944.
Rihoux, B., Rezsöhazy, I., & Bol, D. (2011). Qualitative comparative analysis (QCA) in public policy analysis: an extensive review. *German Policy Studies*, 7(3), 9-82.
Rose, R. (1991). What is lesson-drawing?. *Journal of public policy*, 3-30.
Rosen, R. (1987). Some epistemological issues in physics and biology. *Quantum implications: Essays in honour of David Bohm*, 314-327.
Rosselló, J., Santana-Gallego, M., & Awan, W. (2017). Infectious disease risk and international tourism demand. *Health policy and planning*, *32*(4), 538-548.
Sheppard, D. K., and Duck, N. W.,(1978). A Proposal for the Control of the UK Money Supply. *The Economic Journal*, *88*(349), 1-17.
Smith, J., & Jenks, C. (2006). *Qualitative complexity: Ecology, cognitive processes and the re-emergence of structures in post-humanist social theory*. Routledge.

Smith, L. B. (2005). Cognition as a dynamic system: Principles from embodiment. *Developmental Review*, *25*(3-4), 278-298.
Solomon, M., & De Wet, W. A. (2004). The effect of a budget deficit on inflation: The case of Tanzania. *South African Journal of Economic and Management Sciences*, *7*(1), 100-116.
Stacey, R. D. (1996). *Complexity and creativity in organizations*. Berrett-Koehler Publishers.
Stone, D. (2008). Global public policy, transnational policy communities, and their networks. *Policy studies journal*, *36*(1), 19-38.
Taylor, L., Haynes, P., & Darking, M. (2020). English local government finance in transition: towards the 'marketization of income'. *Public Management Review*, 1-26.
Unruh, G. C. (2000). Understanding carbon lock-in. *Energy policy*, *28*(12), 817-830.
Williams, R. A. (2009). Exogenous shocks in subsystem adjustment and policy change: the credit crunch and Canadian banking regulation. *Journal of Public Policy*, 29(1), 29-53.
Weible, C. M. (2014). Advancing policy process research. *Theories of the policy process*, *3*, 391-408.
World Bank; International Monetary Fund. (2019). *Togo - Joint World Bank-IMF Debt Sustainability Analysis. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/32564 License: CC BY 3.0 IGO.*
Zelli, F., Gerrits, L., & Möller, I. (2021). Global Governance in Complex Times: Exploring New Concepts and Theories on Institutional Complexity. *Complexity, Governance & Networks*, *6*(1), 1-13.

Annex

Annex 1.1. Configurational Model for Emergent Clusters

Note: For cases where the achievement of the convergence criteria is met, data is shaded in the colour of the pattern in the HCA results. Likewise, in cases where this is demonstrated across a set of convergent cases, indicators are in **"Bold"** and *"Italic."* Variable codes: Primary Criteria: BD - Ratio of Budget Deficit to Nominal GDP; IR - Annual Average Inflation Rate; CBF - Central Bank Financing of Budget Deficit; GER - Gross External Reserve. Secondary Criteria: TPD - Ratio of Total Public Debt to GDP; NERV - Nominal Exchange Rate Variation.

	BD_2012	IR_2012	CBF_2012	GER_2012	TPD_2012	NERV_2012
Nigeria	-1.40	12.20	*0*	*8.50*	*12.60*	*0.70*
Cote D'Ivoire	3.20	1.30	*0*	*5.30*	*34.20*	*-4.80*
Guinea Bissau	2.10	2.10	*0*	*5.30*	*52.40*	*-4.80*
	BD_2013	**IR_2013**	**CBF_2013**	**GER_2013**	**TPD_2013**	**NERV_2013**
Nigeria	-1.3	*8.5*	*0*	*8.9*	*12.4*	*2.1*
Cote D'Ivoire	2.2	*2.6*	*0*	*4.7*	*34*	*4.1*
Guinea Bissau	3.4	*0.7*	*0*	*4.7*	*52.6*	*4.1*
	BD_2014	**IR_2014**	**CBF_2014**	**GER_2014**	**TPD_2014**	**NERV_2014**
Nigeria	*-1*	*8*	*0*	*6*	*12.5*	*-1.9*
Cote D'Ivoire	*2.2*	*0.4*	*0*	*5*	*36.9*	*0.1*
Guinea Bissau	*2.6*	*-1*	*0*	*5*	*53.3*	*0.1*
	BD_2015	**IR_2015**	**CBF_2015**	**GER_2015**	**TPD_2015**	**NERV_2015**
Nigeria	*-1.5*	*9*	13.1	*8.2*	*12.6*	*-1.9*
Cote D'Ivoire	*2.9*	*1.2*	0	*5*	*40.8*	*-9.3*
Guinea Bissau	*2.7*	*1.4*	0	*5*	*46.8*	*-9.3*
	BD_2016	**IR_2016**	**CBF_2016**	**GER_2016**	**TPD_2016**	**NERV_2016**
Nigeria	-2.2	15.7	*0*	*5.8*	*17.1*	-23.5
Cote D'Ivoire	3.9	0.7	*0*	*4.4*	*42.1*	0.5
Guinea Bissau	4	1.5	*0*	*4.4*	*46.1*	0.5

Table 5. Configurational model for Nigeria, Cote D'Ivoire, and Guinea Bissau

DOI: http://dx.doi.org/10.20377/cgn-108

	BD_2012	IR_2012	CBF_2012	GER_2012	TPD_2012	NERV_2012
Senegal	*-5.80*	*1.40*	*0*	*5.30*	*36.70*	*-4.80*
Togo	*-5.80*	*2.60*	*0*	*5.30*	*44.00*	*-4.80*
	BD_2013	**IR_2013**	**CBF_2013**	**GER_2013**	**TPD_2013**	**NERV_2013**
Senegal	*-5.5*	*0.7*	*0*	*4.7*	*30.7*	*4.1*
Togo	*-4.6*	*1.8*	*0*	*4.7*	*45.3*	*4.1*
	BD_2014	**IR_2014**	**CBF_2014**	**GER_2014**	**TPD_2014**	**NERV_2014**
Senegal	*-5.2*	*1.1*	*0*	*5*	*35.4*	*0.1*
Togo	*-3.4*	*0.2*	*0*	*5*	*66.9*	*0.1*
	BD_2015	**IR_2015**	**CBF_2015**	**GER_2015**	**TPD_2015**	**NERV_2015**
Senegal	*-4.8*	*0.1*	*0*	*5*	29.1	*-9.3*
Togo	*-6.3*	*1.8*	*0*	*5*	76.8	*-9.3*
	BD_2016	**IR_2016**	**CBF_2016**	**GER_2016**	**TPD_2016**	**NERV_2016**
Senegal	*-4.2*	*0.8*	*0*	*5.79*	55.7	*0.5*
Togo	*-8.5*	*0.9*	*0*	*4.4*	79.4	*0.5*

Table 6. Configurational model for Senegal and Togo

	BD_2012	IR_2012	CBF_2012	GER_2012	TPD_2012	NERV_2012
Ghana	*-5.70*	*9.10*	25.40	*3.00*	47.80	*-4.40*
Cabo Verde	*-12.40*	*2.50*	0	*4.00*	91.10	*-4.00*
Gambia	*-4.60*	*4.30*	0.40	*4.80*	78.00	*-4.50*
	BD_2013	**IR_2013**	**CBF_2013**	**GER_2013**	**TPD_2013**	**NERV_2013**
Ghana	*-8.6*	11.7	12.3	*3.1*	56.8	-7.4
Cabo Verde	*-8.8*	1.5	0	*4.9*	102.5	4.1
Gambia	*-8.7*	5.7	0	*4.6*	88.1	-10.3
	BD_2014	**IR_2014**	**CBF_2014**	**GER_2014**	**TPD_2014**	**NERV_2014**
Ghana	*-6.4*	17	13.7	*3*	70.2	-31.5
Cabo Verde	*-7.2*	-0.2	0	*5.4*	115	0.1
Gambia	*-9.6*	6.9	40.8	*3.7*	104.1	-16.5
	BD_2015	**IR_2015**	**CBF_2015**	**GER_2015**	**TPD_2015**	**NERV_2015**
Ghana	*-4.8*	17.2	4.1	2.6	73.2	-15.7
Cabo Verde	*-3.9*	0.1	0	6.4	126.1	-9.3
Gambia	*-6.3*	6.8	41.5	2.5	101.1	4.9
	BD_2016	**IR_2016**	**CBF_2016**	**GER_2016**	**TPD_2016**	**NERV_2016**
Ghana	*-10.9*	17.5	0	2.8	73.1	*-4.2*
Cabo Verde	*-3.5*	-1.4	0	6.6	128.6	*0.5*
Gambia	*-9.5*	7.9	33.1	2.4	117.3	*-3.3*

Table 7. Configurational model for Cluster Ghana, Cabo Verde, and Gambia

DOI: http://dx.doi.org/10.20377/cgn-108

	BD_2012	IR_2012	CBF_2012	GER_2012	TPD_2012	NERV_2012
Liberia	7.50	6.90	0	2.80	*34.10*	*1.30*
Guinea	3.20	15.20	0	2.40	*42.20*	*-2.50*
Sierra Leone	-5.20	12.90	- 37.70	3.40	*36.70*	*3.30*
	BD_2013	**IR_2013**	**CBF_2013**	**GER_2013**	**TPD_2013**	**NERV_2013**
Liberia	*-0.5*	7.6	*0*	2.8	*30.5*	*-4.1*
Guinea	*-2*	11.9	*0.01*	2.9	*44.5*	*2.1*
Sierra Leone	*-1.6*	10.4	*1.7*	3.2	*30.8*	*1.1*
	BD_2014	**IR_2014**	**CBF_2014**	**GER_2014**	**TPD_2014**	**NERV_2014**
Liberia	*0.2*	*9.8*	0	2.5	37.9	*-9*
Guinea	*-3.56*	*9.7*	0	3.2	73.5	*-1.5*
Sierra Leone	*-3.3*	*7.2*	7.2	3.6	35.4	*-4*
	BD_2015	**IR_2015**	**CBF_2015**	**GER_2015**	**TPD_2015**	**NERV_2015**
Liberia	*1.6*	*7.8*	*0*	2.3	*32*	*7.2*
Guinea	*-6.9*	*8.2*	*0.26*	2.2	*43.3*	*2.2*
Sierra Leone	*-4.1*	*8.1*	*-0.7*	3.8	*29.1*	*-3.1*
	BD_2016	**IR_2016**	**CBF_2016**	**GER_2016**	**TPD_2016**	**NERV_2016**
Liberia	*2.2*	8.8	0	3.3	*36.7*	-8.4
Guinea	*0.1*	8.2	0.01	1.4	*43.1*	-16.4
Sierra Leone	*-6.4*	10.8	33.1	4.7	*55.7*	-19.1

Table 8. Configurational model for Liberia, Guinea, and Sierra Leone

	BD_2012	IR_2012	CBF_2012	GER_2012	TPD_2012	NERV_2012
Benin	*-0.40*	*6.80*	*0*	*5.30*	*26.80*	*-4.80*
Niger	*-1.10*	*0.50*	*0*	*5.30*	*18.80*	*-4.80*
	BD_2013	**IR_2013**	**CBF_2013**	**GER_2013**	**TPD_2013**	**NERV_2013**
Benin	*-2.6*	*1*	*0*	*4.7*	*25.4*	*4.1*
Niger	*-2.6*	*2.3*	*0*	*4.7*	*23.1*	*4.1*
	BD_2014	**IR_2014**	**CBF_2014**	**GER_2014**	**TPD_2014**	**NERV_2014**
Benin	*-1.9*	*-1.1*	*0*	*5*	*30.9*	*0.1*
Niger	*-8.1*	*0.9*	*0*	*5*	*25.6*	*0.1*
	BD_2015	**IR_2015**	**CBF_2015**	**GER_2015**	**TPD_2015**	**NERV_2015**
Benin	*-8*	*0.3*	*0*	*5*	*42.4*	*-9.3*
Niger	*-9*	*1*	*0*	*5*	*36*	*-9.3*
	BD_2016	**IR_2016**	**CBF_2016**	**GER_2016**	**TPD_2016**	**NERV_2016**
Benin	*-6.2*	*-0.8*	*0*	*4.4*	*49.4*	*0.5*
Niger	*-6.1*	*0.2*	*0*	*4.4*	*39.7*	*0.5*

Table 9. Configurational model for Benin and Niger

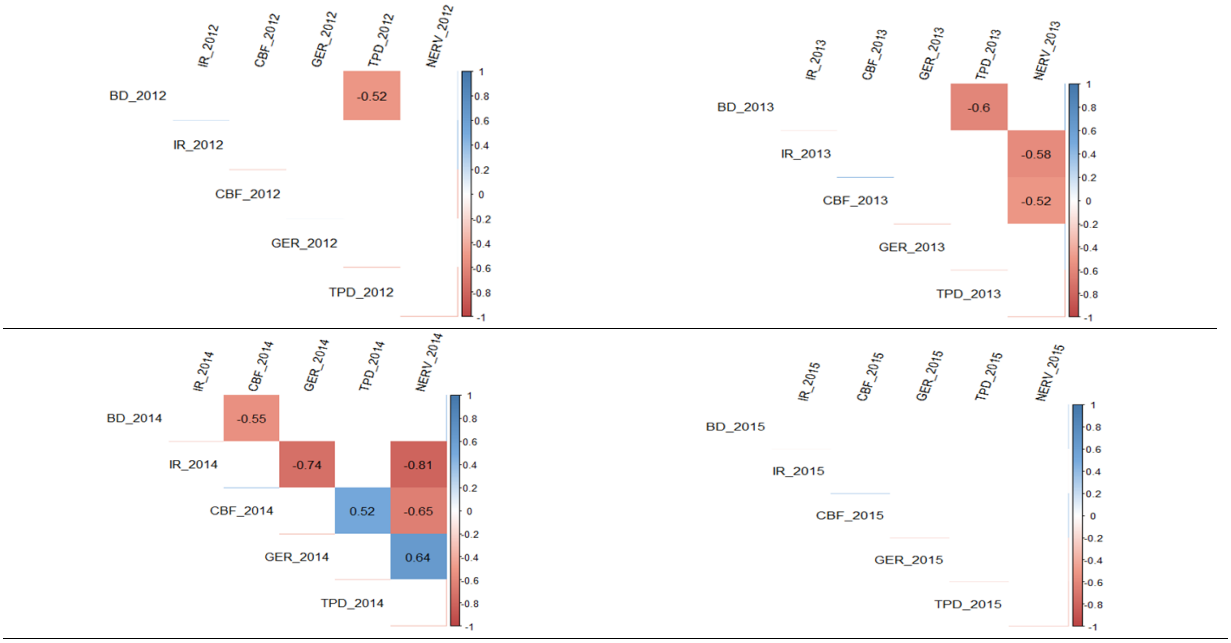
DOI: http://dx.doi.org/10.20377/cgn-108

	BD_2012	IR_2012	CBF_2012	GER_2012	TPD_2012	NERV_2012
Burkina Faso	*-3.10*	*3.80*	*0*	*5.30*	*27.96*	*4.78*
Mali	*-0.10*	*5.30*	*0*	*5.30*	*24.30*	*4.80*
	BD_2013	**IR_2013**	**CBF_2013**	**GER_2013**	**TPD_2013**	**NERV_2013**
Burkina Faso	*-3.58*	*0.5*	*0*	*4.7*	*28.58*	*4.12*
Mali	*-2.2*	*0.6*	*0*	*4.7*	*26*	*4.1*
	BD_2014	**IR_2014**	**CBF_2014**	**GER_2014**	**TPD_2014**	**NERV_2014**
Burkina Faso	*-1.85*	*-0.3*	*0*	*5*	*30.79*	*0.09*
Mali	*-3.8*	*0.9*	*0*	*5*	*27.1*	*0.1*
	BD_2015	**IR_2015**	**CBF_2015**	**GER_2015**	**TPD_2015**	**NERV_2015**
Burkina Faso	*-2.03*	*0.9*	*0*	*5*	*32.75*	*9.33*
Mali	*-1.8*	*1.5*	*0*	*5*	*30.8*	*9.3*
	BD_2016	**IR_2016**	**CBF_2016**	**GER_2016**	**TPD_2016**	**NERV_2016**
Burkina Faso	*-3.14*	*-0.2*	*0*	*4.4*	*34.23*	*0.5*
Mali	*-3.9*	*1.8*	*0*	*4.4*	*36*	*0.5*

Table 10. Configurational model for Burkina Faso and Mali

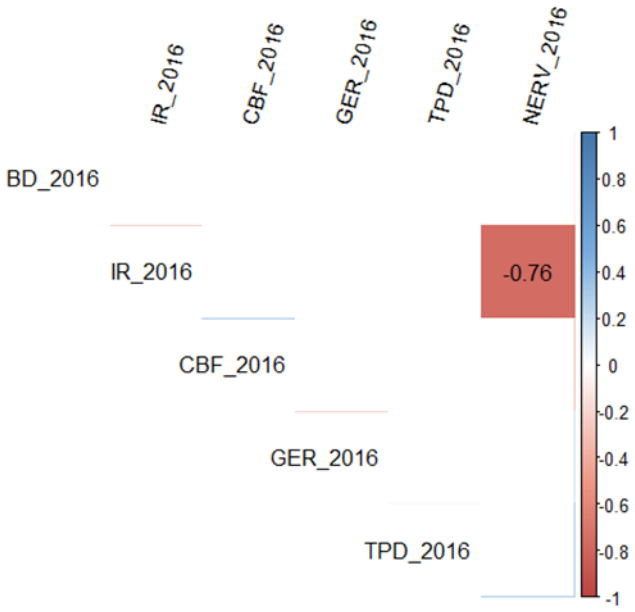
Annex 1.2. Correlation Plot for 2012 to 2015

Note: Correlograms display correlation coefficients for variable pairs. Pairs with more intense colours have more extreme correlations. For insignificant correlations (not significantly different from 0), these are represented by a white box. For more details, see Friendly (2002). Variable codes: Primary Criteria: BD – Ratio of Budget Deficit to Nominal GDP; IR – Annual Average Inflation Rate; CBF – Central Bank Financing of Budget Deficit; GER – Gross External Reserve. Secondary Criteria: TPD – Ratio of Total Public Debt to GDP; NERV – Nominal Exchange Rate Variation.



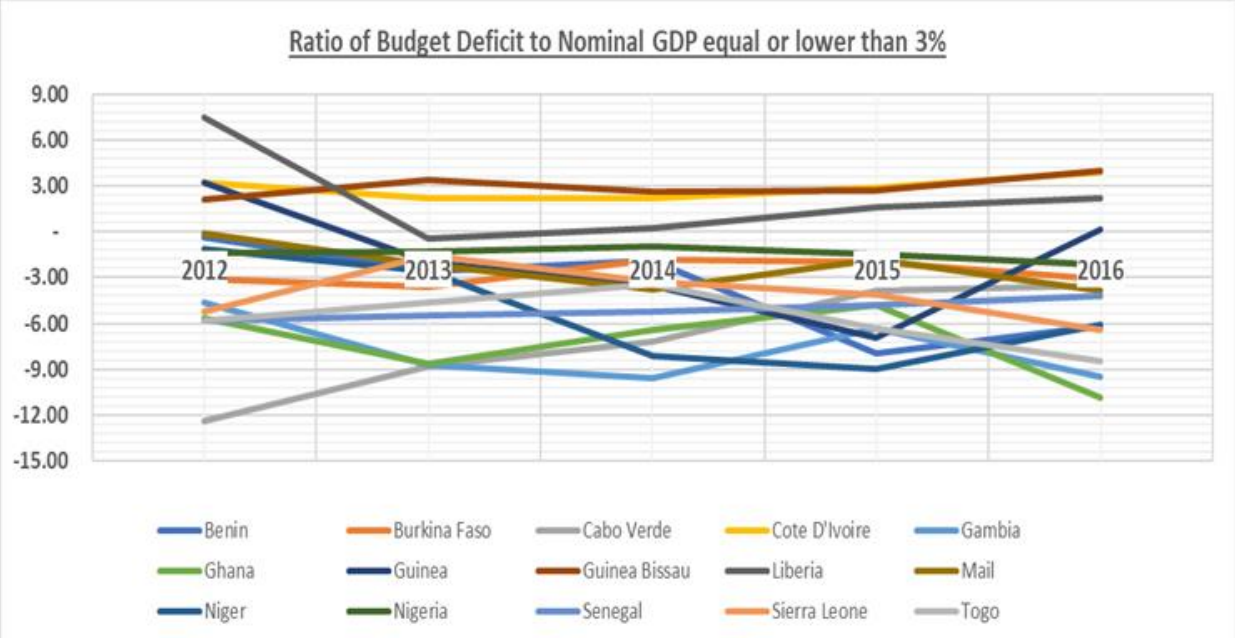
DOI: http://dx.doi.org/10.20377/cgn-108

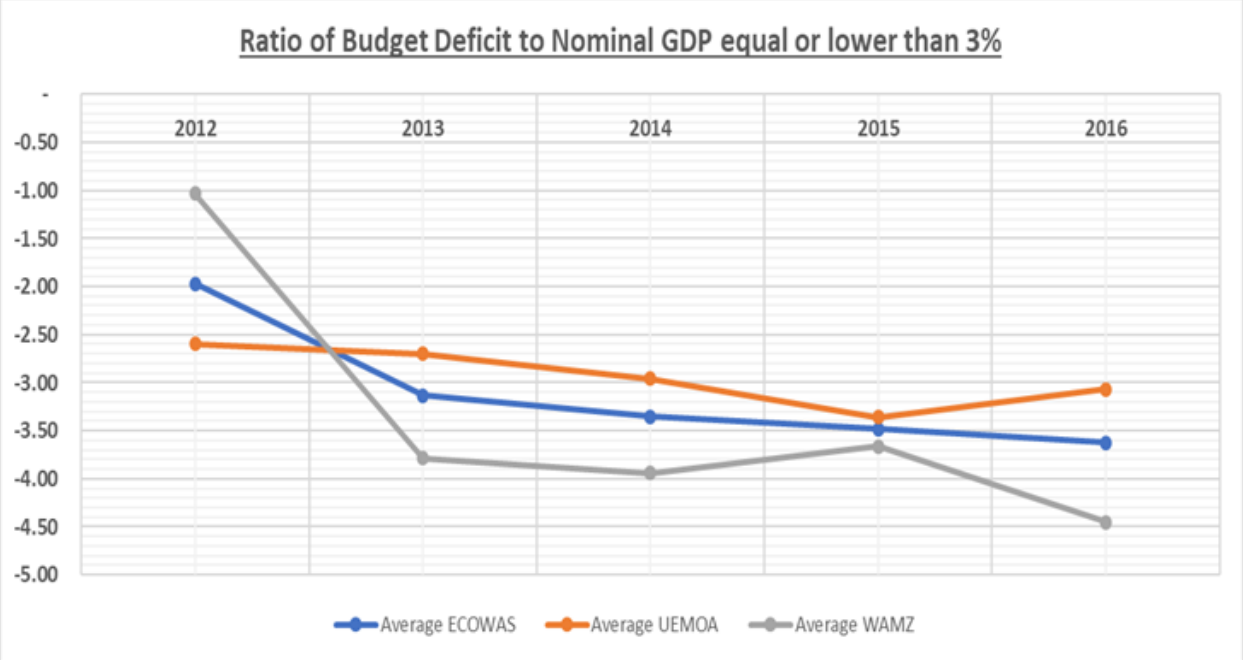
Annex 1.2. Correlation Plot for 2016 (Correlograms – see Friendly, 2002) (Continued)



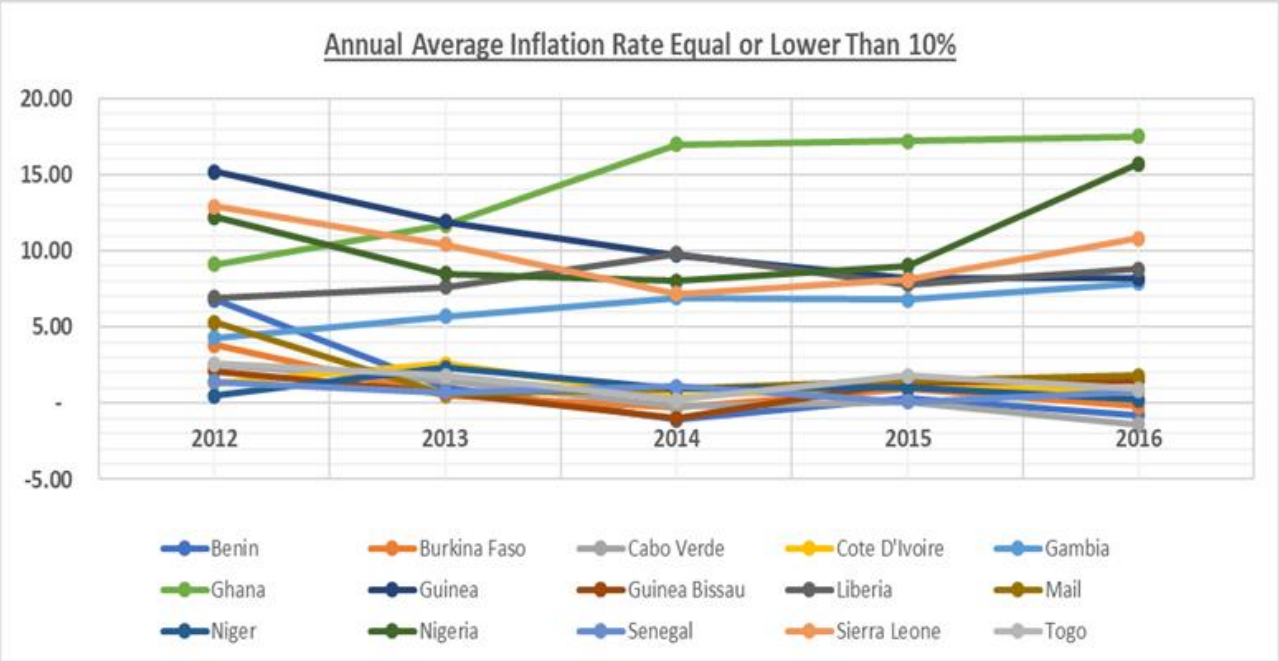
DOI: http://dx.doi.org/10.20377/cgn-108

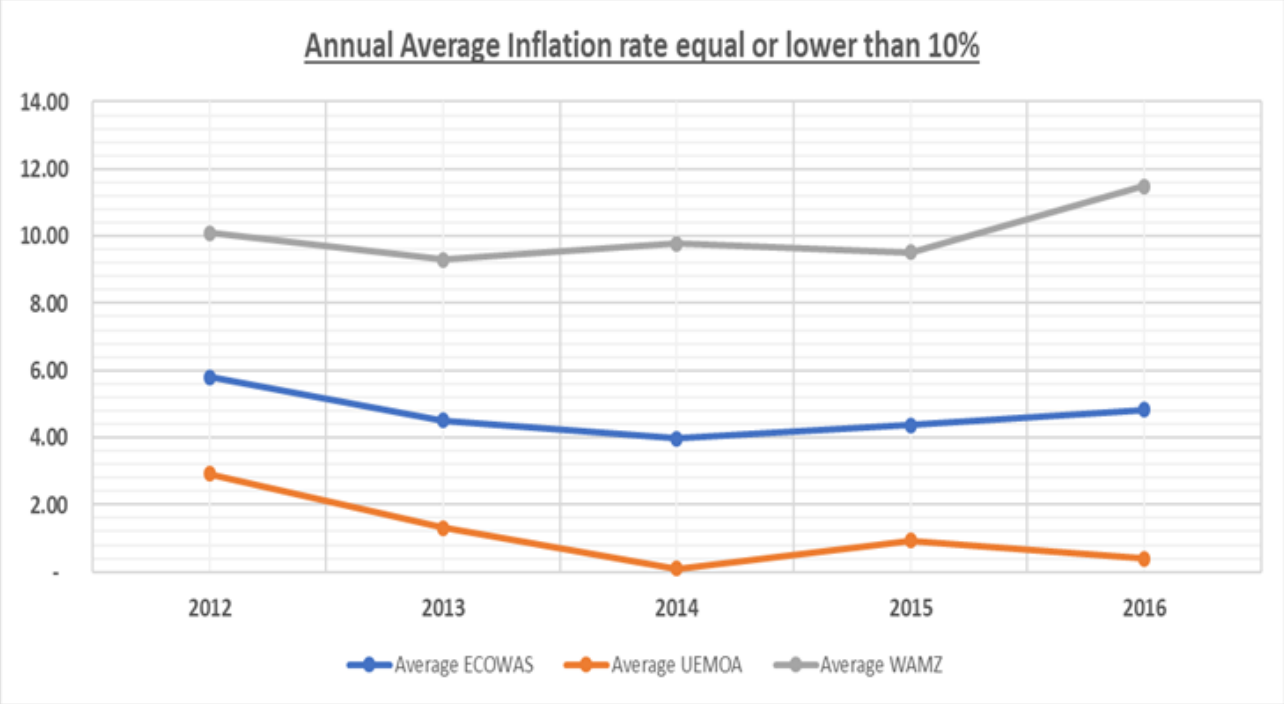
Annex 1.3. Trends in Convergence Indicators





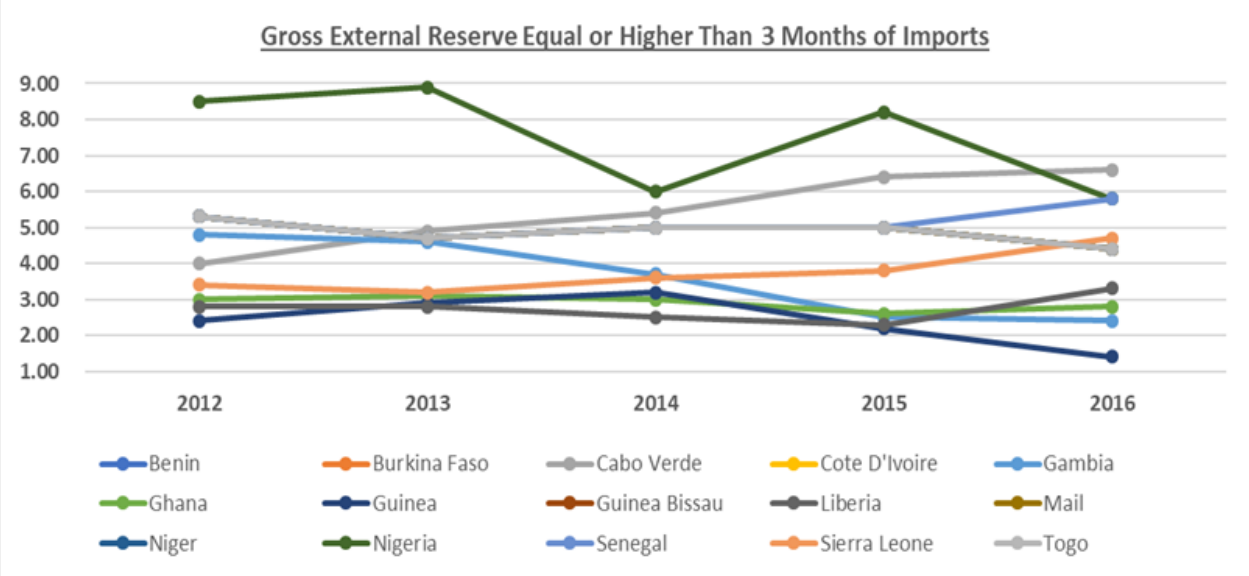
DOI: http://dx.doi.org/10.20377/cgn-108

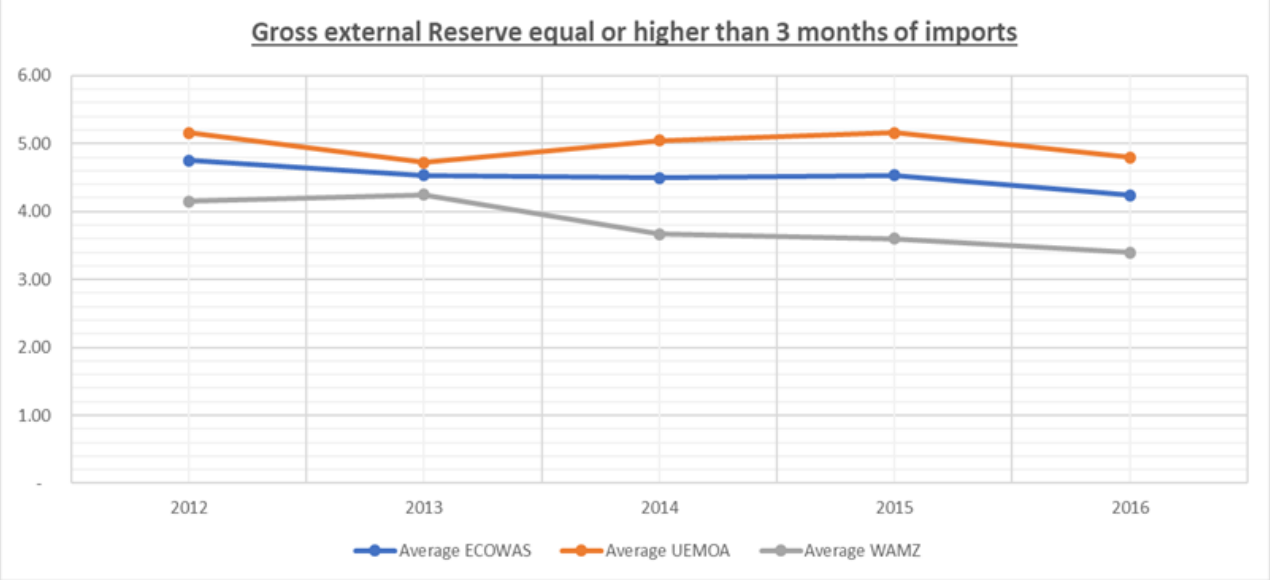


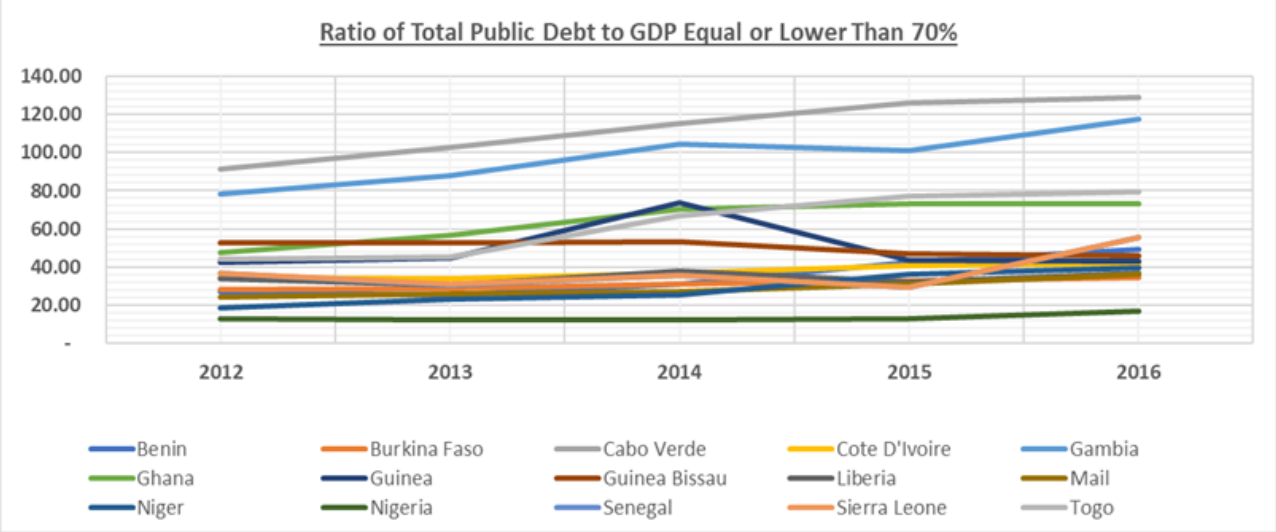


DOI: http://dx.doi.org/10.20377/cgn-108

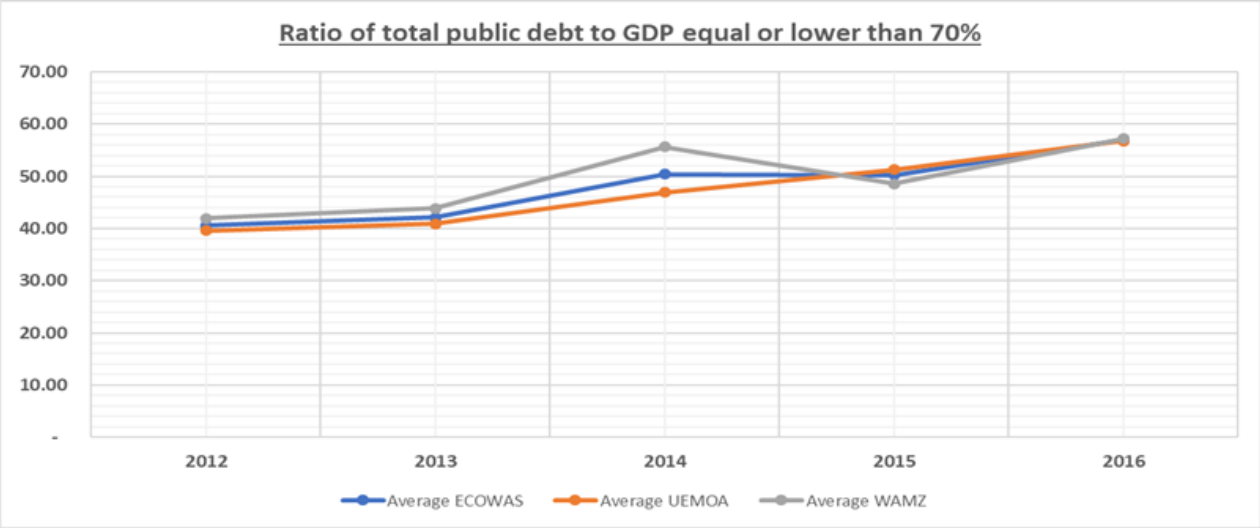
Annex 1.3. Trends in Convergence Indicators (Continued)



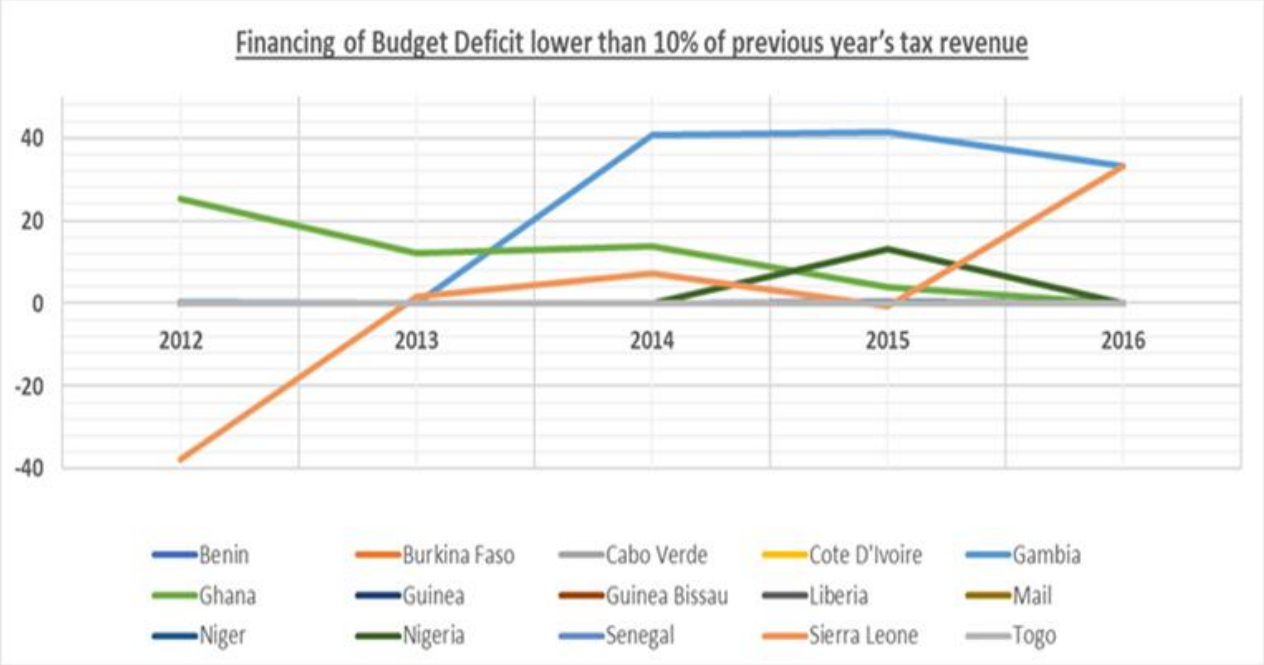




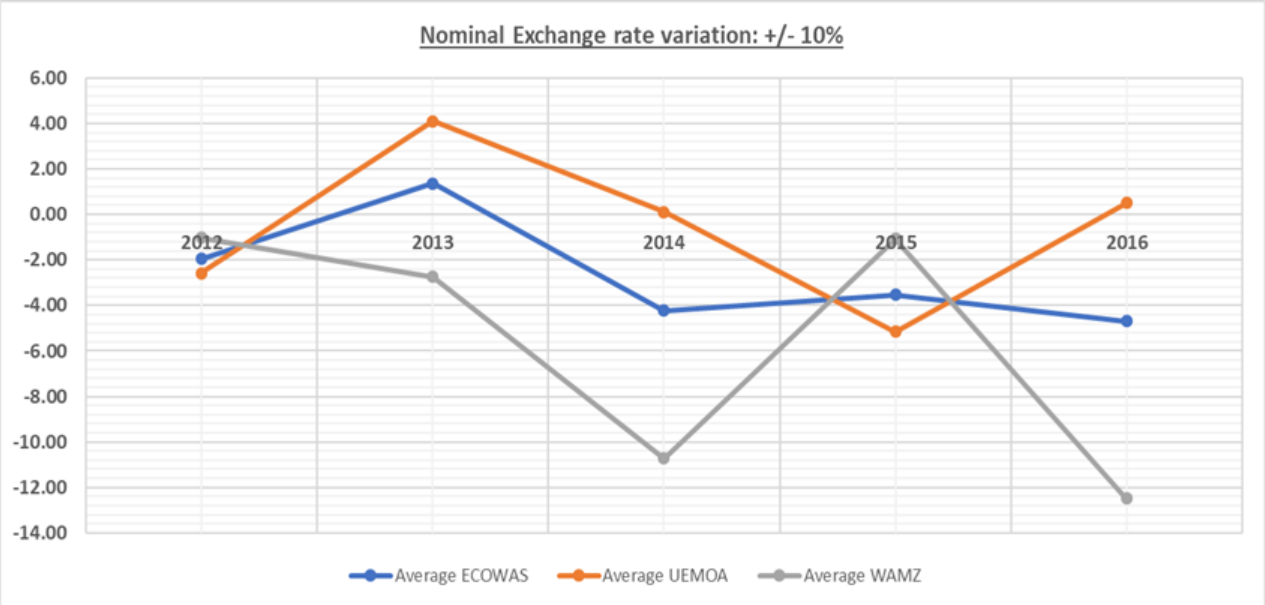
DOI: http://dx.doi.org/10.20377/cgn-108

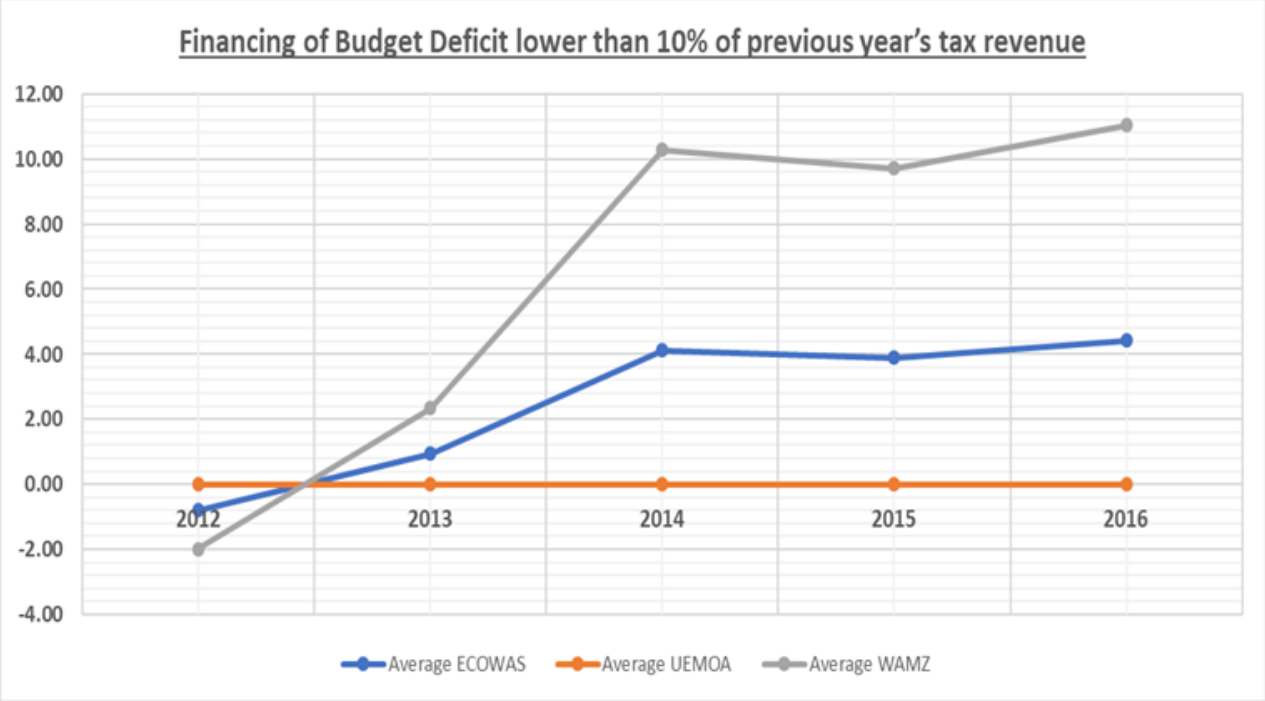


Annex 1.3. Trends in Convergence Indicators (Continued)

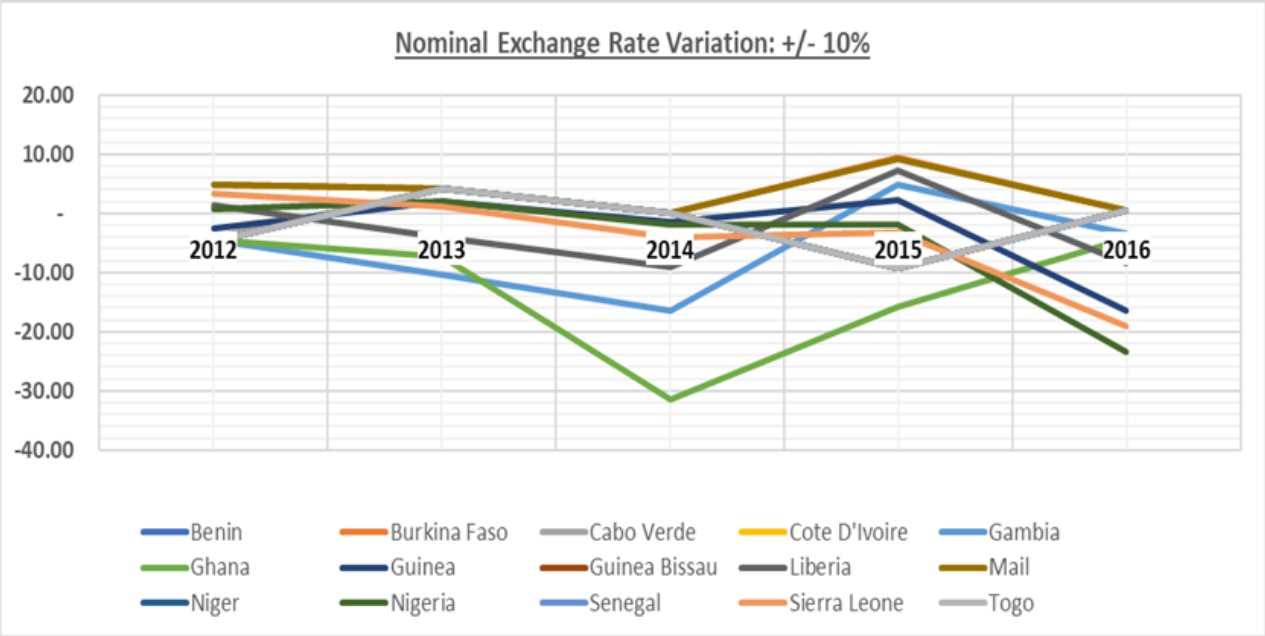


DOI: http://dx.doi.org/10.20377/cgn-108





DOI: http://dx.doi.org/10.20377/cgn-108



DOI: http://dx.doi.org/10.20377/cgn-108

Appendix 1.4. ECOWAS Convergence Situation 2012 - 2016 Dataset[7]

Country	**BD_2012**	**IR_2012**	**CBF_2012**	**GER_2012**	**TPD_2012**	**NERV_2012**
Benin	- 0.40	6.80	0	5.30	26.80	- 4.80
Burkina Faso	- 3.10	3.80	0	5.30	27.96	4.78
Cabo Verde	-12.40	2.50	0	4.00	91.10	- 4.00
Cote D'Ivoire	3.20	1.30	0	5.30	34.20	- 4.80
Gambia	- 4.60	4.30	0.40	4.80	78.00	- 4.50
Ghana	- 5.70	9.10	25.40	3.00	47.80	- 4.40
Guinea	3.20	15.20	0	2.40	42.20	- 2.50
Guinea Bissau	2.10	2.10	0	5.30	52.40	- 4.80
Liberia	7.50	6.90	0	2.80	34.10	1.30
Mail	- 0.10	5.30	0	5.30	24.30	4.80
Niger	- 1.10	0.50	0	5.30	18.80	- 4.80
Nigeria	- 1.40	12.20	0	8.50	12.60	0.70
Senegal	- 5.80	1.40	0	5.30	36.70	- 4.80
Sierra Leone	- 5.20	12.90	- 37.70	3.40	36.70	3.30
Togo	- 5.80	2.60	0	5.30	44.00	- 4.80

Variable codes: Primary Criteria: BD - Ratio of Budget Deficit to Nominal GDP; IR - Annual Average Inflation Rate; CBF - Central Bank Financing of Budget Deficit; GER - Gross External Reserve. Secondary Criteria: TPD - Ratio of Total Public Debt to GDP; NERV - Nominal Exchange Rate Variation.

[7] Source: Economic Community of West African States. (2017). 2016 ECOWAS convergence report. Abuja: ECOWAS.

DOI: http://dx.doi.org/10.20377/cgn-108

Appendix 1.4. ECOWAS Convergence Situation 2012 - 2016 Dataset (Continued)[8]

Country	BD_2013	IR_2013	CBF_2013	GER_2013	TPD_2013	NERV_2013
Benin	-2.6	1	0	4.7	25.4	4.1
Burkina Faso	-3.58	0.5	0	4.7	28.58	4.12
Cabo Verde	-8.8	1.5	0	4.9	102.5	4.1
Cote D'Ivoire	2.2	2.6	0	4.7	34	4.1
Gambia	-8.7	5.7	0	4.6	88.1	-10.3
Ghana	-8.6	11.7	12.3	3.1	56.8	-7.4
Guinea	-2	11.9	0.01	2.9	44.5	2.1
Guinea Bissau	3.4	0.7	0	4.7	52.6	4.1
Liberia	-0.5	7.6	0	2.8	30.5	-4.1
Mail	-2.2	0.6	0	4.7	26	4.1
Niger	-2.6	2.3	0	4.7	23.1	4.1
Nigeria	-1.3	8.5	0	8.9	12.4	2.1
Senegal	-5.5	0.7	0	4.7	30.7	4.1
Sierra Leone	-1.6	10.4	1.7	3.2	30.8	1.1
Togo	-4.6	1.8	0	4.7	45.3	4.1

Variable codes: Primary Criteria: BD - Ratio of Budget Deficit to Nominal GDP; IR - Annual Average Inflation Rate; CBF - Central Bank Financing of Budget Deficit; GER - Gross External Reserve. Secondary Criteria: TPD - Ratio of Total Public Debt to GDP; NERV - Nominal Exchange Rate Variation.

[8] Source: Economic Community of West African States. (2017). 2016 ECOWAS convergence report. Abuja: ECOWAS.

DOI: http://dx.doi.org/10.20377/cgn-108

Appendix 1.4. ECOWAS Convergence Situation 2012 - 2016 Dataset (Continued)

Country	BD_2014	IR_2014	CBF_2014	GER_2014	TPD_2014	NERV_2014	BD_2015	IR_2015	CBF_2015	GER_2015	TPD_2015	NERV_2015
Benin	-1.9	-1.1	0	5	30.9	0.1	-8	0.3	0	5	42.4	-9.3
Burkina Faso	-1.85	-0.3	0	5	30.79	0.09	-2.03	0.9	0	5	32.75	9.33
Cabo Verde	-7.2	-0.2	0	5.4	115	0.1	-3.9	0.1	0	6.4	126.1	-9.3
Cote D'Ivoire	2.2	0.4	0	5	36.9	0.1	2.9	1.2	0	5	40.8	-9.3
Gambia	-9.6	6.9	40.8	3.7	104.1	-16.5	-6.3	6.8	41.5	2.5	101.1	4.9
Ghana	-6.4	17	13.7	3	70.2	-31.5	-4.8	17.2	4.1	2.6	73.2	-15.7
Guinea	-3.56	9.7	0	3.2	73.5	-1.5	-6.9	8.2	0.26	2.2	43.3	2.2
Guinea Bissau	2.6	-1	0	5	53.3	0.1	2.7	1.4	0	5	46.8	-9.3
Liberia	0.2	9.8	0	2.5	37.9	-9	1.6	7.8	0	2.3	32	7.2
Mail	-3.8	0.9	0	5	27.1	0.1	-1.8	1.5	0	5	30.8	9.3
Niger	-8.1	0.9	0	5	25.6	0.1	-9	1	0	5	36	-9.3
Nigeria	-1	8	0	6	12.5	-1.9	-1.5	9	13.1	8.2	12.6	-1.9
Senegal	-5.2	1.1	0	5	35.4	0.1	-4.8	0.1	0	5	29.1	-9.3
Sierra Leone	-3.3	7.2	7.2	3.6	35.4	-4	-4.1	8.1	-0.7	3.8	29.1	-3.1
Togo	-3.4	0.2	0	5	66.9	0.1	-6.3	1.8	0	5	76.8	-9.3

Variable codes: Primary Criteria: BD - Ratio of Budget Deficit to Nominal GDP; IR - Annual Average Inflation Rate; CBF - Central Bank Financing of Budget Deficit; GER - Gross External Reserve. Secondary Criteria: TPD - Ratio of Total Public Debt to GDP; NERV - Nominal Exchange Rate Variation.

DOI: http://dx.doi.org/10.20377/cgn-108

Appendix 1.4. ECOWAS Convergence Situation 2012 - 2016 Dataset (Continued)

Country	BD_2016	IR_2016	CBF_2016	GER_2016	TPD_2016	NERV_2016
Benin	-6.2	-0.8	0	4.4	49.4	0.5
Burkina Faso	-3.14	-0.2	0	4.4	34.23	0.5
Cabo Verde	-3.5	-1.4	0	6.6	128.6	0.5
Cote D'Ivoire	3.9	0.7	0	4.4	42.1	0.5
Gambia	-9.5	7.9	33.1	2.4	117.3	-3.3
Ghana	-10.9	17.5	-	2.8	73.1	-4.2
Guinea	0.1	8.2	0.01	1.4	43.1	-16.4
Guinea Bissau	4	1.5	0	4.4	46.1	0.5
Liberia	2.2	8.8	0	3.3	36.7	-8.4
Mail	-3.9	1.8	0	4.4	36	0.5
Niger	-6.1	0.2	0	4.4	39.7	0.5
Nigeria	-2.2	15.7	0	5.8	17.1	-23.5
Senegal	-4.2	0.8	0	5.79	55.7	0.5
Sierra Leone	-6.4	10.8	33.1	4.7	55.7	-19.1
Togo	-8.5	0.9	0	4.4	79.4	0.5

Variable codes: Primary Criteria: BD - Ratio of Budget Deficit to Nominal GDP; IR - Annual Average Inflation Rate; CBF - Central Bank Financing of Budget Deficit; GER - Gross External Reserve. Secondary Criteria: TPD - Ratio of Total Public Debt to GDP; NERV - Nominal Exchange Rate Variation.