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ESG performance and economic growth: a panel co-integration analysis of North African countries and CEMAC sub-regions

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Abstract: **With growing climate change and global calls for sustainable developments, governments globally are obliging development pathways to capture environmental, social, and governance standards that assure sustainability. African countries are at different levels of development and different levels of consideration ESG in their development paths. However, empirical evidence on the impacts of different EST actions employed so far on growth is not readily available and is even absent for a group of countries with far different levels of development within the same continent like northern African countries and CEMAC countries.**

This study seeks to enrich the empirical literature by investigating the short-run and long-run impacts of ESG performance on economic growth of North African countries and CEMAC countries. The choice of these regions is to compare two sub-African regions with distinct growth patterns, North African countries are experiencing high economic growth rates while CEMAC countries are struggling to meet their growth objectives.

Keywords: **Environmental, Social and Governance (ESG), CEMAC, NORTH AFRICAN.**

1. INTRODUCTION

Environmental Social Governance (ESG) can be used as a sustainable pathway to enhancing green growth agenda being developed by many countries, three primary reasons have been advanced for this (Piabuo et al., 2021). First, ESG performance may serve as a guarantor, reducing uncertainty and thereby ensuring market efficiency. Efficient markets, in turn, will ensure that investments are maximized and advanced technologies are attracted, resulting in maximum growth and development. Margaretic and Pouget (2018) argued that ESG can help to eliminate information asymmetries and establish confidence between investors and the government in question. As a result, countries that do well in terms of environmental, social, and governance (ESG) may attract responsible asset managers and investors who analyze investment opportunities using ESG criteria to avoid investing countries that do not adhere to international norms. Second, successful ESG performance is expected to aid the allocation of assets and resources to sectors with higher productivity and growth, utilizing both market and non-market indicators. (UNDP, 1997).

Infrastructure, education, property rights, and other investments, among other ESG policies, can minimize the economy's vulnerability to unfavorable economic shocks. According to Belardi and Albertal (2009), appropriate ESG policies can have a direct and considerable impact on the economy's ability to recover from a crisis, influencing both family and private sector responses. More specifically, the authors point out that while high performance in terms of education policies, governance, and urban planning cannot guarantee that shocks will not occur, ignoring such concerns might arguably ensure that shock consequences will continue. Furthermore, economic development influences ESG performance through three channels. First, higher growth rates indicate a country's ability to achieve and sustain high investment rates, which leads to technological advancements. To the extent that innovation is proven to incentivize the

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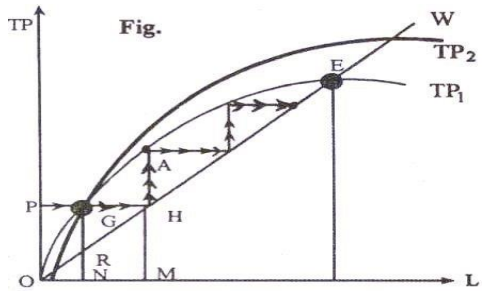
implementation of ESG policies - for example, innovation is based on reducing the degree of environmental harm and enhancing the application of sustainable policies - higher levels of economic growth could greatly boost ESG commitments. Countries with the ability to grow faster will be able to improve their ESG characteristics in this way. Second, rising employment and income levels increase the finances available to fund successful ESG programs. Indeed, countries with high, long-term, and socially beneficial growth have more resources to invest in social issues (Montfort et al., 2014), improve environmental quality (Fodha and Zaghdoud, 2010), and establish higher-quality institutions (McCulloch and Nguyen, 2013). Third, a higher quality of living brought about by economic expansion may alter people's habits; they will pay more attention to environmental concerns, social issues, and governance. Cracolici et al. (2010), for example, proposed that high levels of economic well-being can lead to high levels of non-economic well-being via households, enterprises, and governance.

2. LITERATURE REVIEW ON ECONOMIC GROWTH AND ESG

The Classical Growth Theory postulates that a country's economic growth will decrease with an increasing population and limited resources. Such a postulation is an implication of the belief of classical growth theory economists who think that a temporary increase in real GDP per person inevitably leads to a population explosion, which would limit a nation's resources, consequently lowering real GDP. As a result, the country's economic growth will start to slow.Structural Model



In the chart above, the y-axis represents total production, and the x-axis represents labour. Curve OW outlines the total subsistence wages. If the level of population is ON, and the level of output is OP, the per capita wage is represented by NR. Consequently, the surplus or profit is RG.Because of the surplus, the capital formation process comes into effect. Consequently, the demand for labour increases, leading to a rise in total wages, as the curve moves to GH. If the total population remains constant at ON, and wages exceed subsistence wages, i.e., NG > NR, then total population and total human resources will increase as the curve moves toward OM. Because of the increase in population, surplus can be generated.In such a manner, the process will continue until the economy reaches point E, as depicted by the arrow. Point E represents a stationary situation wherein wages and total output equalize, and no surplus can be generated. However, according to classical economists, with technological progress the production function will shift upward, as depicted by the curve TP2. Also, according to the Classical Growth Theory, economic stagnation can be postponed, although ultimately not avoided.

3. METHODOLOGY OF THE STUDY

This study is aimed at reviewing the effect of ESGs (environmental, social and governance indicators) on the economic growth of CEMAC and North African countries. The study makes use of time series data sourced out from the World Bank Development Indicators (2019), over a period of 26 years (1995 to 2021 inclusive). This period was chosen for this study because the required data for this research was available within this time period.

Table 1: with sources of data

Variable	Source of data
Economic Growth (Gross Domestic Product)	WDI
Carbon emissions (Co2)	WDI
life expectancy at birth	WDI
Foreign direct investment	WDI
control corruption (Percentile Rank)	WGI
Trade	WDI
Gross fixed capital formation	WDI
Total final consumption	WDI

The table below shows the countries used in this study for North Africa countries and CEMAC.

Table 2: North Africa countries and CEMAC.

Number	CEMAC	Number	North African Countries
1	Cameroon	8	Egypt, Arab Rep.
2	Central African Republic	9	Tunisia
3	Chad	10	Morocco
4	Congo, Dem. Rep.	11	Algeria
5	Congo, Rep.		
6	Equatorial Guinea		
7	Gabon		

Estimation Framework

Model specification

The Solow growth model with sustainable development provides the foundation upon which the relationship between ESG and economic growth will be captured over a period of 39 years in CEMAC and North African countries. This framework is used because it is in line with the hypotheses of this study which states that ESGs (non-renewable and renewable) do not have an impact on economic growth. Although the model has some assumptions such as that of a close economy, it is only theoretical because economies are open through international trade. Taking this into consideration, the economic model of this study is:

Economic growth (EG) = f (ESG, foreign direct investment, trade, gross fixed capital formation, total final consumption) ……. 1.0

Though the variables of interest in this study are CO2 emissions metric tons per capita, life expectancy at birth and control corruption (Percentile Rank), it is relevant to include some control variables (foreign direct investment (FDI), trade and gross fixed capital formation (GFFC)) in the analysis of the study. The justification for the inclusion of these control variables are as follows:

- Economic growth in CEMAC and North African countries does not solely depend on ESG but also on other factors. Therefore, the complete exclusion of other factors might not provide robust results, thus leading to a significant error term.

- Foreign direct investment is defined as the net inflows of investment to acquire lasting management interest in an enterprise operating in an economy different from that of the investor. It is the sum of equity capital, reinvestment of earnings, short-term and long-term capital, as shown on the balance of payments (World Development Indicators, 2012). The foreign direct investment employed in this study is measured as a percentage of GDP and includes the inward flow of investment in the economy of CEMAC and North African countries from foreign sources. It does not include the outward flow of investment made to the rest of the world. Only inflows of foreign direct investment have been used because the main interest is to determine how foreign technology affects ESGs exploitation and hence growth in CEMAC and North African countries.

Trade which according to Hayes (2019) is a fundamental economic concept involving the buying and selling of goods and services with compensation being paid to the seller was as well included. Measured as a percentage of GDP, trade in this study is meant to examine how ESGs and other commodities have been traded between CEMAC and North African countries and the rest of the world from 1995 to 2021.

- Gross fixed capital formation consist of resident producer's acquisitions, less disposals of fixed assets during a given period plus certain additions to the value of non-produced assets realised by the productive activity of producer or institutional units (European System of Accounts, 2001). Fixed assets are tangible or intangible assets produced as outputs from processes of production that are used repeatedly in the process of production. In the context of this study, gross fixed capital formation which is measured as a percentage of GDP shows the acquired assets necessary for growth in CEMAC and North African countries from 1995 to 2021.

- Total final consumption refers to the total value of all expenditures on individual and collective consumption goods and services incurred by resident households, resident non-profit institutions serving households (NPISHs) and general government units (OECD, 2001). In other words, it refers to the value of all individual goods and services acquired by

resident households plus the value of the collective services provided by general government to the community or large sections of the community. This variable is measured as a percentage of GDP in this study and is used to show how the consumption of goods and service in CEMAC and North African countries contributes to her growth.

4. RESULTS AND DISCUSSION

In this chapter, we are going to carry out an empirical analysis on the relationship that exists between ESG and economic growth. A series of tests is first conducted. Then, we proceed to examine the long-run and short-run impacts of ESG on economic growth.

From the results obtained, it can be seen that at level, amongst CEMAC countries, only Carbon emissions and trade are become stationary after the first difference, while all the other variables become stationary at level. However, for North African countries, apart from economic growth, all the other countries become stationary after first difference. To further understand the nature of the time series data used in this study, it is important to the existence of serial correlation.

Table 3

Variables	AugmentedDickey Fuller test				
	Level		First Difference		Decision
	trend & intercep	Probability	trend & intercept	Probability	
Economic growth (annual %)	-3.70294	0.0000			I(0)
Carbon emissions	1.95434	0.9747	-7.74134	0.0000	I(1)
Life expectancy	-11.9867	0.0000			I(0)
Contol for corruption	-2.03023	0.0212			I(0)
Trade	-0.88212	0.1889	-13.1330	0.0000	I(1)
Total final consumption expenditure	-4.03855	0.0000			I(0)
North Africa					
Economic growth (annual %)	-6.78156	0.0000			I(0)
Carbon emissions	0.95599	0.8305	-7.71617	0.0000	I(1)
Life expectancy	0.75466	0.7748	-6.21897	0.0000	I(1)
Contol for corruption	-1.03728	0.1498	-5.88728	0.0000	I(1)
Trade	0.72216	0.7649	-6.49450	0.0000	I(1)
Total final consumption expenditure	-0.95025	0.1710	-7.13447	0.0000	I(1)

Test for existence of serial correlation:

Here the Breusch-Godfrey Serial Correlation LM Test is used; the table 4 below shows the results of this test;

Table 4

F-statistic	1.108361	Prob. F(2,16)	0.3542
Obs*R-squared	4.137329	Prob. Chi-Square(2)	0.1264

The table 4 above shows that there is no serial correlation and that our model is good.To further verify this, we use the stability test to see if our model is stable in the long-run.

Cointegration analysis:

To check whether there is a long-run association or co-intergration between variables of the study, Pedroni cointegration test is used, this test employs seven different statistical tests: four individual statistics tests (Panel v-Statistic, Panel rho-Statistic, Panel PP-Statistic and Panel ADF-Statistic) , normal and weighted statistical values were used and three group

statistics tests (Group rho-Statistic, Group PP-Statistic, Group ADF-Statistic). Table 5 shows results for CEMAC and table 6 shows results for North African countries.

Table 5: Pedroni Residual Cointegration Test: CEMAC

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistics	-1.882568	0.9701	-1.943769	0.9740
Panel rho-Statistic	-0.419244	0.3375	0.612438	0.7299
Panel PP-Statistic	-7.849881	0.0000	-4.419269	0.0000
Panel ADF-Statistic	-2.454385	0.0071	-3.300229	0.0005

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	1.503308	0.9336
Group PP-Statistic	-4.157534	0.0000
Group ADF-Statistic	-2.505968	0.0061

The table 5 above shows that four of the within-dimension test results are significant while two of the three between-dimensions are significant, thus suggesting the existence of a cointegration relationship between variables of the study. This suggest the use of a co-integrating regression model that takes into consideration time series variable of order zero or one, thus the ARDL model is best suited for CEMAC countries.

Table 6 below shows cointegration test results for North African countries, it can be seen from the table that just like for CEMAC countries, four within-dimension tests are significant while two between dimension tests are significant, thus suggesting the existence of cointegration between variables and the need to employ long-run regression models that consider time series data that becomes stationary at level or after first difference, the ARDL is also employed.

Table 6: Pedroni Residual Cointegration Test Nort

Series: GDP CO2 LIFE_EXPECT CONTROL_CORUPTION FDI TRADE
TOTAL_FINAL_CONSUMPTION

Date: 03/06/22 Time: 13:37

Sample: 1995 2021

Included observations: 108

Cross-sections included: 4

Null Hypothesis: No cointegration

Trend assumption: Deterministic intercept and trend

Use d.f. corrected Dickey-Fuller residual variances

Automatic lag length selection based on SIC with lags from 3 to 4

Newey-West fixed bandwidth and Quadratic Spectral kernel

Alternative hypothesis: common AR coefs. (Within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.466161	0.3206	0.065911	0.4737
Panel rho-Statistic	-1.040880	0.1490	-0.625037	0.2660
Panel PP-Statistic	-9.982009	0.0000	-7.221664	0.0000
Panel ADF-Statistic	-12.42062	0.0000	-8.242920	0.0000

Alternative hypothesis: individual AR coefs. (Between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.232933	0.5921
Group PP-Statistic	-9.045834	0.0000
Group ADF-Statistic	-9.894126	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.151	0.879050	0.831119	2.00	25
2	0.103	5.244722	5.647446	2.00	19
3	-0.615	3.056679	3.207151	2.00	25
4	-0.463	0.906668	1.102119	2.00	25

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.151	0.915677	0	4	25
2	-0.558	3.767628	1	3	18
3	-0.615	3.184041	0	4	25
4	-0.463	0.944446	0	4	25

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