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Economic institutions and economic growth: Empirical evidence from the Economic Community of West African States

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Background: Economic institutions are considered as the fundamental cause of economic growth. Economic institutions affect economic growth through allocation of resources like physical and human capital. Unfortunately, there is dearth of empirical studies showing the impact of economic institutions on growth of the Economic Community of West African States (ECOWAS).

Aim: This study investigates the impact of economic institutions on economic growth of the ECOWAS.

Setting and method: The study applied cause and effect relationship. The study used econometric research techniques of unit root and co-integration tests to establish the time series properties of the data; the vector error correction and co-integration regression models to estimate the population parameters. The research data comprised data obtained from the United Nations Conference on Trade and Development (UNCTAD), the Transparency International (TI) and Heritage Foundation databases. The variables employed were the real gross domestic product (GDP) per capita (RGDPPC), corruption perception index (CPI), property rights protection (PROPRGT), private investment per capita (INVESPC), government expenditure per capita (GOEXPPC) and trade openness (TRAOPN).

Results: The results of the data analysed showed that economic institutions represented by the property rights index engender RGDPPC growth in ECOWAS. The CPI could not stimulate RGDPPC growth in ECOWAS. The results also show that all the other variables stimulated growth except trade openness.

Conclusion: The study concludes that good economic institutions, private investments, and government intervention by providing security, economic and social infrastructural facilities are conducive for economic growth in the ECOWAS region. The study recommended that more efforts be made at curbing corruption in the region.

Introduction

Economic institutions are regarded as fundamental causes of economic growth (Acemoglu 2003; Rodrick, Subramanian & Trebbi 2002). The contribution of economic institutions to economic growth far outweighs the availability of natural resources, the supply of factors of production and technological progress (Acemoglu, Johnson & Robinson 2001; Kloomp & De Hana 2009).

Several reasons have been advanced for the importance of economic institutions in stimulating economic growth. One of the reasons is that economic institutions determine the incentives given to the main performers in the economy; the outcomes of economic processes are influenced by the economic institutions. Through these incentives, economic institutions influence investment in physical and human resources, research and development (R&D), technology and the organisation of production (Acemoglu, Johnson & Robinson 2005; North 1990; Weil 2008). It is posited that economic institutions influence several aspects of economic outcomes, such as the distribution of resources. These resources are income, wealth, and physical and human capital. This means that economic institutions determine not only the aggregate economic growth but the distribution of resources in the country and these in turn, contribute to maintaining order in the country.

It has also been argued that economic growth causes good economic institutions. Valeriani and Peluso (2011) acknowledged the bi-causality between economic institutions and economic growth. The rationale for causality from economic growth to quality economic institutions stems from the simple logic that economic growth implies a high living standard with greater awareness. The

higher the level of awareness is, the higher the sense of discipline and the demand for decency from the public. The demand for decency brings about high-quality institutions, for example, the rule of law, property rights, good judicial practices, less harassment from the police, etc.

The Economic Community of West African States (ECOWAS) formulated the objective of 'striving to enhance the well-being of its citizens and to promote growth', among other goals. The Economic Community is aware of the need to have good economic institutions to realise this objective. To achieve good economic institutions, it encourages the member states to embrace democratic practices, promote rules of law and property rights. To encourage democratic practices in the region, ECOWAS intervened in Côte d'Ivoire in 2011 and Gambia in 2017 after the incumbent presidents, President Laurent Gbagbo and President Yahya Jammeh called elections, lost and decided not to hand over. This study is therefore undertaken to ascertain to what extent has the promotion of these good economic institutions impacted on per capita growth in the ECOWAS states?

To answer the above question, this study is designed to test the alternative hypothesis that economic institutions and some approximate factors stimulating economic growth have promoted economic growth in the region. Existing empirical works on the impact of economic institutions on the economic growth of ECOWAS are sparse and most of them are based on individual countries. For example, the work of Okoh and Ebi (2013) examined the impact of economic institutions on economic growth in Nigeria. This study is therefore designed to bridge the existing gap by investigating all the ECOWAS countries.

The remainder of this paper is organised as follows: The 'Theoretical and empirical literature review' section reviews both theoretical and empirical literature; The 'Research methodology' section explains the research methodology applied in this study, the sources of data employed, the measurement of variables applied, the statistical methods of analysis employed and the model used in the analysis. The 'Results and analysis' section presents and interprets the results of the data analysed, and conducts diagnostic tests on the results to establish their reliability. The 'Summary and concluding remarks' section summarises and concludes the study.

Theoretical and empirical literature review

This section reviews the theoretical literature as well as the existent empirical research relating to the role of economic institutions in promoting economic growth.

Theoretical relationship between economic institutions and growth

Researches, such as North (1988); Rodrick et al. (2002) and Petrunya and Ivashina (2010) have shown that economic institutions are primary causes of economic growth, far more than the natural environment, the supply of factor inputs and technological progress. Economic institutions that are important for growth include those that protect property rights (Acemoglu et al. 2001; North & Thomas 1973); those that mobilise savings and make them available for investment (Tchouassi 2014) and those that cause rulers to be subjected to the ruled or hold the rulers accountable to the majority of the people (Acemoglu & Robinson 2012; Keefer 2005).

Przeworski and Curvale (2007) stated that economic institutions that promote economic growth are institutions that absorb, and peacefully process likely conflicts of interest and values under any conditions. These institutions are political institutions and they must be self-sustaining. The solution that is attained using these political institutions should be preferred to the solution that would be achieved through the use of force by each of the parties involved.

Acemoglu et al. (2005) argued that economic institutions determine long run causes of economic growth. Adam Smith (1776) once put forward the same argument. Acemoglu et al. (2005) concluded that the traditional neoclassical economic growth models of Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965) explained the differences in the per capita incomes across countries in terms of differences in capital accumulation. In these models, cross-country differences in factor accumulation are either explained by differences in savings rates (Solow 1956; Swan 1956), preferences (Cass 1965; Koopman 1965) or other exogenous parameters like the total factor productivity or technological progress.

These models accept that institutions do exist. The models are based on representative agents who are assumed to be well behaved and have property rights and agents exchange goods and services in the markets. However, the models do not acknowledge that differences in income and growth rates are not explained by differences in institutions or variations in institutions. Acemoglu et al. (2005) acknowledged the emergence of the first wave of more recent growth theories of Romer (1986) and Lucas (1988), which are different from the frameworks of the neoclassical growth theories. These are different in the sense that the new theories emphasise that externalities from physical and human capital accumulation have the tendency to sustain unlimited, steady state growth or long-term per capita growth rates. Acemoglu et al. (2005) further argued that this approach remains within the neoclassical tradition by using preferences and endowments to explain long-run growth.

The second wave of the more recent growth models, particularly those of Romer (1990), Grossman and Helpman (1991), Aghion and Howitt (1992) and Barro (1990), endogenised economic growth and technological progress. However, their explanation of differences in per capita income across countries is in tandem with those of the neoclassical school and the first wave of endogenous growth models. Romer (1990) argued that one country may grow faster than another country by investing more resources in

research and innovation. Barro (1990) argued that a country may prosper by making sure that public goods grow at the same rate as the growth rate in private investment per labour head.

Romer (1990) did not explain what determines the preferences and the prospect of the technology for creating ideas. Barro (1990) did not explain what causes government to expand the provision of services in line with the growth rate of capital per labour head.

The neoclassical and the endogenous models have become the traditional tools for economic growth explanation (Acemoglu et al. 2005). This traditional approach provides insight into economic growth mechanisms. However, Acemoglu et al. argued that the approach has failed to explain the fundamental cause of economic growth. This is the reason North and Thomas (1973) posited that innovation, technology, human capital development, physical capital, economies of scale and government provision of services are growth in itself and they cannot explain growth.

The arguments in favour of institutions in promoting economic growth are many. Economic institutions matter for economic growth because they influence the incentives for the key performers in the economy (Easterly 2008). To be more specific, economic institutions influence investments in physical and human capital, technology and the organisation of production (Acemoglu et al. 2005). It is further suggested that geographical and cultural factors also matter in terms of economic growth, but that institutions are more fundamental in explaining long-run economic growth (Weil 2008). Institutions are not only significant in explaining aggregate economic growth, but they are also important in explaining an array of economic outcomes, such as the distribution of resources (wealth, physical capital and incomes). This means that economic institutions also influence how economic wealth is distributed among members of the society, be it output, income, physical capital or human capital (Acemoglu et al. 2005). Based on this, it can be contended that economic institutions determine the economic performance and distribution of resources in a society.

Empirical studies

A review of the empirical literature is presented in this section. Lehne, Mo and Plekhanov (2014) researched the determinants of the quality of economic institutions in cross-country settings. The study was based on the observation that the relationship between a good political system and economic growth is not linear but a 'U'-shaped curve. The study listed democratic institutions, geography, history, ethnic factionalism and natural resource endowments as the determinants of the rule of the game.

Using the appropriate measures of some factors affecting economic institutions, the study found that democracy improved economic institutions and that history had a significant impact on economic institutions. Other findings were that geographical factors such as economic openness and resource abundance had a substantial impact on economic growth. The study further found that resource abundance tends to encourage bad economic institutions.

Okoh and Ebi (2013) examined the impact of infrastructural development and the quality of economic institutions on economic growth in Nigeria. In estimating the impact of corruption and infrastructural development on economic growth, several specifications were used to test the robustness of the results. The results generally showed that infrastructural development and contract enforcement had a positive and significant effect on economic growth. Corruption exacted a negative effect on economic growth.

Valeriani and Peluso (2011) investigated the institutional framework under which economic growth takes place and how economic institutions explain growth and differences of growth across countries. The regression model used by the study stated that economic growth is determined by education (EDU), infrastructure (INFRA), dummy variables (representing economic institutions) and regions (REG). The results of the study showed that the quality of economic institutions impact positively on growth. The study also showed that investment stimulated economic growth.

Tamilina and Tamilina (2014) explained the uniqueness of economic institutional effects on economic growth in post-communist countries. Their study showed that the collapse of communism in the communist countries led to radical changes in political, social and economic systems of the former communist countries. The introduction of capitalist economic institutions was dysfunctional (Polterovich 2008). The relationship between the quality of economic institutions and economic growth in the former communist countries appeared to differ from the patterns in advanced and developing countries. The study revealed that the revolutionary process rather than evolutionary process accounted for the poor functioning of the former communist economic systems.

The study found that economic institutions that are evolutionary, affected economic growth in relation to their quality ratings. Good economic institutions promoted growth. In revolutionary methods, the effect of the quality of economic institutions on growth does not reflect their index in the short run, but in the long run they do.

Davis and Hopkins (2006) investigated the interaction between economic institutions, inequality and economic growth. The study was designed to establish whether economic institutions significantly stimulated economic growth. The study was also designed to test the hypothesis that inequality does not stimulate economic growth positively.

The statistical analytical method employed five yearly sets of data for eight periods starting from 1961/1965 to 1996/2000. It employed a regression model which stated that the per

capita income is a function of years of schooling plus the Gini coefficient representing inequality, plus a variable for economic institutions which is property rights.

The results of the study showed that economic institutions promoted growth but that income inequality depressed growth. The study further demonstrated that investment also promoted economic growth.

Zouhair (2012) studied the effects of institutional factors on investment and growth in the Middle East and North America (MENA). The study covered 11 countries for a 9-year period from 2000 to 2009 and made use of dynamic panel data.

The theoretical perspective of the study emphasised the fact that the empirical literature examining the impact of institutions on economic growth is increasing since the seminal work of North (1991). Good economic institutions encourage economic agents to invest. Conversely, poor institutional quality creates uncertainty, unpredictable environments, instability and corruption and thereby increasing the cost of transacting. In such an environment, private investments are discouraged and thus retard growth (Zouhair 2012).

The estimation of the model applied in the study used the generalised method of moments (GMM) of Arellano and Bond (1998). The key findings of their study showed that political institutions and investment stimulated growth. The study also showed that interaction between political institutions and investment promoted growth, while political instability depressed growth.

Docquier (2014) identified the impact of institutions on economic growth. The study stated that the past century had come and gone but only a few poor countries had caught up with the rich countries. The study was designed to explain convergence across countries. Data used for the study spanned the period from 1870 to 2010. It found no evidence of convergence of economic institutions among the countries studied and did not find any evidence of convergence in growth.

Ferrini (2012) examined the interaction of economic institutions to stimulate economic growth. This is achieved through considering four aspects of economic institutions. The first aspect is the reduction in the cost of economic transacting (exchange). Economic institutions enhance development by encouraging people to enter into contracts. Contract enforcement uses common commercial law codes and the sharing of information. This reduces transaction cost, risk and uncertainty. Secondly, economic institutions determine the degree of appropriation of returns to investment. Property rights, fundamental human rights, and the rule of law encourage investment, employment, output and incomes. Thirdly, economic institutions determine the expropriation of state resources by the ruling elite. Unequal opportunity provided by economic institutions discourages investment and economic exchanges. Fourthly, economic institutions determine the degree to which the investment environment is conducive to cooperative behaviour and this increases social capital. Inclusive and participative economic institutions increase the free flow of information and the extent to which resources can be pooled and invested in collective properties (education, health and infrastructure), reduce risks and ensure sustained wealth creation.

Pereira and Teles (2009) employed an econometric model based on the GMM and used the autoregressive distributed lagged model for 109 countries for a 9-year period, from 1975 to 2004. The key dependent variable was the GDP per capita; political institutions were taken as explanatory variables. The political institutions used were the electoral rules (plurality vs. proportional representations), form of government (parliamentary vs. presidential systems) and political regime (dictatorship vs. democratic leaders).

When economic variables were controlled or moderated, the study demonstrated that political institutions matter for recipient democracies, and not for consolidated democracies. Consolidated democracies have already internalised the effects of the political system on their economic growth. In recipient democracies, there is a need to internalise good political institutions that will promote economic growth to ensure the continued growth of the economy.

Research methodology

This section discusses the research methods applied. It presents the data sources, explains the measurements of variables, the statistical methods applied in the study and the model used in estimating the model.

Sources of data

This study applied data obtained from the United Nations Conference on Trade and Development's (UNCTAD) database. The data collected spanned the period from 1990 to 2015. The data obtained from UNCTAD comprised data for the real gross domestic product per capita (RGDPPC), government expenditure per capita (GOEXPPC), investment expenditure per capita (INVESPC) and trade openness (TRAOPN) per capita. Data were also obtained from Transparency International (TI)'s Corruption Perception Index (CPI) for the period from 1996 to 2015, and the Heritage Foundation's Property Rights Index from 1995 to 2015.

Measurement of variables

The variables used in this study are RGDPPC, GOEXPPC, INVESPC, and TRAOPN. The RGDPPC is measured in thousands of US dollars at 2005 constant prices. The GOEXPPC and INVESPC are also measured in US dollars and at 2005 constant prices. TRAOPN is computed as the value of imports plus the value of exports in a given year and the result is divided by the real GDP of the year in which it is computed.

Economic institutions are measured based on the CPI as published by TI and the property rights index published by the Heritage Foundation. The range of values used is from 1, indicating very high corruption or very low level of property rights protection, to 10, indicating complete absence of corruption or complete property rights protection.

Regression methods applied

This study applied combinations of both cross-sectional data and time series data, and as a result, it estimates the parameters of the regression using vector auto-regression and co-integrating regression models. The study investigates the impact of economic institutions on economic growth. It is a well-known fact that good economic institutions promote economic growth, which in turn, causes good economic institutions. There is a bi-causality between the two variables. To establish this bi-causality, this study applied the vector error correction (VEC) model. Because the study applied panel data which involves data that may be co-integrated, the employment of this method may yield consistent and efficient estimated parameters (Baltagi 2014). The estimated VEC regression model is presented in Equation 1 below.

$$\Delta RGDPPC_{it} = \beta 0 + \beta 1 \Delta RGDPPCit-1 + \beta_{2\Delta} RGDPPCit-2 + \beta 3 \Delta CPIit-1 + \beta 4 \Delta CPIit-2 + \beta 5 \Delta PROPRGTit-1 + \beta 6 \Delta PROPRGTit-2 + \beta 7 INVESPCit + \beta 8 GOEXPPCit + \beta 9 TRAOP + \varepsilon it \quad \text{[Eqn 1]}$$

where RGDPPC, CPI, PROPRGT and INVESPC are real GDP per capita, CPI, property rights index and private investment per capita, respectively. GOEXPPC, TRAOPN and ε refer to government expenditure per capita, trade openness and the random error term, respectively. The symbols Δ, i and t are used to indicate the first difference; cross-sectional units, i, taking the values 1, 2, 3, 4, …, 15 for Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, …, Togo, in alphabetical order, and t, taking the values 1990, 1991, 1992, …, 2015. The error term is assumed to be uncorrelated with the regressions. The regression model is assumed to have regressors that are not highly correlated and that there is constant variance over time.

To test for bi-causality between the dependent variable and the regressors that represent economic institutions, this study estimated two more regression models using CPI and PROPRGT as dependent variables. These are stated in Equations 2 and 3 below.

$$\Delta CPI_{it} = \beta 0 + \beta 1 \Delta RGDPPCit-1 + \beta 2 \Delta RGDPPCit-2 + \beta 3 \Delta CPIit-1 + \beta 4 \Delta CPIit-2 + \beta 5 \Delta PROPRGTit-1 + \beta 6 \Delta PROPRGTit-2 + \beta 7 INVESPCit + \beta 8 GOEXPPCit + \beta 9 + \varepsilon it \quad \text{[Eqn 2]}$$

$$\Delta PROPRGT_{it} = \beta 0 + \beta 1 \Delta RGDPPCit-1 + \beta 2 \Delta RGDPPCit-2 + \beta 3 \Delta CPIit-1 + \beta 4 \Delta CPIit-2 + \beta 5 \Delta PROPRGTit-1 + \beta 6 \Delta PROPRGTit-2 + \beta 7 INVESPCit + \beta 8 GOEXPPCit + \beta 9 + \varepsilon it \quad \text{[Eqn 3]}$$

The expected signs of the estimated parameters are:

$$\beta 1, \beta 2, \ldots, 9 > 0.$$

This study also used fully modified ordinary least square (OLS) (FMOLS) and dynamic OLS (DOLS) co-integrating regression models in estimating the parameters of the study. As there is co-integration among the variables studied, the co-integrating regression models may yield consistent and efficient estimated parameters. The co-integrating regression method of DOLS makes use of the past, present and future values of the regressors. The DOLS regression is estimated using the formula (Eqn 4):

$$j = -p$$

$$Yit = Xi + \theta i Xit + \sum P \rightarrow \delta j Xit - j + Uit. \quad \text{[Eqn 4]}$$

where Y is the dependent variable and X is the independent variable. The U is the random error term which is assumed to be uncorrelated with the explanatory variables. θ and δ are the estimated parameters and θ and δ are the cross-sectional units and the time series periods, respectively. The FMOLS also uses related features of DOLS in estimating the parameters of the regression.

The panel co-integrating relationships are designed to study long-run relationships that are featured in macroeconomic settings. Such long-run relationships are predicted by economic theories. Researchers seek to find out whether the predictions of the theories largely hold. Two approaches have been recommended for estimating panel co-integrating regression models. Phillips and Moon (1999) and Pedroni (2000) advocated employment of FMOLS estimating technique, while Kao and Chiang (2000) suggested the application of DOLS estimating method. This study adopts the co-integrating regression methods because of their ability to give estimated parameters that are consistent and efficient in the presence of endogeneity (Yardimcioglu, Gurdal & Altundemir 2014), where the dependent variable explains the regressors and vice versa. The method is also able to give efficient estimation of parameters in the presence of trending variables that time series data are prone to have. In view of the time series elements of the panel data applied, this study applied panel unit root tests to examine the time series properties of the data. As the data have the usual times series properties, trending over time, the study applied the (Kao 1999) co-integration test to examine if the variables are co-integrated before the data are subjected to the VEC regression model and co-integrating regression models.

Before applying the results of regression models in testing the hypothesis of this study, the study carries out diagnostic tests to ascertain that the results are not spurious regression. The diagnostic tests are tests for multi-collinearity and the test for autocorrelation and heteroscedasticity. The tests applied for multi-collinearity are un-centred variance inflation factors (VIF). The joint test applied for autocorrelation and heteroscedasticity is autoregressive conditional heteroscedasticity (ARCH) in the residuals as suggested by Newey and West (1987) and as elaborately explained in Greene (2012) and West (2008).

Results and analysis

This study applied time series analytical methods. The time series analytical techniques applied are unit root tests, co-integration tests, the VEC regression model and the co-integrating regression models. The study also conducted diagnostic tests to check the reliability of the regression models applied.

Statistical results

This section presents the results of data estimated using unit root tests, co-integration tests and regression models using the VEC and co-integrating regression model. The regression results are subjected to second-order tests to ascertain the degree of reliability that can be placed on them. The second-order tests conducted are mainly of two types – coefficient diagnostic tests using VIF and coefficient variance decomposition and residual-based tests.

Tables 1 and 2 present the results of the unit root tests using the Augmented Dickey–Fuller (ADF), Im–Pesaran–Shin (IPS), Phillips–Peron (PP), Levin–Lin–Chu (LLC) and Breitung tests.

Tables 1 and 2 show that all the variables are not stationary, except private INVESPC, but the variables become stationary after the first differencing. This means that the variables are first difference stationary (integrated of degree one). The implication of this finding is that the bulk of the data used in this study is not stationary. It is, therefore, advisable to employ time series or another related relevant method in estimating the parameters of the population. Because the data applied are co-integrated, this study applies co-integration test. The co-integration test is estimated applying the Kao test in Table 3.

Table 3 shows that there is co-integration among the variables used in the analysis. The reason is that the computed ADF statistic is significant at 5%. The null hypothesis that there is no co-integration among the variables applied in this study cannot be accepted.

From the results of the unit root tests in Tables 1 and 2 and co-integration test in Table 3, it is clear that the variables used in this study are co-integrated. It is therefore important to apply an appropriate regression model in estimating the parameters of the population under study. The reason is to avoid the situation of having spurious regression results. This study used the VEC method and co-integrating regression methods of FMOLS and DOLS to estimate the parameters of the population of the study. The VEC method is adopted to establish whether bi-causality exists between the dependent variable and the regressors. The co-integrating regression methods are adopted because of the co-integrating nature of the variables used in estimation and to avoid the problem of endogeneity that exists between economic growth and economic institutions. Table 4 shows the estimated regression results. Equations 1, 2 and 3 estimate the parameters of the population using the VEC regression model with RGDPPC, CPI and PROPRGT as the dependent variables, respectively. Equations 4 and 5 applied co-integrating regression models of FMOLS and DOLS, respectively.

The results of Equation 1 show that four of the variables exhibit their expected signs. These are CPI, PROPRGT

TABLE 2: Unit root test.

Variable	Number of differencing	ADF-Fisher		PP-Fisher	
		Stat.	Prob.	Stat.	Prob.
GDP^{it}	At a level	47.3	0.02	46.4	0.04
	1st difference	110	0.00	240	0.00
GOEXPPC	At a level	17.91	1.00	20.81	0.89
	1st difference	82.6	0.00	383.1	0.00
INVESPC	At a level	31.9	0.00	89.7	0.00
	1st difference	178.6	0.00	378.8	0.00
PROPRGT	At a level	31.9	0.43	36.9	0.18
	1st difference	89.8	0.00	492	0.00
RGDPPC	At a level	17.2	0.96	17.2	0.97
	1st difference	89.2	0.00	148.9	0.00
TRAOPN	At a level	32.3	0.35	35.2	0.24
	1st difference	406.2	0.00	464.8	0.00

Stat., statistic; Prob., probability; CPI, corruption perception index; GOEXPPC, government expenditure per capita; INVESPC, investment per capita; PROPRGT, property rights protection; RGDPPC, real gross domestic product per capita; TRAOPN, trade openness.

TABLE 1: Unit root test.

Variable	Number of differencing	LLC		Breitung		IPS	
		Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
CPI	At a level	-1.77	0.04	-1.16	0.12	-1.85	0.02
	1st difference	-8.96	0.00	-6.95	0.00	-7.66	0.00
GOEXPPC	At a level	0.50	0.69	3.61	1.00	3.91	1.00
	1st difference	-3.54	0.00	1.33	0.91	-4.81	0.00
INVESPC	At a level	-5.12	0.00	-2.79	0.00	-4.90	0.00
	1st difference	-	-	-	-	-	-
PROPRGT	At a level	-0.95	0.17	-1.81	0.04	-0.17	0.43
	1st difference	-8.35	0.00	-7.33	0.00	-6.35	0.00
RGDPPC	At a level	1.30	0.10	2.45	0.99	1.73	0.95
	1st difference	-5.13	0.00	-2.17	0.02	-5.67	0.00
TRAOPN	At a level	0.92	0.82	2.35	0.99	0.57	0.72
	1st difference	-5.93	0.00	-3.65	0.00	-7.08	0.00
	1(1)	-7.91	0.00	-2.08	0.02	-10.66	0.00

Stat., statistic; Prob., probability; CPI, corruption perception index; GOEXPPC, government expenditure per capita; INVESPC, investment per capita; PROPRGT, property rights protection; RGDPPC, real gross domestic product per capita; TRAOPN, trade openness.

(second lagged value), GOEXPPC and the INVESPC. These exhibited the sign that the estimated parameters are positive. The remaining variables RGDPPC lagged values and TRAOPN does not exhibit the expected signs. The expected sign of these variables is greater than zero, but the sign they exhibit is less than zero, the opposite expected sign. Table 4, Equations 1–3 also show that there is a one-way causality between real gross domestic product per capita (RDGPPC) and CPI and between RGDPPC and PROPRGT. A unit improvement in CPI is likely to increase RGDPPC by over 0.5 for the first year and by over 0.4 during the second year, all other things remaining equal. A unit increase in PROPRGT is liable to increase RGDPPC by a little less than 0.03 in the second year following the increase, holding other factors constant. The results of the Equation 1 also tend to show that GOEXPPC exerts the greatest impact on the RGDPPC followed by improvement in CPI. A unit increase in GOEXPPC is liable to increase RGDPPC by over 1.4 units while an improvement in CPI stimulates RGDPPC by a little over 0.5 units of the RGDPPC. Another feature of the VEC results is that if there is a temporary deviation of the ECOWAS economy from its long-run equilibrium path, it will recover about 28% of the deviations every year. This conclusion is derived from the coefficient of the error correction term.

The results of Equation 4 indicate that all the variables under Equation 4 exhibit the expected signs except TRAOPN, which shows a negative sign instead of a positive sign. In Equation 5, however, all the variables exhibit their *a priori* signs. Equations 4 and 5 also show that GOEXPPC has the highest contribution to RGDPPC in ECOWAS, holding other factors constant. The second highest contributor is improvement in property rights (PROPRGT). A unit increase in GOEXPPC is likely to increase RGDPPC by over 4.7 based on FMOLS regression model and 5.7 based on DOLS regression model, holding all other factors constant.

However, before subjecting the results of the estimated equations to hypotheses testing, it is important to subject each of the regression results to diagnostic testing to ensure that the results are efficient. The regression models to be tested are Equations 1, 4 and 5. The reason is that the study is interested in explaining the impact of economic institutions on economic growth which is represented by RGDPPC and not the other way round. The diagnostic tests for the VEC

TABLE 3: Kao residual co-integration test.

Type of test	*t*-statistic	Probability
Augmented Dickey–Fuller (ADF)	-6.157	0.00
Residual variance	0.758	-
HAC variance	0.783	-

HAC, Heteroscedasticity- and -autocorrelation-consistent

TABLE 4: Panel data regression results (real gross domestic product is the dependent variable, except Models 2 and 3).

Variable	Equation 1		Equation 2		Equation 3		Equation 4		Equation 5	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Constant	-1814	-0.85	0.0002	0.80	0.0034	0.93	-	-	-	-
ECM	-0.276	-4.78	0.0086	1.02	0.0885	0.59	-	-	-	-
D(RGDPPCit-1)	-0.0096	-1.40	-0.0064	-0.31	-0.5947	-1.59	-	-	-	-
D(RGDPPCit-2)	-0.0653	-0.1.00	-0.0022	-1.09	-3444	-0.96	-	-	-	-
CPI	-	-	-	-	-	-	0.1903	1.70	0.0144	0.55
D(CPIit-1)	0.5582	2.58	-0.2878	-4.33	-1.2435	-1.05	-	-	-	-
D(CPIit-1)	0.4170	1.9601	-0.2797	-4.26	-1.2488	-1.07	-	-	-	-
PROPRGT	-	-	-	-	-	-	0.0184	2.57	0.0063	3.85
D(PROPRGTit-1)	-0.0127	-1.013	-0.0049	-1.28	-0.0012	-0.02	-	-	-	-
PROPRGTit-2	0.0280	2.30	-0.0063	-1.70	-0.0744	-1.12	-	-	-	-
INVESPC	0.0044	0.65	0.0002	0.80	0.0034	0.93	0.0040	2.95	0.0016	1.87
GOEXPPC	1.4047	7.41	-0.0488	-0.84	-0.1774	-0.17	4.722	24.10	5.7913	52.73
TRAOPN	-55	-2.39	0.0110	1.51	-0.0234	-1.06	-0.0040	-1.22	0.0029	1.33
Adjusted R2	0.340	-	0.125		0.104	-	0.988	-	0.988	-
F-statistic	12.11	-	4.10		3.53	-	-	-	-	-
F-prob.	0.00	-	0.00		0.00	-	-	-	-	-
LM stat. 1 lag	38.27	-	-	-	-	-	-	-	-	-
LM stat. prob.	0.00	-	-	-	-	-	-	-	-	-
Adjusted Q-stat. prob.	0.03	-	-	-	-	-	-	-	-	-
Chi-square 132 *df*	182	-	-	-	-	-	-	-	-	-
Chi-square prob.	0.00	-	-	-	-	-	-	-	-	-
Highest 2	-	-	-	-	-	-	2.41 & 2.22	-	2.49 & 2.12	-
Un-centred VIF	-	-	-	-	-	-	-	-	-	-
Lowest 2 condition numbers	-	-	-	-	-	-	5.38E-5 & 0.00011	-	3.7E- 5 & 0.0007	-
Highest 2 eigenvalues	-	-	-	-	-	-	0.99 & 0.16	-	0.99 & 0.12	-
Q-statistic	22.53	-	-	-	-	-	1.26	-	3.28	-
Q-statistic prob.	0.03	-	-	-	-	-	0.19	-	0.07	-

ECM, error correction term; D(RGDPPCit), first difference of RGDPPC; D(CPIit), first difference of CPI; R^2, adjusted R^2; *F*, *F*-statistic; Q, Q-statistic; VIF, variance inflation factors; *df*, degrees of freedom; LM, likelihood multiplier; Stat. statistic, Prob. Probability; CPI, corruption perception index; PROPRGT, property rights protection; INVESPC, investment per capita; GOEXPPC, government expenditure per capita; TRAOPN, trade openness, RGDPPC, real gross domestic product per capita; and the subscript I and t stand for the cross- sectional units (countries of ECOWAS) from i=1, 2, …, 15 and years from 1990 taking the value of 1 to 2015 taking the value of 26.

regression model applied are mainly residual tests. The first is the likelihood multiplier (LM) residual test for serial correlation. The LM null hypothesis states that the computed VEC regression model has no serial correlation. The computed LM statistic using 1 lag value is 38.27 with a probability value of 0.00. The probability value shows that the LM value of 38.27 is unlikely to happen by chance. This study concludes that the VEC model suffers from serial correlation. The computed Q-statistic residual test for serial correlation also confirms that there is serial correlation based on computed Q-statistic of 22.53 having a probability value of 0.03. The test for VEC residual heteroscedasticity states that the VEC results are homoscedastic in their residuals. The computed chi-square value using 132 degrees of freedom (*df*) is 382.957 with the probability of 0.00. Thus, this study cannot accept the null hypothesis that the computed residuals are homoscedastic. This study concludes that the computed residuals are heteroscedastic and by extension the estimated VEC regression model has a heteroscedasticity problem.

The diagnostic tests for the two co-integrating equations are presented in this section. From the results of coefficient diagnostic tests using VIF and coefficient decomposition, the computed un-centred VIF is less than 3.0 for both FMOLS and DOLS regression models. Thus, both FMOLS and DOLS are unlikely to exhibit multi-collinearity problems. The VIF of less than 3.0 cannot cause collinearity among regressors. The computed condition numbers show that no two variables meet one of the requirements of having multi-collinearity with two conditional numbers below 0.001. However, none of the two variables has associated eigenvalues that are in excess of 0.5. For multi-collinearity to exist, at least two condition numbers must be less than 0.001 and at least two associated eigenvalues must be greater than 0.5. The lowest two computed condition numbers for FMOLS are 5.4E-5 (0.000054) and 0.00011, and for DOLS 1.4E-5 and 0.0007. The highest associated eigenvalues are 0.99 and 0.16 for FMOLS, and 0.99 and 0.12 for DOLS. Thus, both FMOLS and DOLS have no problem of multi-collinearity. Therefore, there is no substantial evidence of linearity among the regressors.

The tests for autocorrelation and heteroscedasticity applied, make use of ARCH in the residuals. This study uses Q-statistics and its probabilities for testing the null hypothesis that states no autocorrelation and heteroscedasticity exist in the residuals of the regression. The computed Q-statistic for the first lagged value of the FMOLS and the DOLS are 1.26 and 3.28 with their respective probabilities of 0.19 and 0.07. Thus, this study cannot reject the null hypothesis of no autocorrelation and heteroscedasticity in the residuals of both the FMOLS and DOLS regression models.

The above diagnostic tests show that the VEC regression model did not only have a serial correlation but also a heteroscedasticity problem. The consequence thereof is that the computed *t*-statistic and *F*-statistic of the VEC regression do not follow the normal *t*-statistic and *F*-statistic. The use of the *t*-ratios in testing hypotheses of this study will lead to wrong conclusions. For this reason, this study does not apply the VEC regression model as an instrument of drawing conclusions about this study. The VEC regression models, however, give an indication of the nature of the data used in this study. The VEC results show the line of causation. The co-integrating regression methods are, however, not wanting. Having satisfied the requirements of exhibiting no significant evidences of serial correlation, heteroscedasticity and multi-collinearity, the models are applied to test the hypothesis formulated to guide this study.

This study hypothesised in its null hypothesis that corruption exerts no significant impact on RGDPPC. The computed *t*-statistic of the CPI is 1.70 for FMOLS and 0.55 for DOLS. Given the degrees of freedom from the panel data for both FMOLS and DOLS to be 295 which is greater than 120, the critical *t*-statistic using 5% significance limit is 1.96. As the computed statistic is less than 1.96, this study cannot reject the null hypothesis that corruption has no significant influence on economic growth in ECOWAS countries.

This study also hypothesised that property rights protection has not promoted RGDPPC in ECOWAS. The computed *t*-statistic for the index of property rights using FMOLS is 2.57 and for DOLS 3.85. Because the computed *t*-statistics of both are greater than the critical *t*-ratio, the null hypothesis is rejected. The study concludes that property rights protection has significantly enhanced per capita GDP in ECOWAS.

The study also tested the hypothesis that GOEXPPC has not stimulated RGDPPC growth in ECOWAS. The computed *t*-statistic is 24.10 for FMOLS and 52.73 using DOLS. Given the critical statistic value of 1.96, this study rejects the null hypothesis and concludes that GOEXPPC stimulated per capita GDP growth in ECOWAS member countries.

It is also hypothesised that private investments have no significant impact on RGDPPC growth in ECOWAS countries. Comparing the computed *t*-ratios of 2.95 and 1.87 for FMOLS and DOLS, respectively, with the critical *t*-value of 1.96, this study rejects the null hypothesis based on FMOLS and concludes that private INVESPC has stimulated RGDPPC growth in ECOWAS. However, using DOLS, this study cannot reject the null hypothesis and the conclusion in this case is that private INVESPC has no significant impact on RGDPPC of ECOWAS.

The study has also tested the hypothesis that TRAOPN has no significant impact on the real GDP growth rate in ECOWAS. From the computed *t*-ratios of both FMOLS and DOLS of -1.22 and 1.33, respectively, this study concludes that TRAOPN exerts no significant impact on the ECOWAS RGDPPC.

Summary and concluding remarks

In this study, an attempt was made to establish the link between economic institutions and RGDPPC in ECOWAS member countries. To carry out the investigation, it was necessary to establish the theoretical linkages between

economic institutions and economic growth. In the theoretical arguments, it was stated that economic institutions are the fundamental cause of economic growth that explains income and productivity differences across countries of the world. It was further argued that economic institutions are by far better determinants of growth than technology, an increase in investment, government provision of services, among others. The reason is that economic institutions serve as the bedrock on which economic growth takes place. Once there are solid economic institutions in a country, other approximate determinants of growth fall in place. The study also reviewed related empirical literature that established the impact of economic institutions on economic growth in several countries, to see how the theoretical postulations applied to real-world situations.

The study explained the method of research applied in the study. The data used for the analysis were obtained from the UNCTAD database, TI and the Heritage Foundation. The independent variables used in the analyses were combinations of both approximate and fundamental causes of growth. The approximate causes of growth were represented by GOEXPPC, INVESPC and TRAOPN. The fundamental causes of growth were represented by the corruption perception index and the property rights index. The dependent variable used is the RGDPPC.

The results of data analysed established that GOEXPPC made the highest contribution to RGDPPC growth in ECOWAS countries, followed by the protection of property rights (PROPRGT). The results also showed that private INVESPC stimulated RGDPPC growth under FMOLS but not under the DOLS regression model.

On the basis of these findings, this study presents a number of policy implications of the study in this section. The study established that government provision of services as measured by the GOEXPPC has made a significant impact on economic growth in ECOWAS. This means that government expenditure is below the optimal spending limit; hence, this is the main condition to be met for government spending to have a significant positive impact on growth. Governments in ECOWAS can increase their spending within the range of their fiscal limit. However, it is important for each of the ECOWAS member countries to compute its optimal government size so that the size is not exceeded.

The study also showed that property rights protection has stimulated RGDPPC growth in ECOWAS. The reason for this may be attributed to the fact that property rights protection encourages people to work hard and own properties. It also encourages investment. There is the need to continue to ensure continuous PROPRGT as this can attract foreign investment into the region and foreign investments can help to diversify ECOWAS economies out of the primary products.

The study established that the corruption index has no significant impact on per capita GDP in ECOWAS countries. This does not mean that the resources ECOWAS countries used in fighting corruption are wasted. The implication of this finding is that if there are no significant efforts in fighting corruption, corruption can affect the quality of publicly provided services and this can retard economic growth. Moreover, if there is no sufficient effort in tackling corruption, corruption can adversely affect the reward system in the society. The consequence of this is that human efforts that are engaged in producing productive goods and services will be diverted into rent seeking.

TRAOPN has not stimulated economic growth of the ECOWAS countries. This finding is probably a reflection of the international arrangement in which developing countries are engaged in the production of primary products with the attendant fall in the terms of trade against them. If ECOWAS countries must overcome this problem, they have to learn how to process their primary products into at least semi-processed goods before exporting them.

This study has also established that private INVESPC stimulated economic growth in ECOWAS based on the FMOLS estimation method but not on the basis of the DOLS regression model. Private investments, particularly from international companies, are also the means of transferring technologies from more advanced countries to less developed countries. ECOWAS countries must not overlook the opportunities private foreign investments present. The ECOWAS countries must not only encourage them but also encourage their citizens to acquire the technique of production with the aim of diffusing them in the ECOWAS region generally. This is very important if private investments must become more useful to ECOWAS countries.

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The authors declare that they have no financial or personal relationship(s) which may have inappropriately influenced them in writing this article.

Authors' contributions

L.Z.W. did most of the writing but under the supervision of P.L.R. who supervised and ensured that the standard of publication was attended.

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