

Economic Growth of ECOWAS Countries and the Validity of Kaldor's First Law

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Abstract

Kaldor's first growth law posits that the growth rate of an economy is positively related to the growth rate of its manufacturing sector. This paper tests the validity of this law for ECOWAS by controlling for both heterogeneity and cross-sectional dependence. The results suggest that the growth trajectory of ECOWAS countries is consistent with Kaldor's first law.

Keywords: Economy; Economic growth; Empirical data; Econometric methods; GDP

Introduction

In the 1960s, Kaldor [1] challenged the idea that the source of economic growth is the availability of factors of production such as labor, technology and capital. He argued that economic growth is based on the increasing return of economic scale in the economy. The sector with higher return of economic of scale determines economic growth. According to Kaldor [1], manufacturing has characteristics which make it the engine of economic growth for two main reasons. Firstly, manufacturing itself is subject to both static and dynamic increasing returns, while land-based activities and petty services are subject to diminishing returns [2]. Secondly, as the manufacturing sector expands and draws labor from other sectors, productivity in these activities rises automatically. Thus, the faster manufacturing output grows, the faster the growth of productivity in the economy as a whole, which is the major source of economic growth and social development. Using empirical data for OECD countries, Kaldor [1] showed that the economic growth rate is positively related to the growth rate of manufacturing sector. This finding known as Kaldor's first law has been tested in a large number of empirical studies employing different econometric methods and data [3-10]. The general conclusion from these studies confirms Kaldor's first law. The bulk of this literature focuses on developed countries and developing countries in general, with no explicit focus on West African countries. Most of the existing empirical works, on the other hand, are potentially flawed with severe estimation biases as they rely on the original approach employed by Kaldor [11]. First, the econometric model consists in regressing real GDP growth rate on the growth rate of manufacturing or industrial output, without accounting for a potential long-run relationship between the level variables. It is now well established that if GDP and manufacturing output are cointegrated, this approach is misspecified. Second, they employ earlier panel data regression approaches that impose cross-sectional homogeneity on coefficients, with the hope that the results could be applied to all countries. The cross-sectional homogeneity assumption is likely to be violated given the heterogeneity of economies with respect to trade policy, economic conditions and technological and institutional developments. Third, standard panel data methods do not take into account cross-sectional dependency issue. They assume that the cross-sections are independent. As cross-section dependence can arise due to unobserved common factors, externalities, regional and macroeconomic linkages, it is an important issue when dealing with countries that share geographic proximity. In the presence of cross-sectional dependency, standard estimation methods may result in misleading inference and inconsistency in empirical findings. There

is therefore a need for further research on the relationship between manufacturing and economic growth.

This paper examines the validity of Kaldor's first law for the Economic Community of West African States (ECOWAS), looking more closely at the issues of cointegration, heterogeneity and cross-sectional dependence. It seeks to address the question: to what extent is the growth performance of ECOWAS economies related to how fast their industrial sector is growing? To the best of our knowledge, there is no attempt to incorporate the hypotheses of heterogeneity and cross-sectional dependence in the literature on Kaldor laws.

The remainder of the paper is organized as follows. Section 2 presents the model specification and the data used for the empirical analysis. Section 3 outlines the econometric methodology employed for testing Kaldor's first growth law. Section 4 reports the empirical findings of the study. Section 5 concludes the study and provides some policy recommendations.

Model Specification and Data

Kaldor's first law states that there is a close relation between the growth rate of manufacturing output and the growth rate of GDP. In most existing studies, this law has been tested using the following specification:

$$\Delta y_{it} = \alpha + \beta \Delta man_{it} + \mu_i + u_{it} \quad (1)$$

where Δy_{it} is the growth rate of real GDP and Δman_{it} is the growth rate of manufacturing output. The subscripts i and t refer, respectively, to the country and time dimensions of the panel. The term μ_i represents individual country heterogeneity and captures the unobserved and time-invariant effects which affect economic growth. Such country-effect may include several factors such as geographic and cultural characteristics, as well as omitted economic variables. The term u_{it} represents the vector of *i.i.d.* idiosyncratic errors. The coefficient β is expected to be positive. The magnitude of the coefficient indicates the contribution of manufacturing sector to economic growth.

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A major problem with eqn. (1) is that if GDP and manufacturing output are cointegrated, eqn. (1) is subject to omitted-variable problem. Engle and Granger [12] and Johansen [13,14] showed that as long as variables are cointegrated, their short-run dynamics follows an error correction model. In presence of cointegration, the relationship between manufacturing output growth rate and GDP growth rate is given as follows:

$$\Delta y_{it} = \alpha + \beta \Delta man_{it} + \lambda (y_{it-1} - \theta man_{it-1}) + \mu_i + u_{it} \quad (2)$$

where θ is the long-run coefficient. A significant and negative coefficient on the lagged error correction term provides evidence in support of the existence of a long-run relationship.

The study uses annual time series data for a sample of 11 ECOWAS member countries for which data are available. The countries under study include: Benin, Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. The variables used are real GDP and industrial output. The sample period is 1970-2014 for all countries except Nigeria for which data on industrial output cover the period 1981-2014. All data are in constant 2010 US dollar and are converted into natural logarithms so that they can be interpreted in growth terms after taking first difference. The data set comes from the electronic databank of the World Bank.

Table 1 provides summary statistics for the variables. Looking at Panel A of this Table we note that there is a disparity in economic growth rate among countries. The average economic growth rate varies from 2.25% in Niger to 5.08% in Mali. Similarly, manufacturing growth rate varies from 2.69% in Nigeria to 5.76% in Sierra Leone.

The correlation coefficient suggests a positive relationship between manufacturing output growth and GDP growth. The statistics reported in Panel B show a wide variation in the share of manufacturing sector to GDP ranging from 13.53% in Gambia to 37.29% in Nigeria. In the majority of cases, the share of agricultural sector is higher than that of manufacturing sector. Furthermore, the size of the manufacturing sector in ECOWAS countries is relatively smaller compared to East Asian countries where it exceeds 50 per cent of GDP.

Econometric Methodology

To obtain consistent estimate of Kaldor's first law within the panel framework, we need to carefully address at least three econometric key issues. The first issue is to control for the possible cross-sectional dependence across the panel units. It has been demonstrated that in the presence of cross-sectional correlation in the error terms, substantial biases and size distortions occur in standard panel estimation methods [15-20]. The second important issue to test is whether or not the slope coefficients are homogeneous among panel members. The third issue is related to the presence of a meaningful long-run relationship between manufacturing and GDP.

Testing for cross-sectional dependence

Cross-section dependence can arise due to unobserved common factors, externalities, regional and macroeconomic linkages. It is an important issue when dealing with countries that share geographic proximity or are closely integrated financially. This is particularly true for ECOWAS countries that apply a common external tariff and have important economic inter-relations. On the other hand, a

Panel A: GDP growth and manufacturing output growth									
Country	GDP growth (%)				Manufacturing output growth (%)				
	Mean	Std.	Min.	Max.	Mean	Std.	Min.	Max.	Corr.
Benin	3.68	3.14	-5.02	9.48	2.90	9.27	-24.05	29.55	0.38
Burkina Faso	4.53	3.10	-1.79	10.45	4.18	9.52	-18.53	31.64	0.17
Cote d'Ivoire	2.61	4.53	-11.60	12.15	2.91	7.38	-12.16	18.72	0.36
Gambia	3.64	3.37	-4.42	11.68	3.75	6.04	-18.41	24.78	-0.08
Ghana	3.54	4.63	-13.27	13.14	3.62	18.38	-46.03	52.78	0.34
Mali	5.08	5.83	-7.66	18.47	4.98	9.16	-24.10	20.95	0.23
Niger	2.25	6.34	-18.69	12.64	4.79	11.78	-17.43	40.29	0.32
Nigeria	3.89	6.73	-11.37	29.07	2.69	6.92	-14.03	19.98	0.50
Senegal	2.88	3.40	-5.74	8.54	3.41	3.77	-9.42	10.84	0.60
Sierra Leone	2.56	6.99	-21.09	23.32	5.76	20.63	-18.00	82.17	0.48
Togo	2.60	5.55	-16.37	13.96	3.03	14.78	-44.23	58.52	0.45
Panel	3.37	5.13	-21.09	29.07	3.84	11.81	-46.03	82.17	0.34

Panel B: Manufacturing and agricultural output as share of GDP									
Country	Manufacturing output (% GDP)				Agricultural output (% GDP)				
	Mean	Std.	Min	Max	Mean	Std.	Min	Max	
Benin	18.75	7.45	11.70	32.82	31.19	4.04	23.45	37.85	-
Burkina Faso	21.83	2.71	16.22	28.08	33.16	3.36	28.22	40.20	-
Cote d'Ivoire	21.09	2.58	15.15	26.26	26.28	3.52	21.20	34.00	-
Gambia	13.53	0.99	10.55	14.97	30.07	7.23	18.96	41.90	-
Ghana	21.12	6.27	6.46	28.93	44.63	0.96	22.39	65.04	-
Mali	18.36	5.11	9.86	28.64	43.21	9.93	33.01	66.02	-
Niger	16.27	3.96	6.94	22.94	42.34	9.48	20.11	65.46	-
Nigeria	37.29	7.90	24.94	52.99	33.03	6.53	20.23	48.56	-
Senegal	21.72	2.66	16.38	25.46	18.96	2.78	13.77	24.86	-
Sierra Leone	20.14	9.47	6.79	41.01	44.81	9.36	29.60	61.96	-
Togo	20.58	3.32	15.53	33.13	34.27	4.82	24.08	44.14	-
Panel	20.60	7.42	6.46	52.99	35.09	10.55	13.77	66.02	-

Note: Std. denotes standard deviation. Corr. denotes the correlation coefficient between GDP growth and manufacturing output growth

Table 1: Descriptive statistics of the variables.

shock affecting one country influences the other members. This was particularly the case during the Ivorian political crisis over the period 2002-2011, which was felt in Burkina Faso, Mali and Niger. Hence, it is highly probable that the time series in our panel show cross-section dependence.

There are various tests analyzing cross-sectional dependency in panel data. In eqn. (1), the null hypothesis of no cross-sectional dependence is $H_0: cov(u_{it}, u_{jt})=0$ for all t and $i \neq j$. Initially, Breusch and Pagan [15] proposed the following Lagrange Multiplier (LM) statistic to test for cross-sectional dependency:

$$CD_{LM} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \quad (3)$$

where $\hat{\rho}_{ij}$ is the sample correlation coefficient among the residuals obtained from individual OLS estimations of eqn. (1). Under the null hypothesis of no cross-sectional dependence, the LM statistic is asymptotically distributed as Chi-square with $N(N-1)/2$ degrees of freedom. The LM statistic is valid for panels in which N is relatively small and T is sufficiently large. In the case of an unbalanced panel, only completed observations are included, i.e., $T_{ij} = \min(T_i, T_j)$, where T_i is the number of observations for individual i .

Pesaran [21] proposed the scaled version of the LM statistic, which is defined for balanced panels as follows:

$$LM_S = \sqrt{\frac{1}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N (T \hat{\rho}_{ij}^2 - 1) \right) \quad (4)$$

This statistic is asymptotically distributed as standard normal when $T \rightarrow \infty$ first and then $N \rightarrow \infty$. To address the size distortion of LM and LM_S , Pesaran [21] also proposed a more general cross-sectional dependency tests that is valid for panel where T and N are sufficiently large in any order. This statistic is defined as follows:

$$CD_P = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \quad (5)$$

In the case of an unbalanced panel, the CD test statistic becomes:

$$CD = \sqrt{\frac{2}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \sqrt{T_{ij}} \hat{\rho}_{ij} \right) \quad (6)$$

Under the null hypothesis of no cross-sectional dependence, the CD test statistic is asymptotically distributed as standard normal. A more in depth discussion of cross-sectional dependence tests can be found in De Hoyos and Sarafidis [22], Pesaran [17] and Chudik and Pesaran [23].

Results displayed in Table 2 indicate that the null hypothesis of no cross-sectional dependence across the members of panel is strongly rejected. This suggests that there are cross-section connections among ECOWAS countries, and that a shock to one of them is likely to affect the others.

Testing for slope homogeneity

Standard panel data estimation methods restrict all the slope coefficients to be identical across countries. If the slopes are heterogeneous across panel units, these estimators will generate inconsistent and misleading results [24-26]. Even though ECOWAS countries belong to the same geographic area, they are not identical in terms of economic structure, industrial policy and economic development. In this context, the assumption that slope coefficients are homogeneous is unlikely to hold.

This study applies a battery of homogeneity tests to determine whether or not slope coefficients are homogenous. The standard F-test is widely used to test the null hypothesis of slope homogeneity $H_0: \beta_i = \beta$ for all i against the alternative of heterogeneity $H_1: \beta_i \neq \beta$ for a non-zero fraction of pair-wise slopes. However, the F-test requires that the explanatory variables are strictly exogenous, and the error variances are homoscedastic. Swamy [27] proposed a slope homogeneity test that relaxes the assumption of homoscedasticity allowing for group-wise heteroscedasticity. This test is based on the following statistic:

$$\tilde{S} = \sum_{i=1}^N (\hat{\beta}_i - \hat{\beta}_{WFE})' x_i' M_{\tau} x_i (\hat{\beta}_i - \hat{\beta}_{WFE}) \quad (7)$$

where $\hat{\beta}_i$ is the pooled OLS estimator, $\hat{\beta}_{WFE}$ is the weighted fixed effect pooled estimator, M_{τ} is an identity matrix, and $\tilde{\sigma}_i^2$ is the estimator of σ_i^2 . Under the null hypothesis of slope homogeneity, this statistic is asymptotically distributed as Chi-square with $k(N-1)$ degrees of freedom when N is fixed and $T \rightarrow \infty$. Pesaran and Yamagata [28] stated that both the F test and Swamy test require data where N is relatively small compared to T [27]. To overcome this problem they proposed a standardized version of Swamy's test for testing slope homogeneity in large panels. This statistic is defined as follows:

$$\tilde{\Delta} = \sqrt{N} \left(\frac{N^{-1} \tilde{S} - k}{\sqrt{2k}} \right) \quad (8)$$

The small sample properties of the delta test can be improved by using the following mean and variance bias adjusted version:

$$\tilde{\Delta}_{adj} = \sqrt{N} \left(\frac{N^{-1} \tilde{S} - E(\tilde{z}_i)}{\sqrt{\text{var}(\tilde{z}_i)}} \right) \quad (9)$$

where $E(\tilde{z}_i) = k$, $\text{var}(\tilde{z}_i) = 2k(T - k - 1) / (T + 1)$.

Under the null hypothesis, the delta test and its adjusted version have an asymptotic standard normal distribution.

Table 3 presents the results of slope homogeneity tests of the long-run relationship between the two variables. In addition to the Pesaran and Yamagata [28] delta tests and the Swamy [27] test, we perform the Hausman-type comparison of fixed effects and mean group estimates, and the Roy-Zellner test. The Roy-Zellner poolability test accounts for non-spherical disturbances and generalizes the standard Chow

Variables	Breusch-Pagan LM		Pesaran scaled LM		Pesaran CD	
	Test stat.	Prob.	Test stat.	Prob.	Test stat.	Prob.
GDP	2035.29*	0.000	188.81*	0.000	44.87*	0.000
MAN	1739.06*	0.000	160.56*	0.000	41.43*	0.000
ΔGDP	96.46*	0.000	3.95*	0.000	4.31*	0.000
ΔMAN	71.15**	0.070	1.54	0.123	-0.21	0.831

Note: GDP is real gross domestic product, MAN is manufacturing output.
 *,**Indicate rejection of the null hypothesis at the 5% and 10% significance levels, respectively.

Table 2: Results for cross-sectional dependence tests in the variables.

Test	Statistic	Prob.
Hausman test	189.32*	0.000
Roy-Zellner	834.12*	0.000
Swamy test	2199.11*	0.000
Delta	316.274*	0.000
Delta adjusted	345.348*	0.000

Note: The Hausman test compares Fixed Effects model with Mean Group estimator.
*Indicates rejection of the null hypothesis at 5% significance level.

Table 3: Results of homogeneity tests.

test. The results support the alternative hypothesis that heterogeneity exists in the GDP-manufacturing nexus among ECOWAS countries. This means that inaccurate outcomes will be obtained if the constraint of slope homogeneity is imposed. Therefore, estimation methods that account for both heterogeneous slopes and cross-sectional dependency should be employed.

Estimation methods

To deal with both cross-section dependence and parameter heterogeneity, we apply the Common Correlated Effects Mean Group (CCEMG) estimator designed by Pesaran [16] and the Augmented Mean Group (AMG) estimator introduced by Eberhardt and Bond [26]. These methods are also robust to omitted variables bias and endogeneity of regressors. The main difference between the CCEMG and the AMG estimators is how they estimate the unobserved common factors. The CCEMG estimator treats them as nuisance parameters while the AMG represents them as a common dynamic process which can be estimated. The CCEMG estimator assumes the following multifactor error structure:

$$\Delta man_{it} = \phi_i f_t + \varphi_i + \eta_{it} \quad (10)$$

$$u_{it} = \omega_i f_t + e_{it} \quad (11)$$

where ϕ_i is an individual effect, f_t is a $mx1$ vector of unobserved common effects with country-specific factor loadings φ_i and η_{it} are individual country-specific idiosyncratic errors assumed to be distributed independently of the common factors and across i . In eqn. (11) ω_i is a $mx1$ loading vector capturing the country-specific effect of the common factor f_t , and e_{it} are idiosyncratic errors assumed to be distributed independently of x_{it} and f_t . The error term, u_{it} , is allowed to be correlated with the regressor Δman_{it} through the presence of the factors f_t in both. This implies that if the factor loadings φ_i and ω_i are non zero, estimating eqn. (1) without accounting for this correlation will produce biased and inconsistent estimates of β . Substituting eqn. (10) into eqn. (1) gives:

$$\Delta y_{it} = \alpha_i + \beta_i \Delta man_{it} + \omega_i f_t + e_{it} \quad (12)$$

The multi-factor error structure model addresses the issue of endogeneity associated with the GDP-manufacturing relationship by allowing unobserved common factors to be correlated with observed factors. The CCEMG estimator eliminates unobserved common factors by using simple cross-section averages of the dependent and independent variables as additional regressors:

$$\Delta y_{it} = \alpha_i + \beta_i \Delta man_{it} + c_i \Delta \bar{y}_t + d_i \Delta \overline{man}_t + e_{it} \quad (13)$$

The CCEMG estimator produces consistent estimates of the parameters as simple averages of the group-specific estimates.

The Augmented Mean Group (AMG) estimator accounts for cross-section dependence by including a common dynamic process in the country regressions. It follows a two-step procedure. The first

step is carried out via pooled OLS regression of the first-differenced variables model augmented with T-1 differenced year dummies D_t . The coefficients on these dummies, i.e., \hat{C}_t , provide an average estimate of the unobservable common factors. In the second step, the model is augmented with \hat{C}_t as an explicit regressor.

To test whether there is a long-run relationship between GDP and manufacturing output, we test for unit root in the series and the regression residuals obtained from the CCEMG and AMG estimators. To this end, we apply the Cross-sectionally Augmented Dickey-Fuller (CADF) panel unit root test proposed by Pesaran [29], which takes into account both the heterogeneity and the cross-sectional dependency. This test follows the Common Correlated Effects approach by augmenting the ADF regressions with cross section averages. In presence of cointegration among the variables, the CCEMG estimator is obtained by estimating the augmented following model:

$$\Delta y_{it} = \alpha_i + \beta_i \Delta man_{it} + \lambda_i ecm_{it-1} + c_i \Delta \bar{y}_t + d_i \Delta \overline{man}_t + \kappa_i \overline{ecm}_{it-1} + e_{it} \quad (14)$$

where $ecm_{it-1} = y_{it-1} - \theta_i man_{it-1}$ is the lagged error correction term.

Empirical Results and Discussion

When analyzing time series data, it is necessary to make sure that we do not run spurious regressions. To this end we test the order of integration of the series by means of unit root tests. We first apply the well-known IPS test developed by Im et al. [30], which is less restrictive and more powerful compared to the other first generation panel unit root tests. The IPS test allows heterogeneity in the autoregressive coefficient. However, this test assumes that the errors are independent across countries. Given the above results, we employ the Cross-sectional Augmented Dickey-Fuller (CADF) test proposed by Pesaran [29] which deals with both heterogeneity and cross-section dependence. The results of these tests are reported in Table 4. They indicate that the null hypothesis of unit root cannot be rejected for all of our variables. However, when applied to the first differences of the variables, the null hypothesis of unit root is clearly rejected. Thus, we can regard the variables as being integrated of order one, which suggests that there might be a long-run relationship among them.

The existence of cross-sectional dependency and slope heterogeneity among countries make the CCEMG and AMG estimators suitable for estimating the long-run relationships between the variables under study. We introduce a linear time trend in all models, in an attempt to mitigate the omitted variable bias. For each regression we test the residuals for non-stationarity using heterogeneous panel unit root tests. Results are reported in Table 5. The results confirm the positive impact of manufacturing growth on real GDP. The results indicate that the long-run effect of a one percentage increase in manufacturing output on the level of GDP is about 0.384 percent and 0.266 percent in the CCEMG and AMG models, respectively. The CADF and IPS test results suggest rejection of the null hypothesis of no cointegration for both CCEMG and AMG models. We can conclude that the variables

	Level		First difference	
	IPS test	CADF test	IPS test	CADF test
GDP	2.537 (0.994)	0.086 (0.534)	-14.696* (0.000)	-3.501* (0.010)
MAN	-2.000*(0.022)	2.408 (0.992)	-15.599* (0.000)	-3.188* (0.001)

Notes: The IPS test provides W-t-bar statistic, whereas the CADF test provides z-t-bar statistic of Pesaran's CADF test. Tests are conducted for model with intercept and trend for level and intercept only for first difference. p-values are in parentheses. Optimal lag length was determined using AIC with a maximum of 5.
*,**Denote rejection of the null hypothesis of unit root at the 5% and 10% significant levels, respectively.

Table 4: Panel unit root test results.

Dependent variable: log of GDP				
	CCEMG		AMG	
	Coef.	t-stat.	Coef.	t-stat.
Manufacturing output (log)	0.384*	4.70	0.266*	4.31
Intercept	5.938	1.56	16.253*	14.61
Country trend	0.011**	1.77	-0.004	-0.59
Nb. of country trends sign. at 5%	7	-	8	-
Obs.	484	-	484	-
Unit root tests				
IPS	-8.284* (0.000)	-	-7.808* (0.000)	-
CADF	-3.884* (0.000)	-	-3.162* (0.001)	-

Note: CCEMG is the Common Correlated Effects Mean Group by Pesaran (2006) and AMG refers to the Augmented Mean Group of Eberhardt and Bond (2009). IPS unit root test provides W-t-bar statistic, whereas the CADF test provides z-t-bar statistic with p-values in parentheses. Optimal lag length was determined using AIC with a maximum of 5. IPS and CADF tests are conducted in the case of an intercept only.
*,**Indicate significance at the 5% and 10% levels, respectively.

Table 5: Long-run relationship between GDP and manufacturing output.

Dependent variable is GDP growth rate				
	CCEMG		AMG	
	Coef.	t-stat.	Coef.	t-stat.
Δman_t	0.208*	4.04	0.182*	4.00
ecm_{t-1}	-0.367*	-11.56	-0.353*	-10.54
Intercept	-0.001	-0.06	0.053*	9.08
Obs.	473	-	473	-
CD test p-value	0.134	-	0.562	-
RMSE	0.034	-	0.036	-

Note: CCEMG is the Common Correlated Effects Mean Group by Pesaran (2006) and AMG refers to the Augmented Mean Group of Eberhardt and Bond (2009). The CD test is Pesaran (2004) test of the null of lack of cross-sectional correlations of the residuals. RMSE is Root Mean Squared Error.
*Indicate significance at the 5% and 10% levels, respectively.

Table 6: Kaldor's first law equation.

have a long run relationship in the period under study. Owing to this fact, we estimate Kaldor's first growth equation.

Table 6 presents the results from the CCEMG and AMG estimators. Both estimators deal with cross-section dependence and allow for coefficient heterogeneity. They are derived from averaging the coefficient estimates from individual time-series regressions. As can be seen, manufacturing growth rate is positively related to economic growth rate. This finding suggests that the manufacturing sector has performed an important role in economic growth of ECOWAS countries during the period 1970-2014. In other words, the growth trajectory of ECOWAS seems to be consistent with Kaldor's first law.

The fact that the results for the whole panel reveal a positive and significant relationship between economic growth and manufacturing growth does not necessarily imply that Kaldor's first growth law holds in each individual country. To make sure that this result is not driven by a few countries, we look at the individual country estimates. The results are reported in Table 7. As expected, the CCEMG results show considerable heterogeneity in the relationship between manufacturing growth and economic growth. The coefficient on manufacturing growth ranges from 0.011 in Gambia to 0.667 in Senegal. Except Gambia, manufacturing growth is significantly and positively related

to economic growth in all ECOWAS member countries. The point estimates of the error correction term are negative and significant. This provides evidence in support of the existence of a long-run relationship between GDP and manufacturing output and suggests that manufacturing Granger-causes economic growth in the long run. Thus even at the individual country level there is evidence supporting Kaldor's first growth law. Therefore, structural change in favor of industrial activities would help to accelerate economic growth in ECOWAS countries.

Conclusion and Recommendations

The aim of this study was to shed light on the relationship between manufacturing and economic growth in ECOWAS area over the period from 1970 to 2014. Contrary to previous panel studies which are typically based on standard panel estimators, we have made use of a more flexible and efficient panel estimation framework which controls for a number of issues usually affecting panel methods. Among these, parameter heterogeneity and cross-section dependence among the panel groups are of particular importance. Our empirical strategy deals with these issues relying on multifactor modelling approaches. Specifically, we make use of the Common Correlated Effects Mean Group estimator developed by Pesaran [16] and the Augmented

Dependent variable is GDP growth rate (Δy_{it})				
Country	CCEMG		AMG	
	Δman_{it}	ecm_{t-1}	Δman_{it}	ecm_{t-1}
Benin	0.126* (2.92)	-0.298* (-3.15)	0.140* (3.28)	-0.298* (-2.74)
Burkina Faso	0.157* (3.55)	-0.387* (-2.95)	0.097* (2.46)	-0.309* (-2.22)
Cote d'Ivoire	0.263* (3.33)	-0.219* (-2.51)	0.259* (3.09)	-0.186* (-2.13)
Gambia	0.011 (0.12)	-0.314* (-2.65)	0.003 (0.03)	-0.285* (-2.59)
Ghana	0.149* (3.51)	-0.255* (3.51)	0.121* (3.64)	-0.299* (-2.34)
Mali	0.130** (1.84)	-0.500* (-3.96)	0.088 (1.17)	-0.547* (-3.55)
Niger	0.101** (1.71)	-0.289* (-3.00)	0.111* (2.05)	-0.332* (-2.73)
Nigeria	0.303* (2.07)	-0.514* (-3.52)	0.296* (2.14)	-0.424* (-2.85)
Senegal	0.667* (6.76)	-0.509* (-3.80)	0.571* (6.19)	-0.533* (-3.59)
Sierra Leone	0.215* (4.18)	-0.335* (-3.26)	0.172* (4.49)	-0.275* (-3.97)
Togo	0.167* (3.58)	-0.414* (-3.25)	0.148* (3.31)	-0.393* (-3.13)

Note: CCEMG is the Common Correlated Effects Mean Group estimator of Pesaran (2006) and AMG refers to the Augmented Mean Group estimator of Eberhardt and Bond (2009). Figures in parentheses are t-statistics.
*,** Indicates significance at the 5% (10%) level.

Table 7: Individual country results.

Mean Group technique suggested by Eberhardt and Bond [26]. The results strongly support the hypothesis that the economic growth of ECOWAS countries is in a significant way positively associated with the expansion of the manufacturing sector. From a policy perspective, this finding suggests that adopting a development strategy based on industrial sector is going to help with economic development.

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