Economics and Business
ISSN 2256-0394 (online)
ISSN 2256-0386 (print)
2021, *35*, 1–13
https://doi.org/10.2478/eb-2021-0001
https://content.sciendo.com

EXTERNAL DEBT AND ECONOMIC GROWTH IN NIGER: A VECTOR AUTOREGRESSION AND VARIANCE DECOMPOSITION ANALYSIS

Issoufou OUMAROU

Université de Tahoua, Tahoua, Niger
Corresponding author e-mail: oumar1911@yahoo.com

Abstract. In the quest for quick economic development, many Sub Saharan African (SSA) countries borrow money to finance their budget deficits and vital infrastructure. Niger has seen its external debt increase year after year without really reaching economic development. This study uses a vector autoregressive (VAR) model to investigate the relation linking external debt and economic growth in Niger and variance decomposition forecast to verify if there is any significant impact from shocks for a period of 5 years in the future. The study utilises time series yearly data provided by the World Bank for the period covering 1970–2019. The empirical results reveal no long-run relationship between economic growth, external debt and government spending in Niger. The results also indicated that, on average ceteris paribus, the past realisation of economic growth is related to an increase of 97.75 % in economic growth, while the past realisation of external debt and government spending is associated with an increase of 83.77 % and 79.70 % in external debt and government spending, respectively. The results furthermore show that economic growth has a statistically significant causal effect on government spending in the short term. One percentage increase in economic growth accounts for an increase of 35.28 % in government spending on average ceteris paribus. The variance decomposition forecast reveals that economic growth has a significant influence on predicting government spending in the future.

Keywords*: Economic growth, External debt, Niger, Variance decomposition (VD), Vector autoregression (VAR).*

JEL Classification: C32; F43; H63

INTRODUCTION

In the quest for quick economic development, many Sub Saharan African (SSA) countries borrow money to finance their budget deficits and vital infrastructure. This is the case of Niger. Niger has been borrowing heavily from exterior and interior sources. By the year of 1970, Niger external debt stocks stood at $ 31 677 128 and by 2019, the amount had grown to $ 9 340 692 471. The total debt of Niger expressed in percentage of Gross Domestic Product (GDP) rose from 8.11 % in 1970 to 54.37 % in 2019. This increasing debt trend has led the International Monetary Fund (IMF) and the World Bank to warn Niger government as the country is struggling to service the interest on previous loans. While it is

widely believed that external debt helps developing countries achieve development, the major concern with the debt accumulation of Niger is that there is not much to illustrate by way of economic development for the massive amounts of debt accumulated.

The main aim of the article is to examine the relation linking external debt and economic growth in Niger and verify if there is any significant impact from shocks. This article is motivated to provide an empirical evidence of the impact of external debt of Niger on its economic growth. For this purpose, the study adopts vector autoregressive (VAR) technics and variance decomposition to investigate the existence of significant impact from shocks using a five-year forecast period in the future and Bound cointegration test to investigate the existence of a long-run relationship between external debt and economic growth in Niger.

The remainder of the article is structured in the following way: Section 1 provides the literature review, while Section 2 discusses the research data and methodology. Section 3 displays the outcome of the performed econometric tests and presents discussions.

1. LITERATURE REVIEW

Many authors have investigated the association linking external debt and economic growth. The results obtained and the methods used varied from one article to another. There are also differences in the countries studied and the periods used.

Al-Tamini and Jaradat (2019) analysed the impact of external debt on Jordan economic growth during the period of 2010–2017. The study empirical results showed a significant negative effect of external debt on economic growth.

Ma'ale (2019) utilized multiple linear regressions to explore the effects of public investment and public debt on economic growth in Jordan during the period of 1990–2017. The empirical results revealed a statistically significant negative effect of public debt on economic growth in Jordan. The empirical results demonstrated that a percentage point augmentation in public debt engendered a 0.11 % decrease in economic growth in Jordan. The outcome also indicated that public investment has a statistically significant positive effect on economic growth. One percent point raise in public investment resulted in a 0.11 % increase in economic growth.

Çifligu (2018) looked into the connection between public debt and economic growth in Albania in the period after dictatorships using annual data obtained from the Ministry of Finance, the Bank of Albania and the IMF. The empirical results showed no significant connection between public debt and economic growth. The results revealed that changing the workforce from low productivity to elevated productivity, cautious fiscal and monetary policies, sustainability of the macroeconomic situation, and steady investment expansion had significant effects on economic growth.

Hammed *et al.* (2018) utilised the debt overhang theory to examine the effect between external debt and economic growth among the Economic Community of West African States (ECOWAS) members. The used data covered the period of

1980–2015. The empirical results revealed that there were short-term and long-term causality linking external debt and economic growth among ECOWAS members.

Cui, Wu and Zhao (2018) used a vector autoregression (VAR) model and variance decomposition forecast to dynamically classify the determinants of energy consumption in Shanxi Province of the People Republic of China during the period of 1990–2015. The empirical results obtained from the impulse response function showed that a positive shock in gross domestic product and population had a positive effect on energy consumption. The variance decomposition results revealed that variation in energy consumption explained by the innovation in the level of urbanisation accounted for 23.18 %, which played an established role in increasing energy consumption.

Shkolnyk and Koilo (2018) utilised various econometrics methods including the autoregressive distributive lag model and correlation test to inspect the connection between external debt and economic growth in some emerging economies. The study covered the period of 2006–2016. The empirical results revealed no significant effects of external debt on the economic growth of Ukraine. The empirical results also demonstrated a marginal effect of external debt on economic growth in the emerging economies. Empirical results finally indicated a severe debt weight for the emerging countries.

Moriyana, Nishimura and Nagatani (2018) used forecast error variance on Japan annual data to support a steady process of the development of a highly developed technology for trash incineration. The empirical results indicated the existence of causal relationship between the research variables.

Onakoya and Ogunade (2017) analysed the effect of external debt in filling the missing ressource needed for economic growth in Nigeria. They used the auto regressive distributive lag bound test on data provided by the Nigerian Central Bank. The data covered the period of 1981–2014. The empirical results revealed a long-run connection between external debt and economic growth with external debt having a negative effect on economic growth in Nigeria.

Mbah, Umunna and Agu (2016) explored the existence of long-term connection between external debt and economic growth in Nigeria during the study time of 1970–2013. The article utilised auto regressive distributive lag bound testing to investigate the relationship. The empirical results revealed the existence of long-run association linking the study research variables. The study, furthermore, showed that external debt had negative effects on economic growth in Nigeria.

Hadhek and Mrad (2014) used dynamic panel data to carry out two empirical tests on nineteen developing countries to explore debt effects on economic growth and the role of investment in economic growth. The study covered the period of 1990–2011. The empirical results found a significant negative effect of external debt on GDP. The results also indicated a negative interaction linking external debt and investment.

Faraji and Makame (2013) studied the effects of external debt on Tanzanian economic growth by means of time series analysis. The study covered the period of 1990–2010 and the data were obtained from the Tanzanian Bank. The empirical results of the study indicated that external debt stock had a positive impact on GDP

in short-term. The study also exposed that debt service payment exhibited a negative effect on GDP in the long-run.

McKenzie, Goodwin and Carreira (2009) examined the use of Forecast Error Variance Decompositions to guide the econometrician's model specification. The authors use wholesale chicken markets to conduct their study. The empirical results demonstrated that Forecast Error variance Decomposition approach has the potential to provide superior model selections to Granger causality tests.

Olusegun (2008) used a Vector Autoregression (VAR) approach to investigate the impacts of oil price shocks on the macroeconomic performance in Nigeria and variance decomposition to forecast seven macroeconomic variables for Nigeria. The study used yearly time series data covering the period of 1970–2005. The empirical results of the vector autoregressive analysis revealed the existence of long run relationship between the variables. The empirical results of the forecast error variance decomposition indicated that oil price shocks had a significant effect on the inconsistency of oil returns and output.

Pesaran, Shin and Smith (2001) introduced a new approach to checking the existence of connection between a dependent variable and a number of independent variables that had different integration order: order one and order zero. The test they introduced was based on F- and t-statistics. They proposed a procedure based on bounds. The lower bound was denoted I(0) and the upper bound was denoted by I(0). The empirical weight of the bounds methods was demonstrated by a re-examination of the earnings equation included in the macro-econometric model of the United Kingdom Treasury.

Ayadi, Chatterjee and Obi (2000) used a vector autoregressive analysis to analyse to find out the effects of the Nigerian energy sector on the Nigerian economy. Their findings showed that the Nigerian energy sector had an influence on its economy. The results also revealed that the country was not able to control the price of its chief export and import components.

The specification and identification of simultaneous equations model have been questioned by many researchers. As an alternative to the classical way, Lütkepohl (2000) proposed Impulse response functions as tools for interpreting VAR models.

Phillips (1998) introduced a method on how to apply impulse response and forecast error variance on nonstationary data. The empirical results proved that the finding is relevant in finite samples in VARs with some unit root and cointegration. The results also showed that impulse responses and forecast error decomposition are inconsistent at long horizons in unrestricted VARs with some unit roots.

Campbell (1991) used a Vector autoregressive method to break expected stock returns in expected future dividends and expected future returns. The empirical results demonstrated that unexpected stock returns must be associated with changes in expected future dividends or expected future returns. The results showed that one-third of the variance of unexpected returns is attributed to the variance of changing expected dividends, one-third to the variance of changing expected returns, and one-third to the covariance of the two components.

Dickey and Fuller (1979) investigated the distribution of the estimators for Autoregressive Time series With a Unit Root on a sequence of normally distributed independent variables with zero mean and common variance. The empirical results

demonstrated that the power of the statistics studied are higher than the one of the Box-Pierce Q statistic in a Monte Carlo study.

Past studies on the relationship between external debt and economic growth were conducted in many developed, emerging or less developed countries. Regarding Sub-Saharan African countries, there are few such studies. Therefore, the study aims at filling in the gap by using data that are more recent.

2. RESEARCH DATA AND METHODOLOGY

2.1. Research Data

The study uses annual time series data obtained from the World Bank. The study covers the period starting from 1970 to 2019. The research variables used are real GDP, used as a proxy for economic growth, the external debt stocks used as proxy for external debt and government consumption expenditure used as government expending. All the variables are Log transformed and expressed with the capital letter L at the beginning. Thus, Leg stands for economic growth (or real GDP), Ldebt stands for external debt and Lgexp stands for government spending. Table 1 gives the statistics of the research variables before the transformation.

Table 1. Descriptive Statistics of Research Variables

Variables (US $)	Obs.	Mean	Median	Maximum	Minimum	Std. Dev.
Real GDP	50	4.17E+09	3.17E+09	9.34E+09	2.27E+09	1.90E+09
External debt stock	50	1.39E+09	1.55E+09	3.26E+09	31677128	8.07E+09
Government spending	50	4.45E+09	2.61E+09	1.29E+11	5.47E+09	3.83E+10

Source: The author's calculation

Table 1 indicates that during the study period both external debt stock and government spending (government consumption expenditure) display high fluctuation in variability. The external debt stock of Niger varies from a minimum of $ 31 677 128 to a maximum of $ 3 260 000 000. The government spending varies from a minimum of $ 5 470 000 000 to a maximum of $ 129 000 000 000. Table 1 also shows that the real GDP exhibits a moderate variability during the study period.

2.2. Research Hypotheses

The following hypotheses have been formulated and tested.

Hypothesis 1: There is a long-run relationship between external debt, government expenditure and economic growth in Niger.

Hypothesis 2: external debt has a significant impact on economic growth in Niger.

Hypothesis 3: economic growth has no significant impact on external debt in Niger.

Hypothesis 4: economic growth has a significant impact on government expenditure.

2.3. Methodology

The current study adopts the vector autoregressive techniques to look into the relation connecting external debt and economic growth in Niger and uses variance decomposition to verify if there is any significant impact from shocks using a 5-year forecast period in the future. The study begins with the transformation of the research variables in logarithm form and the application of unit root test. The Augmented Dickey-Fuller (ADF) test is applied to verify the stationary of the research variables. In the second step, the study proceeds with the determination of the optimal lag number for each research variables and the application of cointegration test for checking the existence of long-run connection among the variables. In the third step, the unrestricted vector autoregressive estimation is performed on the research variables. In the fourth step, residuals diagnostics tests are performed for the accuracy of the predictions of the estimates. In the final step, variance decomposition is performed for a short-term period. A period of 5 years is considered in the study.

3. RESULTS AND DISCUSSIONS

Concerning the model choice, the options are chosen among a model with a constant term, model with trend term, model with one constant and trend or a model without a constant and trend term. Such listed information criteria as Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Criterion (HQ) are employed to find out the appropriate model. The model presenting the smallest value of the information criteria is chosen. The study results recommend using the Akaike Information Criterion. The suggested model for the study is a model containing one constant with no trend.

3.1. The Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey-Fuller test is performed on the research variables at their level and their first differences. If the series are stationary at the level, the series are said to be integrated of order zero I(0). Variables are said integrated of order one, I(1) if they do not have unit root at their first differences. The outcome of Augmented Dickey-Fuller unit root tests is provided in Table 2 and 3.

Table 2. Augmented Dickey-Fuller (ADF) test at series level

Variables	Number of lag	5 % critical value	ADF test statistics	*P*-value
Economic growth (Leg)	1	2.923780	1.644558	0.9994
External debt (Ldebt)	1	−2.923780	−3.555363*	0.0105
Government spending (Gexp)	1	−2.923780	−1.322549	0.6117

Source: The author's calculation

Table 2 shows the ADF test at the series level. The null hypothesis of unit root in the series is discarded for external debt (Ldebt) at 5 % significance level as the

ADF test statistic (−3.555363) is smaller than the 5 % Critical Value (−2.923780) and the *p* value ($p = 0.0105$) is lower than 0.05, that is $p < 0.05$. Hence, the external debt variable is stationary at the series level. Ldebt is therefore I(0) integrated of order zero. Table 4 also indicates that the same null hypothesis cannot be discarded for the remaining research variables because their ADF test statistics are larger than the 5 % critical value and their respective probability values are higher than 0.05. Hence, all the remaining two variables are non-stationary at their level.

Table 3. Augmented Dickey-Fuller (ADF) Test at Series First Differences

Variables	Number of lag	5 % critical value	ADF test statistics	*P*-value
Economic growth (Leg)	1	−2.925169	4.556006*	0.0006
External debt (Ldebt)	1	−2.925169	−3.604940*	0.0093
Government spending (Gexp)	1	−2.925169	−3.703192*	0.0071

Source: The author's calculation

Table 3 shows the results of the ADF unit root test on series first differences. The 5 % critical value is −2.925169. The ADF test statistics for all the variables (Leg, Ldebt and Lgexp) are lower than the 5 % critical value and the p values are inferior to 0.05, which indicates that the null hypothesis is rejected. Hence, all the series are stationary as they do not have unit root.

According to the ADF unit root tests results, the null hypothesis is rejected at the 5 % significance level for the external debt (Ldebt) variable, but it cannot be rejected for the remaining research variables at the series level. The same null hypothesis is rejected at the 5 % significance level for all the variables at the series first differences. Therefore, external debt is integrated of order zero I(0) and economic growth and Government spending are integrated of order one I(1).

3.2. Optimal Lags of Research Variables

To obtain the optimal lags for each research variable, the unrestricted vector autoregressive estimation is applied to each variable and the lag number to be used in the model for each variable is given by the Akaike Information Criterion (AIC). Tables 4, 5 and 6 provide the optimal lag for economic growth (Leg), external debt (Ldebt) and government spending (Lgexp) respectively.

Table 4. Optimal Lag Selection Result for Economic Growth

Variables	Lag	AIC	SIC	HQ
Economic growth (Leg)	0	2.430573	1.018730	0.993869
	1	0.005690*	−2.963229*	−3.012951*
	2	0.034087	−2.888172	−2.962756
	3	0.048292	−2.806860	−2.906305
	4	0.083576	−2.726749	−2.851056

Source: The author's calculation

Table 4 shows that the Akaike Information Criterion suggests using one lag for the economic growth variable. Therefore, one lag will be used for economic growth. in the model.

Table 5. Optimal Lag Selection Result for External Debt

Variable	Lag	AIC	SIC	HQ
External debt (Ldebt)	0	0.978977	2.470326	2.445465
	1	−3.042735*	0.085196*	0.035473*
	2	−3.007431	0.153346	0.078762
	3	−2.965872	0.207304	0.107859
	4	−2.925514	0.282341	0.158035

Source: The author's calculation

Table 5 shows that the AIC suggests using one lag for the external debt variable. Therefore, one lag will be used for external debt in the model.

Table 6. Optimal Lag Selection Result for Government Spending

Variable	Lag	AIC	SIC	HQ
Government spending (Gexp)	0	2.310082	2.349835	2.324974
	1	−0.591630*	−0.512123*	−0.561846*
	2	−0.560331	−0.441072	−0.515656
	3	−0.558596	−0.399584	−0.499029
	4	−0.547956	−0.349191	−0.473497

Source: The author's calculation

Table 6 shows that the Akaike Information Criterion suggests using one lag for the government spending variable. Therefore, one lag will be used for government spending in the model.

3.3. The cointegration test

The unit root tests results show that the research variables are integrated of different order. The variables of economic growth and government spending are integrated of order one while the variable of external debt is integrated of order zero. Given these results, the appropriate cointegration test is the bounds cointegration test proposed by Pesaran, Shin and Smith (2001).

Table 7. Bound Cointegration Test Result

Research variables	F-statistic	5 % significance level lower bound	5 % significance level upper bound
Economic growth	2.835149	3.1	3.87
External debt			
Government spending			

Source: The author's calculation

Table 7 shows that the obtained F-statistic of 2.835149 falls below the lower bound I(0) of 3.1; hence, only the short run model will be considered since the variables show no evidence of a long-run relationship as indicated by the results of the bound test.

3.4. Vector autoregressive (VAR) estimation

After having defined the number of lag to use for each research variable, the study proceeds with the vector autoregressive estimation. The following VAR equations are estimated:

$$\begin{aligned} Leg_t &= \alpha_{11} + \beta_{11} Leg_{t-1} + \gamma_{11} Ldebt_{t-1} + \delta_{11} Lg\exp_{t-1} + \mu_{1t} \\ Ldebt_t &= \alpha_{12} + \beta_{12} Leg_{t-1} + \gamma_{12} Ldebt_{t-1} + \delta_{12} Lg\exp_{t-1} + \mu_{2t} \\ Lg\exp_t &= \alpha_{13} + \beta_{13} Leg_{t-1} + \gamma_{13} Ldebt_{t-1} + \delta_{13} Lg\exp_{t-1} + \mu_{3t} \end{aligned} \quad (1)$$

where: α_{1i} are intercepts; β_{1i}, γ_{1i} and δ_{1i} are short-run dynamic coefficients of the model and μ_{it} are residuals in the equations. Table 8 gives the vector autoregressive estimation results.

Table 8. Vector Autoregressive Estimation Result

Variable lags	Leg	Ldebt	Lgexp
Leg(-1)	0.977584	−0.160317	0.352852
	[16.9334]	[−0.69804]	[2.18483]
Ldebt(-1)	−0.003823	0.837796	0.030839
	[−0.28121]	[15.4896]	[0.81081]
Lgexp(-1)	0.032843	0.155982	0.796668
	[0.98022]	[1.17024]	[8.49963]
c	−0.194254	3.213412	−3.446020
	[−0.26077]	[1.08432]	[−1.65361]

Source: The author's calculation

Table 8 shows that the past realisation of real GDP (Leg) is associated with an increase of 97.75 % in GDP on average ceteris paribus when real GDP (Leg) is used as a dependent variable. The t-statistics analysis indicates no significant t statistic values for the lags of the two other research variables. Table 8 also demonstrated that when external debt stock (Ldebt) is used as a dependent variable, the past realisation of external debt stocks is related to an increase of 83.77 % in external debt stocks on average ceteris paribus. The t-statistics analysis indicates no significant t-statistic values for the lags of the other research variables.

Table 8 finally shows that when government spending (Lgexp) is used as a dependent variable, the past realisation of government spending is associated with an increase of 79.66 % in government spending on average ceteris paribus. The t-statistics analysis indicates that the t-statistic value of the first lag of real GDP (Leg) is significant. It can be concluded that real GDP (Leg) has a causal effect on government spending in short-term. The results point out that a one percentage

increase in real GDP (Leg) accounts for 35.28 % increase in government spending on average ceteris paribus.

3.5. Diagnostic Tests on Residuals

To check the reliability of the estimates, some diagnostic tests are conducted on the residuals. Tables 9 and 10 give respectively the tests on residuals, which include respectively autocorrelation and heteroskedasticity test.

Table 9. Residual Serial Correlation LM Tests

LM statistic	Test statistic	Probability value
Lag 1	7.375397	0.5981

Source: The author's calculation

Table 9 shows the residuals correlation test. The test probability value is larger than 0.05 ($p > 0.05$). It indicates that the null hypothesis stating that the residuals are not serial correlated cannot be rejected. Hence, the residuals are not correlated.

Table 10. Residuals Heteroskedasticity Test Result

LM statistic	Chi-square	Probability value
Residual heteroskedasticity test	38.53639	0.3555

Source: The author's calculation

Table 10 shows the residual heteroskedasticity test result. The null hypothesis stating that the residuals are not heteroskedastics cannot be rejected as the probability value is higher than 0.05 ($p > 0.05$). The residuals are, therefore, homoskedastics. The diagnostic tests on the residuals show that the estimates are reliable.

3.6. Variance Decomposition Estimation

To check if there is any significant impact from shocks, variance decomposition analysis is applied to each research variable for a short-term period. A period of 5 years is considered. Table 11, 12 and 13 respectively give the variance decomposition for economic growth, external debt and government spending.

Table 11. Variance Decomposition of Economic Growth Results

Variance Decomposition of Economic Growth			
Period	**Economic growth**	**External debt**	**Government spending**
1	100.0000	0.000000	0.000000
2	99.58109	0.004253	0.414652
3	98.86541	0.008536	1.126053
4	98.03216	0.010837	1.957001
5	97.18099	0.011192	2.807813

Source: The author's calculation

Table 11 indicates that in the first year, 100 % of forecast error variance in economic growth is explicated by the variable itself indicating that other variables in the model have a strong exogenous impact; they do not have any influence on economic growth. In the second year, influence of external debt and government spending on economic growth is below 0.5 %. External debt and government spending exhibit strong erogeneity; this indicates that the two variables have a weak influence on predicting economic growth in short-term. In the long-term, 97.18 % of the forecast error variance in economic growth is explicated by economic growth itself. Economic growth shows a strong influence from the short-run period into the future. The influence of external debt and government spending on economic growth is very insignificant.

Table 12. Variance Decomposition of External Debt Results

Variance Decomposition of External Debt			
Period	**Economic growth**	**External debt**	**Government spending**
1	2.918978	97.08102	0.000000
2	2.518251	96.79919	0.682558
3	2.251851	95.89708	1.851068
4	2.080121	94.71697	3.202907
5	1.976174	93.46520	4.558628

Source: The author's calculation

Table 12 indicates that in the first year 97.08 % of forecast error variance in external debt is defined by the variable itself. In the second year, the combined influence of economic growth and government spending on external debt is below 4 %. Economic growth and government spending exhibit a strong erogeneity; this indicates that the two variables have a very weak influence on predicting external debt in the short-term. In the long-term, 93.46 % of forecast error variance in external debt is defined by external debt itself. This indicates that external debt shows a strong influence from the short-run period into the future. The influence of economic growth and government spending on external debt is very insignificant.

Table 13. Variance Decomposition of Lgexp Results

Variance Decomposition of Government Spending			
Period	**Economic growth**	**External debt**	**Government spending**
1	2.093296	0.398259	97.50844
2	4.905367	0.752995	94.34164
3	8.573438	1.115047	90.31151
4	12.77989	1.434798	85.78532
5	17.24166	1.687521	81.07082

Source: The author's calculation

Table 13 shows that in the first year, 97.50 % of forecast error variance in government spending is explained by government spending itself. However, the influence of government spending in predicting itself decreases gradually to 81.07 % in the long-run. At the same time, the influence of economic growth in predicting government spending increases from 2.09 % in the short-run to 17.24 % in 5 years. This indicates that economic growth has a significant influence on predicting government spending.

CONCLUSION

Economic growth is a question of concern for all economies around the world. In the quest for quick economic development many African countries engage in massive borrowing to finance budget deficit and vital infrastructure. This article has examined the relation between external debt and economic growth in Niger to check whether there is any significant impact from shocks. For this examination, the study has used vector autoregressive techniques, variance decomposition forecast for a period of 5 years in the future and bound cointegration test. The empirical results have revealed no long-run relationship between economic growth, external debt and government spending in Niger. The results also indicate that, on average ceteris paribus, the past realisation of economic growth is related to an increase of 97.75 % in economic growth while the past realisation of external debt and government spending is respectively associated with an increase of 83.77 % and 79.70 % in external debt and government spending. The results furthermore show that economic growth has a statistically significant causal effect on government spending in the short-term. One percentage increase in economic growth accounts for an increase of 35.28 % in government spending on average ceteris paribus. The variance decomposition forecast reveals that economic growth has a significant influence on predicting government spending in the future. The present research is important because of two main reasons: first, there are no previous studies investigating the relation between external debt and economic growth; second, the study provides empirical valuable information for policy makers in Niger on the impact of external debt on economic growth in Niger. The study recommends that policy makers in Niger encourage studies of this kind by providing financial support to Nigerien researchers.

REFERENCES

Al-Tamimi, K. A. M., & Jaradat, M. S. (2019). Impact of External Debt on Economic Growth in Jordan for the Period (2010–2017). *International Journal of Economics and Finance, 11*(4), 114–118. https://doi.org/10.5539/ijef.v11n4p114

Ayadi, F. O., Chatterjee, A., & Obi, C. P. (2000). A vector autoregressive analysis of an oil-dependent emerging economy – Nigeria. *Opec review*, *24*(4), 329–349. https://doi.org/10.1111/1468-0076.00087

Campbell, J. Y. (1991). A Variance Decomposition for Stock Returns. *The Economic Journal, 101*(405), 157–179. https://doi.org/10.2307/2233809

Çifligu, E. P. (2018). The Relationship between Public Debt and Economic Growth in Albania and Other Countries. *Academic Journal of Interdisciplinary Studies, 7*(3), 95–102. https://doi.org/10.2478/ajis-2018-0061

Cui, H., Wu, R., & Zhao, T. (2018). Dynamic Decomposition Analysis and Forecasting of Energy Consumption in Shanxi Province Based on VAR and GM (1, 1) Models. *Hindawi Mathematical Problems in Engineering*, *2018*, 4234206. https://doi.org/10.1155/2018/4234206

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series With a Unit Root. *Journal of the American Statistical Association, 74*(366), 427–431. https://doi.org/10.2307/2286348

Faraji, K., & Makame, A. S. (2013). Impact of External Debt on Economic Growth: A Case Study of Tanzania. *Advances in Management & Applied Economics, 3*(4), 59–82.

Hadhek, Z., & Mrad, F. (2014). Debt and Economic Growth. *International Journal of Economics and Financial Issues, 4*(2), 440–448.

Hammed, O. M., Suraya, M., Suraya, I., Zelhuda, S., & Norfadzilah, R. (2018). Does External Debt Cause Economic Growth? An Experience from ECOWAS Member Countries. *International Journal of Academic Research in Business and Social Sciences, 8*(11), 1256–1264. https://doi.org/10.6007/IJARBSS/v8-i11/5167

Lütkepohl, H. (2000). Impulse response function. In *Macroeconometrics and Time Series Analysis.* London: Palgrave Macmillan. (pp.145–150). https://doi.org/10.1057/9780230280830

Ma'ale, S. A.-D. (2019). The Impact of Public Debt and Public Investment on Economic Growth in Jordan. *International Journal of Academic Research in Accounting, Finance and Management Sciences, 9*(2), 149–157.

Mbah, S. A., Umunna, G., & Agu, O. C. (2016). Impact of External Debt on Economic Growth in Nigeria: An ARDL Bound Testing Approach. *Proceedings of the Fifth Middle East Conference on Global Business, Economics, Finance and Banking*, (pp. 1–18). Dubai.

McKenzie, M. A., Goodwin, H. L., & Carreira, R. I. (2009). Alternative Model Selection Using Forecast. *Journal of Agricultural and Applied Economics, 41*(1), 227–240.

Moriyama, T., Nishimura, K., Nagatani, T., & Maeda, S. (2018). Causal Relationship Analysis Method using Forecast Error Variance Decomposition based on Sensor Common Frequency for Exhaust-Gas Fluctuation Analysis. *Journal of the Japan Society for Precision Engineering, 84*(5), 454–462. https://doi.org/10.2493/jjspe.84.454

Olusegun, O. A. (2008). Oil Price Shocks and the Nigerian Economy: A Forecast Error Variance Decomposition Analysis. *Journal of Economic Theory, 2*(4), 124–130.

Onakoya, A. B., & Ogunade, A. O. (2017). External Debt and Nigerian Economic Growth Connection: Evidence from Autoregressive Distributed Lag Approach. *Journal of Economics and Development Studies, 5*(1), 66–78. https://doi.org/10.15640/jeds.v5n1a7

Pesaran, H., Shin, Y., & Smith, J. R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326. https://doi.org/10.1002/jae.616

Phillips, P. C. P. (1998). Impulse response and forecast error variance asymptotics in nonstationary VARs. *Journal of Econometrics, 83*, 21–56. https://doi.org/10.1016/S0304-4076(97)00064-X

Shkolnyk, I., & Koilo, V. (2018). The relationship between external debt and economic growth: empirical evidence from Ukraine and other emerging economies. *Investment Management and Financial Innovations, 15*(1), 387–400. https://doi.org/10.21511/imfi.15(1).2018.32

AUTHOR'S SHORT BIOGRAPHY

Issoufou OUMAROU obtained a Doctoral degree in economics (2011) from the University of International Business and Economics (UIBE). He received the 2011 Best Teaching Assistant award of the University of International Business and Economics. He was the Head of the Department of Economics and Management of the School of Law, Economics and Management of the University of Tahoua/ Niger from 2015 to 2019. He is affiliated to the Research and Analysis Laboratory on Economic and Social Development (LARADES). He teaches Macroeconomics, International Economics and Finance. His main research focus is on economic growth. He has published and co-authored articles on Foreign Direct Investment and Trade in WAEMU, youth unemployment in the Sahel and remittances. E-mail: oumar1911@yahoo.com
ORCID iD: https://orcid.org/0000-0002-7950-5612