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IMPACT OF MICROECONOMIC VARIABLES ON ECONOMIC RECESSION IN SOKOTO STATE

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Abstract

The economic recession is considered a painful but necessary path to sustainable development which requires fiscal and monetary policies towards the development of the Nigerian economy. This research emphasizes finding out the effect of economic recession based on Gross Domestic Product (GDP) and Real Gross Domestic Product (RGDP) of Sokoto state during the period of the study. The data collected was analyzed using ordinary least squares model (OLS) to check whether the microeconomic indicators depend on sustainable development or not, for the period under study. The result indicated that unemployment rate, inflation rate, Balance of payment for imports and Exports, and Aggregate poverty rate all have negative effects on the economic recession during the period covered in Sokoto. Nigeria's over reliance on foods imports and low-tech consumer and industrial goods have resulted in negative balance of payment (BOP=−0.124223) in GDP model. Massive importation of food is a drain on Nigeria's foreign reserve and BOP. However, bad economy of the state has resulted in negative expenditure on health (-0.725145) and Percentage Growth in manufacturing index (-0.194486). But expenditure on education (1.76358) and expenditure on infrastructure (2.03929) have resulted positively in the current economy of the state during the covered period. Thus, economic recession of the state has serious negative impacts on expenditure on health and Growth in manufacturing index while it has positive impact on expenditure on education and expenditure on infrastructure during the period of the study. Therefore, it is necessary for Sokoto state government to take appropriate measures to control economic recession before it becomes worst.

Keywords: Economic recession, microeconomic variables.

1.0 INTRODUCTION

Economic or business cycle is one of the major topics of interest in modern macroeconomics theory. Every economy (country) is affected by business cycle (or economic cycle). Business cycle refers to economy-wide (nationwide) fluctuations in production, trade and general economic activities over medium-to-long-term in a free market system. Free market economy is one where there is no government intervention in economic activities; rather demand and supply interact to correct disequilibrium (anomalies)in the market. The business cycle is the upward and downward movements of levels of Gross Domestic Product (GDP), and refers to the period of expansions and contractions in the level of economic activities(business fluctuations) around its long-term growth trend. These fluctuations involve shifts over time between periods of relatively rapid economic growth(boom), and periods of relative stagnation or decline(a contraction or recession [1]. Recession as a phase of economic cycle occurs after two consecutive quarters of negative growth featuring low output and investment, abnormal increases in unemployment due to massive retrenchment, falls in the availability of credit facilities, fluctuation in foreign market, illiquidity, downsizing and layoff as well as reduce amount of trade and commerce.

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According to the National Bureau of Statistics(NBS), the Nigerian economy slid into recession path in first quarter (Q1) of 2016 (since 2004) with real GDP of-0.36 percent, the contraction of economic activities resulted from an evaporation of confidence and no new investments, inordinate delay in government speeding during the period, acrimonious legislative squabbles in approving budget, erosion in the value of Naira in the foreign market, pipelines vandalism, misaligned currency and foreign shortages, high interest rate environment as well as trade and import restrictions. The current recession seems to affect socio political structures, Nigeria's credit condition, general living standards, imports, production and employment as well as consumption demand in Nigeria [2].

Nigeria has been an economically slavish neocolonial state. The present economic recession in Nigeria is a manifestation of long-term ills in the structure of the economy that became full-blown under the present government. The recession seems to affect socio-political structures, Nigeria's credit condition, general living standard, imports, production and employment as well as consumption demand in Nigeria. Today, because of short drop in the price of crude oil in the oil market, Nigeria is in serious economic dilemma which affects Sokoto State as one of the 36 states in the country. In Sokoto state, the monies gotten from federal government are not enough to execute capital projects and provision of social activities in the state, which causes household income, business activities to be very slow. Some industries are closed because of no profit, high cost of living, unemployment, inflation, hunger and rise in poverty. Economic activities are almost collapsed, impacting severely on businesses due to the challenge of the exchange rate of Naira to US dollar. It is based on this background that, this study seeks to apply Multiple Regression to determine the relationship and impact of economic variables over the dependent variable (economic recession) in Sokoto State of Nigeria.

2.0 LITERATURE REVIEW

Empirical Review of Economic Recession

It was stated in [3] that, recession is caused by inadequate aggregate demand in the economy. Strategies favoured for moving an economy out of a recession vary, depending on which economic school the policy maker adopts. Monetarists would favour the use of expansionary policy, while the Keynesian economists may advocate increase in government spending to spark economic growth. Supply side economists may support tax cuts to promote business investment. Some recessions have been anticipated by stock market decline. Also, it was mentioned by [4] that, since 1948, ten recessions were preceded by a stock market decline. However, real estate declines can last much longer than recession [5].

During the economic decline, it was reported by [5] that, high yield stocks such as fast moving consumer goods, pharmaceuticals and tobacco tend to hold up better. However, when the economy starts to recover and the bottom of the market has passed, growth stocks tend to recover faster. Diversifying one portfolio into international stocks may provide some safety; however, economies that are closely correlated with the United State may also be affected by a recession in United State of America. Productivity tends to fall in the stages of recession and then rise again as week firms close, the variation in profitability between firms sharply [6]. This corroborates the finding of [7], that although, the recent economic recession has ripple effect in many industrial organizations resulting in low productivity and negative consequence. However, the impact has not been the same for every organization. The point according to [7], is that, while some organizations may have experienced the worst hit like the textile industry, others experienced higher productivity, goodwill, motivation for employees.

Also, according to [8], low skilled, low educated workers and young are most vulnerable to employment in downstream. After recession in Britain in 1980s and 1990s, it took five years for unemployment to fall back to its original level. The problem of economic recession lies with indiscriminate laying off staff with little or no premium placed on experience and requisite professional skill of staff. The danger of the consequences is often enormous as organizations affected by recession may lack visible team of management to sustain productivity as a result of lay off. The living standards of people dependent on wages and salaries are more affected by recession than those who rely on fixed incomes and welfare benefits. The loss of job is known to have negative impact on the stability of families and individuals' health and wellbeing [6].

In [9], stated that organizations, as a centerpiece of economic activities, responds to economic recession into forms of organizational downsizing and organizational decline whereas organization downsizing is international proactive management strategy; organizational decline is an involuntary negative consequence of non-adjustment to adverse environment circumstances such as recession.

3.0 METHODOLOGY

3.1 Method of Data Collection

Data collection is a very important stage in any statistical investigation. In fact, the soundness of the method employed in the collection of data determined to an extent, the source of enquiry. In general, for the case of this research work secondary source of data collection is used.

3.2 Method of Analysis

The ordinary least square (OLS) method is adopted for data analysis. Two models and two functions are formulated from the model thus: Equation (1) measures the impact of recession on macroeconomic stability; while equation (2) measures the sustainable development variables.

GDP= f(UNEMR, INFLR, BOP, APOV)

$$Y = \beta_0 - \beta_1 UMEMR - \beta_2 INFLR + \beta_3 BOP + \beta_4 APOV + \mu \qquad (1)$$

Where β_0 is the intercept of the model whileβ_1, β_2, $\beta_3$and β_4 are theslope of the respective independent variables in equationone.

Y= Gross Domestic Product= GDP

UNEMR= Unemployment rate

INFLR= Inflation rate

BOP= Balance of payment for imports and Exports

APOV= Aggregate poverty rate

The prior expectations of the independent variables arenegative.

RGDP = f(EXHEL, EXEDU, EXINFRAS, GRMAN)

$$YR = \beta_0 + \beta_1 EXHEL + \beta_2 EXEDU + \beta_3 EXINFRAS + \beta_4 GRMAN + e \qquad (2)$$

Where β_0 is the intercept of the model whileβ_1, β_2, $\beta_3$and β_4 are theslope of the respective independent variables inequation two, β_1, β_2, $\beta_3$and $\beta_4 > 0$. μ and e are the stochastic error terms in equation (1) and equation (2) respectively.

YR= Percentage Real Gross Domestic Product =RGDP

EXHEL= Aggregate expenditure on health

EXEDU= Aggregate expenditure on education

EXINFRAS= aggregate expenditure on infrastructure

GRMAN= Percentage Growth in Manufacturing index

4.0 RESULTS AND DISCUSSION

Table 1: Model 1: OLS, using observations 1997-2017 (T = 21)
Dependent variable: GDP

	Coefficient	Std. Error	t-ratio	p-value
Const	27.8471	47.8396	0.5821	0.5686
UNEMPR	−0.0117343	0.585160	−0.02005	0.9842
INFLR	−0.216618	0.173480	−1.249	0.2298
BOP	−0.124223	0.493464	−0.2517	0.8044
APOV	−0.225961	0.737392	−0.3064	0.7632

Mean dependent var	6.323810	S.D. dependent var	6.683330
Sum squared resid	797.9280	S.E. of regression	7.061905
R-squared	0.316802	Adjusted R-squared	0.216498
F(4, 16)	0.478289	P-value(F)	0.751259
Log-likelihood	−67.99142	Akaike criterion	145.9828
Schwarz criterion	151.2054	Hannan-Quinn	147.1163
Rho	−0.061617	Durbin-Watson	2.122143

Source of variation	Sum of squares	Df	Mean squares
Regression	95.4101	4	23.8525
Residual	797.928	16	49.8705
Total	893.338	20	44.6669
F(4, 16) = 23.8525 / 49.8705 = 0.478289 [p-value 0.7513]			

Table 1 shows the multiple regression results of GDP with unemployment rate, inflation rate, Balance of payment for imports and Exports, and Aggregate poverty rate as independent variables. The value of the R square 0.316802 shows that the explanatory variable was able to explain about 31.7% of the factors that affect the Gross Domestic Product (GDP) of Sokoto State, while the value of the adjusted R square of 0.216 shows that explanatory variables and the dependent variable will have a goodness of fit of 21.6%. However, from the coefficients of the explanatory variables, it indicated that unemployment rate, inflation rate, Balance of payment for imports and Exports, and Aggregate poverty rate all have negative effect on the economic recession during the period covered in Sokoto. That is, there are linkages between economic recession and macroeconomic stability in Sokoto State. Thus, as indicated in the multiple regression results for model 1, the economic recession has serious negative impacts on government revenue, employment, income vulnerability, inflation, poverty and natural resource management in the state during the period of the study.

Table 2: Model 2: OLS, using observations 1999-2017 (T = 19)
Dependent variable: RGDP

	Coefficient	Std. Error	t-ratio	p-value
Const	2.02799	2.61166	0.7765	0.4504
EXHEL	−0.725145	1.08014	−0.6713	0.5129
EXEDU	1.76358	3.33360	0.5290	0.6051
EXINFRAS	2.03929	1.07924	1.890	0.0797*
GRMAN	−0.194486	0.130402	−1.491	0.1580

Mean dependent var	3.231579	S.D. dependent var	2.452675
Sum squared resid	65.23859	S.E. of regression	2.158680
R-squared	0.397507	Adjusted R-squared	0.225366
F(4, 14)	2.309195	P-value(F)	0.109006
Log-likelihood	−38.67915	Akaike criterion	87.35830
Schwarz criterion	92.08049	Hannan-Quinn	88.15748
Rho	−0.037204	Durbin-Watson	2.026765

Source of variation	Sum of squares	Df	Mean squares
Regression	43.0425	4	10.7606
Residual	65.2386	14	4.6599
Total	108.281	18	6.01561
F(4, 14) = 10.7606 / 4.6599 = 2.30919 [p-value 0.1090]			

Table 2 shows the multiple regression results of percentage real growth domestic product (RGDP) with Aggregate expenditure on health, Aggregate expenditure on education, Aggregate expenditure on infrastructure, and Percentage Growth in manufacturing index as independent variables. The value of the R square 0.397507 shows that the explanatory variable was able to explain about 39.8% of the factors that affect the real growth domestic product (GDP) of Sokoto State, while the value of the adjusted R square of 0.516 shows that explanatory variables and the dependent variable will have a goodness of fit of 22.5%. However, from the coefficients of the explanatory variables it shows that aggregate expenditure on health (-0.725145) and Percentage Growth in manufacturing index (-0.194486) have negative effect on the real growth domestic product in line with the economic recession of the state. While aggregate expenditure on education (1.76358) and aggregate expenditure on infrastructure (2.03929)have positive effect on the real growth domestic product in line with the economic recession of the state during the covered period. That is to say there are linkages between economic recession and sustainable development in Sokoto State. Thus, as indicated in the multiple regression results for model 2, the economic recession has serious negative impacts on expenditure on health and Growth in manufacturing index while it has positive impact on expenditure on education and expenditure on infrastructure in the state during the period of the study.
Base on the two models adopted, it signifies that model 2 of real growth domestic product (RGDP) with Aggregate expenditure on health, Aggregate expenditure on education, Aggregate expenditure on infrastructure, and Percentage

Growth in manufacturing index as independent variables displayed high percentage of both R-squared and Adjusted R-squared. Moreover, it also shown that model 2 is the best model considering the information criteria, this mean that model 2 has minimum of those criteria (Akaike criterion, Hannan Quinn and Schwarz criterion).

Table 3: Variance Inflation Factors for GDP Model

Minimum possible value = 1.0	
Values > 10.0 may indicate a collinearity problem	
UNEMPR	8.980
INFLR	1.476
BOP	1.433
APOV	7.060
VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient between variable j and the other independent variables	

Table 3 shows the variance inflation factors for GDP model on four explanatory variables namely; (unemployment rate, inflation rate, Balance of payment for imports and Exports, and Aggregate poverty rate). Looking at the result it signifies that there is no sign of collinearity problem in the data with all the explanatory variables having VIF less than 10. This justified how valid the data obtained was.

Table 4: Variance Inflation Factors for RGDP Model

Minimum possible value = 1.0	
Values > 10.0 may indicate a collinearity problem	
EXHEL	2.085
EXEDU	3.252
EXINFRAS	1.373
GRMAN	1.661
VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient between variable j and the other independent variables	

Table 4 similarly shows the variance inflation factors for RGDP model on four explanatory variables namely; (Aggregate expenditure on health, Aggregate expenditure on education and infrastructure, and Percentage Growth in manufacturing index). Looking at the result it signifies that there is no sign of collinearity problem in the data with all the explanatory variables having VIF less than 10. This justified how valid the data obtained was.

5.2 Summary

The economic recession is seen by this study as, though not sustainable and painful, but as a necessary path (that requires fiscal and monetary policies), to transition and development of the Nigerian economy. Therefore, this research work laid emphasis on finding out the effect of economic recession based on Gross Domestic Product (GDP) and Real Growth Domestic Product (RGDP) of Sokoto State during the period of the study. The data collected was analyzed using ordinary least squares model (OLS) to test for the nature of the relationship between the dependent variables over independent variables, that is, to check whether the microeconomic indicators depend on sustainable development or not for the period under study. Having done so, we have the following summary of results;

It indicated that unemployment rate, inflation rate, Balance of payment for imports and Exports, and Aggregate poverty rate all have negative effect on the economic recession during the covered period in Sokoto. That is to say there are linkages between economic recession and macroeconomic stability in Sokoto State. Thus, economic recession has serious negative impacts on government revenue, employment, income vulnerability, inflation, poverty and natural resource management in the state during the period of the study. Nigeria's over reliance on foods imports and low-tech consumer and industrial goods have resulted in negative balance of payment (BOP=−0.124223) in GDP model. Massive importation of food is a drain on Nigeria's foreign reserve and BOP. However, from the coefficients of the RGDP model bad economy of the state has resulted in negative expenditure on health (-0.725145) and Percentage Growth in manufacturing index (-0.194486). But expenditure on education (1.76358) and expenditure on infrastructure (2.03929) have resulted positively the current economy of the state during the covered period. Thus, economic recession of the state has serious negative impacts on expenditure on health and Growth in manufacturing index while it has positive impact on expenditure on education and expenditure on infrastructure during the period of the study.

5.3 Conclusion

Economic recession is a threat to any nation it causes decline in economic and social activities. Nigeria is a nation hit by economic recession and it is caused a lot of problems in the country such as decline in economy and social activities, collapse of industries, shortage in government funding. Due to its danger, a project work titled "statistical analysis of the effect of economic recession in Sokoto metropolis" was carried out aimed to find whether the effect of economic recession is severe, moderate or low. The study discovered that the effect is severe in Sokoto metropolis because it causes increases in unemployment rate, crime rate, inflation rate and decline of economic and social activities. The standard of living, education, healthcare, infrastructure and general wellbeing are affected. Therefore, it is necessary for Sokoto State government to take appropriate measures to control economic recession before it becomes worst.

5.4 Recommendations

The findings are relevant for policy makers. Therefore base on the findings of this research work, it is inevitable to provide a set of policy recommendation that would be applicable. In order to make economic progress we have the following recommendations;

1. Government and private sector within the state should partner to promote community based enterprises, innovation, recycling, re-using, local farmers markets, financial cooperatives, community health and fitness, local training and skills, household gardening and natural resource conservation.
2. The youth with all their energies and education should not shy away from agriculture, but embrace it with pride and dignity of labour, as a business and means of livelihood.
3. State government should encourage and promote modern agriculture for big and small farm holders.
4. Monetary policy should provide access to cheap credits and sources of financing start ups, with very low lending rates. There is need to reduce over-reliance on foreign goods and finance capital, with good example from the political class.
5. Also, states should not over-rely on the federal government for funding; they should use local content resources to innovate, produce, collaborate and compete for self-reliance and economic independence.
6. The states must be able to generate their own revenue without depending on the federal allocation, as it is done in China and other fast developing countries. Presently, only Lagos State in Nigeria is capable of doing so. There is need to diversify the state and federal economy, improving the industrial capacity; Nigeria should grow its own rice, refine its crude oil. Farmers should be empowered to grow and process their tomatoes, value-added to cassava, cotton, cocoa, rubber, palm oil and fruits.

References

[1] CBN, (2012). *Understanding Monetary Policy Series. NO 14.Economic Recession*. Central Bank of Nigeria Journal Applied Statistics ISBN: 13:978-52861-3-7.

[2] Agri, E. M., Mailafia, D., & Umejiaku, R., I. (2017). Impact of Economic Recession on Macroeconomic Stability and Sustainable Development in Nigeria. *Science Journal of Economics.130, 1-12. doi: 10.7237/sej/130.*

[3] Samuelson, R.J. (2010). Our Economy's Crisis of Confidence. The Washington Post. Retrieved from: http/www.washingtonpost.com/wpdyn/content/srticle/2010/06/13/AR2010061303330.html. (Accessed on: 18 October, 2019).

[4] Siegel, J. (2002). *Stocks for the Long Run: The Definitive Guide to Financial Market Returns and Long-term, Investment Strategies.* 3rd (Edn.), McGraw-Hill New York, ISBN: 9780071370486. The Guardian 14 May 2010.

[5] Shiller, R. (2009). Animal Spirits Depend on Trust. *The Wall Street Journal*. 1-5.

[6] Vaitilingan, R. (2009). Recession Britain New ESRC Report on the Impact of Recession on People's Jobs, Business and Daily Lives. Retrieved from http//www.esrc.ac.uk/ ESRC Info Centre/PO/releases/2009/ September/recessionbritain.aspx.

[7] Oludayo, T., & Okwara, C.N. (2012).Management of Economic Recession in a Non-banking Sector in Lagos Nigeria. *Maxwell Journal of Social Science.* 7(2), 270-282.

[8] Elizur, D., &Sagie, A. (1999).Facets of Personal Values of a Structural Analysis of Life and Work Values. *Psychology.* 48: 73-87.

[9] Lee, G. (2001). Towards a Contingent Model of Key Staff Retention: The New Psychological Contract Reconsidered. *South African Journal of Business Management.* 32:1-9.