

Economic Development, Technological Change, and Growth

Is Macroeconomic Instability a Preventive Measure in Attaining Sustainable Development Goals in Nigeria?

Samson Aladejare¹, Ishaku Nyiputen², Festus Osagu³

Abstract: This study evaluates the impact of macroeconomic instability on Nigeria's quest to attain the sustainable development goals set by the United Nations by 2030. The impact of macroeconomic instability was viewed from three different perspectives which are: as a source of macroeconomic outcome, domestic sources, and external sources of instability. The structural vector autoregressive model and the generalized forecast error variance decomposition were adopted to gauge the short-term and future impacts of attaining these goals. Findings from the study suggest that the impact of instability resulting from macroeconomic outcome have been moderate. Nevertheless, they are not to be taken for granted. While shocks from domestic sources have not been really preventive in attempts at meeting the set goals. Shocks from external sources, and specifically emanating from oil price, constitute a huge cause of concern if Nigeria is to achieve the set goals by 2030.

Keywords: Macroeconomic; Instability; Sustainable; Development; Goals

JEL Classification: E61; F53; O20

1. Introduction

It is no hidden fact that the Nigerian economy is regarded as one of the most unstable in the world. This instability can be linked to its heavy reliance on commodity export (crude oil) for revenue source. Hence, constituting a major challenge to the nation's development planning, as well as increasing the cost of doing business.

In time past, various Nigerian governments have tried to ensure sustainability in development programs, with little or no success recorded. For instance, the national development plan from 1962 to 1985 failed to deliver on the targeted

¹ Federal University Wukari, Nigeria, Address: PMB 1020, Katsina Ala Rd, Wukari, Nigeria, Corresponding author: aladejare@fuwukari.edu.ng.

² Federal University Wukari, Nigeria, Address: PMB 1020, Katsina Ala Rd, Wukari, Nigeria, E-mail: ishakurimantanung@gmail.com.

³ University of Ibadan, Nigeria, Address: Oduduwa Road, Ibadan, Nigeria, E-mail: festusosagu@gmail.com.

infrastructural development it was initiated for, due to structural changes in the Nigerian economy. Likewise, the structural adjustment program of 1986-1989 also did not help to smoothen the path of development as anticipated by its initiators. Since it created an exchange rate problem which also culminated in rising price levels. From 1990 to 1999, four rolling plans were launched by the government with the goal of reviving, as well as providing new infrastructural development for the country. However, this goal was hampered by macroeconomic constraints such as the rising cost of servicing the nation's debt. Furthermore, the aspiration of becoming one of the twenty leading economies in the world drove policymakers into formulating the vision 20:2020. Given the abundant resource endowment of Nigeria, it was rational to think such vision was achievable 'ceterisparibus'. From the economic point of view, the economy was anticipated to grow to at least \$900 billion United States (US) Dollars by 2020, as against \$212 billion US Dollars as at 2008 when the vision was conceived. Suggesting that the economy will have to grow at a constant annual average rate of 13.4 percent. However, as at 2017 (three years to the end of the vision), the economy only grew to \$375.77 billion US Dollars, with an average annual growth rate of 6.27 percent from 2008 to 2017 (WDI, 2018). To further exacerbate the problem, the fall in the international price of oil experienced from late 2014 to 2016, saw the economy plunge into a recession in 2016.

Prior to the recession year, a summit of heads of state which includes Nigeria, in 2015, adopted 17 Sustainable Development Goals (SDGs) to be achieved by 2030. The goals are meant to chart out a global, holistic set of objectives to help set the world on a path towards sustainable development, by dealing with the economic development, social inclusion, and environmental sustainability of signatory nations. This study believes that having a stable macroeconomic atmosphere should be imperative in stimulating long-term planning for the purpose of achieving these set-out SDGs. Reason being that instability in the macroeconomic sphere of a country, has the tendency of derailing a nation's quest for economic prosperity, as a result of the effect such volatility will exert on various economic activities such as production, investment, and financing (Chow et al. 2018). Hence, the need to assess the antecedence of macroeconomic instability in achieving some of the SDGs, and evaluate the prospects of Nigeria in meeting the 2030 target, given the presence of volatility in the country's macroeconomic environment.

For the aim of elaborate measure of macroeconomic instability, this study views macroeconomic instability from three different perspectives. The first stem from the fact that instability can be the result of macroeconomic outcome. For instance, it is expected that macroeconomic policies such as controlling inflation, achieving growth in output, reducing unemployment of factors of production, etc., initiated in an economy should help to guarantee economic stability. On the contrary, macroeconomic policies in developing countries, have been known to rather

exaggerate instability in these countries (Loayza et al., 2007). Secondly, macroeconomic instability can arise from self-inflicted domestic shocks, triggered by the very nature of the instability associated with a country's development process and self-inflicted policy mistakes (Loayza et al., 2007). This intrinsic instability can be traced to the development of the country's financial system. Thirdly, macroeconomic instability can arise from external sources. For example, an oil-dependent country such as Nigeria is susceptible to bigger exogenous shocks from volatile resource price, than a well-diversified economy. This is due to the weak "shock absorbing" feature of an oil-driven economy in the presence of volatile oil prices. For instance, it is a known fact that oil revenue constitutes about 75 percent of the total Federal government revenue in Nigeria (Aladejare, 2018). Furthermore, reduction in capital inflows due to changes in the international financial markets can stimulate external volatility. More so, that the financial market of a developing nation like Nigeria does not possess sufficient market instruments to neutralize effects from such external shocks (World Bank, 2000).

The rest of this study is structured as follows. Section 2 covers the study's literature review. Section 3 captures the methodology and data description of the study. Section 4 covers the study's empirical findings. While the concluding remarks of the study can be found in section 5.

2. Literature Review

Today, the concept of macroeconomic instability or volatility is gradually growing to become an area of independent study. Thus, graduating from a second-order area of interest to a focal spot in development economics (Aizenman & Pinto, 2005). Macroeconomic instability or volatility is usually characterized by frequent fluctuations in the general condition, and in the essential macroeconomic aggregates in the economy (Ukwu et al., 2003). It is the measure of the variation in the growth rate of economic variables, which includes the gross domestic product (GDP), inflation, money supply, real interest rate, lending rates, etc. It is normally measured by the standard deviation in the macroeconomic variable over some time period.

Notwithstanding, most prior studies on macroeconomic instability focussed on its effect on economic growth. Hence, there exist divergent views on the nature of impact economic instability exerts on long-run economic prosperity. For instance, there are studies that report a positive effect of economic volatility on long-run growth (Ghosh & Ostry 1997; Canton 2002). Specifically, studies such as Kormendi and Meguire (1985) and Grier and Tullock (1989) supports the evidence of a positive impact of output volatility on economic growth.

While on the other hand, there are studies that aligned with the conclusion of a negative effect of volatility on long-run growth (Kharroubi, 2007; Aysan, 2007). In this study category, cross country empirical findings suggest that economic volatility does not favour long-run growth (Ramey & Ramey 1995; Hnatkovska & Loayza 2004; Koren & Tenreyro 2007). These studies have been able to establish that the negative impact of economic volatility on long-run growth, is often being exacerbated in developing countries with an institutionally underdeveloped financial sector. Furthermore, the level of specialization and economic diversification adopted by a country, may aggravate more volatility and inverse effect on the long-run growth (Hausmann & Hidalgo, 2011).

Studies also abound that have investigated the cause of volatility in developing countries. Karras (2006) and Haddad et al. (2013) are examples of such, in which a negative effect of trade openness on economic volatility was found. For instance, Haddad et al. (2013) found out that countries with diversified export, possess the crucial ability to regulate the impact of trade openness on growth volatility. However, the study by Kim et al. (2016) showed that for economic growth to be achieved, there is the need for the trade volume to also grow. This, however, is not without a cost in terms of high volatility in the long-run, despite the potency of increase in foreign trade to lower economic instability in the short-run. In a slight contradiction, Mireku et al (2017) identified trade openness as one of the factors that give rise to long and short-run economic growth instability.

The impact of macroeconomic instability has also been examined on the use of natural resources in achieving sustainable development (Dauvergn 1999; Gaveau et al 2009; Huang 2011). Such studies also highlight the complementary role of the interaction between global financial markets, and the general economy, as a core stimulant in achieving sustainable development. Dauvergn (1999) for instance, revealed that in the presence of financial crisis, rising unemployment and declining income which are always accompanying phenomenon, are likely to activate greater natural resource extractions. This is because, people living in poorly and densely populated countries, have the tendency to fall back on economic activities such as fishing, wood fetching, and stone mining for survival; but with dire ecological consequences. Similarly, Huang (2011) showed that output volatility hinders sustainable development, especially in countries with poorly developed financial channels. The study revealed that countries with low-income level, trade-share level, as well as having poor energy-intensity, are more vulnerable to macroeconomic shocks. Hence, in the presence of output volatility, the impact is expected to be negative on the available natural resource (a vital ingredient of sustainability) since it will suffer depletion.

From the above review, prior studies are more concerned with the impact of macroeconomic instability on long-run economic growth. However, this study

diverges from what these earlier studies have done; by examining the impact of macroeconomic volatility from three different sources on the ability of Nigeria in achieving the sustainable development goals, and the prospects of meeting the 2030 target.

3. Data Description and Study Methodology

3.1. Data Description

In this study, attaining the SDGs are conditioned to be responsive to macroeconomic shocks. Hence, this analysis examines the impact of macroeconomic shocks on three crucial SDGs which are: SDGs 7, 8, and 17. Since any success at fulfilling these three SDGs, will surely aid the actualization of most of the other goals, due to their close links. Hence, SDG 7 aims to “ensure access to affordable, reliable, sustainable, and modern energy for all”. The electric power consumption (EPC) is used to proxy this goal, with the intent of capturing the share of the population using reliable electricity in both urban and rural areas. SDG 8 aims to “promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”. To proxy this goal, we use the gross national income per capita (GNIPC) in current United States dollars (World Bank atlas method). SDG 17 is to “strengthen the means of implementation and revitalize the global partnership for sustainable development. To capture this goal, we use an indicator of debt sustainability which is external debt as a share of export (EDX). It should be noted that the indicators used to proxy these three SDGs also cross-reference with the SDGs 1, 3, 5, 9, 11, and 12 (SDSN 2015). Suggesting that our findings should also have significant impact on these other goals.

As stated earlier, this study dissects macroeconomic instability into three perspectives. The first which is instability as a macroeconomic outcome is being measured using the growth rates of the following variables: real GDP (denoted as GRGDP), CPI (denoted as GCPI), export (denoted as GX), and import (denoted as GM). While macroeconomic instability as a domestic source is gauged using the growth rates of broad money supply (denoted as GM2), the growth rate of nominal deposits (denoted as GDR), real interest rate (RINT), the growth rate of real broad effective exchange rate (denoted as GBEX), and the degree of openness (DOP). To measure the third source of macroeconomic instability, the net foreign direct investment inflows as a share of GDP (denoted as NFDIGDP), the Nigerian international price of oil (denoted as NOP) known as “Forcados”, and the growth rate of the external reserve (denoted as GXRE) were used.

Annual time series data spanning from 1980 to 2017 were used to gauge the impact of macroeconomic instability on the SDGs over time. While the generalized forecast error variance decomposition (GFEVD) was used to assess the potential of

Nigeria in attaining these goals base on the 2030 target. All data were sourced from the World Bank Development Indicator (WDI).

3.2. Study Methodology

This study employs the Structural Vector Autoregressive (SVAR) model. Reason being that economic theories in many circumstances usually fall short in determining the nexus between certain variables. Whenever this is the case, the VAR model as established by Sims (1980) downplays the importance of theory in the nature of the relationship exhibited among variables in the model. Thereby, aiding researchers with better knowledge about the important interaction among macroeconomic variables beyond the limit.

The SVAR model imposes some identified restrictions on an ordinary VAR model in other to deduce structural shocks from it. Meanwhile, when restrictions are incorporated into a VAR model, essential information that could be derived from theory within the model can still be derived (Adedokun 2018). In addition, an SVAR model is multivariate in nature, exhibiting a linear representation of a vector of observables on the lags of the dependent variables and also on the explanatory variables. Furthermore, an SVAR model is used to generate precise identifying assumptions, with the goal of separating the impact of policy behaviour and the corresponding response of the economy; while ensuring that the model is free of any extra constrained assumptions required to give each parameter a behavioural meaning.

As a starting point, the SVAR framework on which this study is base is setup as follows.

$$w(L)Y_t = k(L)X_t + \epsilon_t \quad \dots \dots \dots 1$$

Where $w(L)$ is a $n \times n$ matrix polynomial in the lag operator; $k(L)$ is a $n \times k$ matrix polynomial in the lag operator; Y_t is a $n \times 1$ vector of endogenous variables; and X_t is a $k \times 1$ vector of exogenous variables; ϵ_t is a $n \times 1$ vector of structural instabilities, with $\text{var}(\epsilon_t) = \Lambda$, where Λ is a diagonal matrix.

Corresponding with this structural model is a reduced-form VAR:

$$Y_t = m(L)Y_t + n(L)X_t + \mu_t \dots \dots \dots 2$$

Where $m(L)$ and $n(L)$ are matrices polynomial; μ_t is a vector of reduced-form instabilities, with $\text{var}(\mu_t) = \lambda$.

If we let V be the contemporaneous coefficient matrix in the structural form, and letting $p(L)$ be the parameter matrix in $d(L)$ without contemporaneous coefficient. That is,

4. Empirical Analysis

4.1. Unit Root Tests

This study adopts the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. The results are as presented in Tables 1.

Table 1. Unit Root Stationarity Test on Study Variables

Variable	ADF Test			PP Test		
	With Constant	With Constant & Trend	Without Constant & Trend	With Constant	With Constant & Trend	Without Constant & Trend
EDX	-4.701*** <i>a</i>	-4.823*** <i>a</i>	-4.775*** <i>a</i>	-6.230*** <i>b</i>	-6.433*** ^{<i>b</i>}	-6.328*** ^{<i>b</i>}
EPC	-7.986*** <i>a</i>	-7.841*** <i>a</i>	-7.629*** <i>a</i>	-7.986*** <i>b</i>	-7.845*** ^{<i>b</i>}	-7.588*** ^{<i>b</i>}
GNIPC	-3.137** ^{<i>a</i>}	-3.976** ^{<i>a</i>}	-2.989*** <i>a</i>	-2.3261	-2.1579	-2.381** ^{<i>b</i>}
GRGDP	-4.611*** <i>a</i>	-5.144*** <i>a</i>	-4.043*** <i>a</i>	-4.619*** ^{<i>a</i>}	-5.165*** ^{<i>a</i>}	-4.133** ^{<i>a</i>}
GCPI	-2.948** ^{<i>a</i>}	-3.599** ^{<i>a</i>}	-1.808* ^{<i>a</i>}	-2.818* ^{<i>a</i>}	-2.9054	-1.6662* ^{<i>a</i>}
GX	-8.022*** <i>a</i>	-8.319*** <i>a</i>	-7.025*** <i>a</i>	-8.589*** <i>a</i>	-19.786*** <i>a</i>	-7.007*** ^{<i>a</i>}
GM	-5.443*** <i>a</i>	-5.399*** <i>a</i>	-5.427*** <i>a</i>	-5.437*** <i>a</i>	-5.392*** ^{<i>a</i>}	-5.420*** ^{<i>a</i>}
GM2	-3.459** ^{<i>a</i>}	-3.459* ^{<i>a</i>}	-2.039** ^{<i>a</i>}	-3.179** ^{<i>a</i>}	-3.1344	-2.0061** ^{<i>a</i>}
GDR	-6.355*** <i>b</i>	-6.275*** <i>b</i>	-6.461*** <i>b</i>	-7.182*** <i>a</i>	-7.479*** ^{<i>a</i>}	-6.895*** ^{<i>a</i>}
RINT	-6.013*** <i>a</i>	-6.510*** <i>a</i>	-6.099*** <i>a</i>	-6.013*** <i>a</i>	-6.971*** ^{<i>a</i>}	-6.099*** ^{<i>a</i>}
GBEX	-10.82*** <i>a</i>	-10.54*** <i>a</i>	-10.77*** <i>a</i>	-11.69*** <i>a</i>	-12.048*** <i>a</i>	-10.77*** ^{<i>a</i>}
DOP	-8.197*** <i>b</i>	-4.372*** <i>b</i>	-8.268*** <i>b</i>	-8.197*** <i>b</i>	-8.384*** ^{<i>b</i>}	-8.2676*** <i>b</i>
NFDIG DP	-3.668*** <i>a</i>	-3.619** ^{<i>a</i>}	-1.967*** <i>a</i>	-3.636*** <i>b</i>	-3.5274* ^{<i>a</i>}	-1.825* ^{<i>a</i>}

NOP	- 5.479*** <i>b</i>	- 5.397*** <i>b</i>	- 5.553*** <i>b</i>	- 5.481*** <i>b</i>	-5.399*** ^{<i>b</i>}	-5.554*** ^{<i>b</i>}
GXRE	- 6.596*** <i>a</i>	- 6.597*** <i>a</i>	- 6.068*** <i>a</i>	- 6.596*** <i>a</i>	-6.622*** ^{<i>a</i>}	- 6.080*** <i>a</i>

Note: where a and b denotes stationarity at level and first difference respectively, *, **, *** denotes significance at 10%, 5%, and 1% respectively.

Source: Author's Estimated Result.

From the output, it is evident that there is a mixture of level and first difference stationarity of series used in the study. Both the ADF and the PP unit root tests, attest to almost the same level of stationarity of each series. Hence, we can conclude that the series are stationary, and inferences reached base on the regression output can be relied upon for policy analysis. Furthermore, the presence of a combination of both level and first difference stationary variables, helps to further validate the VAR framework adopted in this study.

4.2. Variance Decomposition Analysis

Result for the variance decomposition analysis from the estimated SVAR models are as presented in Tables 2 to 4 in Appendix 1. While the GFEVD outputs are contained in Appendix 2 (Table 5-7). It was observed that the three SDGs responded more to shocks generated from within their self; even though the impacts also declined over the ten-year short-term. However, the shocks from the three sources of macroeconomic instability are as analysed as follows.

4.2.1. Instability as a Macroeconomic Outcome (Table 2)

For the ten years short-run period, SDG 17 response to shocks from the growth rates of GDP and CPI, are revealed to gradually increase to almost 10 percent by the 10th year. On the other hand, growth rates of export and import both have less than 1 percent shock impact on this goal.

Similarly, SDG 7 responded more to shocks from growth rates of GDP and CPI. Specifically, shocks from the growth rate of GDP grew gradually from 11.5 percent in the 2nd year to 15 percent by the 10th year. While shocks from the growth rate of CPI rose from 3 percent in the 3rd year, to about 15 percent in the 10th year. Shocks from the growth rate of export hovered around 2 percent from the 2nd year to the 10th year. While shocks from the growth rate of import were however higher, averaging about 8 percent.

SDG 8 responded less to shocks from macroeconomic outcomes when compared to the other goals. For instance, shocks from growth rates of GDP, CPI, and import were revealed to be less than 1 percent within the first six years. It later increased

marginally above 1 percent in the remaining four years. However, shocks from the growth rate of export climbed from about 3 percent in the third year, to about 8.7 percent in the tenth year.

Future Forecast using GFEVD (Table 5)

SDG 17 will continue to respond more to shocks from itself until the goal date. Although, at a lower response rate compared to the past. Shocks from the growth rate of GDP is anticipated to impact more on this goal, ranging from 23 percent in the first year to 35 percent by the set date. The shock effect of growth rates of CPI and export are anticipated to be relatively stable at 2 percent within the period. While the growth rate of import will be relatively stable at a higher rate of about 8 percent, after declining from about 10.7 percent in the first year.

As Nigeria race against time to ensure the fulfilment of SDG 7, shocks from the growth rate of GDP will rise from less than one percent to 18 percent in the goal year. A shock from the growth rate of CPI is expected to rise from 3 percent in the third year to about 15 percent in the goal year. while shock from the growth rate of export is anticipated to rise from about 5 percent to 10 percent in the last six years of the goal period, before remaining relatively stable to the eleventh year. Similarly, shock from the growth of import is anticipated to rise from less than 1 percent in the first year, to a relatively steady 12 percent from the third year to the final target year.

The anticipated future shocks to SDG 8, will be higher from the growth rate of export. The shock is anticipated to rise from about 8 percent to 24 percent by the goal year. An anticipated shock from the growth rate of GDP will rise from about 6 percent to 11 percent by the end of the goal year. While growth rates of CPI and import will exert less than 1 percent shock, almost through-out the remaining goal period.

4.2.2. Domestic Sources of Macroeconomic Instability (Table 3)

The shock response of SDG 17, was highest from real interest rate aside response to shocks from itself. Growing from about 6 percent in the second year to about 17 percent in the tenth year. This is followed by a response to shocks from trade openness which grew from about 3 percent in the fourth year to 14 percent in the tenth year. On the contrary, the goal's response to shocks from the growth of broad exchange rate grew from about 5 percent in the second year to 7 percent in the third year. It remained relatively steady to the sixth year, before declining marginally to about 6 percent in the remaining four years. Shocks from the growth rates of broad money supply and deposit rates fell below 1 percent in the ten-year period.

Observing the response of SDG 7 reveals less response to the domestic source of macroeconomic instability. For instance, the highest shock response is from the growth rates of GDP, which was steady at 3 percent on the average from year 2 to

year 6. Before rising to about 4 percent in year 7 and further rising marginally to 4.6 percent in year 10.

Similarly, SDG 8 responded less to shocks from the growth rate of GDP, while rising to 2 percent from the fifth year and peaking at about 9 percent in the tenth year. Shocks from the growth rate of CPI rose from about 2 percent in year two, to about 4 percent in year 4 and remained relatively stable at this rate to the tenth year. Shocks from deposit rate also grew from 0.1 percent in year 2, to 10.4 percent in the tenth year. However, shocks from the growth rate of import are revealed to be less than 1 percent throughout the ten-year period. While shocks from the growth rate of export increased from less than 1 percent in year two, to about 6 percent by the tenth year.

Future Forecast using GFEVD (Table 6)

Future shocks from growth in broad money supply, to SDG 17, is anticipated to be higher for the remaining target period. Nevertheless, it is expected to decline steadily from 11 percent to 8 percent by the end of the goal year. Furthermore, an anticipated shock from the growth in the broad exchange rate is to rise from 0.2 percent in the first year to about 13 percent in the third year and stabilizing at such to the sixth year. From the seventh year, the impact of the shock is expected to be declining marginally to 11.6 percent by the target year. Lastly, the shock from the growth rate of nominal deposit is expected to remain less than 1 percent through the 11-year period.

The shock impact of the growth rate of GDP to SDG 7, is expected to be almost stable at 2 percent in the first five years of the left period for the goal target. However, it is expected to rise from almost 3 percent in the sixth year to about 6 percent in the eleventh year. Shocks from the growth rate of GDP will rise from less than one percent to 18 percent in the goal year. Shocks emanating from the growth rate of CPI is expected to rise from about 1 percent in the third year to about 3 percent in the final goal year. While shocks from the growth rate of nominal deposit rate is to rise from about 1 percent in the third year to about 9.6 percent in the final year target. The growth rate of import is expected to exert minimal shock ranging from less than a percentage from the second year to about 1.7 percent in the final target year. Shocks from the growth rate of export on the contrary is anticipated to fluctuate between 4.6 and 6.5 percent in the remaining eleven-year period.

Future shocks to the SDG 8, is anticipated to be highest from the growth rate of deposit rates. Rising from 11.4 percent in the first year, to about 32 percent by the eleventh year. Anticipated shocks from the growth in GDP is next to rise from about 2.7 percent to about 12 percent in the final target year of the goal. The shock

effect from the growth rate of CPI, is expected to be lower than 1 percent after the first year of the last eleven-year period. On the other hand, it will be higher from the growth rate of import. As it is anticipated to rise from 7.6 percent to 9 percent between year 1 and year 5. It is, however, to decline from the sixth year to the eleventh year from 8.7 percent to 7.4 percent. For shock originating from the growth rate of export, it is anticipated to rise from 1.5 percent to 8.5 percent between the second and the eleventh year.

4.2.3. External Sources of Macroeconomic Instability (Table 4)

Shocks from the net foreign direct investment inflow as a share of the GDP to SDG 17, rose from 1.3 percent in the third year to about 8.4 percent in the tenth year. The shock impact from the Nigerian international oil price however grew to a significant amount of 20.4 percent in the tenth year, from about 1.7 percent in the second year. The shock from growth in the external reserve rose from 5.8 percent in the second year, to 14.9 in the tenth year.

Assessing the response of SDG 7 to external shock variables, suggest that NFDIGDP exerts less than 2 percent shock to the goal in the ten-year period. While shock from the Nigerian Forcados grew from about 3.4 percent in the second year, to about 40 percent in the tenth year. Shock from the growth in external reserve increased marginally from 1 percent in the second year, to 3.2 percent in the tenth year.

The shock impact of NFDIGDP on SDG 8 grew from 1.4 percent in the fifth year to about 4.2 percent in the tenth year. For the first five years, the shock impact is revealed to be less than one percent. On the other hand, shock from the Nigerian Forcados is much larger, rising from about 12 percent in the second year to about 57.2 percent in the tenth year. While shock from the growth rate of external reserve increased from 1.5 in year five to 4.1 percent in year 10. Similar to shocks from NFDIGDP, the earlier five years had shocks of less than a percentage.

Future Forecast using GFEVD (Table 7)

Assessing the future shocks to SDG 17, reveals that shocks from NFDIGDP will grow marginally from about 5.5 percent in the first year to about 5.9 percent in the eleventh year. As prior observed in the short-term analysis, the shock from the Nigerian oil price will continue to be larger to the goal target date. Its shock impact is anticipated to rise from about 13.1 percent in the first year to about 35.1 percent in the final SDG target date. While shocks from external reserve growth will grow from 2.3 in year one to 13.2 percent by year four 4; before declining to 12 percent in year eleven

For SDG 7, NFDIGDP is expected to have diminishing shock effect for the remaining years of the goals. Its impact is anticipated to decline marginally from 4 percent in the first year, to about 1.2 percent by the end of the SDG target year. A shock from the Nigerian international oil price is anticipated to rise from 17.7 percent in the first year, to about 56 percent by the end of the goal target period. Shock from external reserve growth is anticipated to be less than 2 percent for the remaining target period.

NFDIGDP is expected to exert less shock impact on SDG 8 for the remainder of the goal duration. Its impact is suggested to decline from about 3.8 percent in the first year to about 1.3 percent in the eleventh year. The Nigerian Forcados on the other hand is anticipated to continue to be a major source of shock to the actualization of this goal. Rising from about 19.8 percent in the first year to about 70.4 percent in the final year of the SDG lifespan. Exerted shock from growth in the external reserve is expected to be less than two percent for the remaining goal period.

4.3. Impulse Response Function (IRF) Analysis

Below is the analysis of the IRF of the three SDGs, to the three sources of macroeconomic instabilities evaluated in this study. It was observed that the generalized IRFs for the three dependent variables are of no significant variance from the normal IRFs. Hence, for the sake of brevity and clarity, they are not reported.

4.3.1. IRFs from Instability as a Macroeconomic Outcome

Aside from the positive response of SDG 17 to shocks emanating from itself (see Appendix 3), its response to the variables of interest used in gauging instability as a result of macroeconomic outcome reveals mix response (see Figure 1). Specifically, SDG 17 impulse response to shocks from the growth rates of GDP and CPI is negative. While its response to shocks from the growth rates of export, suggest an almost neutral effect with exception to the second and fourth year when the response is slightly negative. Furthermore, response to shocks from the growth rate of import is revealed to be positive in the first three years, before turning slightly negative to the tenth year.

In Figure 2 (see Appendix 3), the impulse response of SDG 7 to shocks from macroeconomic outcome, suggests positive impacts from the growth rates of GDP, export and import. While only the growth rate of CPI is shown to negatively impact on the SDG.

The impulse response of SDG 8 to instability as a macroeconomic outcome in Figure 3 (see Appendix 3), indicates that this goal responds positively to shocks

from itself and the growth rate of export. Furthermore, its response to the growth rate of GDP in the first three years is shown to be neutral, and later positive for the rest of the period. However, SDG 8 impulse response to the growth rate of CPI and import is significantly negative within the short term.

4.3.2. IRFs from Domestic Sources of Macroeconomic Instability

The IRF function for SDG 17 in Figure 4 (see Appendix 3), reveals a mixture of positive and negative functions. While SDG 17 responded positively to shocks emanating from itself, the growth rate of deposit rate, and the real interest rate; the same cannot be said of its response to shocks from the growth rates of broad money supply, broad effective exchange rate, and the degree of openness, which are all negative.

Similarly, there is a mixture of the response of SDG 7 to shocks from domestic sources of macroeconomic instability. Figure 5 (see Appendix 3) shows SDG 7 responding positively to shocks originating from itself, although the impact declines with time. SDG 7 impulse response to shocks from the growth rate of broad money supply, suggests a negative pattern up to year 5 before turning positive. While its impulse response to shocks from the degree of openness is positive. On the other hand, the impulse response to shocks from the growth rate of deposit rate and the real interest rate is negative. While the impulse response to shocks from the broad money supply fluctuated slightly within the first four years before turning neutral.

The impulse response of SDG 8 to shocks from domestic sources of macroeconomic instability is contained in Figure 6 (see Appendix 3). The outcome shows a positive impulse response of SDG 8 to shocks emanating from itself. Similarly, shocks from the growth rate of broad money supply only appear positive from the fifth year, after being neutral in the preceding four years. Furthermore, the degree of openness also exerts a growing positive impact on SDG 8. However, impulse responses from the growth rate of nominal deposit rates, and the real interest rate to SDG 8 are negative. Likewise, the impulse response from the growth rate in the broad exchange rate is slightly negative all through the short-term.

4.3.3. IRFs from External Sources of Macroeconomic Instability

In Figure 7 (see Appendix 3), the impulse response of SDG 17 to the three external sources of macroeconomic instability as used in this study is captured. Empirical observation from the output indicates that though the response of this goal to self-generated shock is positive, the impact is however declining. Impulse responses from net foreign direct investment inflows, suggest a positive response in the first

two years, before turning negative. The Nigerian international oil price, however, suggest a diminishing negative impact on SDG 17 in the short-term. Impact of growth rate of external reserve is positive, but steadily declining from the third year.

Figure 8 (see Appendix 3) contains the IRF response of SDG 7 to shocks originating from domestic sources of macroeconomic instability. The output shows SDG 7 responding positively to shocks from itself at a constant rate. Likewise, is its response to shocks emanating from the Nigerian international price of oil. While its response to shocks from net foreign direct investment inflows declined from being positive to neutral in the fourth and fifth year; before turning negative from the sixth year to the tenth year. Response to shocks from the growth in external reserve remained steadily negative from the third year to the tenth year.

Analysis of the impulse response of SDG 8 to external sources of macroeconomic instability in Figure 9 (see Appendix 3), indicates that SDG 8 responded positively to shocks originating from itself, but at a declining rate. While response to shock from the net foreign direct investment inflows, suggest a constant positive effect. Response to the Nigerian international oil price also indicate a positive response. However, the impact begins to decline from the sixth year. For the response to shocks from the growth in the external reserve, there is a steady growing negative effect from the third year to the tenth year.

5. Conclusions and Recommendations

It appears the impact of instability as a macroeconomic outcome is not really significant on SDG 17 and SDG 8. However, for the remaining goal period, this source of instability will be moderately impactful on SDG 17; especially, shocks from growth in the size of the economy. Similarly, the SDG 8 will respond more to shocks from growth in the size of the economy, as well as export in the time left for the goal to be achieved. For SDG 7, instability as a macroeconomic outcome is revealed to exert more impact, while in the future, the impact is anticipated to be relatively stable. Nevertheless, despite the low impact of this perceived source of macroeconomic instability on the SDGs, the negative effect of growth in CPI on the SDGs should be controlled. As failure to do such could impact inversely on the attempt to achieve a sustainable consumption and production pattern for the country in the future.

Shocks emanating from the domestic sources of instability to the three SDGs have been moderately low within the time frame of this study. This trend is expected to continue into the remaining target period of the goal. The low impact of this perceived source of instability is not unconnected to the evolving stage of the Nigerian financial system. Being a developing country, the Nigeria financial

market is still equipped with less developed financial channels, as well as having a low interaction with the global financial market. Thus, instruments within the financial system are not adequate to make the sector the main driver of sustainable growth.

On shocks from external sources, empirical evidence from this study suggest that there is a low impact of shocks from net foreign direct investment inflows, and the growth in the external reserve to the three SDGs. However, shocks from the fluctuating international price of the Nigerian oil has been the major source of external shocks to the actualization of these goals. This source of an external shock is also revealed to be growing to a worrisome level on the three SDGs; a trend which is anticipated to even be higher for the remaining target period of the goals. For example, the shock impact is anticipated to reach about 41 percent for SDG 17, 59 percent for SDG 7, and 71 percent for SDG 8 by the end of the goals lifespan. The shock implication of the fluctuating Nigerian international price of oil could be devastating. Reason being that the need to end poverty, and promote healthy living and well-being of all citizens by the government could be daunting to achieve. Also, the goal to ensure gender equality and women empowerment could be hampered. In addition, it would be difficult for the government to provide sustainable infrastructures, ensure comprehensive and sustainable industrialization, and promote the growth of innovation. All this is because oil revenue alone constitutes about 75 percent of all government revenue sources (Aladejare 2018). This shows the crucial position oil revenue occupy in Nigeria in the actualization of the SDGs. Hence, there is a need to diversify the country's revenue base to help lower the shock effect of a declining oil price, on the country's SDGs actualization. This is because, a diversified export base, will afford the country's policymakers the crucial ability to regulate any emanating shock from the country's expanding trade openness.

References

- *** (2015). Sustainable Development Solution Network (SDSN). *Indicators and a Monitoring Framework for the Sustainable Development Goals*. A report to the Secretary-General of the United Nations by the Leadership Council of the Sustainable Development Solution Network. June 15.
- Adedokun, A. (2018). The effects of oil shocks on government expenditures and government revenues nexus in Nigeria (with exogeneity restrictions). *Future Business Journal*, Vol.4, pp. 219-232.
- Aizenman, J. & Pinto, B. (2005). Overview. In Aizenmann, J. & Pinto, B. eds. *Managing Economic Volatility and Crises*. Cambridge, United Kingdom: Cambridge University Press.
- Aladejare, S. A. (2018). Resource Price, Macroeconomic Distortions, and Public Outlay: Evidence from Oil-Exporting Countries. *International Economic Journal*, Vol. 32(2), pp. 199-218.

- Aysan, A. F. (2007). The Effects of Volatility on Growth and Financial Development through Capital Market Imperfections. *METU Studies in Development*, Vol. 34(1), pp. 1–18.
- Canton, E. (2002). Business Cycles in a Two-sector Model of Endogenous Growth. *Economic Theory*. Vol 19, pp. 477–92.
- Chow, Y. P.; Muhammad, J.; Noordin, B. A. A. & Cheng, F.F. (2018). Macroeconomic Dataset for Generating Macroeconomic Volatility among Selected Countries in the Asia Pacific Region. *Data in Brief*, Vol. 16, pp. 23-28.
- Dauvergn, P. (1999). The Environmental Implications of Asia's 1997 Financial Crisis. *IDS Bulletin*, Vol. 30(3), pp. 31–42.
- Gaveau, D. L. A.; Matthew L.; Patrice L. & Nigel, L. (2009). Three Decades of Deforestation in Southwest Sumatra: Effects of Coffee Prices, Law Enforcement, and Rural Poverty. *Biological Conservation*. Vol. 142(3), pp. 597–605.
- Ghosh, A. R. & Jonathan, D. O. (1997). Macroeconomic Uncertainty, Precautionary Saving, and the Current Account. *Journal of Monetary Economics*, Vol 40(1), pp. 121–39.
- Grier, K. B., and Tullock, G. (1989). An Empirical Analysis of Cross-national Economic Growth, 1951–1980. *Journal of Monetary Economics*. Vol. 24, pp. 259–76.
- Haddad, M.; Lim, J. J.; Pancaro, C. & Saborowski, C. (2013). Trade openness reduces growth volatility when countries are well diversified. *Canadian Journal of Economics/Revue Canadienne d'Economique*, Vol.46(2), pp. 765-790.
- Hausmann, R. & Hidalgo, C. A. (2011). The network structure of economic output. *Journal of Economic Growth*. Vol. 16(4), pp. 309-342.
- Hnatkovska, V. V. & Loayza, N. V. (2004). Volatility and growth. *Policy Research Working Paper Series 3184*. The World Bank.
- Huang, Y. (2010). *Determinants of Financial Development*. Basingstoke, U.K.: Palgrave Macmillan Press.
- Karras, G. (2006). Trade Openness, Economic Size, and Macroeconomic Volatility: Theory and Empirical Evidence. *Journal of Economic Integration*. Vol. 21(2), pp. 254-272.
- Kharroubi, E. (2007). Crises, Volatility, and Growth. *World Bank Economic Review*. Vol. 21(3), pp. 439–60.
- Kim, D. H.; Lin, S. C. & Suen, Y. B. (2016). Trade, growth and growth volatility: New panel evidence. *International Review of Economics & Finance*, Vol. 45, pp. 384-399.
- Koren, M. & Tenreyro, S. (2007). Volatility and Development. *Quarterly Journal of Economics*. Vol. 122(1), pp. 243–87.
- Kormendi, R. & Meguire, P. (1985). Macroeconomic Determinants of Growth: Cross-country Evidence. *Journal of Monetary Economic*, Vol 16(2), pp. 141–63.
- Loayza, N. V.; Ranciere, R.; Serven, L. & Ventura, J. (2007). Macroeconomic Volatility and Welfare in Developing Countries: An Introduction. *The World Bank Economic Review*, Vol. 21(3), pp. 343-357.
- Mireku, K.; Agyei, E. A. & Domeher, D. (2017). Trade Openness and Economic Growth Volatility: An Empirical Investigation. *Cogent Economics and Finance*, Vol.5, pp.1-11.

Ramey, G. & Ramey, V. A. (1995). Cross Country Evidence on the Link between Volatility and Growth. *American Economic Review*. Vol. 85(5), pp. 1138–51.

Sims, C. A. (1980). Macroeconomics and Reality. *Econometrica*, Vol. 48(1), pp. 1–48.

Ukwu, I. U.; Obi, A. W. & Ukeje, S. (2003). Policy Options for Managing Macroeconomic Volatility. A publication of the *African Institute for Applied Economics Publication*, pp. 1-44.

World Bank (2000). *Securing Our Future in a Global Economy*. Washington, D.C.

Appendices

Appendix 1. Variance Decomposition Outputs

Table 2. Instability as a Macroeconomic Outcome

	EDX	GRGDP	GCPI	GX	GM
Variance decomposition of EDX					
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000
Year 2	94.75079	1.925351	2.588457	0.003293	0.732114
Year 3	87.54376	6.005033	5.375747	0.559973	0.515488
Year 4	84.58520	6.513656	7.593058	0.656536	0.651551
Year 5	83.58757	7.141420	8.118119	0.573974	0.578918
Year 6	83.18467	7.196234	8.470375	0.544452	0.604274
Year 7	83.02756	7.295691	8.553150	0.533286	0.590313
Year 8	82.88126	7.378537	8.637252	0.514675	0.588280
Year 9	82.71780	7.473600	8.724579	0.507036	0.576985
Year 10	82.59761	7.517484	8.807811	0.500972	0.576119
Variance decomposition of EPC	EPC				
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000
Year 2	81.91614	11.45477	0.002034	1.629057	4.998002
Year 3	74.96492	9.781949	3.247193	2.557335	9.448602
Year 4	70.00021	10.15297	8.711384	2.139223	8.996210
Year 5	66.55984	11.92138	10.95907	2.066935	8.492773
Year 6	64.38301	12.57431	12.40856	2.190796	8.443318
Year 7	62.69903	13.75132	13.37610	1.984499	8.189046
Year 8	61.61907	14.48785	13.90819	1.928292	8.056593
Year 9	60.87198	14.79435	14.46610	1.887383	7.980194
Year 10	60.15256	15.17496	14.97343	1.815476	7.883576
Variance decomposition of GNIPC	GNIPC				
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000
Year 2	98.29759	0.211553	0.079380	0.869561	0.541918
Year 3	95.91454	0.093423	0.290336	3.417580	0.284125
Year 4	94.25166	0.183774	0.451189	4.836050	0.277323

Year 5	92.32063	0.559163	0.601719	5.937109	0.581381
Year 6	90.59035	0.961785	0.770798	6.880782	0.796280
Year 7	88.94481	1.441956	0.997637	7.562352	1.053244
Year 8	87.51108	1.928209	1.236480	8.057313	1.266919
Year 9	86.26464	2.395986	1.461987	8.420189	1.457194
Year 10	85.28396	2.802757	1.654468	8.658390	1.600425

Source: Authors Estimated Output.

Table 3. Domestic Sources of Macroeconomic Instability

	EDX	GM2	GDR	RINT	GBEX	DOP
Variance decomposition of EDX						
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
Year 2	88.11256	1.030890	0.432886	5.759834	4.663160	0.000669
Year 3	82.64811	1.762109	1.064415	6.267785	7.292014	0.965563
Year 4	79.22990	1.246701	0.858979	8.911821	7.103536	2.649059
Year 5	75.07242	0.968004	0.796654	11.22477	6.926029	5.012116
Year 6	71.85922	0.859100	0.834912	12.70032	6.785014	6.961439
Year 7	68.99027	0.856627	0.756516	14.01215	6.452697	8.931737
Year 8	66.26001	0.895702	0.724130	15.14553	6.195164	10.77946
Year 9	63.93158	0.986497	0.701416	16.06699	5.945397	12.36811
Year 10	61.87156	1.094448	0.666324	16.85632	5.702691	13.80866
Variance decomposition of EPC	EPC					
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
Year 2	95.65882	3.730222	0.212897	0.008396	0.343293	0.046367
Year 3	94.33675	3.301011	1.106785	0.544378	0.366483	0.344596
Year 4	93.05917	3.298855	1.455580	1.467405	0.306327	0.412659
Year 5	91.98869	2.888776	1.560443	2.330049	0.274149	0.957887
Year 6	89.67976	3.266718	1.843076	3.071873	0.245055	1.893514
Year 7	87.17318	3.941063	2.077615	3.500356	0.225077	3.082715
Year 8	84.89606	4.330062	2.245355	3.848677	0.211040	4.468807
Year 9	82.71366	4.518795	2.378826	4.273132	0.198237	5.917355
Year 10	80.60947	4.637094	2.467982	4.792757	0.187594	7.305107
Variance decomposition of GNIPC	GNIPC					
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
Year 2	97.38542	0.001071	1.675317	0.116770	0.167153	0.654266
Year 3	92.25060	0.323056	3.893836	2.478761	0.189945	0.863798
Year 4	88.48856	0.780500	4.296638	5.171483	0.135786	1.127030

Year 5	84.71128	2.043706	4.306679	7.183746	0.085252	1.669336
Year 6	80.59800	4.169424	4.322257	8.407687	0.059681	2.442955
Year 7	76.93752	6.223843	4.331767	9.092566	0.050488	3.363811
Year 8	74.00645	7.702662	4.331930	9.548405	0.047085	4.363473
Year 9	71.65603	8.661134	4.310838	9.963882	0.044030	5.364088
Year 10	69.71067	9.286752	4.264523	10.39085	0.039893	6.307307

Source: Authors estimated output.

Appendix 2. Generalized Forecast Error Variance Decomposition (GFEVD)

Table 5. Instability as a Macroeconomic Outcome

	EDX	GRGDP	GCPI	GX	GM
Variance decomposition of EDX					
Year 1	60.57418	23.15607	4.216996	1.331178	10.72157
Year 2	59.24115	27.08889	3.447088	1.375876	8.846995
Year 3	54.97237	32.61204	2.510618	2.408914	7.496065
Year 4	53.35562	33.36766	2.528171	2.608616	8.139929
Year 5	52.73348	34.37946	2.324868	2.462714	8.099480
Year 6	52.42527	34.58850	2.209174	2.432879	8.344181
Year 7	52.23266	34.81801	2.095005	2.433964	8.420370
Year 8	52.08309	34.99084	2.019533	2.409517	8.497017
Year 9	51.95580	35.15423	1.971124	2.406385	8.512459
Year 10	51.86452	35.24203	1.939515	2.402659	8.551278
Year 11	51.80042	35.32017	1.914147	2.396931	8.568335
Variance decomposition of EPC	EPC				
Year 1	94.85298	0.118297	0.066320	4.737238	0.225163
Year 2	69.00688	13.73542	0.069232	9.200442	7.988023
Year 3	62.32879	11.40460	3.009436	11.20205	12.05512
Year 4	56.49818	13.26553	7.963198	9.411973	12.86111
Year 5	52.83273	14.38371	10.39785	9.833130	12.55258
Year 6	50.08914	15.23266	11.90078	10.17518	12.60224
Year 7	48.22200	16.34011	12.92622	10.13153	12.38015
Year 8	46.94232	17.04608	13.52131	10.23687	12.25341
Year 9	45.96616	17.49301	14.03491	10.33683	12.16909
Year 10	45.19135	17.86863	14.48882	10.35083	12.10036
Year 11	44.57857	18.17678	14.82927	10.38746	12.02792
Variance decomposition of GNIPC	GNIPC				
Year 1	85.88800	5.845723	0.152548	7.944350	0.169377

Year 2	83.38397	4.163889	0.052788	12.26472	0.134631
Year 3	77.48602	4.849222	0.053454	17.42972	0.181580
Year 4	74.17873	5.786951	0.104063	19.70893	0.221332
Year 5	71.26691	7.001595	0.186385	21.14090	0.404205
Year 6	69.03499	7.933987	0.293396	22.24538	0.492247
Year 7	67.20482	8.793356	0.453035	22.96678	0.582015
Year 8	65.75705	9.523428	0.632608	23.44610	0.640814
Year 9	64.60741	10.12817	0.812584	23.76495	0.686894
Year 10	63.76941	10.58975	0.974539	23.95080	0.715497
Year 11	63.20359	10.91477	1.108029	24.03918	0.734433

Source: Authors estimated output.

Table 6. Domestic Sources of Macroeconomic Instability

	EDX	GM2	GDR	RINT	GBEX	DOP
Variance decomposition of EDX						
Year 1	80.11765	11.17796	0.257114	2.674355	0.221359	5.551557
Year 2	71.50651	7.106697	0.173010	7.886720	9.248138	4.078921
Year 3	67.50231	5.315811	0.344699	8.181328	13.15901	5.496851
Year 4	60.89495	6.239964	0.231165	11.45202	13.01459	8.167313
Year 5	55.45818	6.648746	0.188950	13.76057	13.01960	10.92395
Year 6	51.65226	7.021136	0.197064	15.23381	12.97898	12.91676
Year 7	48.56364	7.377462	0.166389	16.44204	12.62138	14.82908
Year 8	45.91926	7.632950	0.154741	17.43745	12.38886	16.46674
Year 9	43.74774	7.890626	0.148256	18.25739	12.14232	17.81366
Year 10	41.91998	8.112822	0.137938	18.94181	11.88701	19.00044
Year 11	40.35679	8.306248	0.132424	19.51376	11.67096	20.01982
Variance decomposition of EPC	EPC					
Year 1	93.38001	1.682958	0.029871	0.220957	0.066813	4.619388
Year 2	90.74654	2.504148	0.183052	0.529418	0.752389	5.284456
Year 3	90.92431	1.941779	1.109976	0.914910	0.709178	4.399846
Year 4	90.27516	1.676681	1.464908	1.461146	1.060634	4.061474
Year 5	89.23373	1.685199	1.625023	2.580614	1.317917	3.557515
Year 6	85.78168	2.870326	2.013907	4.457698	1.469928	3.406462
Year 7	82.40636	4.182916	2.338564	5.916840	1.477045	3.678277
Year 8	79.78713	4.977567	2.565911	6.946049	1.487896	4.235446
Year 9	77.50293	5.428252	2.739283	7.848351	1.540292	4.940895
Year 10	75.36300	5.727916	2.855135	8.731983	1.625616	5.696355
Year 11	73.31341	5.991517	2.931501	9.583814	1.724551	6.455207

Variance decomposition of GNIPC	GNIPC					
Year 1	76.08376	2.745419	1.929466	11.37468	7.572865	0.293808
Year 2	73.95793	2.746790	0.538678	13.62746	7.627965	1.501180
Year 3	65.35411	3.691083	0.508097	19.97899	8.468312	1.999403
Year 4	59.52713	4.452466	0.434827	24.16196	9.001310	2.422305
Year 5	54.37576	5.956983	0.396038	27.04654	9.089921	3.134766
Year 6	49.82968	7.971810	0.414548	28.98407	8.726306	4.073587
Year 7	46.39526	9.684141	0.446827	30.12988	8.264941	5.078955
Year 8	43.94064	10.82363	0.474324	30.79887	7.904931	6.057607
Year 9	42.12396	11.51342	0.490976	31.24895	7.662922	6.959774
Year 10	40.70076	11.92964	0.496917	31.60096	7.508446	7.763281
Year 11	39.52708	12.20960	0.496271	31.89416	7.405859	8.467022

Source: Authors estimated output.

Table 7. External Sources of Macroeconomic Instability

	EDX	NFDIGDP	NOP	GXRE
Variance decomposition of EDX				
Year 1	79.03761	5.529226	13.14402	2.289138
Year 2	68.86621	5.719562	16.45354	8.960689
Year 3	62.78882	4.428143	19.82901	12.95403
Year 4	58.46968	3.973529	24.34964	13.20715
Year 5	55.00262	4.164034	27.91753	12.91582
Year 6	52.31071	4.497900	30.50335	12.68804
Year 7	50.38747	4.861310	32.29184	12.45938
Year 8	49.03231	5.213087	33.48787	12.26673
Year 9	48.09564	5.506128	34.27177	12.12646
Year 10	47.46331	5.735555	34.77353	12.02760
Year 11	47.04415	5.908904	35.08692	11.96002
Variance decomposition of EPC	EPC			
Year 1	77.91485	3.955562	17.72847	0.401111
Year 2	72.65391	3.147099	23.72907	0.469921
Year 3	66.40342	2.480660	30.59327	0.522643
Year 4	60.69443	2.054324	36.55009	0.701157
Year 5	55.98868	1.751222	41.40511	0.854980
Year 6	52.12243	1.540056	45.33473	1.002788
Year 7	48.99464	1.399373	48.46956	1.136431
Year 8	46.45978	1.311531	50.97525	1.253442
Year 9	44.39257	1.261082	52.99172	1.354623
Year 10	42.69161	1.235741	54.63096	1.441692

Year 11	41.27781	1.226612	55.97904	1.516536
Variance decomposition of GNIPC				
Year 1	76.32851	3.826802	19.75666	0.088030
Year 2	60.60834	1.821561	37.52361	0.046494
Year 3	49.17243	1.079667	49.71856	0.029341
Year 4	41.96964	0.664420	57.21149	0.154445
Year 5	37.21364	0.462355	61.95263	0.371378
Year 6	33.94167	0.423903	65.04915	0.585278
Year 7	31.60636	0.509002	67.10837	0.776267
Year 8	29.89924	0.674536	68.48616	0.940070
Year 9	28.63321	0.885068	69.40662	1.075102
Year 10	27.68669	1.113133	70.01633	1.183852
Year 11	26.97735	1.338567	70.41413	1.269951

Source: Authors estimated output.

Appendix 3. Impulse Response Functions (IRF)

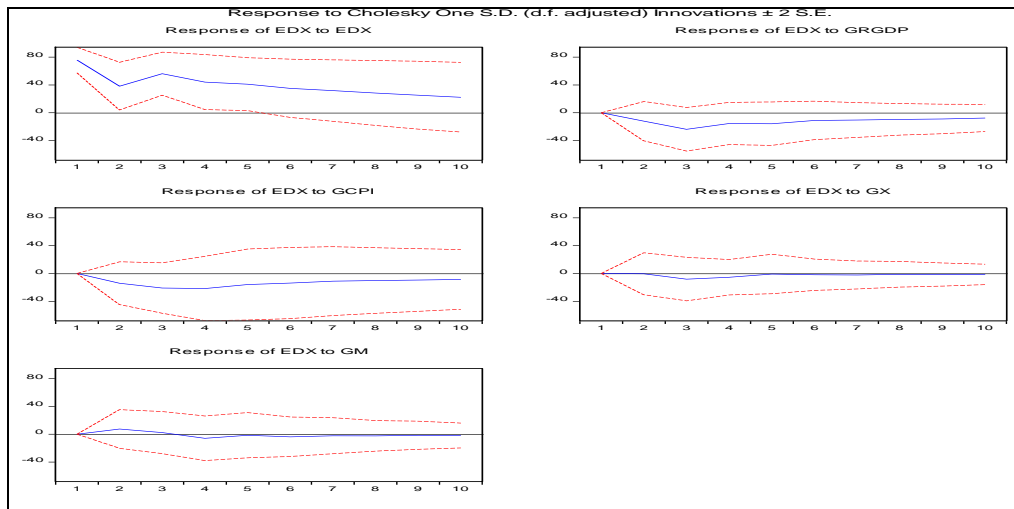


Figure 1. Impulse Response of SDG 17 to Instability as a Macroeconomic Outcome.

Source: Authors estimated output.

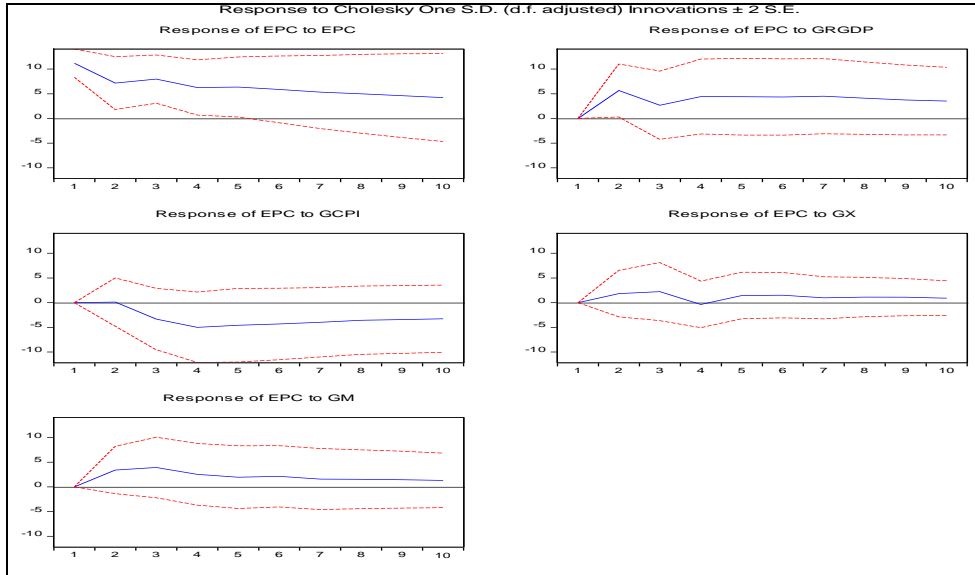


Figure 2. Impulse Response of SDG 7 to Instability as a Macroeconomic Outcome
 Source: Authors estimated output.

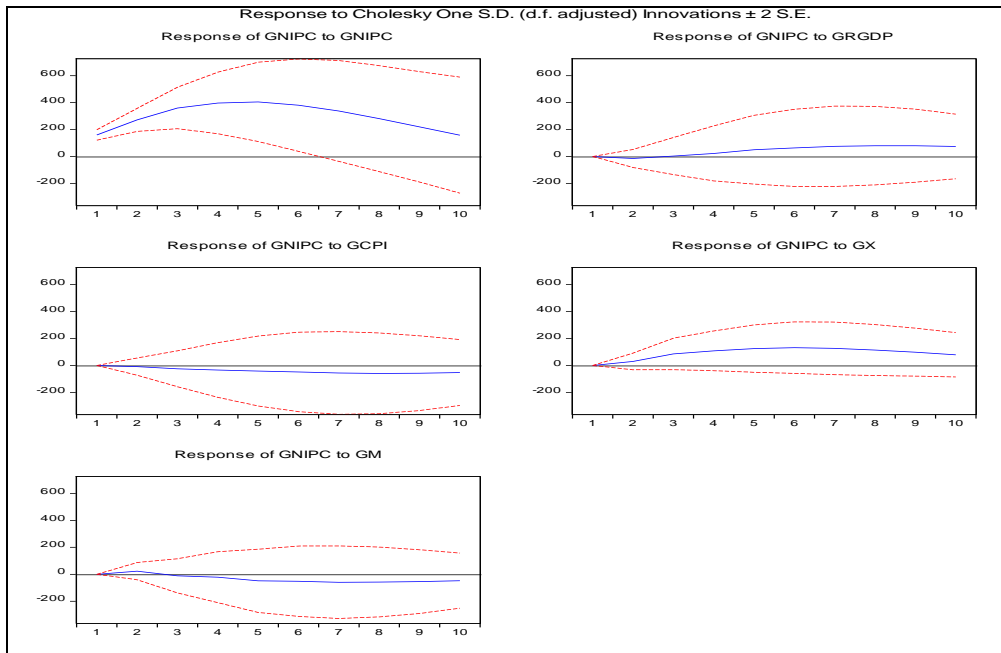


Figure 3. Impulse Response of SDG 8 to Instability as a Macroeconomic Outcome.
 Source: Authors Estimated Output.

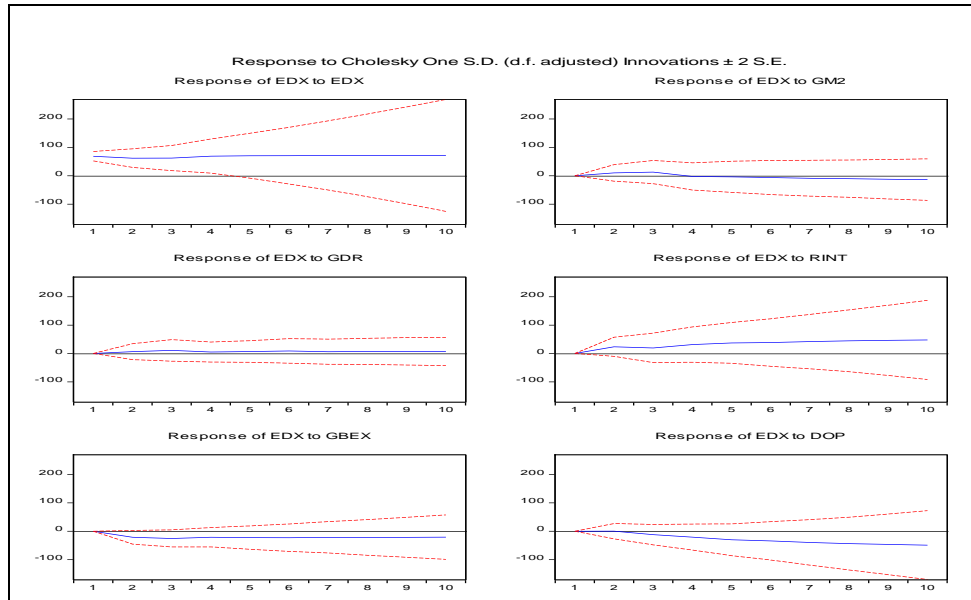


Figure 4. Impulse Response of SDG 17 to Domestic Sources of Macroeconomic Instability

Source: Authors estimated output.

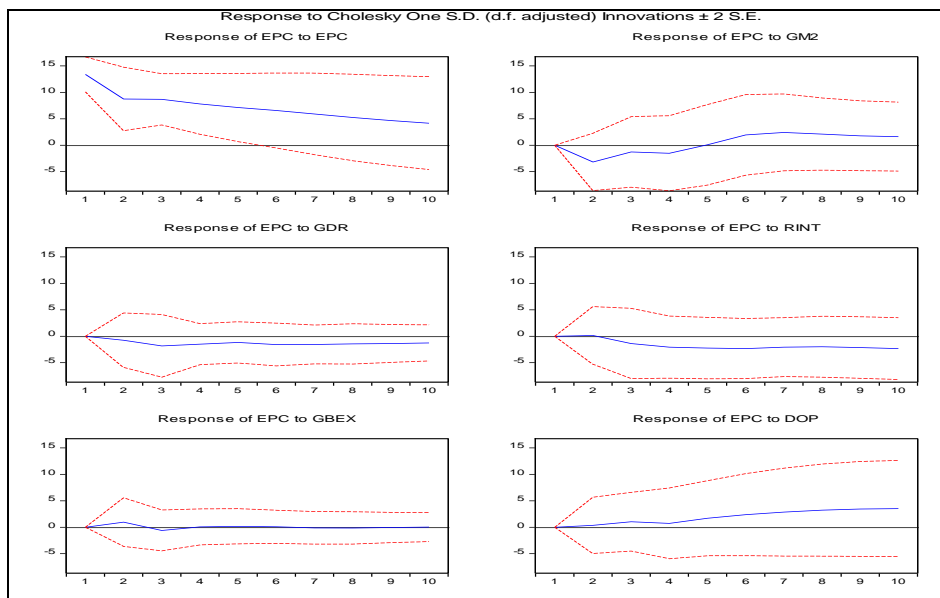


Figure 5. Impulse Response of SDG 7 to Domestic Sources of Macroeconomic Instability.

Source: Authors estimated output.

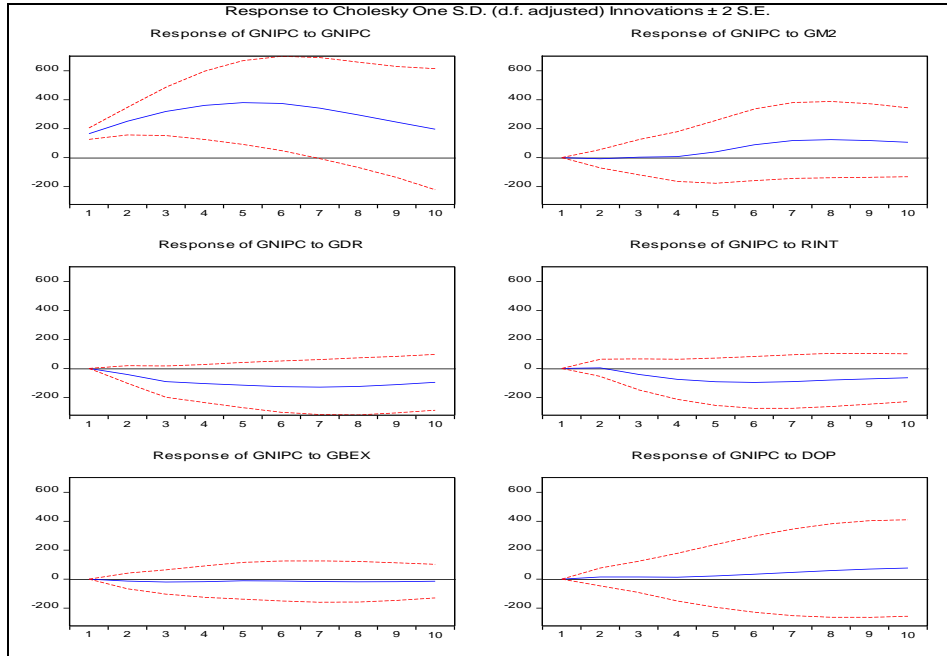


Figure 6. Impulse response of SDG 8 to domestic sources of macroeconomic instability.

Source: Authors estimated output.

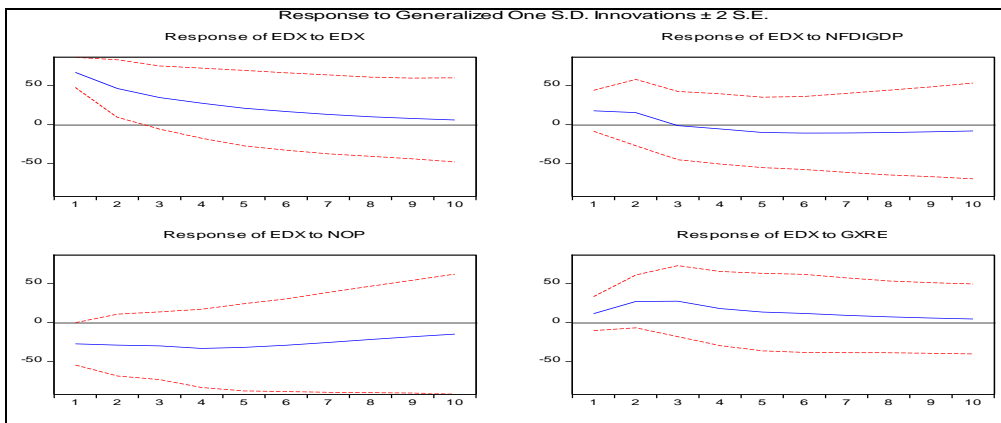


Figure 7. Impulse Response of SDG 17 to External Sources of Macroeconomic Instability

Source: Authors estimated output.

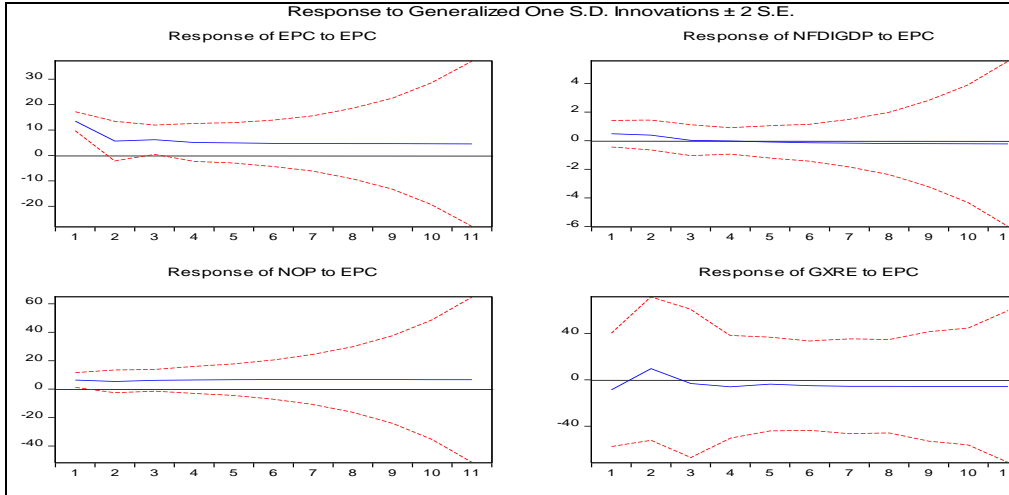


Figure 8. Impulse Response of SDG 7 to External Sources of Macroeconomic Instability.

Source: Authors estimated output.

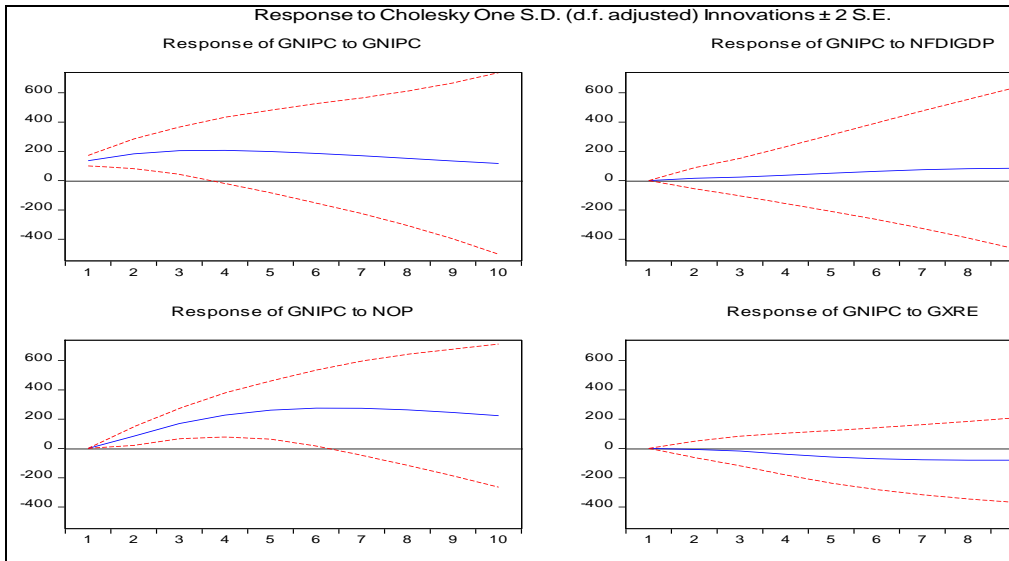


Figure 9. Impulse Response of SDG 8 to External Sources of Macroeconomic Instability.

Source: Authors Estimated Output.