




Human Development and Macroeconomic Shocks in Nigeria: An Empirical Investigation


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Abstract

This paper explores how human development responds to selected macroeconomic shocks in Nigeria. The study employed the Sen's capabilities approach as the analytical approach and posited that the level of education, health status, quality of investment, technology, and government fiscal and monetary policies are plausible determinants of human development. We used the Structural Vector Autoregression (SVAR) to estimate the responses of such selected shocks, which are inflation, interest rate, government capital expenditure, exchange rate, current account balance, and savings shocks. The Forecast Error Variance Decomposition (FEVD) and the Impulse Response (IR) showed that a fiscal policy shock is the major factor influencing human development outcomes. This finding underscored the important role government plays in enhancing the well-being of its citizens. Fiscal policy tools (such as investment in education, health, housing, and infrastructure) are essential for human development. In particular, the human development outcome is found to respond positively to shocks from real interest rates, which are felt significantly in the short run. We concluded that human development is negatively affected by a sudden decline in the federal government's capital budget expenditure.

Keywords: *human development, macroeconomic shocks, structural vector autoregression, macroeconomic outcomes*

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Introduction

The formulation and effective implementation of appropriate macroeconomic policies and programs, which are targeted for economic growth and improved access to basic social and economic services, have been recognized as essential. This is understandable in view of the importance of a stable macroeconomic

environment to the economy and human development (Vasylieva et al., 2018; Dauda & Makinde, 2014; Iwegbu & Oguntunde, 2020; Srithilat et al., 2017).

World Bank (1993) underscores the crucial role of the macroeconomic environment and human capital investment in economic growth performance. The World Bank (1993) contends that the rapid industrialization and growth of the high-performing Asian economies (HPAEs) was essential as a result of their “market-friendly” approach to development. The report further posits that the main feature of government policy in these economies is that they got the “fundamentals right” through fostering macroeconomic stability, promoting human capital development, and ensuring effective and dependable bank-based financial systems. Similarly, policies were directed at limiting price distortions, keeping the relative prices of traded goods close to international prices; providing openness to external trade and technology; and developing agriculture. Interventions were specifically employed to rectify market failures and were implemented with performance standards, which encouraged “contest-based competition.”

In the same vein, Fischer (1993) suggests that the macroeconomic environment has important implications for growth. He identifies five conditions that underscore the importance of a sound macroeconomic framework in promoting growth and, by implication, for human development. These conditions are, namely, a moderate inflation rate that can be predicted; a growth-driven interest rate; a stable fiscal policy that is sustainable; an effective real exchange rate; and a favorable balance of payment. However, others, including Fetahi-Vehapi et al. (2015), Anyanwu (2014), and Chirwa & Odhiambo (2016), as well as Fischer (1993), argue that the satisfaction of one or two of these conditions is not sufficient enough for growth and, by implication, is not sufficient for human development, since growth is a necessary condition for economic development. This view is partly corroborated by the Mexican experience in the early 1990s. It was recorded that Mexico had a low inflation rate accompanied by a consolidated fiscal situation; this notwithstanding, there was an indication that growth performance remained low due to the uncompetitive nature of the real exchange rate, culminating in a nonviable balance of payments, combined with high real interest rates, which appear to also be volatile. This had a deleterious impact on human development.

The general objective of this study was to investigate the response of human development outcomes to selected macroeconomic outcomes in Nigeria. The study covered the period between 1981–2019 and offered valuable information on the interaction between macroeconomic indicators and human development outcomes. This information is of utmost importance to policymakers because it engendered the creation of a credible policy framework, which is necessary for sustainable economic growth and human development. In the remaining parts of the paper, a literature review section describes the theoretical and empirical review of the study. Other sections include the analytical framework for the study, the research methodology used to collect and analyze the data, the empirical findings from the analysis of the results, the summary policy recommendations, and the conclusion.

Literature Review

Macroeconomic Policy Framework and Human Development Outcomes in Nigeria

Within the Nigerian context, Saibu (2010) investigated how real output grows when compared with other macroeconomic policies. We employed descriptive statistical measures, and the results show that the economy, at varying times, experienced a full business cycle; however, recent economic growth trends have not been able to match the growth rate achieved in the 1970s. The study recommended that fiscal and monetary policy both significantly have the ability to influence economic growth among developing economies. As such, output fluctuations are externally induced and not determined by the fiscal and/or monetary policy shocks.

Macroeconomic Policy Framework

As a result of the economic crisis of the late 1970s and early 1980s, the Nigerian government adopted some stabilization, austerity, and counter-trade measures between 1982 and 1984. In April 1982, the Economic Stabilization Act was promulgated and designed as an attempt to halt economic deterioration through measures, such as stringent exchange control, import restrictions, and enactment of appropriate monetary and fiscal policies. In October 1985, the Nigerian Government put in place a 15-month economic emergency period in pursuit of economic stabilization, which was followed by the withdrawal of 80% of the petroleum subsidy in January 1986. The various policy measures, however, did not produce the desired results, and the population experienced hardships unknown in the previous 15 years (Olaniyan, 1996).

In 1986, the Structural Adjustment Programme, under the auspices of the World Bank and the International Monetary Fund, was introduced. Major elements of this program included removing the restrictions placed on the exchange rate and allowing the market forces to determine the same; employing restrictive fiscal and monetary policy measures in order to control for inflation and ensure judicious and rational utilization of the government's fiscal resources, which includes public investment program; liberalization of the trade regime, the abolition of price controls (including the marketing boards from 1987 and the rationalization of customs tariffs); financial sector reforms to deregulate interest rates and liberal licensing of banks from July 1987; and commercialization and privatization of public enterprises from June 1988. The Structural Adjustment Programme failed to achieve any reasonable impact because the underlying commitment to reform was missing. In 1993, the government introduced a policy of "guided deregulation," and during this period, the naira exchange rate was once again capped; it stood at $N = 22$ to the U.S. dollar (Aigbokhan, 2005).

With the advent of democracy in 1999, major reform initiatives have been undertaken in areas such as exchange rate flexibility, fiscal policy reform, financial sector reform, along with privatization and public enterprise reforms. In an attempt to resolve the economic crisis that plagued the economy, the then government introduced the National Economic Empowerment Development Strategy (NEEDS) program in 2004, which underscored the crucial role of private sector development in wealth creation, employment generation, poverty reduction, and value reorientation. One of the major objectives of the macroeconomic reform was the pursuit of a predictable macroeconomic environment in order to stabilize the Nigerian economy with a view to eliminating waste, improving the budgetary system, fighting corruption, promoting accountability and transparency, and providing a platform for sustained economic diversification and non-oil growth. Fiscal policy rules were adopted in order to de-link public expenditures from oil revenue earnings. These rules range from the Fiscal Responsibility Act, the pricing of crude oil, and a deficit of no more than 3 % of the gross domestic product (GDP; NPC, 2004, p. 35). Several structural, public sector, institutional, and governance reform measures were also carried out.

The Nigeria Vision 20: 2020 was formulated within the context of a global financial and economic crisis that is targeted at ensuring a robust economic growth trajectory, which ushers the economy onto a growth path that is sustainable, inclusive, and socio-economically driven. Key elements of the macroeconomic strategies and policy thrusts include attaining double-digit growth rates and establishing a robust economy that has a growth-oriented price level, interest rate, exchange rate, and other real monetary aggregates that could enhance economic diversification, stimulate the real sector, and enhance its global competitiveness among others (NPC, 2009, pp. 22–23). One of the major challenges for macroeconomic management over the vision period would be the attainment of a diversified economic structure—away from oil—whose fortunes are highly dependent on the unpredictability of the global economy.

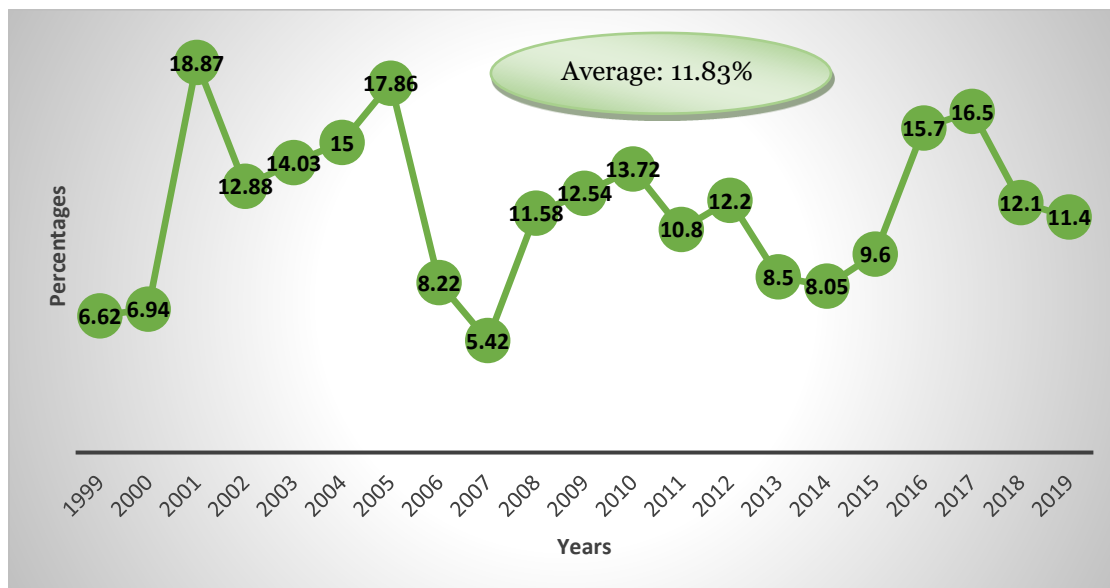
The federal government of Nigeria, led by President Mohammed Buhari, has recognized the need for macroeconomic stability, which will engender human development. Thus, the government rolled out the Economic Recovery and Growth Plan (ERGP), a medium-term plan for 2017–2020, that builds on the

strategic implementation plan, which is a short-term intervention plan. The ERGP's principle focuses on addressing factors that negatively impact growth. This is achieved by leveraging private sector engagement, enhancing national cohesion, and offering greater social inclusion. The promotion of societal value will allow markets to function and uphold the society's core values. The ERGP core objective includes investing in the people by ensuring social inclusion, job creation, youth employment, and improvement in human capital.

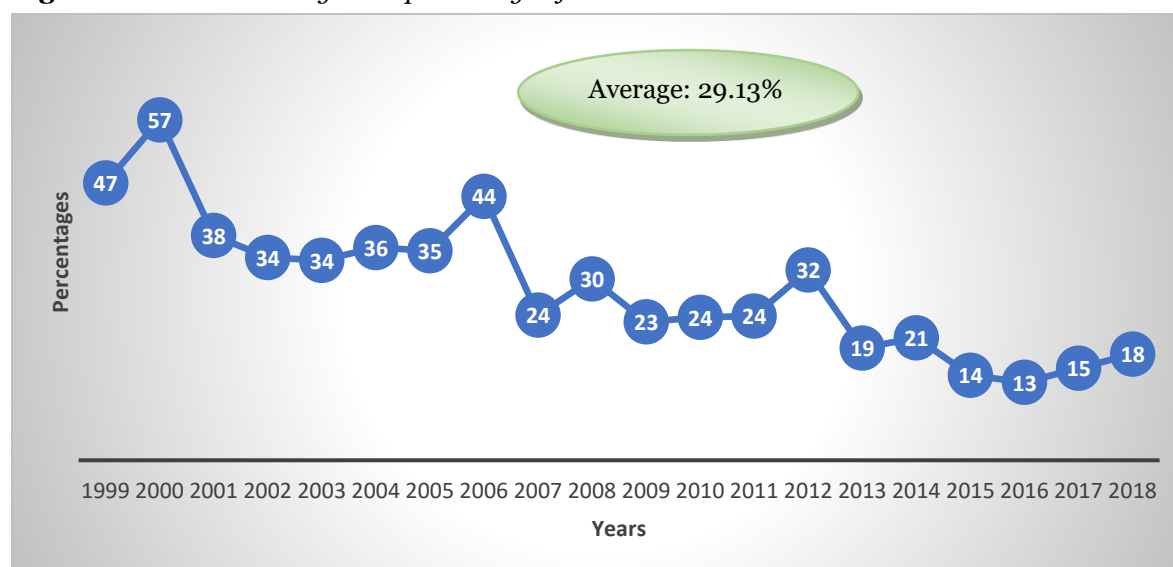
There are five key execution priorities in achieving the plan and where attention must be focused on. These priorities include stabilization of the macroeconomic environment; improvement in agriculture and food security; ensuring energy sufficiency; improvement in transportation infrastructure; and driving industrialization through subject matter experts (SMEs). Macroeconomic stability centers on monetary stability–inflation targeting, reduced interest rate, and favorable exchange rate system; fiscal stimulus and external balance-promoting exports; and reliance on expenditure switching (ERGP, 2017). The plan shows the role that macroeconomic outcomes have on human development. This study intends to provide empirical evidence on how macroeconomic variables engender human development, thereby validating the ERGP strategy, and provides a template for the actual macroeconomic variable that drives human development.

In the period 1999–2019, the inflation rate averaged 11.83% per annum. It was 6.62% in 1999 and grew to 18.87% in 2001. Inflation, however, reduced to 5.42% in 2007 and stood at 13.72% in 2008. And, as in 2019—two years after the recession—inflation stood at 11.4% (see Figure 1). Inflation was attributable to cost-push factors, such as a deregulated interest rate. One of the major objectives of the financial reforms carried out was to enhance financial intermediation in the economy through the banking system. The general level of savings expressed as a ratio of gross domestic product increased progressively from 46.55% in 1999 to 17.82% in 2018 and then averaged 29.13% between 1999 and 2018 (see Figure 2).

Figure 1. Inflation Rate, 1999–2019



Source: CBN 2018 and Q4 2019 Statistical Bulletin

Figure 2. Trend in Savings as a percentage of Gross Domestic Product

Source: World Development Indicators (2019)

Human Development Outcomes: Trends and Patterns

Over time, the Nigerian economy has experienced several internal and external shocks, which have culminated in severe distortions and structural changes. From the 1980s to the year 2000, slow economic growth hampered Nigeria's development process. The adverse economic growth experienced during the first half of the 1980s led to the introduction of the Structural Adjustment Programme (SAP). Despite the introduction of the SAP, the performance of the economy was no different before the policy was introduced. During the post-SAP policy reforms, the overall performance of the economy was impressively high (as shown in Table 1). Table 1 presents the GDP, oil, and non-oil growth rates at constant basic prices in 2010.

Table 1. GDP, Oil, and Non-Oil Growth Rates at 2010 Constant Basic Prices

Activity Sector	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total GDP Growth Rate (%)	5.31	4.21	5.49	6.22	2.79	-1.58	0.82	1.91	2.55
Oil GDP Growth Rate (%)	2.33	-4.95	-13.07	-1.32	-5.45	-14.45	4.69	0.97	6.36
Non-oil GDP Growth Rate (%)	5.85	5.81	8.42	7.18	3.75	-0.22	0.47	2.00	2.26

Source: 4th Quarter, CBN 2019 Quarterly Bulletin

The oil sector contributed to the sluggish growth trajectory experienced by the Nigerian economy, and this created some significant level of instability; however, there was a rebound after the recession of 2016, as the oil sector contributed a whopping 4.69% and 6.36% in 2017 and 2019, respectively. The non-oil growth was impressive, and this was strongly determined by the improvement in the agricultural sector (especially crop production), as well as the services sector (special emphasis on retail trade, wholesale trade, and the telecommunication sub-sectors). The non-oil sector grew steadily as the agricultural and trading sectors responded to the favorable global cyclical upturn, which encouraged global demand for most commodities.

Overall, one can conclude from the foregoing that the challenge of economic development in Nigeria has remained difficult. In spite of the series of macroeconomic and sectoral policy reforms embarked upon by the successive Nigerian governments since the 1980s, it became apparent by the late 1990s that the Nigerian economy was still engulfed in a crisis of development. Even though in the period between 1999 and 2008 the

performance of the Nigerian economy (as measured by the growth of real GDP) improved significantly, the country failed to break the vicious circle of poverty.

The 2018 *United Nations Human Development Report* (UNDP, 2019) gives a broader perspective on Nigeria's poverty trajectory. According to the report (as shown in Table 2), out of 189 countries, Nigeria poorly fared as it ranked 158th in the Human Development Index (HDI), which measures achievement in terms of life expectancy, education, and real income. Life expectancy is given as 54.3 years, and infant mortality stands at 75.7 per 1,000 live births (UNDP, 2019). The paradox of Nigeria's deepening underdevelopment since the 1980s is that the country has been richly endowed with a huge diversity of human, natural, and financial resources on a scale that is inconsistent with observed widespread poverty and decrepit economic superstructures.

Table 2. Nigeria's Human Development Index, 2018

Indices	Value	World Ranking (Out of 189 Countries)
Human Development Index value	0.534	158
Life expectancy at birth (years)	54.3	NA
Expected years of schooling (years)	9.7	NA
Mean years of schooling (years)	6.5	NA
GNI per capita (2011 PPP US \$)	5,086.4	136

Source: UNDP (2019) *Human Development Report*

Empirical Review

Research exploring the relationship amongst macroeconomic policies, socioeconomic outcomes, and economic growth has been diverse and controversial. Evidence from the literature on “the impact of macroeconomic policies on growth” remains contradictory and inconclusive. For instance, the Fischer (1991, 1993) and Bleaney (1996) studies have shown that macroeconomic stability plays a crucial role in sustaining growth. In the same vein, Sirimaneetham and Temple (2006) examined the relationship between macroeconomic policy and the distribution of growth across countries. The authors found that high-quality macroeconomic management is a precondition for all of the fastest-growing countries included in their study. In contrast, however, Acemoglu et al. (2003) and Easterly (2004) provided evidence that macroeconomic policies (such as, inflation, the level of government spending, and the overvaluation of the real exchange rate) have no predictive power for growth, output volatility, or cross-country variations in income per capita after accounting for the impact of institutions.

Fatas and Mihov (2009) examined the growth effects of volatility induced economic policy. They observed that economic policy volatility (any of fiscal policy or exchange rate channels) is important and serves as a robust explanatory variable of cross-country differences in economic growth. The authors concluded that strengthening the conduct of macroeconomic policy can have a beneficial effect on growth even if institutional reforms are not taking place. Also, De Long and Summers (1992), who examined how macroeconomic policies determine the productivity of an economy in the long run, discovered that much of the variation in productivity growth rates cannot be traced to macroeconomic policies, but is attributed to structural and external factors.

Knowledge has become a key driver of growth and development; it is an insubstantial concept that is embodied in human capital. Intense competition in a fast-growing globalizing world has prompted fresh consideration of the role of human capital in the growth performance of a country. The economic success of the newly industrializing countries, particularly the East Asian Tigers, has been linked to substantial investment in human resources, most especially in education (World Bank, 1993; Min, 2008). Numerous

empirical studies have investigated the effects of human capital accumulation on economic growth performance in different countries (World Bank, 1991; Mankiw et al., 1992; Barro & Sala-I-Martin, 1995).

The studies by Barro and Sala-I-Martin (1995), which had cross-sectional observations, show that the level of education—when measured with secondary and tertiary enrollment—positively enhance economic growth. The study found that increases in the average male secondary schooling of 0.68 cause the economy to grow by 1.1 percentage points. As for tertiary education, an increase of 0.09 years causes an increase in economic growth of 0.5 percentage points.

Pissarides (2000) conducted a micro-based analysis and examined whether human capital enhances the economic growth of Chile, India, Egypt, and Tanzania. The study considered the efficiency level within the formal educative process to the efficiency of the utilization of education and human capital within the economy as a whole. He revealed that subsidies tend to be harmful to growth performance if the type of education they support will not supply the labor needs of the economy.

Teweldemedhin (2014) examined the impact that macroeconomic policies have on poverty alleviation, which improves human development in Sub-Saharan African countries. In measuring its level of poverty, the Multidimensional Poverty Index (MPI) was used in measuring poverty incidence, as well as the Oxford Poverty and Human Development Initiative (OPHI). The study employed the weighted least square estimation technique in examining the objective earlier stated. The result revealed that external debt positively significantly spurs poverty incidence (same for inflation, output, and agriculture) and population growth. The result obtained, however, does not conform to a priori expectations, and a possible reason for this is the model specification style of the study, which could lead to misleading conclusions. Also, the author's motivation for the study was to examine how shocks and fluctuations in macroeconomic policies affect human development via a reduction in poverty. The expected technique to examine this is the impulse–response shock analysis; however, the study's technique is not in line with the objective, which led to a conflicting result. Our study intends to fill this lacuna by investigating the response of human development to macroeconomic outcomes.

Stiglitz (2012) examined macroeconomic fluctuations, inequality, and human development in Columbia. He employed a descriptive style of investigation to identify the implications of economic fluctuations on inequality and human development; the role of inequality on economic downturns; and how human development responds to monetary policy and fiscal policy. He concluded that output shocks exert negative consequences on well-being from increased insecurity, deterioration of health, and loss of human capital. The study also concludes that there is a link amongst inequality, human development, and output shocks. Our study widens the scope of Stiglitz (2012) by examining the magnitude of human development responses on other macroeconomic shocks.

The studies conducted by Abraham and Ahmed (2011) examined the nexus between economic growth and the Human Development Index (HDI) in Nigeria. In achieving their objective, they employed the error correction method to trace its short-run impact and the findings revealed that economic growth does not significantly contribute to HDI in the short run. There was no information on what happens in the long run, and growth can only translate to development over time when it is persistent. The study has no theoretical framework upon which it builds its argument. Also, there are other determinants of human development outcomes that the study did not capture. Our study differs from this one by providing a theoretical framework upon which macroeconomic variables interact with human development outcomes.

Fahad (2011) examined how macroeconomic policies can enhance human development through poverty reduction. He employed an ordinary least square in examining his objective. He extended the study by examining how the policies can affect income distribution. The result revealed that government expenditure

on developmental projects has a significant impact on human development. Our study extends beyond Fahad's (2011) by examining other macroeconomic outcomes that exert shocks on human development.

Percoco (2016) examined how health-related shocks affect human capital development in learning and quality education in Spain. The exogenous health-related shock considered is the outbreak of the Spanish Flu, which affected the economy significantly. The study employed both ordinary least squares and the logistic regressions estimation technique. The study results showed that there is a small but persistent impact of health-related shocks on human capital development and investment in education.

In another related research, Shah and Steinberg (2017) examined how rainfall shocks impact human capital development in the rural area of India by using the dynamic stochastic general equilibrium model under the framework of the overlapping generations model. The study results revealed that rainfall shocks significantly hampered the opportunity for school and human capital development, as increases in rainfall cause children (between the ages of 5 and 16 years) to switch out of school into some productive work.

Berloffa and Giunti (2019) examined how human capital investment through expenditures on health responds to shocks from international remittances that go to the households. The study employed the data of 24,700 households in the Peruvian economy and analyzed data using the almost ideal demand system estimation with instrumental variable estimation technique. The result shows that remittances have a significant impact on human capital investment, as they increase household expenditure on health and housing—a major component of human capital investment. In a similar vein, Chung and Partridge (2019) examined if the Mariel boatlift caused a permanent shock in the future human capital development of Miami. The study employed the structural equation modeling and estimated the root mean square percentage error loss. The study results show that the Mariel boatlift, which led to a decrease in the level of average skills, caused a long-lasting, permanent shock on human capital development.

Furthermore, on the empirical findings, the study by Murendo et al. (2020) examined how resilience capacities of the economy affect human capital development, which is defined by the extent of household nutrition. The study employed a data panel from 1,494 Malawi households, which were collected in 2013 and 2016, to achieve the research objective. The data collected were analyzed using the fixed effect panel data regression estimation technique, and the results showed that the resilience capacity significantly and positively improves human capital development by increasing household nutrition in Malawi, which is more important during shocks.

Jamani and Ukarin (2020) investigated the impact of public expenditure shocks on human capital development and revealed that the response of the human development index (HDI) to investment shocks appears to be the most destabilizing during the study period and suggested the need for government to promote efficiency in public spending. Emara and Mohammed (2021) investigated the relationship between global economic fluctuations and human development, in Egypt, using the Vector Autoregressive Model (VAR), relying mainly on impulse response functions and variance decompositions. The authors found a negative relationship between human development and the four channels of global economic fluctuations identified in the study, namely overseas development assistance, foreign direct investment, export earnings, and remittance. However, it was clearly shown that both foreign direct investment and export earnings constitute the most effective transmission channels in the short run and long run, respectively.

Analytical Framework

Our study relies on Sen's (1979, 1999) capabilities approach, which, in its simplest form, suggests that "a person's capability to have various functioning vectors and to enjoy the corresponding well-being achievements" (p. 75) is the appropriate indicator of human development. This approach gave the measure and determinants of human development a new perspective to include a vector of attributes, such as income,

well-being, education, and other possible opportunities that affect individual performance (Shuaibu & Oladayo, 2016). The implication of this approach is that the level of education, health status, quality of investment, and technological improvement cannot be the sole determinant of human development. Other factors, such as the macroeconomic environment, play a significant role in determining the level of human development. Sen (1999) opines that human development is a multidimensional concept and that development policies (fiscal and monetary policies, institutions, etc.) come together to interact in determining the level of human development. To this end, this study relied on Sen's capabilities approach to investigate the response of human development outcomes to selected macroeconomic outcomes in Nigeria.

As posited by Fischer (1993), the macroeconomic environment conditioning has important implications for growth. These growth implications include a moderate inflation rate that can be predicted; a growth-driven interest rate; a stable and sustainable fiscal policy; an effective real exchange rate; and a favorable balance of payment that is regarded as viable.

We can, therefore, specify that:

$$\text{Human Development} = f(\text{macroeconomic outcomes}) \quad (i)$$

Methodology

Data and Data Sources

There are two types of data available in economic literature: quantitative data and qualitative data (Saunders et al., 2019). Within the quantitative data, two types also exist: the numerical and categorical data. In this study, the numerical data is employed, which is continuous and can be compared. The numerical data is a time series data that are collected over time on an annual basis. The data employed in this study are retrieved from the fourth quarter of the Central Bank of Nigeria's "2018 Statistical Bulletin" and the United Nations Development Programme data for 2019.

Data Collection Method

There are two sources of data collection: the primary and the secondary source of data collection. The primary source of data deals with field surveys where first-hand information is collected, while secondary sources come from already collected and processed databases. For the purpose of this study, the secondary sources of data were deployed in collecting the data used for estimation from the relevant agency.

Operationalization: Variables and Indicators

The measure for human development relies on the widely known Human Development Index (HDI), which is a geometric composite index life expectancy, an education index, and the gross domestic product (GDP) per capita. The macroeconomic outcome is a row vector of macroeconomic indicators that is adapted from the works of Fischer (1993) and Shuaibu and Oladayo (2016). Our study modifies the works of the aforementioned authors by including government social expenditure—a composite of government expenditures on health and education—as empirically proven by Iwegbu and Dauda (2022), who showed that fiscal policies on health and education improve human development through poverty reduction and income increases in Africa. These indicators are inflation rate, real interest rate, government social expenditure, real exchange rate, current account balance, and national savings. Equation (i) can thus be expanded to form equation (ii), as follows:

$$\text{HDI}_t = f(\text{INF}_t, \text{RIR}_t, \text{GCET}_t, \text{RER}_t, \text{CAB}_t, \text{SAV}_t) \quad (ii)$$

The data sources and measurement are provided in Table 3.

Table 3. Data Sources and Measurements

Variable	Variable Name	Definition	Source of Data
HDI _t	Human Development Index at time t	Constructed from the composite index of life expectancy, education index, and GDP per capita	UNDP, 2019
INF _t	Inflation Rate at time t	Consumer prices (annual %)	CBN Statistical Bulletin, 2018, Q4 2019
RIR _t	Real Interest Rate at time t	Cost of doing business	CBN Statistical Bulletin, 2018, Q4 2019
GCE _t	Government Capital Expenditure at time t	Government expenditures on infrastructure	CBN Statistical Bulletin, 2018, Q4 2019
RER _t	Real Exchange Rate at time t	Official exchange rate (Local currency unit per U.S. \$, period average)	CBN Statistical Bulletin, 2018, Q4 2019
CAB _t	Current Account Balance at time t	Current account balance (BOP, current)	CBN Statistical Bulletin, 2018, Q4 2019
SAV _t	Saving as a percentage of GDP at time t	Gross savings (% of GDP)	WDI, 2019

Data Analysis Method: The Structural Vector Autoregression Model

In order to achieve our objective by estimating equation (ii), we specify a Structural Vector Autoregression (SVAR) model and employ the Impulse Responses and Forecast Error Variance Decomposition (FEVD) to investigate how human development will respond to the macroeconomic outcome. The SVAR purely extracts all exogenous shocks (macroeconomic variable) and retrieves the responses of the endogenous variable (human development index) after the economy is hit by these shocks (Sims, 1980). The SVAR helps to answer the response of the human development index (HDI) to shocks from macroeconomic conditionings.

The use of SVAR methodology is preferred because of its simplicity to deploy, and, also, there is no need to first specify the theoretical model supporting it. The SVAR is also useful when analyzing the dynamics behind historical data. The model also helps us to conduct a feedback interrelationship, which can possibly exist amongst macroeconomic fundamentals within a system. Under this model, we do not need to separately model all the endogenous variables in a system as a function of the lagged value of all endogenous variables (Sims, 1980; Salisu, 2015).

Gottschalk (2001) explained some limitations that SVAR methodology is likely to face. This drawback hinges on the assumption by the SVAR, which assumes all shocks are orthogonal and will likely be restrictive. The SVAR framework is widely used, as it controls for endogeneity issues that may arise during estimation, since it considers the time lags in the interrelationships among the variables of a system (Hahn, 2007).

Equation (ii) can then be re-written in an SVAR model following the work of Brini et al. (2016) as:

$$A_0 X_t = A_1 X_{t-1} + A_2 X_{t-2} + \dots + A_q X_{t-q} + \varepsilon_t \quad (\text{iii})$$

Where $X_t = (HDI_t, INF_t, RIR_t, GCE_t, RER_t, CAB_t, SAV_t)$ an $n \times 1$ vector made up of human development index, inflation rate, real interest rate, government capital expenditure, real exchange rate, current account balance and saving. A_i is the 7×7 matrix of coefficients for $i = 0, 1, \dots, q$ and

$\varepsilon = (\varepsilon_t^{HDI}, \varepsilon_t^{INF}, \varepsilon_t^{RIR}, \varepsilon_t^{GCE}, \varepsilon_t^{RER}, \varepsilon_t^{CAB}, \varepsilon_t^{SAV})$ represent the vector of structural disturbances. The reduced form equation of equation (iii) is then written as:

$$X_t = B(L)X_t + \mu_t \tag{iv}$$

From equation (iv), it can be deduced that $B(L) = A_0^{-1}A_1(L)$ and $A_1(L)$ is a matrix of polynomial in the lag operator. The study adopts the method of Vinayagathan (2013) in identifying the endogenous and exogenous variables. The domestic block comprises endogenous variables, which are in a vector $(Y_t: HDI, INF, RIR, GCE, CAB, SAV)$. The domestic block comprises two blocks in the system; the non-policy block and the policy variable block, which are $\{HDI, CAB, SAV, INF\}$ and $\{RIR, GCE\}$ respectively.

Identification of Macroeconomic Shocks

From equation (iv), the reduced form equation derived does not contribute significantly to economic discussion because they are linear combinations of structural shocks. According to Blanchard and Perotti (2002), the reduced-form residual of HDI, our equation of interest ε_t^{HDI} is seen to possess linear combinations of three types of shocks—the automatic responses, system responses and random shocks, taken as the truly uncorrelated structural exchange rate shocks.

In a VAR system that is made up of n -variables, there are $\frac{n(n+1)}{2}$ restrictions that are required for the system to be identified. Normalizing the diagonal element to one places n -restrictions on the VAR system. The difference between $\frac{n(n+1)}{2}$ and n implies that there are still $\frac{n(n-1)}{2}$ other identification restrictions needed. Sims (1980) proposed the recursive identification strategy in which the matrix of contemporaneous effects of structural shocks on the variables is assumed to be lower triangular and this yields the exactly needed other identification restrictions. The matrix representing the identifying restrictions is presented in equation (v) below.

$$\begin{pmatrix} \varepsilon^{HDI} \\ \varepsilon^{INF} \\ \varepsilon^{RIR} \\ \varepsilon^{GCE} \\ \varepsilon^{RER} \\ \varepsilon^{CAB} \\ \varepsilon^{SAV} \end{pmatrix} = \begin{pmatrix} 1 & \lambda_{12} & \lambda_{13} & \lambda_{14} & \lambda_{15} & \lambda_{16} & \lambda_{17} \\ 0 & 1 & \lambda_{21} & \lambda_{22} & \lambda_{23} & \lambda_{24} & \lambda_{25} \\ 0 & 0 & 1 & \lambda_{34} & \lambda_{35} & \lambda_{36} & \lambda_{37} \\ 0 & 0 & 0 & 1 & \lambda_{45} & \lambda_{46} & \lambda_{47} \\ 0 & 0 & 0 & 0 & 1 & \lambda_{56} & \lambda_{57} \\ 0 & 0 & 0 & 0 & 0 & 1 & \lambda_{67} \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \mu^{HDI} \\ \mu^{INF} \\ \mu^{RIR} \\ \mu^{GCE} \\ \mu^{RER} \\ \mu^{CAB} \\ \mu^{SAV} \end{pmatrix} \tag{v}$$

Employing the recursive identification strategy, we have 21 zero restrictions above the leading diagonal for an exact identification. It must be noted that certain exclusion restrictions on the structural parameters have become standard for studies of both closed and open economy macroeconomics literature.

Row 1 reveals that inflation rate, real interest rate, government capital expenditure, real exchange rate, current account balance, and saving can have contemporaneous effects on the human development index measured by $\lambda_{12}, \lambda_{13}, \lambda_{14}, \lambda_{15}, \lambda_{16}$ and λ_{17} . Human development index, real interest rate, government capital

expenditure, real exchange rate, and current account balance are assumed to have a contemporaneous effect on the inflation rate measured by $\lambda_{21}, \lambda_{23}, \lambda_{24}, \lambda_{25}$ and λ_{26} .

Thus, the reduced error term of the human development index can be expressed as:

$$\mu^{\text{HDI}} = -\lambda_{12}\mu^{\text{INF}} - \lambda_{13}\mu^{\text{RIR}} - \lambda_{14}\mu^{\text{GCE}} - \lambda_{15}\mu^{\text{RER}} - \lambda_{16}\mu^{\text{CAB}} - \lambda_{17}\mu^{\text{SAV}} + \varepsilon^{\text{HDI}} \quad (\text{vi})$$

Equation (vi) enables us to estimate the response of human development outcomes to the selected macroeconomic variables. Before estimating the SVAR model, we carried out necessary tests—both unit root and cointegration tests—to justify the applicability of SVAR. First, we proceed by determining the underlying properties of the process that generates our time series, that is, to test whether each variable is stationary or non-stationary. This investigation is necessary to ensure stability in subsequent econometric modeling. To test for unit roots, we employed the Augmented Dickey Fuller (ADF) and the Bounds Cointegration tests.

Empirical Findings

Descriptive Statistics

First, we attempt to present the descriptive statistics of the variables employed. This helps in providing the statistical properties of the variables and supplying further evidence on the trend and pattern of the variables; to this effect, the descriptive statistics are provided in Table 4.

Table 4. Descriptive Statistics

	Current account balance (₦)	Government capital expenditure (₦)	HDI	Inflation (%)	Exchange rate (₦)	Real interest rate (%)	Savings ratio of GDP (%)
Mean	847 billion	474 billion	0.510	18.985	94.24	13.08	42.66
Median	46.3 billion	309 billion	0.523	12.54	102.11	13.50	43.37
Maximum	4.89 trillion	2.29 trillion	0.542	72.73	306.08	26.00	88.39
Minimum	(3.03 trillion)	4.10 billion	0.452	5.40	0.61	6.00	13.08
Std. Dev.	1.62 trillion	528 billion	0.027	16.357	92.81	4.047	19.38
Jarque-Bera	3.919	19.575	3.295	28.170	4.251	5.771	1.57
Probability	0.1409	0.0001	0.193	0.0000	0.1194	0.0558	0.4558
Sum	33 trillion	18.5 trillion	13.775	740.41	3675.3	510.08	1621.11
Obs	.39	39	27	39	39	39	38

Source: Authors' computation employing data from CBN 2018, UNDP, 2019 & WDI, 2019

From Table 4, we can deduce that, on average, for the periods under investigation, Nigeria's human development outcome scored 0.510, which falls under the category of low human development. The highest HDI score recorded was 0.542, and the least was 0.452. This implies that efforts by the past government to improve the level of development have yielded a low result. The inflation rate for the period under investigation was highly volatile, as there was a wide margin between the minimum value of 5.40% and the maximum value of 72.73%. The naira was traded as high as ₦306.08 per U.S. dollar in 2019; reaching its peak and was once exchanged for 0.61 per U.S. dollar. This shows the high level of macroeconomic uncertainties that the economy has undergone between the periods of study, as the monetary authority has constantly strived to maintain a stable exchange rate.

However, the pressures on demand for importation have mounted more pressure, which forced the monetary authority to further devalue the currency in order to meet the demand for foreign currency. It is imperative to note that further devaluation will definitely increase the prices of imported products that account for a significant proportion of our daily demands. Saving as a percentage of GDP remained relatively at an average of 42.66% of the nation's output, while the gross savings went up as high as 88.39%. This is impressive, as the financial institutions have further enhanced the savings ability of the citizens, which has the capacity to enhance people's welfare. The cost of doing business (interest rate) remained high at an average of 13.08% during the period under investigation—reaching as high as 26%—but was as low as 6%. Also, note that the average real interest rate did not take into consideration the markup (inflation cost and cost of loan service) that will be added to adjust the nominal interest rate upward.

The position of external balances is also being met with instabilities, as the current account balance was as low as a deficit of 3 trillion nairas while, at a time, it increased to 4.89 trillion nairas at another. Exchange rate dynamics and crude oil prices are the principal determinants of this behavior. The government, at some point in time, has improved its capital expenditure profile from 4.10 billion to a massive 2.29 trillion; however, the average annual expenditure rallied around 474 billion. This certainly is spent on all sectors to provide for the growing population of about 205 million (Worldometer, 2020). The Jarque-Bera statistics test the null hypothesis of a series being normally distributed against the alternative hypothesis of such series not normally distributed. The probability from Table 4, using a 5-percent level of significance, reveals that current account balances, human development index, real interest rate, exchange rate, and savings ratio are all normally distributed, while government capital expenditure and inflation rate are not normally distributed.

Correlation Result

Table 5 reveals that the correlation between the human development index (HDI) and current account balance was negative and a little higher above average; however, the HDI has a weak negative relationship with government capital expenditure and the exchange rate. The HDI has a positive and weak relationship with the inflation rate and the interest rate. Other variables have shown varying levels of relationship, not exceeding a mark of ± 0.85 ; this is considered fair and can be said to be free from possible perfect multicollinearity.

Table 5. Correlation Result

	CAB	GCE	HDI	INF	RER	RIR	SAV
CAB	1.00	0.43	-0.60	-0.31	0.31	-0.43	-0.23
GCE		1.00	-0.10	-0.49	0.85	-0.55	-0.82
HDI			1.00	0.24	-0.05	0.48	0.16
INF				1.00	-0.50	0.36	0.35
RER					1.00	-0.36	-0.85
RIR						1.00	0.51
SAV							1.00

Source: Authors' computation employing data from CBN 2018, UNDP, 2019 & WDI, 2019

Unit Root Test

The study employs Augmented Dickey-Fuller (ADF) test to examine the stationarity of the time series and test the null hypothesis of a unit root. The test is examined at level and first difference using a 5-percent MacKinnon critical value. The summary of the statistic is reported in Table 6.

Table 6. Augmented Dickey-Fuller (ADF) Unit Root Test Result

Variable	At Level			At First Difference			Order
	ADF statistics	5% critical value	Prob	ADF statistics	5% critical value	Prob	
CAB	-1.690	-2.946	0.427	-7.517**	-2.946	0.000	I (1)
GCE	4.014	-2.968	1.000	-6.004**	-3.574	0.000	I(1)
HDI	-1.869	-2.986	0.340	-3.240*	-3.145	0.043	I (1)
INF	-2.921	-2.941	0.052	-5.884**	-2.943	0.000	I(1)
RER	1.372	-2.941	0.999	-4.258**	-2.943	0.002	I(1)
RIR	-3.263*	-2.941	0.024	-	-	-	I (0)
SAV	-2.189**	-2.946	0.214	-5.575**	-2.957	0.000	I (0)

* Implies significance at 5%, meaning that the variable is stationary at that order ** Implies significance at 1%, meaning that the variable is stationary at that order. Source: Authors' computation employing data from CBN (2018), UNDP (2019), and WDI (2019).

Table 6 shows that only the real interest rate is stationary at levels, while other variables are integrated to the order of one. The implication of this is that the variables are integrated of a different order. Hence, the Peseran (2001) bound test is employed to test for long-run cointegration.

There are no exact critical values to validate the cointegration condition of models that have a mixed level of stationarity. In order to overcome this, Pesaran et al. (2001) developed a strategy that can be used to examine the possibility of cointegration in a series of statistics that have a mixed level of stationarity. The f -test, by Pesaran, reports two cortical values at various levels of significance; these are the lower bound critical value (I(0)) and the upper bound (I(1)). If the calculated f -statistics fall below the lower bound critical level, we can conclude that there is no cointegration in the model of interest estimated. However, if the calculated value is above the upper bound critical level, we conclude that there is cointegration. An inconclusive decision is reached if the calculated statistics fall between the lower bound and the upper bound. The presence of cointegration in the test shows that there is a long-run relationship associated with the model, and this implies that predictions and forecasts from this model are reliable and valid.

Table 7. Bounds Wald Statistic Result

Dependent Variable	HDI	INF	RIR	GCE	RER	CAB	SAV
F -Statistics	7.23	6.512	1.685	1.685	1.556	7.160	1.051
df	6	6	6	6	6	6	6
Decision	Cointegrated	Cointegrated	Level	Level	Level	Cointegrated	Level

Note: I(0) bound at 5% critical value is 2.45 and I(1) bound at 5% critical value is 3.61.

Source: Authors' computation employing data from CBN 2018, UNDP, 2019 & WDI, 2019

Given that a vector autoregression model is estimated, all variables are endogenous in the system while restrictions are placed on the contemporaneous effect of one shock on the other. Hence, the bounds test is conducted for all seven variables (see Table 7). The result reveals that three of the models in the system are

cointegrated at first difference, thus having a long-run relationship, while four of the models are cointegrated at level.

Response of Human Development Outcomes to Selected Macroeconomic Outcomes

We present here the result of the impulse–response function and forecast error variance decomposition of human development index (HDI) response to impulses from macroeconomic variables. The impulse response function examines how variables respond to changes in their structural variation, while the variance decomposition shows the share of structural responses that are attributed to other structural shocks in the other endogenous variables.

Table 8. SVAR Forecast Error Decomposition (FEVDs) of Human Development Index

Period	Standard Error	Variable Shocks						
		HDI	INF	RIR	GCE	RER	CAB	SAV
1	0.025	19.73	1.21	12.41	17.69	20.49	21.17	7.30
2	0.040	9.16	2.53	18.44	35.83	10.37	16.59	7.08
3	0.048	6.36	2.22	15.37	47.20	10.69	12.15	6.01
4	0.051	6.64	2.32	14.86	46.43	12.09	10.79	6.86
5	0.054	7.24	2.58	13.85	42.73	12.56	11.35	9.69
6	0.056	6.65	3.12	15.79	41.71	11.58	11.997	9.16
7	0.056	6.74	3.13	15.66	41.94	11.51	11.94	9.08
8	0.060	6.84	2.75	14.26	41.75	14.13	10.51	9.75
9	0.063	6.45	2.54	13.07	39.50	18.39	9.85	10.20
10	0.065	6.01	2.38	12.57	37.38	19.24	9.99	12.42

Source: Authors' computation employing data from CBN (2018), UNDP (2019) and WDI (2019)

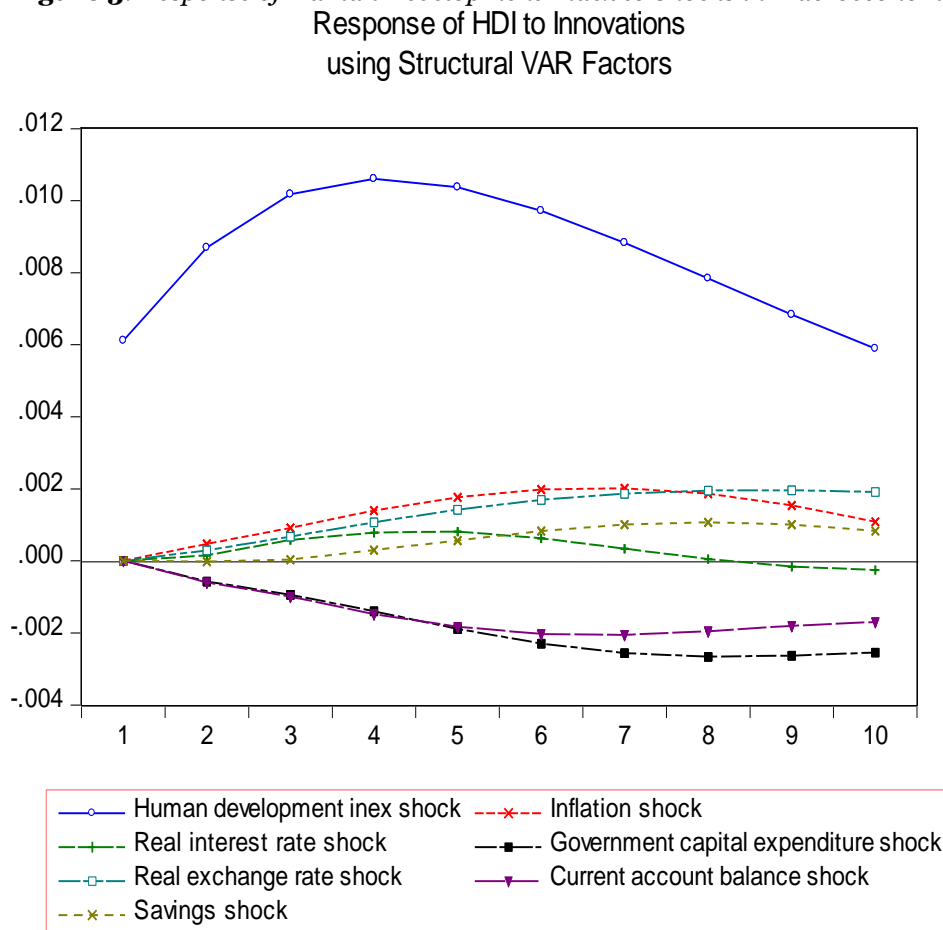
Figure 3. Response of Human Development Index to Shocks in Macroeconomic Variables

Figure 3 shows the accumulated responses of the HDI to generalized structural VAR factor shocks from macroeconomic variables (real interest rate, inflation rate, government capital expenditure, real exchange rate, current account balance, and saving). Figure 3 reveals that the HDI negatively and significantly responds to government capital expenditure from period 1 to period 10, and this is felt greatly in period 8. Also, the HDI positively and significantly responds to real interest rate shocks from period 1 to period 10, and this is felt greatly in period 5. The HDI also negatively and significantly responds to current account balance shock from period 1 to period 10, and this is felt greatly in period 6. The result further reveals that HDI positively and slightly responds to shocks from savings, inflation rate, and real exchange rate from period 2 to period 10. However, in period 10, the human development outcome did not respond to real interest rate.

Table 8 revealed that 1.21% of shocks in the HDI were explained by inflation rate in period 1 and this rose to 2.58% in period 5, but endured a gradual decline after period 10, only accounting for 2.38% of shocks in the human development outcome. Also, 12.41% of shocks in the HDI were explained by real interest rate in period 1, and this rose to 13.85% in period 5, but endured a gradual decline after period 10, only accounting for 12.57% of shocks in the human development outcome. Table 8 further reveals that 17.69% of shocks in the HDI were explained by government capital expenditure in period 1, and this increased to 42.73% in period 5 and fell further after period 10, only accounting for 37.38% of shocks in the human development outcome. Just over 20% (20.49) of shocks in the HDI were explained by real exchange rate in period 1, and this declined to 12.56% in period 5, but increased after period 10, only accounting for 19.24% of shocks in the human development outcome. Also, 21.17% and 7.30% of shocks in the HDI were explained by current account balance and saving, respectively, in period 1; however, in period 5, the contribution of current account

balances to shocks in the HDI declined to 11.35%, while that of savings increased slightly to 9.69%. As at period 10, shocks in the HDI caused by current account balances declined further to 9.99%, while that of savings increased to 12.42%.

Summary, Policy Recommendations, and Conclusion

The main focus of this paper was to investigate the response of human development outcomes to selected macroeconomic outcomes in Nigeria. For this purpose, empirical data was utilized from 1981 to 2019. Findings from the FEVDs and IRFs revealed that fiscal policy shock appears to be the main determinant of human development outcomes. This underscores the importance of government as an institution in improving the welfare of the citizenry. The fiscal policy tool employed is the government capital expenditure, and this is crucial in human capital development. The policy implication of this study is that policymakers must make efforts to ensure the full implementation of government capital spending, as any shock from such a plan engenders the human development outcome. The study further reveals that when budget implementation falls below expectations, the welfare of the citizenry is affected. The full implementation of the government expenditure plan for the fiscal year on infrastructure and social spending is not negotiable. Further conclusions drawn from the study are that interest rate, exchange rate, and current account balance shocks significantly contribute to the human development outcome. Although the fiscal policy is the main determinant of shocks in human development, the cost of doing business, from the study, has shown to be a determining factor, as this was consistent both in the short- and long-run periods of human development dynamics. External shocks from the exchange rate and current account balances are also significant determinants of the human development outcome; the decline in the long run reveals that a well-coordinated policy to ensure external balances in the form of a stable exchange rate and a favorable current account balance will improve the human development outcome.

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