

Macroeconomic Factors and the Prospects of Economic Prosperity in a Developing Economy: Evidence from Dynamic ARDL Simulations

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Research Article

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Abstract

This study investigated the effects of inflation and exchange rates, deficit financing, foreign investment, and financial development on economic prosperity measured by GDP per capita for Nigeria from 1970 to 2020. Empirical inferences were derived by applying the autoregressive distributed lag (ARDL), dynamic ARDL (DYNARDL), and the Kernel-based least squares (KRLS) models. It was observed that inflation rate and deficit financing adversely impacted economic wealth in the short and long term. At the same time, the exchange rate and financial development only benefited economic prosperity in the long term. In contrast, foreign investment was reported to be prosperity-decelerating in the long term. Applying the DYNARDL and KRLS techniques enabled the response of economic prosperity to future counterfactual shocks to the inflation and exchange rate variables. While inflationary shocks may have long-term beneficial effects on economic prosperity, shocks to the exchange rate will slightly erode these benefits. The study proposed several policy measures.

JEL Classifications: E6, O11, O47.

1. Introduction

Every nation's government aims to ensure or sustain economic prosperity at the expiration of any economic policy's lifespan. The most prominent measures used to indicate a country's wealth increases are the gross domestic product (GDP) growth rate and the GDP per capita (Petrakis, 2020; Batrancea et al., 2021). Consequently, policymakers have been fascinated with the combinations of macroeconomic indicators that can drive long-term wealth in different countries. For many, the inflation and exchange rate level constitute crucial 'economic pulse' indicators. However, some other measures have been identified in the literature to include foreign direct investment (FDI), capital formation, government receipt and outlay, deficit financing, commodity prices, export and import, and financial development (Tung, 2018; Ahmed et al., 2019; Aladejare, 2020; Ehigiamusoe and Lean, 2020; Wu et al., 2020; Osondu and Adiele, 2021), etc.

Hence, this study considered the Nigerian economy, which exhibits numerous economic challenges due to its structural distinctiveness. Despite being the first and sixth oil-producing nation in Africa and the world, Nigeria lags behind some of its African and world contemporaries in income growth (when measured in GDP per capita). An indication that the oil wealth has not translated to expected prosperity for the nation over time. From the 1970s to date, the country has continued implementing various development plans anchored predominantly on oil receipts, hoping to attain more incredible economic wealth. These policies include the national development plans, structural adjustment programme, rolling plans, national economic direction, seven-point agenda, etc. Nevertheless, aside from the economic recession the country experienced in the mid-1980s, it has also suffered two quick recessions within the decade. At the same time, government revenue has also dwindled in recent times, irrespective of the booms in crude oil prices. Thus, pointing to the fact that economic prosperity for Nigeria might significantly be a function of the combination of factors other than resource price. To buttress further, since the 2000s, policymakers in the country have simultaneously considered macroeconomic parameters such as the inflation and exchange rates, government revenue, foreign price of oil, and growth rate of real GDP in the yearly budget planning but with insignificant impact on promoting economic prosperity (Aladejare, 2022a).

Hence, this study assessed and proposed vital indicators policymakers should synergise for long-term economic prosperity in Nigeria. These variables are inflation and exchange rates, deficit financing, foreign investment, and financial development. The inflation and exchange rate variables have long been considered essential economic strength and competitiveness measures. Today, countries worldwide (developed or developing) are grappling with the significant adverse effect of inflation, such as eroding income value. Similarly, a poor exchange rate management regime can dissuade investors' interests and create uncertainty in an economy. Especially when the economy is predominantly mono-cultural, and the export commodity price is characterised by volatility. The country is susceptible to a twin deficit problem in such an instance. For instance, Nigeria has been running a deficit budget since 1970 due to the inability of its revenue, predominantly from oil, to meet its development needs. Recent empirical findings by Ebi and Aladejare (2022) and Aladejare (2022b) have further shown that despite growth in deficit financing, they have not helped to generate the necessary wealth due to poor fiscal management.

FDI inflows are another critical indicator of economic prosperity through job creation, especially when the inflows are to the real sectors of the economy. A situation where foreign investors prefer portfolio investment over real investment in an economy cannot spur long-term economic growth and prosperity. Also, a country's financial development level is essential to long-term economic prosperity determination. Financial development helps effectively mobilise savings for investment, irrespective of whether the country is developed or developing. It constitutes a primary means of resource accumulation for investment needed for job creation and poverty reduction. In the past three decades, Nigeria has embarked on different reforms to develop its financial sector, such as interest rate liberalisation, elimination of direct and subsidised credit schemes, the introduction of open market operation, bank consolidations and mergers, etc. However, the financial sector is still incapacitated in financing enormous capital investments that can produce jobs and income growth. The combination of these indicators as determinants of economic prosperity for Nigeria is empirically scant; hence, this study extends existing knowledge on this front.

Furthermore, the synergic impact of these measures on long-term economic prosperity indicated by GDP per capita is evaluated through the dynamic autoregressive distributed lag (DYNARDL) method from 1970 to 2020. By adopting the DYNARDL technique, this study was able to simulate the future path of economic prosperity, *ceteris paribus*, inflation and exchange rate shocks persist in the Nigerian economy. Also, the model's explanatory power is robustly assessed using the Kernel-based ordinary least squares (KRLS) approach. Empirically, these methods are predominantly growing in the energy, environment, and health-related literature and somewhat rare in macroeconomic-related studies. Hence, their adoption for this study represents a value-addition to the literature. The remainder of the study is of the following order. Section two is the literature review, section three is the data and research methodology, while sections four and five contain results, discussions, and the study conclusions.

2. Literature Review

2.1 Theoretical review

The theoretical leaning of this study is the immiserising growth (IG) theorem. It is a long-term phenomenon whereby the benefits of a country's social welfare due to its economic growth are eroded by the loss in such welfare resulting from a negative change in the country's terms of trade. There are two propositions to the IG theorem, which are considered herein.

First is the proposition by Bhagwati (1958), who revealed how IG could happen in a country exporting a commodity good with highly inelastic price or income elasticities of demand, or both. The higher quantity of exports would result in a decline in the foreign price of its export commodity. In Bhagwati's argument, if the conventional exports (commodity A) of a rapidly growing developing country are confronted with world demand curves known to be highly price and income inelastic, then the relative price of commodity A is expected to decline. In a scenario where the price fall is significantly massive, welfare will also decline. Consequently, a paradoxical effect of economic growth resulting in falling national welfare exists. In most instances, such IG prevails in a developing nation whose exports are predominantly a single primary commodity. Bhagwati et al. (2004) further investigated some associated scenarios. An example is the outcome of outsourcing which produces a negative change in terms of trade as a result of its induced enlargement of the output of the exported commodity. Furthermore, if a non-neutral change in the production frontier happens, the course of IG can either be retarded or quickened (Pryor, 2007).

A second proposition of the IG theorem was given by Samuelson (2004), where a decline in social welfare could also exist in a home country, given its trade partner align to a specific growth strategy of locally producing more of the commodity that the home country exports. In other words, the partnership has a biased form of economic growth. In particular circumstances, this would yield a rise in the world output of the commodity and, in turn, negatively change the terms of trade against the home country. The Samuelson proposition specifically observed that when the trade partner adopts an import substitution form of economic growth, it elevates its production frontier, particularly along the course of the imported commodity. Therefore, in the subsequent period, its output of imported goods will relatively increase while it imports less. In a traditional demand condition, the world's terms of trade will change against this commodity since more of it is produced (Pryor, 2007).

From the home country's perspective, the terms of trade for its exports will be inverse, and where its economic growth is relatively sluggish, this price change may lead to a considerable loss of social welfare beyond what is gained through economic growth. Unlike Bhagwati's proposition, where the home country's action is responsible for a decline in its social welfare, this type of IG appears to be more prevalent and less paradoxical. For instance, Samuelson noted that such a phenomenon is specifically likely for an industrialised country when its economically developing trade partner is experiencing rapid economic growth and is attempting to industrialise by producing commodities it had been importing. Hence, economic growth in the developing nation creates IG in the industrialised country. Social welfare could also decline in the industrialised country, especially if the developing country is large while the industrialised country is small. Suppose the developing nation should undergo an economic depression. In that case, its commodity imports from the industrialised country may decline substantially, resulting in a fall in the relative price of commodity A. Also, the developing nation could mount trade barriers that could enormously impact adversely on the terms of trade of the industrialised country.

2.2 Empirical review

Zubair and Aladejare (2017) adopted the ordinary least squares (OLS) technique and concluded that FDI inflows and exports are determinants of Nigeria's short- and long-term GDP growth. Kollie (2018) demonstrated with the ARDL approach that trade openness, FDI inflows, exchange rate, and political instability are critical determinants of GDP growth for Liberia. Another study by Barguelli et al. (2018) adopted the difference and system generalised method of moments (GMM) technique. It showed that real and nominal exchange rate volatility affects GDP in 45 developing and emerging economies. Bekere and Bersisa (2018) found through the dynamic GMM that FDI is crucial for GDP growth in 14 East African countries. In the study by Tung (2018), the cointegration and error correction model (ECM) was applied to deduce a long-run effect of fiscal deficit on GDP growth for Vietnam. Pegkas (2018) conducted a study for Greece by employing the ARDL methodology. The study inferred that private investment, government consumption, and trade openness exacted a positive effect on GDP. However, public debt and population growth adversely impacted GDP.

Furthermore, the significance of remittances and FDI in GDP per capita growth for seven Central and Eastern European countries was confirmed through the panel OLS procedure by Comes et al. (2018). Park et al. (2019) were able to show using the system generalised method of moments (GMM) that initial income level, population growth, human capital, and fixed capital investment determined the standard of living (measured by GDP per capita growth) in 60 selected countries. By employing an extreme bounds analysis, Hosseinpour et al. (2019) affirmed for 40 developing countries that investment and trade indicators are significant GDP determinants. Ketenci and Aydogan (2019) applied the Kejriwal and Perron structural break method and suggested that trade openness and natural gas consumption affect Turkey's GDP. Chirwa and Odhiambo (2019) employed the ARDL technique and showed that inflation, government consumption, trade openness, and real exchange rate impacted GDP per capita for Zambia. Wu et al. (2020) used the seemingly unrelated regression (SUR) procedure to indicate that FDI and government expenditure significantly impacted China's GDP and GDP per capita.

Aladejare (2020) applied the pool mean group (PMG) method and submitted that long-run GDP per capita growth in the ECOWAS region is determined by the gross fixed capital formation and exchange rate. While in the COMESA region, exchange rate and degree of openness are determinants of long-run GDP per capita growth. Ho and lyke (2020) demonstrated with the aid of the ARDL technique. They submitted that in the long-term, human capital and foreign aid are GDP-enhancing, while labour, debt servicing, and financial development are GDP-reducing for Ghana. A more comprehensive study for 21 African countries by Oyebowale and Algarhi (2020) revealed through the PMG technique that growth in exports, government outlay, and gross capital formation significantly improves GDP. Similarly, Ali and Sardar (2020) showed for seven South Asian economies through the PMG approach that unemployment, access to electricity, financial inclusion, FDI, inflation, and public debt significantly determine GDP. Yakubu et al. (2020) used the dynamic and fully modified (OLS) and submitted that financial liberalisation, government expenditure, and political instability are critical determinants of real GDP per capita for Kenya. Ehigiamusoe and Lean (2020) employed the mean group (MG) and PMG methods for West African countries and indicated that fiscal deficit and public debt impacted GDP.

Zeng and Zhou (2021) demonstrated with panel GMM that FDI substantially impacted China's provinces' GDP per capita. Thaddeus et al. (2021) applied the ARDL method. They concluded that government spending, exchange rate, inflation, FDI, trade openness, human capital development, gross capital formation,

money supply, and foreign aid are determinants of GDP growth in Cameroon. Wen et al. (2021), in a panel study for 120 countries, applied the system GMM and found that financial development exerts an adverse effect on GDP growth. Ustarz and Fanta (2021) used the GMM and SUR approaches to conclude that financial development positively affects the service and agricultural sectors' contributions to GDP for sub-Saharan Africa (SSA) countries. The ARDL method was applied by Verma et al. (2021) for a study on Bangladesh. Empirical findings from the study revealed that FDI, public spending, foreign aid, and trade openness positively impacted GDP growth, while public debt has an adverse effect. Rehman et al. (2021) studied 23 emerging economies using the GMM approach and found that trade openness is a crucial determinant of GDP.

Gurdal et al. (2021) considered the time and frequency domain techniques for G7 countries and concluded that tax receipts and public spending impacted GDP. The vector error correction model (VECM) was applied by Zuhroh (2021). Findings from the study revealed that inflation, exchange rate and money supply impacted Indonesia's GDP. Waheed and David (2021) showed using the ARDL procedure that inflation and exchange rates, capital, and tax receipts determine GDP growth for Pakistan. By applying a multimodal panel procedure for 34 African countries, Batrancea et al. (2021) showed that exports, imports, gross domestic savings, and gross capital formation are crucial determinants of GDP. Another study by Batrancea et al. (2022) applied a descriptive statistical analysis and observed that GDP growth in Bolivia, Estonia, Poland, Czech Republic, Malaysia, and Thailand is a function of bank capital to asset ratio. Abate (2022) conducted a panel study for 44 developing countries using the system GMM method and concluded that foreign aid, inflation, investment, and government expenditure significantly determined real GDP/capita. Chowdhury et al. (2022) observed through pooled OLS that remittances played a primary role in the GDP per capita growth of low-income Asian frontier economies.

From the above review, different studies have tried to identify the combinations of macroeconomic indicators crucial for long-term economic prosperity in various developing and emerging countries. Inflation and exchange rates, deficit financing, foreign investment, and financial development have featured as dominant economic prosperity determinants. Nevertheless, the combination of these variables is scant in extant studies related to Nigeria. Prominently also, the ARDL methodology has been extensively applied (either for country or panel analysis). However, the novel DYNARDL procedure is rarely available in macroeconomic literature. These gaps constitute the core value addition of this study to the literature.

3. Data And Methodology

3.1 Data

This study applied data from 1970 to 2020 to evaluate Nigeria's cogent macroeconomic determinants of economic prosperity. Economic prosperity, as prior noted, is often measured either with the GDP growth rate or GDP per capita. Although the GDP gives an aggregate perspective of an economy's wealth, the GDP per capita provides a more efficient individual account for the total wealth. Hence, the real GDP per capita is adopted for this study. Theoretically, it not only represents each individual's share in an economy but is also adjusted for inflationary effects, making it a better measure of economic prosperity. Furthermore, the real GDP per capita is of much significance to this study given that its increase in an economy is strongly determined by improvement in factor inputs' productivity (intensive economic growth).

This study's indicators considered critical for improvement in economic prosperity are inflation and exchange rates, deficit financing, foreign investment, and financial development. A stable inflationary path and predictable exchange rate are important determinants for enhanced economic wealth. While inflation can erode the value of money, the exchange rate can restrict individuals' access to essential foreign goods. Thus, both indicators can potentially widen the income inequality gap in a country. Similarly, Nigeria, as a developing country, has consistently engaged in deficit financing since 1970 to fund essential economic infrastructure in sectors such as healthcare, education, housing, transportation, energy, etc. Over time, Nigeria's deficit financing has witnessed tremendous growth, but with a meagre impact on the pre-listed sectors. Foreign investment and a developed financial sector complete the critical factors considered. An increase in both indicators can raise the output level, increase employment, and ensure a favourable trade balance for a developing nation. Proper management and synergy of these measures can accelerate a country's economic wealth. The unit of measure and source for each indicator is captured in Table 2.

Table 2
Variable description

Variable	Measurement	Sources	Symbol
Economic prosperity	GDP per capita (constant domestic currency unit)	WDI (2022)	<i>yp</i>
Inflation	Consumer price index	WDI (2022)	<i>cpi</i>
Exchange rate	Official exchange rate per US\$	WDI (2022)	<i>xr</i>
Deficit financing	Deficit financing (% of GDP)	CBN annual statistical bulletin (2021)	<i>dfy</i>
Foreign investment	FDI inflows (% of GDP)	WDI (2022)	<i>fiy</i>
Financial development	Domestic credit to the private sector by banks (% of GDP)	WDI (2022)	<i>dcy</i>
Source: Author's computation.			

3.2 Methodology

One essential benefit of the DYNARDL model is its ability to visualise the impact of a counterfactual change in one independent variable at a specific time, ceterisparibus, through a stochastic simulation approach. Dynamic simulation techniques are increasingly being deployed as a straightforward path to depict

the substantive outcomes of time-series models, whose parameters usually exhibit non-intuitive or "hidden" meanings (Breunig and Busemeyer, 2012; Philips et al., 2016).

Before applying the DYNARDL method, the order of integration of the variables must strictly have the response variable as the $I(1)$ series. At the same time, the regressors can be a combination of level (that is, $I(0)$) and first difference (that is, $I(1)$) series, but not $I(2)$ (Jordan and Phillips, 2018). It is thus suggested that cointegration can only be attained when the response variable is stationary at $I(1)$ (Sarkodie and Owusu, 2020). In contrast, the bounds testing technique with a stationary response variable at $I(0)$ can be tested by applying the standard but modified ARDL bounds test with surface regression (Kripfganz and Schneider, 2020). Also, the information criterion required for choosing the best-fitted lagged-difference structure must be determined to correct normality, autocorrelation and heteroscedasticity issues and ensure no structural breaks in the model (Philips, 2018; Jordan and Phillips, 2018).

The DYNARDL procedure requires estimating an ARDL model, as shown in Eq. 1.

$$\Delta lyp_t = \alpha_0 + \alpha_1 lyp_{t-1} + \alpha_2 lcpi_{t-1} + \alpha_3 lxr_{t-1} + \alpha_4 dfy_{t-1} + \alpha_5 fiy_{t-1} + \alpha_6 dcy_{t-1} + \sum_{j=1}^m \pi_j \Delta lyp_{t-j} + \sum_{j=0}^m \sigma_j \Delta lcpi_{t-j} + \sum_{j=0}^m \tau_j \Delta lxr_{t-j} + \sum_{j=0}^m \delta_j \Delta dfy_{t-j} + \sum_{j=0}^m \theta_j \Delta fiy_{t-j} + \sum_{j=0}^m \eta_j \Delta dcy_{t-j} + \epsilon_t$$

$Note: i = 1, 2, \dots, N; t = 1, 2, \dots, T.$

where l is the logarithm operator, "et" denotes the error correction term and the parameter θ_i represents the speed of adjustment from short-term distortion to the long-term equilibrium path.

After conducting the necessary tests on the residuals of the ARDL model to ensure its conformity to the absence of serial correlation, heteroscedasticity, and no structural breaks, the DYNARDL can be estimated. Nigeria's average annual growth rate of inflation and exchange rates from 1970 to 2020 is approximately 18% (WDI, 2022); consequently, a ~ 18% shock to inflation and exchange rate in the DYNARDL estimation. They are used for counterfactual shocks over 20 years from 2020 to 2040. Effects of shocks to both variables are known to often boomerang into every sector of the economy, which can impact income growth. Thus, the study's DYNARDL model simulation is succinctly specified in Eq. 2.

$$\Delta lyp_t = \beta_0 + \beta_1 lyp_{t-1} + \beta_2 lcpi_{t-1} + \beta_3 \Delta lcpi_{t-1} + \beta_4 lxr_{t-1} + \beta_5 \Delta dfy_{t-1} + \beta_6 \Delta dfy_{t-1} + \beta_7 fiy_{t-1} + \beta_8 \Delta fiy_{t-1} + \beta_9 dcy_{t-1} + \beta_{10} \Delta dcy_{t-1} + \epsilon_t \quad (Equ.2)$$

4. Results And Discussions

4.1 Descriptive statistic test results

Contained in Table 2 is the descriptive statistic of the variables. Nigeria's mean GDP per capita is reported as 275,185 (US\$1,924) which exceeds the \$1,676, \$1,063, and \$1,032 average for west, middle, and east African countries, respectively (IMF, 2021). However, it falls short of the \$2,944 and \$5,426 for north and south African countries, respectively, and \$4,650 and \$6,625 for south-east Asian and South American countries, respectively (IMF, 2021). The mean consumer price index is about 51.93 points, while the exchange rate averaged 79.18 per \$1 for the study period. Deficit financing per GDP averaged 2.4%, which falls within the deficit financing cap of 5% and 3% as contained in the CBN and fiscal responsibility Acts of 2007. Nevertheless, the peak deficit financing-to-GDP ratio is about 8.6%. FDI per GDP has a mean of 1.4%, which is lower than the 2.7% average for most African countries (WDI, 2022)—suggesting that investors may not find the country attractive despite its vast resource wealth. Banks' domestic credit to the private sector was 8.8% of the GDP, which can be considered grossly inadequate to drive employment and output growth for the country.

Table 2
Descriptive summary statistics.

Variables	Mean	Max.	Min.	Std. Dev.
yp	275185	385349	199039	61269
cpi	51.931	267.512	0.099	74.118
xr	79.183	358.8	0.547	98.215
dfy	2.412	8.618	-9.544	3.054
fiy	1.424	4.860	-0.372	1.135
dcy	8.780	19.604	3.862	3.433
Obs.	51	51	51	51
Source: Author's computation.				

4.2 Unit root test

The stationarity of the series was examined using the Philips-Perron (PP) and augmented Dickey-Fuller (ADF) unit root tests. By confirming the stationarity status of the variables, effects from potential spurious regression can be eliminated. Table 3 reveals that all the variables are I(1) series except for deficit financing, which was stationary at level. Hence, the null hypothesis is firmly rejected at the first difference for the regressand (lyp) and regressors except for deficit financing.

Table 3
Unit root tests

Variable	ADF (level)	ADF $(\frac{1}{D}\frac{\mathbf{s}}{\mathbf{t}}\frac{\mathbf{D}}{\mathbf{j}}\frac{\mathbf{D}}{\mathbf{f}})$	PP (Level)	PP $(\frac{1}{D}\frac{\mathbf{s}}{\mathbf{t}}\frac{\mathbf{D}}{\mathbf{j}}\frac{\mathbf{D}}{\mathbf{f}})$
lyp	-0.966	-3.189**	-1.092	-5.390***
lcpi	-1.234	-3.240**	-1.125	-3.055**
lrx	-0.248	-5.679***	-0.340	-5.670***
dfy	-5.753***	-	-5.878***	-
fiy	-1.493	-11.755***	-2.451	-11.843***
dcy	-2.345	-5.988***	-2.242	-11.322***
{H}_{0}	Series has a unit root			
Note: ** and *** denote statistical significance at 5% and 1% levels, respectively.				

Source

Author's computation.

4.3 Cointegration test

After fulfilling the strict first-difference stationary dependent variable criterion, the optimal lag for the proposed model was derived (as 2 lags) using the Schwarz and Akaike information criteria. Furthermore, the optimal lag was used to determine the presence of cointegration through the Pesaran, Shin, and Smith (PSS) bounds approach with the novel Kripfganz and Schneider (KS) critical values and approximate probability values.

Evidence in Table 4 confirms the presence of cointegration between the study series since the F-statistic (6.124) and t-statistic (-4.580) are beyond the upper bounds of critical values (4.391, -4.181) at the 5% significance level. Further validation was achieved using the KS approximate probability values (p-value < 0.05). Hence, the PSS and KS critical values with approximate p-values invalidated the null hypothesis of no long-run relationship.

Table 4
Bounds test for cointegration

	1%		5%		10%		p-value	
K = 5	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	6.124	3.973	5.941	2.840	4.391	2.360	3.730	0.001***
T	-4.580	-3.544	-5.042	-2.815	-4.181	-2.454	-3.752	0.001***
Note: I(0) and I(1) are the lower and upper band critical values at 1%, 5% and 10% significance levels of Pesaran et al. (2001) bounds test; the p-value is Kripfganz and Schneider's (2020) critical values and approximate p-values; ** and *** denote statistical significance at 5% and 1% levels, respectively.								

Source

Author's computation.

4.4 Mainstream ARDL result

The outcome in Table 5 indicates that inflation rate, deficit financing, and foreign investment adversely impacted economic prosperity in the long term. In contrast, exchange rate and financial development are positive and significant long-term determinants of economic prosperity. In the short-term, inflation rate and deficit financing in their current and lagged form exerted negative and positive effects on economic prosperity. However, exchange rate and financial development in their current and lagged form exhibited significant positive and inverse impacts on economic prosperity. Both current and lagged foreign investment showed adverse effects on economic prosperity.

The speed of adjustment term (et) parameter indicates an annual correction of 24% distortion before the long-term equilibrium path can be restored.

Table 5
Mainstream ARDL estimates

Model	Variable	Coefficient	Std. error	Prob. value
	{et}_{t-1}	-0.243	0.053	0.000***
Long-term	{lcpil}_{t-1}	-0.294	0.081	0.001***
	{lxl}_{t-1}	0.348	0.088	0.000***
	{dfy}_{t-1}	-0.045	0.014	0.002***
	{fiy}_{t-1}	-0.146	0.033	0.000***
	{dcy}_{t-1}	0.056	0.012	0.000***
Short-term	{\varDelta lcpil}_{t}	-0.165	0.059	0.008***
	{\varDelta lcpil}_{t-1}	0.302	0.075	0.000***
	{\varDelta lxl}_{t}	0.025	0.025	0.330
	{\varDelta lxl}_{t-1}	-0.023	0.026	0.375
	{\varDelta dfy}_{t}	-0.009	0.002	0.000***
	{\varDelta dfy}_{t-1}	0.005	0.002	0.024**
	{\varDelta fiy}_{t}	-0.041	0.011	0.001***
	{\varDelta fiy}_{t-1}	-0.005	0.009	0.575
	{\varDelta dcy}_{t}	0.013	0.003	0.001***
	{\varDelta dcy}_{t-1}	-0.005	0.003	0.111
	Constant	2.884	0.647	0.000***
	ARDL(2,2,2,2,2,2) Obs.	49	{R}^{2}	0.74
	Root MSE	0.0345	{Adj.R}^{2}	0.60
	Note: ** and *** denote statistical significance at 5% and 1% levels, respectively.			

Source

Author's computation.

4.5 Residual tests

As a pre-condition for estimating the DYNARDL simulations, several residual tests to eliminate serial correlation, heteroscedasticity, violation of normality, and structural breaks were performed. Table 6 captures the serial-autocorrelation test conducted using the Breusch-Godfrey Lagrangian multiplier (LM) technique. The null hypothesis of no serial correlation was upheld (since p-value > 0.05), thus, indicating that the residuals of the estimated mainstream ARDL model are independent of autocorrelation.

Table 6
Breusch-Godfrey LM test for autocorrelation

Lags(p)	F	Df	Prob.>F
1	0.011	1, 30	0.918
2	0.006	2, 29	0.994
3	0.031	3, 28	0.992
4	0.247	4, 27	0.909
Source: Author's computation.			

Output in Table 7 reveals the test for heteroscedasticity in the residuals by employing Cameron and Trivedi's decomposition of the IM-test. It can be deduced from the outcome that the null hypothesis of homoscedasticity is validated at a 5% significance level, thereby showing that the residuals are homoscedastic.

Table 7
Cameron and Trivedi's decomposition of IM-test

Source	Chi ²	Df	Prob. Value
Heteroskedasticity	49.00	48	0.433
Skewness	9.93	17	0.906
Kurtosis	1.80	1	0.179
Total	60.74	66	0.660
Source: Author's computation.			

Next, the normality test to ascertain residuals' independence using the Skewness/Kurtosis approach was conducted, and the result is displayed in Table 8. From the outcome, a normal distribution null hypothesis is upheld since p-values exceed the 5% significance level.

Table 8
Normality and parameter stability test

Normality and parameter stability test					
Skewness/Kurtosis tests for normality					
Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	Joint adj chi²(2)	Prob > chi²
Residuals	49	0.293	0.443	1.78	0.411
Cumulative sum test for parameter stability					
Statistic	Test statistic	1% critical value		5% critical value	10% critical value
OLS	0.398	1.628		1.358	1.224
H ₀ : No structural break				Obs.: 49	
Source: Author's computation.					

Further normality validation was conducted through plots of both standardised normal probability (Fig. 1a) and quantiles of residuals against quantiles of normal distribution (Fig. 1b). The output plots captured in Fig. 1 affirmed that the model residuals are normally distributed.

Lastly, the check for possible structural breaks using the cumulative sum test for parameter stability was performed. The estimated output in Table 8 shows the test statistic is lower than the critical values, thus, implying the absence of a structural break in the model's parameters. Further validation was done through a cumulative sum plot captured in Fig. 2. Evidence from the plot showed the estimated test statistic as lying within the 95% confidence band, thereby validating the stability of the estimated parameters over time.

4.6 Dynamic ARDL simulations

The DYNARDL simulations in this study are based on an $\sim 18\%$ rise in inflation and exchange rates for over 20 years (from 2020 to 2040). Table 9 contains the empirical short and long-run estimates of the DYNARDL model. It is noteworthy that there are similarities in the short and long-run outputs of the mainstream and DYNARDL estimates.

The inflation rate is revealed to have significantly and adversely affected economic prosperity in the short and long term. This result aligns with the studies of Chirwa and Odhiambo (2019) and Abate (2022) for developing economies. Keeping a close watch on inflation is crucial for fixed-income investors because the inflation rate will discount future income flows to ascertain the present value of money in future terms. Stated differently, a general rise in the inflation rate over time will shrink consumers' purchasing power, given that income remains fixed. Hence, progressively few consumptions will be afforded. If the fall in income value persists, economic prosperity will decline.

In contrast, the exchange rate exhibited a positive long-term impact on economic prosperity. Thus, affirming the earlier submission by Aladejare (2020). As the nominal exchange rate rises, the country's exports become cheaper in the international market. Although Nigeria operated a fixed exchange rate regime till mid-1986, the perceptions about the country's export as being too expensive have seen the domestic currency (naira) undergo several liberalisation policies to date (Aladejare, 2022b). Subjecting the naira to the operations of market forces is expected to aid export demands, improve foreign earnings, and enhance the country's long-term productivity.

Table 9 further shows that deficit financing exacted a significant negative effect on economic prosperity in the short and long term. Wu et al. (2020) and Yakubu et al. (2020) are two studies to have reported similar findings in the literature. This outcome implies that the supplementary funds derived through deficit financing to augment the use of revenue for infrastructural development have been income-diminishing. Extant studies such as Ebi and Aladejare (2022) and Aladejare (2022b) have observed that annually, an enormous share of Nigeria's deficit financing funds are often expended on import demands and subsidy payments. Such measures cannot promote a country's income growth and overall economic wealth. Therefore, deficit financing can only propel prosperity in a country when channelled into capital infrastructural projects, which can later translate to employment and productivity in an economy.

Foreign investment, another essential determinant was indicated not to have contributed to economic prosperity both in the short and long term. This outcome negates empirical studies (such as Comes et al., 2018; Park et al., 2019; Wu et al., 2020; Abate, 2022) that have reported significant impacts of foreign investment on GDP per capita. A plausible explanation for this outcome could be that most foreign investments in the country are in the form of portfolios, not real investments. On the other hand, it takes a long term for the level of financial development to aid economic prosperity. This outcome supports empirical submission by Ali and Sardar (2020) and Yakubu et al. (2020). Sustained credit facilities to the private sector reduce unemployment of factor inputs. It also enhances output productivity and income growth, which are prerequisites for long-term economic prosperity.

The speed of adjustment term parameter indicates an annual correction of 12% distortion before the long-term equilibrium path can be restored. Hence, implying that about 99 months may be required for the long-run equilibrium state to be restored in the event of short-term distortion in the determinants.

Table 9
Estimates of dynamic simulated ARDL model

Model	Variable	Coefficient	Std. error	Prob. Value
Long-term	{ecm}_{t-1}	-0.116	0.046	0.016**
	{lcpj}_{t-1}	-0.055	0.013	0.000***
	{lxi}_{t-1}	0.062	0.014	0.000***
	{dfy}_{t-1}	-0.005	0.003	0.075*
	{fiy}_{t-1}	-0.002	0.009	0.797
Short-term	{dcy}_{t-1}	0.006	0.003	0.075*
	{\varDelta lcpj}_{t}	-0.150	0.060	0.016**
	{\varDelta dfy}_{t}	-0.007	0.002	0.003***
	{\varDelta fiy}_{t}	-0.010	0.009	0.279
	{\varDelta dcy}_{t}	0.005	0.003	0.128
	Constant	1.389	0.567	0.019**
	Prob.>F	0.000***	{R}^2	0.58
	Root MSE	0.040	{Adj.R}^2	0.48
Note: *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.				

Source

Author's computation.

Furthermore, the parameter plots of the DYNARDL simulations are depicted in Figs. 3 and 4. To capture the marginal returns of inflation and exchange rates on sustained economic prosperity, the counterfactual shocks via the DYNARDL simulations are evaluated. The annual mean growth rate of inflation and exchange rates (~ 18%) was incorporated in the estimation and simulated for twenty years (2020–2040). Figure 3 reveals that the predicted dynamic shock (-18%) to the inflation rate may accelerate economic wealth at an increasing rate in the first eight-year period and later accelerate at a decreasing rate for the remaining twelve-year period. Furthermore, economic prosperity is predicted to change for the first eight-year period from 2.5–6%, and in the remaining twelve-year period from 6.5–8%.

However, the predicted dynamic shock (-18%) to the exchange rate suggests no effect in the first period, but a decelerating response from economic prosperity is predicted afterwards. The exchange rate's predicted dynamic shock may decelerate economic wealth at an increasing rate for five years after the initial period and later decelerate at a decreasing rate for the remaining twelve-year period (Fig. 4). From the plot, economic prosperity is predicted to change from - 1.5% to -6% (five years after the initial period) and in the remaining twelve-year period from about - 6.5% to -9%. Consequently, the negative effect of the exchange rate will slightly overwhelm inflation's positive impact on economic prosperity.

4.7 kernel-based regularised least squares (KRLS) estimate

A machine learning algorithm was applied to evaluate and determine the causal-effect nexus among the variables to enhance further the reasoning presented in this study. The KRLS is known to implement pointwise derivatives in ascertaining causal-effect relationships among variables. Table 10 captures the aggregate predictive power of the model as 0.95, implying that

the explanatory power of the regressors accounted for 95% of the variation in economic prosperity. Table 10 shows that the average pairwise marginal effects of inflation and exchange rates, deficit financing, foreign investment, and financial development are 0.012%, -0.008%, -0.010%, 0.039%, and 0.026%, respectively. The variables' probability values are significant with exceptions to inflation and exchange rates, which shows evidence of causal-effect nexus in both variables.

Table 10
KRLS pointwise derivatives

lyp	Avg.	Std. error	t-stat.	p > t	P-25	P-50	P-75
lcpi	0.012	0.009	1.329	0.190	-0.098	0.023	0.119
lxi	-0.008	0.009	-0.834	0.408	-0.053	0.004	0.034
dfy	-0.010	0.004	-2.342	0.024**	-0.035	-0.007	0.014
fiy	0.039	0.012	3.157	0.003***	-0.012	0.016	0.104
dcy	0.026	0.005	5.776	0.000***	0.008	0.029	0.042
Diagnostics							
Lambda	0.062	Sigma	5	R ²	0.95	Obs.	51
Tolerance	0.051	Eff. Df	25.21	Looloss	1.863		
Note: *, **, and *** denote statistical significance at 10%, 5%, and 1% levels.							

Source

Author's computation.

In Fig. 5 are plots of the pointwise derivative of the varying marginal effects of the shock variables on economic prosperity. Although both plots expressed similar behaviour, their duration of impact varies. For inflation, the marginal effect is negatively sluggish at low levels of economic wealth, moving towards zero at medium level, and positively faster at higher levels of prosperity (Fig. 5a). Therefore, indicating that inflation exhibits increasing marginal returns on economic prosperity. Thus, lower inflationary episodes decelerate economic prosperity until a threshold point is attained, beyond which higher inflationary episodes reverse the course. Inflation's marginal benefit occurs in several ways, such as producers benefitting from higher prices. Also, investors and firms benefit from additional incentives for investing in productive ventures, increasing returns. Hence, so long as producers access the appropriate investment, they are empowered to produce more goods and services, which will spur an increase in employment of factor inputs and income growth.

On the other hand, the exchange rate's marginal effect is negatively faster at low levels of economic prosperity. Still, it stays harmful beyond the mid-level before sluggishly turning positive at later levels of economic prosperity (Fig. 5b). Consequently, the exchange rate exerts more decreasing than an increasing marginal effect on economic prosperity. Thus, lower exchange rate episodes decelerate economic prosperity for a more extended period until a threshold is attained, beyond which higher exchange rate episodes reverse the course. Due to the developing feature of the economy, the exchange rate may be devalued to make exports more attractive. However, the inadequacy to produce manufactured exports due to technological obsolescence and shortage of skilled human resources will aggravate the price of imports and imported production inputs. Consequently, a low exchange rate will not only hamper income growth for extended periods but will further overwhelm the positive impact on exports.

5. Study Conclusions

This study investigated the effects of inflation and exchange rates, deficit financing, foreign investment, and financial development on economic prosperity gauged by GDP per capita for Nigeria from 1970 to 2020. Empirical inferences were derived by applying the autoregressive distributed lag (ARDL), dynamic ARDL (DYNARDL), and the Kernel-based least squares (KRLS) models. It was observed that inflation rate and deficit financing adversely impacted economic wealth in the short and long term. At the same time, the exchange rate and financial development only benefited economic prosperity in the long term. In contrast, foreign investment was reported to be prosperity-decelerating in the long term. Applying the DYNARDL and KRLS techniques enabled the response capturing of economic prosperity to future counterfactual shocks to the inflation and exchange rate variables. While inflationary shocks may have long-term beneficial effects on economic prosperity, shocks to the exchange rate will slightly erode these benefits. Hence, the following policy recommendations are proposed.

Fiscal and monetary policy targets should align for effective control of inflation and exchange rates in the country. For instance, it is unattractive for the monetary authority to be grappling with controlling the inflationary trajectory through a contractionary policy while the fiscal authority is simultaneously fuelling inflationary pressures by pursuing an expansionary policy. Hence, inflation targeting can only be effective when there is a monetary and fiscal synergy of efforts. Furthermore, investment in sophisticated exports should be pursued to complement dwindling earnings from the predominant commodity exports so that the adverse effect of exchange rate shocks on economic prosperity can be reduced. In other words, diversifying export away from the near monopoly of crude oil will help stabilise the naira and grow foreign earnings for the country. If this condition is not fulfilled, subjecting the value of naira to the forces of demand and supply will be detrimental rather than a blessing to the economy.

Traditionally, deficit financing should spur capital formation in a country and not recurrent outlays. Thus, the application of deficit financing to unprofitable ventures should be discouraged. The intuition is that so long as deficit financing for recurrent spending overwhelms capital outlay, the sustainability of economic prosperity will be eroded. The burden to repay borrowed funds, with interest, in the form of higher taxes will be borne by the future generations and

consequently, long-term economic and income growth will be retarded. Therefore, a policy commitment to ensure deficit financing is strictly deployed for investment in capital formation should be pursued to reverse its adverse effect on long-term income growth.

Foreign investment in the real sector of the economy should be encouraged by providing a thriving investment environment. Its insignificance for income growth may not be unconnected with the characterising uncertainty of the business sphere in the country. Therefore, having a coherent and stable policy direction geared towards attracting foreign investment inflows, especially in the real sector, is encouraged. Such measures will promote output, employment, and income levels in the economy. There is also a need further to encourage the evolution of the country's financial sector to meet foreign investors' significant capital financing demands. The financial sector's domestic and foreign confidence rating will soar by developing such capacity. Consequently, the size of the economy becomes more elastic due to the incentive for capital flight to diminish, thus, making available investable funds to grow and become cheaper.

Declarations

Compliance with Ethical Standards

Authors' contributions

The corresponding author conceived the idea, wrote the introduction, collected and analysed the data, interpreted the results, reviewed the required literature, edited the manuscript, wrote the methodology section, provided the relevant policy directions, and read and approved the final manuscript.

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Disclosure of potential conflict of interest

The author has no competing interests to declare relevant to this article's content.

Research involving human participants and or animals

This study article does not contain any study with human participants or animals performed by the author.

Data Availability Statement

The data that support the study's findings are available from the corresponding author upon reasonable request.

Consent to participate

Not applicable.

Consent to publish

Not applicable.

References

1. Abate, C. A. (2022). The relationship between aid and economic growth of developing countries: Does institutional quality and economic freedom matter? *Cogent Economics and Finance*, 10(1), 2062092.

2. Ahmed, R., Aizenman, J., & Jinjark, Y. (2019). Inflation and exchange rate targeting challenges under fiscal dominance. *NBER Working Paper Series*, 25996, 1–87.
3. Aladejare, S. A. (2020). Macroeconomic Vs. Resource determinants of economic growth in Africa: A COMESA and ECOWAS study. *International Economic Journal*, 34(1), 100–124.
4. Aladejare, S. A. (2022a). Are public spending determinants significant in per capita budget spending decisions in Nigeria? *International Journal of Finance and Economics*, 27(1), 192–206.
5. Aladejare, S. A. (2022b). Deficit financing components, inflation and capital formation in Nigeria: New evidence from a direct and indirect analysis. *Asian Journal of Economic Modelling*, 10(1), 27–42.
6. Ali, H., & Sardar, K. (2020). Macroeconomic and socioeconomic determinants of economic growth: An empirical examination of South Asian economies. *Pakistan Journal of Humanities and Social Sciences*, 8(2), 47–56.
7. Barguelli, A., Ben-Salha, O., & Zmami, M. (2018). Exchange rate volatility and economic growth. *Journal of Economic Integration*, 33(2), 1302–1336.
8. Batrancea, L., Rathnaswamy, M. M., & Batrancea, I. (2021). A panel data analysis of economic growth determinants in 34 African countries. *Journal of Risk and Financial Management*, 14(6), 260.
9. Batrancea, L., Rathnaswamy, M. M., & Batrancea, I. (2022). A panel data analysis on determinants of economic growth in seven non-BCBS countries. *Journal of the Knowledge Economy*, 13(2), 1651–1665.
10. Bekere, B., & Bersisa, M. (2018). Impact of foreign direct investment on economic growth in Eastern Africa. In: Heshmati, A. (eds) *Determinants of economic growth in Africa*. Palgrave Macmillan, Cham.
11. Bhagwati, J. (1958). Immiserising growth: A geometric note. *Review of Economic Studies*, 25 (3), 201–06.
12. Bhagwati, J., Panagariya, A., & Srinivasan, T. N. (2004). The muddles over outsourcing. *Journal of Economic Perspectives*, 18(4), 93–115.
13. Breunig, C., & Busemeyer, M. R. (2012). Fiscal austerity and the trade-off between public investment and social spending. *Journal of European Public Policy*, 19, 921–938.
14. Central Bank of Nigeria (2021). Annual statistical bulletin.
15. Chirwa, T. G., & Odhiambo, N. M. (2019). The nexus between key macroeconomic determinants and economic growth in Zambia: A dynamic multivariate Granger causality linkage. *Empirical Economics*, 57(1), 301–327.
16. Chowdhury, E. K., Dhar, B. K., & Gazi, M. I. (2022). Impact of remittance on economic progress: Evidence from low-income Asian frontier countries. *Journal of the Knowledge Economy*, 1–26. 234.
17. Comes, C., Bunduchi, E., Vasile, V., & Stefan, D. (2018). The impact of foreign direct investments and remittances on economic growth: A Case study in Central and Eastern Europe. *Sustainability*, 10(1), 238.
18. Ebi, B. O. & Aladejare, S. A. (2022). The magnitude of oil price transmission to deficit financing and capital formation. *Jurnal Ekonomi Malaysia*, 56(1), 123–133.
19. Ehigiamusoe, K. U., & Lean, H. H. (2020). The role of deficit and debt in financing growth in West Africa. *Journal of Policy Modelling*, 42(1), 216–234.
20. Gurdal, T., Aydin, M., & Inal, V. (2021). The relationship between tax revenue, government expenditure, and economic growth in G7 countries: new evidence from time and frequency domain approaches. *Economic Change and Restructuring*, 54(2), 305–337.
21. Ho and lyke (2020). The determinants of economic growth in Ghana: New empirical evidence. *Global Business Review*, 21(3), 626–644.
22. Hosseinpour, F., Zarra-Nezhad, M., Arman S. A., & Salahmanesh, A. (2019). Determinants of economic growth in developing countries: An extreme bounds analysis. *Journal of Economic Development*, 44(4), 43–67.
23. International Monetary Fund (2021). World economic outlook.
24. Jordan, S., & Philips, A. (2018). Cointegration testing and dynamic simulation of (autoregressive distributed lag models). *The Stata Journal*, 18(4), 902–923.
25. Ketenci, N., & Aydogan, E. T. (2019). Determinants of economic growth in Turkey in the presence of structural breaks. *Sosyoekonomi*, 27(42), 11–28.
26. Kollie, G. B. (2018). Determinants of economic growth and poverty minimisation in Liberia: An ARDL approach. *Journal of Economics and Sustainable Development*, 9(2), 22–31.
27. Kripfganz, S., & Schneider, D. C. (2020). Response surface regressions for critical value bounds and approximate p-values in equilibrium correction models 1. *Oxford Bulletin of Economics and Statistics*, 82(6) 1456–1481.
28. Osondu, A. N., & Adiele, D. F. (2021). Evaluating the impact of some macroeconomic determinants on economic growth in Nigeria using the autoregressive distributed lag (ARDL) model. *COOU Journal of Physical Sciences*, 4(1), 191–201.
29. Oyebowale, A. Y., & Algarhi, A. S. (2020). Macroeconomic determinants of economic growth in Africa. *International Review of Applied Economics*, 34(6), 839–957.
30. Park, J, Ryu, D., & Lee, K. (2019). What determines the economic size of a nation in the world: Determinants of a nation's share in world GDP vs per capita GDP. *Structural Change and Economic Dynamics*, 51, 203–214.
31. Pegkas, P. (2018). The effect of government debt and other determinants on economic growth: The Greek experience. *Economies*, 6(1), 10; <https://doi.org/10.3390/economies6010010>.
32. Petrakis, P. E. (2020). *Theoretical approaches to economic growth and development: An interdisciplinary perspective*. Palgrave Macmillan.
33. Philips, A. Q. (2018). Have your cake and eat it too? Cointegration and dynamic inference from autoregressive distributed lag models. *American Journal of Political Science*, 62(1), 230–244.

34. Philips, A. Q., Rutherford, A., & Whitten, G. D. (2016). Dynsimpie: A command to examine dynamic compositional dependent variables. *Stata Journal*, 16, 662–677.
35. Pryor, F. L. (2007). Immiserising growth as seen by Bhagwati, Samuelson, and others. *The Journal of Economic Education*, 38(2), 208–214.
36. Rehman, M. A., Shaheen, R., & Munir, F. (2021). Impact of trade openness on economic growth in emerging economies: A panel data analysis. *Pakistan Journal of Humanities and Social Sciences*, 9(2), 210–216.
37. Sarkodie, S. A., & Owusu, P. A. (2020). How to apply the novel dynamic ARDL simulations (dynardl) and Kernel-based regularised least squares (krls). *MethodsX* 7, 101160.
38. Thaddeus, K. J., Ngong, C. A., Nebong, N. M., Akume, A. D., Eleazar, J. U., & Onwumere, J. U. J. (2021). Selected macroeconomic determinants and economic growth in Cameroon (1970–2018) "dead or alive" an ARDL approach. *Journal of Business and Socio-economic Development*, <https://doi.org/10.1108/JBSED-05-2021-0061>
39. Tung, L. T. (2018). The effect of fiscal deficit on economic growth in an emerging economy: Evidence from Vietnam. *Journal of International Studies*, 11(3), 191–203.
40. Ustarz, Y., & Fanta, A. B. (2021). Financial development and economic growth in sub-Saharan Africa: A sectoral perspective. *Cogent Economics and Finance*, 9(1), 1934976.
41. Verma, R., Saini, V. P., & Arya, P. (2021). Impact of macroeconomic determinants on economic growth in Bangladesh: An ARDL approach. Available at SSRN 3993498.
42. Waheed, R., & David, F. (2021). Exploring the determinants of economic growth: Evidence from Pakistan. *Journal of Economics*, 2(2), 35–44.
43. Wen, J., Mahmood, H., Khalid, S., & Zakaria, M. (2021). The impact of financial development on economic indicators: A dynamic panel data analysis. *Economic Research-Ekonomska Istraživanja*, DOI: 10.1080/1331677X.2021.1985570.
44. World Bank (2022). World development indicator.
45. Wu, W., Yuan, L., Wang, X., Cao, X., & Zhou, S. (2020). Does FDI drive economic growth? Evidence from city data in China. *Emerging Markets Finance and Trade*, 56(11), 2594–2607.
46. Wu, W., Yuan, L., Wang, X., Cao, X., & Zhou, S. (2020). Does FDI drive economic growth? Evidence from city data in China. *Emerging Markets Finance and Trade*, 56(11), 2594–2607.
47. Yakubu, Z., Loganathan, N., Mursitama, T. N., Mardani, A., Khan, S. A., & Hassan, A. A. G. (2020). Financial liberalisation, political stability, and economic determinants of real economic growth in Kenya. *Energies*, 13(3), 3426.
48. Zubair, Z. A., & Aladejare, S. A. (2017). Economic growth stimulation through foreign direct investment: The Nigerian perspective. *Asian Journal of Multidisciplinary Studies*, 5(11), 1–8.
49. Zuhroh, I. (2021). The nexus of monetary policy and economic growth: Empirical study from Indonesia. *Journal of Innovation in Business and Economics*, 5(2), 61–70.

Figures

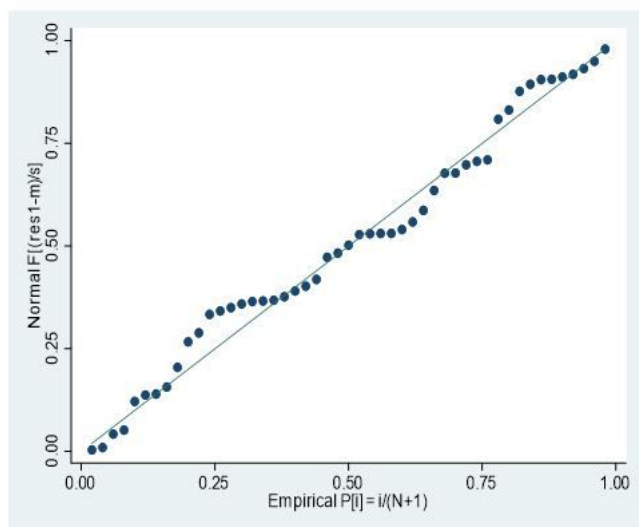
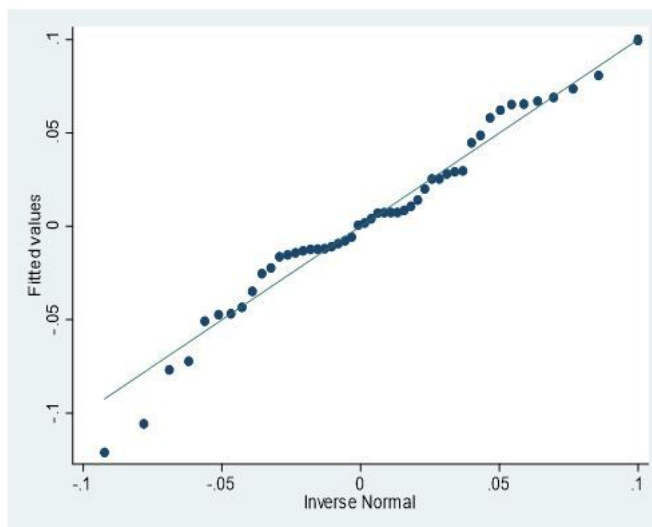


Figure 1a: Standardised normal probability plot.

Figure 1b: Quantiles of residuals against quantiles of normal distribution.

Figure 1: Normality test plot.
Source: Author's computation.

Figure 1

Normality test plot.

Source: Author's computation.

Figure 1a: Standardised normal probability plot. Figure 1b: Quantiles of residuals against quantiles of normal distribution.

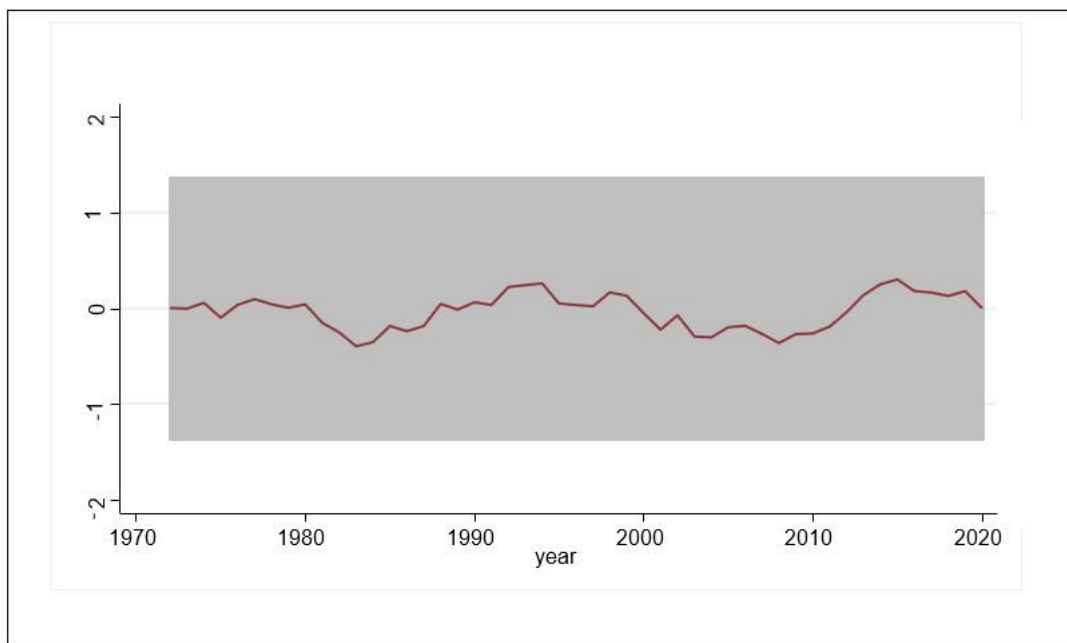


Figure 2

Cumulative sum test using OLS CUSUM plot for parameter stability.

Source: Author's computation.

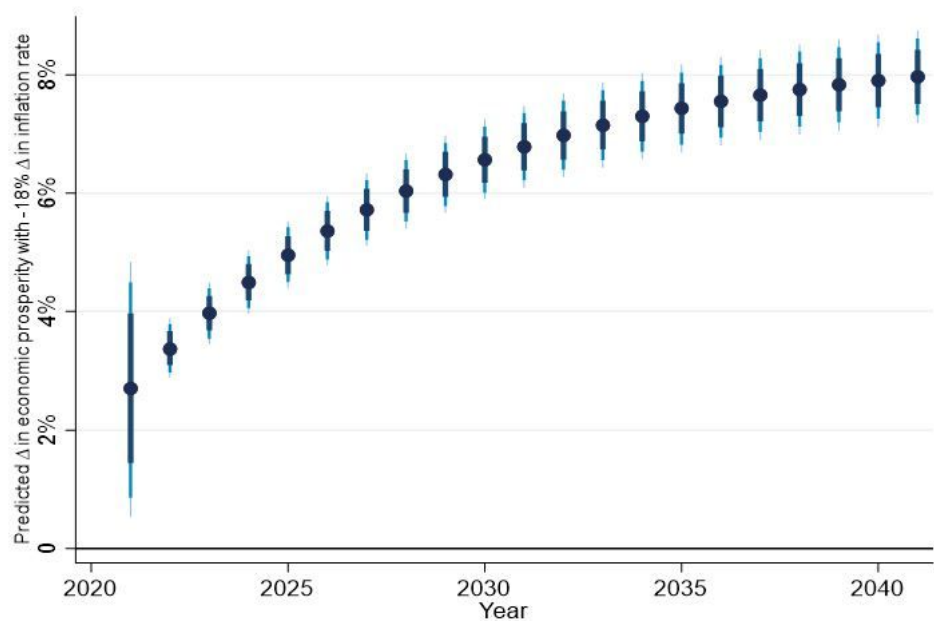


Figure 3

Simulated change in long-term economic prosperity given a shock in the inflation rate.

Source: Author's computation.

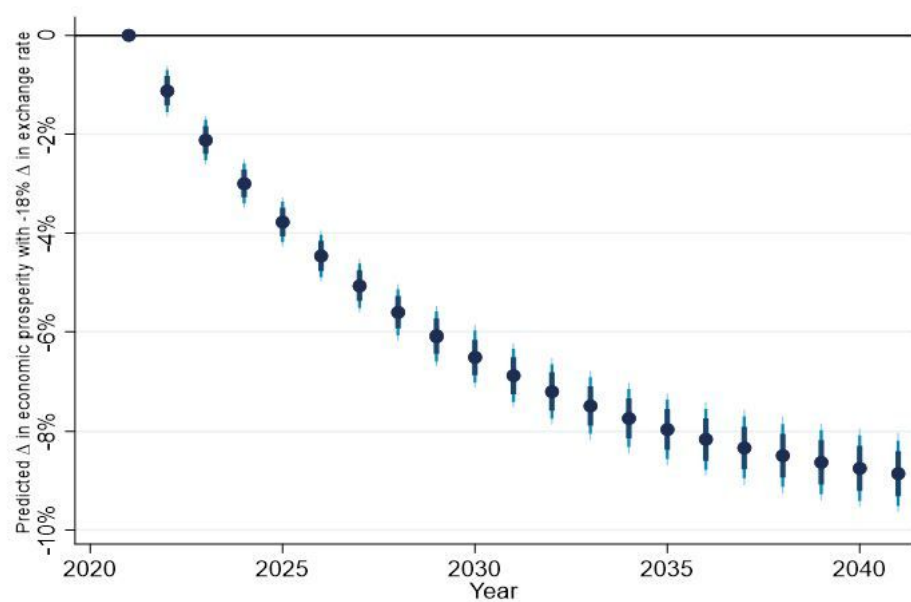


Figure 4

Simulated change in long-term economic prosperity given a shock in the exchange rate.

Source: Author's computation.

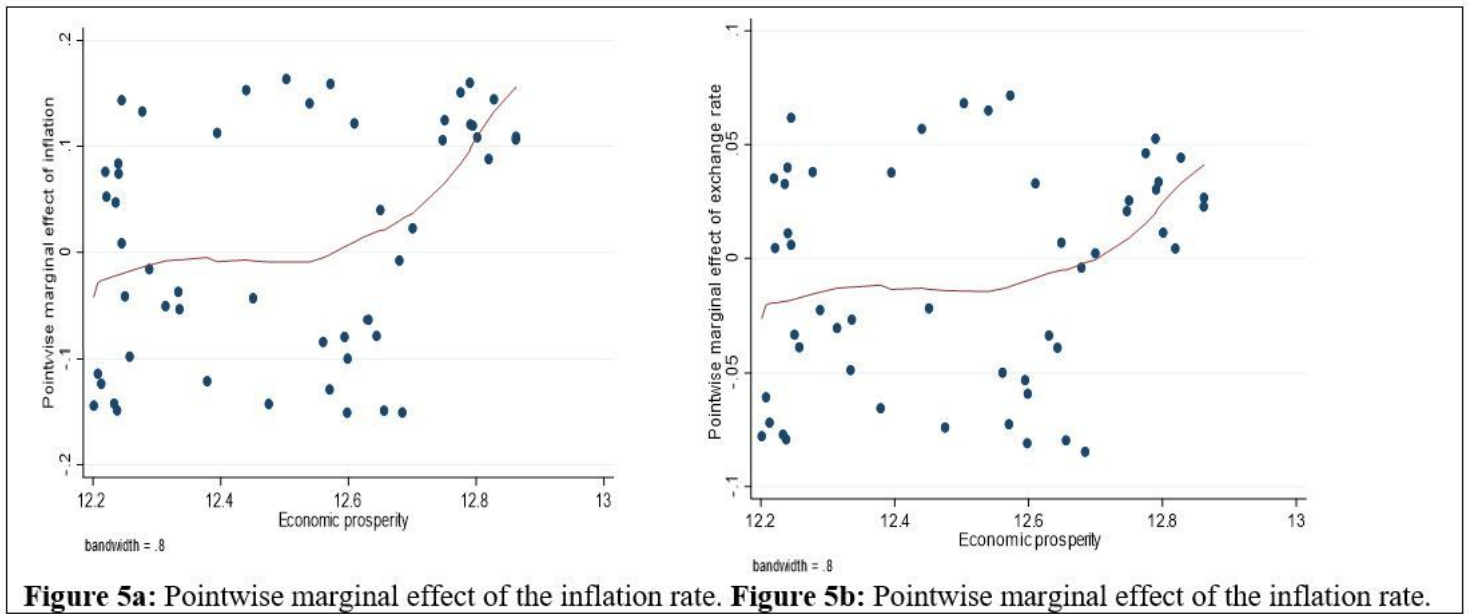


Figure 5

Representation of pointwise marginal effects. **Figure 5a:** Pointwise marginal effect of the inflation rate. **Figure 5b:** Pointwise marginal effect of the inflation rate.