Journal of Social and Development Sciences (ISSN 2221-1152)
Vol. 15, No. 3, pp. 25-42, 2025

Fiscal Policy Variables and Industrial Growth in Uganda

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Abstract: This study examines the effect of government spending, taxation, and borrowing on the development of Uganda's manufacturing sector in both the short and long term based on the ARDL model. The study was focused on three main objectives: examining the role of government consumption expenditure, the effect of value-added tax (VAT), and the role of short-term debt on manufacturing value-added (MVA). The results show that government spending contributes slightly to MVA in the short term but supports growth in the long term. VAT contributes to MVA in the short term but reduces it in the long term, showing how excessive taxation can damage industrial competitiveness. Short-term debt reduces the growth of MVA in the short term but is positive in the long term, showing the need for careful management of debt. In general, the evidence suggests that firm government support, moderate taxation, and prudent borrowing are central to the development of Uganda's manufacturing. However, the study identifies a number of limitations, such as the reliance on secondary data, exclusion of possible determinants, and failure to fully establish causality. It recommends that future research take into account a wider range of variables and more disaggregated data in an effort to shed more light on the determinants of manufacturing growth.

Keywords: *Fiscal Policy, Industrial Growth, Uganda*

1. Background

Industrial growth has become a leading answer to economic self-reliance for developing countries because of its strong multiplier impacts on household earnings, jobs, and general welfare (Huang, Chen, Su, & Wu, 2020). World industrialization is still skewed towards big economies that benefit from high-value manufacturing goods. The majority of developing nations, including Uganda, have remained predominantly in agro-processing and have missed out on the benefits of economies of scale and better returns that come with advanced industrial production (Mazungunye, 2020).

Various reforms and policy measures have been tried in Uganda and the larger Sub-Saharan region to propel industrialization, but all this remains to be seen. These include lack of access to low-cost credit, poor infrastructure, high-cost electricity, and poor road networks (Ggoobi, 2017). Industrial development levels are also low compared to regional peers, as seen in Uganda's performance on exports (Wolff, 2020). The industry only contributes 19.8% of GDP (World Bank, 2018), with mining and quarrying at 2.0%, manufacturing at 15.4%, water at 2.3%, and construction at 6.6% (GoU, 2019). This is much lower than the 35% being targeted by countries seeking middle-income status (NPA, 2019; Olwor, 2023).

During the COVID-19 pandemic, the government reopened the import-substitution approach to strengthen domestic production and safeguard the economy from disruptions in international trade (Ggoobi, 2020). The approach, an expansionary fiscal policy, included financial assistance to domestic producers, encouraging domestic production of goods like PPEs, and implementing protective taxes on foreign products that could be produced locally. While such a plan has worked in economies like Singapore, Taiwan, and China, research shows it must be combined with robust and resolute fiscal policies (Adewale, 2017; Jackson & Jabbie, 2020; Sankaran, Kumar, Arjun, & Das, 2019). Expenditure on capital, taxation, and public debt are fiscal indicators that have an immediate impact on the rate and sustainability of industrial growth. But in Uganda, most studies link industrialization and economic development without the consideration of how the budget measures affect the sector.

This study, therefore, seeks to bridge the gap through an exploration of how government capital expenditure, taxation, and borrowing affect industrial growth in Uganda. Capital expenditure, for instance, as in investment in public infrastructure and works, is generally considered to be one of the underlying engines of industrial development. Taxes and tax incentives are determinants of business competitiveness and industrial

investment. Public debt, on the other hand, is either in support of industrial development when it is effectively used or suppressive when it is a source of debt sustainability concerns. Using the interrelation of the fiscal policy variables and industrial performance as a focus, the study aims to provide recommendations to policymakers on how to best design fiscal strategies that can sustain industrialization.

Industrialization is essential because it spurs job creation, generates exports, increases efficiency in the use of resources, and reduces poverty. The Ugandan government has put industrialization in its development strategy, as evident in the NDP III (2020/21–2024/25), which aims at increasing the contribution of the industrial sector to GDP to 31% by the year 2040, in addition to increasing the industrial workforce to 26% and manufactured exports to 50% of all exports. The same hopes are echoed in Vision 2040, which views industrialization as the core of building a competitive economy. The budget emphasis of recent decades has also put industrialization on top of employment creation and common prosperity (Lukwago, 2021).

However, despite three decades of fiscal expansionary policy, the country's industrial sector is still asleep, with its GDP share remaining constant at 19.8% (World Bank, 2018). This has restricted its capacity to substantially spur employment, government finance, and overall economic transformation (Bank, 2020). The post-COVID-19 initiative of the government toward import substitution indicates that there is a realization that fiscal policies should directly fund industrial development. It is thus necessary to determine the manner in which fiscal instruments—government expenditure, taxation, and public debt—are influencing the path of Uganda's industrialization and what reforms may enhance their influence.

2. Literature Review

Theoretical Literature Review

The Endogenous Growth Theory

As discussed by Rubin (2025), endogenous growth theory explains that long-term economic growth is propelled by forces within the economy rather than from the outside. The theory explains that the rate of growth is determined internally, with a special focus on incentives and opportunities for triggering the creation of technological knowledge(Ye, Gao, Fang, Liu, & Chen, 2021). To that degree, per capita increases in the long run depend heavily on total factor productivity (TFP), and as also noted by Jones (2022), TFP is driven chiefly by technological change. The theory also points out that economic conditions directly influence the pace of technological advance, and since technology is the primary driver of productivity, these conditions ultimately establish long-run growth rates (Rubin, 2025). Growth, therefore, begins with innovation, either in the form of new products, markets, or processes, which emerge from the current economic activity (Akcigit & Ates, 2021). As these innovations become settled, they enable the development and diffusion of new technologies and knowledge, which emerge as the main source of long-run economic growth (Ye et al., 2021; Ghosh & Parab, 2021).

Overview of the Industrial Sector in Uganda

Ever since the early 1990s, Uganda has followed a path of economic liberalization, with the state's role in industrial enterprise decreasing incrementally over time (Behuria, 2021). This change introduced a more prudent and market-oriented method of industrial development (Olwor, 2023). The most remarkable achievement of these changes was the evolution of neoliberal-pushed institutions and policies (Esaku, 2021). A good case in point is the establishment of the Uganda Investment Authority (UIA) through the Uganda Investment Code in 1991, later revised in 1994, as a one-stop focal point for the promotion and attraction of domestic and foreign investment (Buda & Ricz, 2023).

In a further effort to solidify its position in international investment mechanisms, Uganda became a member of the World Bank's Multilateral Investment Guarantee Agency (MIGA) and the International Centre for the Settlement of Investment Disputes (ICSID) and enhanced its industrial policies into global liberal frameworks (Behuria, 2021). These actions put Uganda on the same level as international investment standards and marked the way for the orientation of subsequent national industrial plans, including the current policy scheme (Olwor, 2023; Esaku, 2021).

Notwithstanding these policy and institutional changes, Uganda's manufacturing industry continues to underperform, contributing only a small percentage to GDP (Sendi et al., 2022). Most of the industry is confined to last-stage assembly with minimal value addition, and there is low-capacity utilization at a rate of about 50 percent of installed capacity (Buda & Ricz, 2023). The country's export basket also comprises barely any manufactured products, which is contrary to its competitiveness in foreign markets (Olwor, 2023). Consequently, the current industrial policy up to 2030 has put great emphasis on import substitution as a response to the vulnerabilities exposed by global supply chain shocks such as those brought about by the COVID-19 pandemic (Behuria, 2021).

Empirical Literature Review

Effect of Government Expenditure on Industrial Growth

Industrial growth is generally taken in most economic discourse to be a reflection of general economic growth, since both are linked with increases in output. A number of studies show that government spending promotes growth by building productive capacity and consolidating demand (Sedrakyan & Candamio, 2019; Devarajan et al., 1996; Liu et al., 2008; Ranjan & Sharma, 2008; Barro, 1990; Barro & Sala-i-Martin, 1992; Hansson & Henrekson, 1994; Afonso & Jalles, 2011; Patricia & Izuhukwu, 2013; Gisore et al., 2014). At the same time, there are other researchers who argue that a large government can actually retard growth by crowding out private sector activity and bringing about inefficiencies (Devarajan et al., 1996; Guesh, 1997; Gregoriou & Ghosh, 2009; Usman et al., 2011). There are even those who propose the relationship is not linear in character, with growth outcomes depending on the level of government intervention (Kim et al., 2018).

Evidence regarding causality is also mixed. Wu et al. (2010), with data for 182 nations for 1950–2004, found a bi-directional causality between government spending and growth. Hussain et al. (2012) showed that while defense spending and high taxation reduce growth in Asian economies, health and education spending and overall government spending enhance it. Case-study-specific research also reveals such distinctions. For instance, Ebaidalla (2013) found that government spending causes growth in Sudan, as espoused in the Keynesian hypothesis, while Roşoiu (2015) found bidirectional causality in Romania. Alex and Ebieri (2014), using ARDL analysis, depicted that capital and recurrent expenditure enhance growth, but debt and non-oil tax spending dampen growth. Gitana et al. (2018) observed contradictory findings within the EU, with some nations confirming Wagner's law and others holding up the Keynesian view. In West Africa, Udo et al. (2016) showed mixed results, which varied from no relationship to positive or negative effects. Sedrakyan and Candamio (2019) confirmed Keynesian theory in Armenia and Spain, and Amaghionyeodiwe (2019) proved that government spending on education spurs long-term rather than short-term economic growth in ECOWAS countries.

Cumulatively, the literature shows that government expenditure can stimulate, curtail, or have a neutral impact on growth, depending on the setting, approach, and time frame being considered. Nonetheless, for Uganda's case, research focusing particularly on how spending by the government is associated with industrial development is very rare. This gap calls for the advancement of a concrete research hypothesis to examine the relationship and complete the first study objective.

$\mathbf{H_{o1}}$: Government expenditure affects the level of industrial growth in Uganda

Effect of Tax Revenue on Industrial Growth

According to Tosun and Abizadeh (2019), a study on 24 OECD countries revealed that goods and services tax (GST) and payroll tax had a negative relationship with GDP per capita, but personal and property taxes were positively correlated with growth. During election periods, political parties make available diversified packages of taxes both at the national level and the state level in order to appeal to voters. Against that background, Poulson and Kaplan (2018) examined the influence of marginal income tax rates on United States economic growth, including regional impact and convergence in their model, and concluded that higher marginal income tax rates retard growth. Browning (1976) further contributed that the additional state income tax with federal impositions enhances the negative influence of marginal taxation. Similarly, Bonucchi et al. (2015) held the view that when tax affects the cost of capital vis-a-vis labor, it is involved in monetary policy and relative price adjustments and therefore influences the economy. For a panel model of 28 EU member states, Stoilova (2017) found that while tax designs matter, aggregate tax revenues are largely less harmful to growth. Goulder and

Summers (1987) showed the significance of priorities in capital policy, demonstrating with a general equilibrium model that corporate tax hikes decreased growth.

Evidence in developing economies replicates these findings. Decreasing taxes on retained earnings increased growth convergence to a steady state in Chile (Hsieh & Parker, 2007). Mendoza et al. (1997), based on Harberger's super neutrality hypothesis, demonstrated that tax rates are a determinant factor in investment decisions. The Laffer curve is also what illustrates how beyond a point, higher tax rates reduce total revenue collection. Academic research also points to an inverted-U relationship between taxation and growth, though corruption could complicate this association (Aghion et al., 2016). Lee and Gordon (2005), in a cross-sectional analysis, proved that higher marginal tax rates reduce compliance and reduce total growth, and lowering them may improve performance. At the firm level, Vartia (2008) observed that business tax is a disincentive to investment and productivity but R&D tax credits promote more productivity. In a panel data estimation of 24 EU countries from 1995 to 2010, Szarowska (2014) observed that consumption taxes were growth-stimulating while labor taxes were growth-disincentive.

Collectively, these studies all clearly show that taxation contributes greatly to the determination of industrial and economic performance, with most forms of taxation contributing negatively to growth. Following this evidence, the present research sought to test the hypothesis of whether Uganda's industrial development relies greatly on the country's tax rates, as outlined below.
H_{o2}: There is no significant effect of tax rate on the level of industrial growth in Uganda

Effect of Public Debt on Industrial Growth
There is extensive literature on the effect of public debt on economic growth, but most of it has been concentrated in developed economies, with very few studies examining developing countries (Opare, 2022). For example, Elbadawi et al. (2019), employing quadratic fixed and random effects specifications for data from 99 developing countries, reported that debt begins to interfere with growth at levels above 97% of GDP. Furthermore, Imbs and Ranciere (2015), using Kernel estimates for 87 emerging economies, detected debt overhang effects when debt was at 55–60% of GDP. Pattillo et al. (2011), using quadratic and spline models testing 93 emerging economies, detected that growth is negatively affected when debt is more than 160–170% of exports or 35–40% of GDP. Since the financial crisis in 2008, there has been much focus on the high-income economies, particularly the OECD countries. Exemplary among such studies are Checherita-Westphal and Rother (2012), Baum et al. (2013), Egert (2015a, 2015b), and Sokbae et al. (2017). For instance, Checherita-Westphal and Rother (2012), using quadratic specifications across 12 euro-area nations, found a non-linear one with a turning point between a debt-to-GDP ratio of 90% and 100%. Baum et al. (2013), using panel threshold regressions, found that debt up to 67% of GDP spurs growth but loses its positive impact and becomes detrimental when over 95%.

Egert (2015a), in 20 OECD economies using nonlinear threshold models, found that it was difficult to reliably identify a negative nonlinear effect of debt on growth because findings were extremely sensitive to data and methodology employed. Where these were present, they tended to occur at fairly low debt levels within the range 20% to 60% of GDP. Egert (2015b), in another paper, had sparse reliable evidence of a long-run relationship between growth and debt using non-dynamic panel threshold regressions. Sokbae et al. (2017), in examining developed economies, observed a threshold turning point of approximately 30%. Literature more broadly across countries indicates varying thresholds for developing and advanced economies. Caner et al. (2010), Kumar and Woo (2010), and Chudik et al. (2017) were some of the literature that did this. Caner et al. (2010), with threshold models of 101 countries, fixed the threshold at 77% of GDP for developed countries and 64% for emerging market economies, further stipulating that each percentage point above these thresholds reduces growth by 0.017 and 0.02 annually, respectively. Eberhardt and Presbitero (2015), using panel econometric methods across 118 countries, identified weak evidence of the debt-long-term growth negative correlation but no cross-country consistent threshold. Chudik et al. (2017) using a panel threshold ARDL model for 40 economies estimated the breakpoint to be in the 60% to 80% range of GDP.

Notwithstanding this large body of research, little has been done to specifically investigate the impact of public debt on **industrial development**. It is this gap in research that forms the foundation for the current study,

which aims to find out if public debt contributes to influencing Uganda's industrial development. In this regard, the following hypothesis is advanced for testing:
H_{o3} There is no significant effect of public debt on the level of industrial growth in Uganda.

3. Methodology

Research Design

The study used a longitudinal time series design and was correlational in design to investigate the relationships for the purposes of its objectives (Gasparrini, 2021). Through the use of time series analysis, trends, long-term trends, seasonal variation, cycles, and irregular fluctuations in the data were determined, and projections made based on past performance (Liang et al., 2024). It was a quantitative analysis because all the variables under study were quantified in terms of quantifiable numerical values (Gasparrini, 2021).

Data Type and Source

The research utilized secondary data from credible government and foreign agencies, including the Uganda Bureau of Statistics (UBOS), Uganda Revenue Authority (URA), and World Bank (Goel, 2023). From 1990 to 2020, time series data were utilized, consistent with the initiation of Uganda's industrial reform program (Goel, 2023). Using aggregated national-level data-maintained consistency and ensured that all variables in the research were readily available for analysis (Goel, 2023).

Operationalization of variables to be used

Table 1: Operationalization of Variables

Variables	Definition	Expected Sign	Source of data
Manufacturing Value Added output (Proxy for industrial growth)	Net output (in UGX) of the manufacturing sector after adding up all outputs and subtracting intermediate inputs.		Uganda Bureau of Statistics (UBOS) (1990-2020)
Government expenditure	General government final consumption expenditure refers to the current expenditures for purchases of goods and services.	Positive	World Bank (1990-2020)
VAT (Proxy for Tax Revenue)	Tax (in UGX) levied on the value added to goods and services at each stage of production or distribution.	Negative	Uganda Revenue Authority (1990-2020)
Short Term Debt (Proxy for Public debt)	All debt (in USD) with an original maturity of one year or less and interest in arrears on long-term debt	Positive	World Bank (1990-2020)
GDP per Capita	The average income of a country's population. Calculated by dividing the gross domestic product by the mid-year population	Positive	World Bank

Author's Compilation

Model Specification

The underlying theory and empirical studies on fiscal policy variables and industrial growth provide the foundation for building the manufacturing sector output growth function. This study closely followed the specified model by Mengistu (2022). However, the model for this study included fiscal policy variables that

characterize the Ugandan economy. In so doing, the model captured the objectives of the study as stated in Chapter One. The equation for the model is stated below;

$INDt = \beta_0 + \beta_1 GEXt + \beta_2 TRTt + \beta_3 PDTt + \beta_4 GDPt + \mu_t$ ……. (i)

From equation (i), *IND* is Industrial sector growth proxied by Manufacturing Value Added output, *GEX* is Government Expenditure proxied by Government final consumption expenditure, and *TRT* is Tax Revenue proxied by Value Added Tax. *PDT* is Public Debt stock proxied by Short Term Debt, and *GDP* is Gross Domestic Product per person. μ Represents the white noise in the model, t represents the current period, β_0 Is the intercept of the model while β_1 to β_4 These are parameters that represent the coefficients of the model. The model was transformed into natural logs because, in time series analysis, this transformation is often considered to stabilize the variance of a series.

Model Estimation

Unit Root Test

Stationarity must be tested when working with time series data to ensure that econometric model estimates are precise and not misleading (Nasir & Morgan, 2025). A variable is non-stationary if its mean or variance changes over time and skews influential statistics such as the significance of coefficients, R^2, and the Durbin-Watson statistic, which will ultimately cause misinterpretation when using regression analysis (Chen, Karavias, & Tzavalis, 2022). To confirm this, the study employed the Augmented Dickey-Fuller (ADF) test, which is superior to the general Dickey-Fuller test, particularly for small samples and more complex models (Nasir & Morgan, 2025). The ADF test is employed to check for the presence of a unit root, basically whether past values of a variable influence its current variation (Chen et al., 2022). As a function of the model specification, perhaps including a constant, an intercept, or both trend and intercept, the test statistic is compared to critical values. In the event that the test statistic is sufficiently low, the null hypothesis of non-stationarity is rejected. This approach guarantees that the data used in the analysis have a constant variance, mean, and covariance over time which is necessary in arriving at reliable econometric results (Nasir & Morgan, 2025).

Co-Integration Test

Some of the variables in this case were non-stationary in their nature in their raw state but following first-differencing became stationary and therefore evidenced the potential existence of a long-run relationship between them (Turrisi, Cigada, & Zappa, 2022). This long-run relationship over time is also known as cointegration. As a means to analyze the possibility, the research carried out cointegration tests on the selected variables.

The method utilized was the bounds testing approach under the framework of the Autoregressive Distributed Lag (ARDL) model (Natsiopoulos & Tzeremes, 2022). The method begins with the null hypothesis that there exists no long-run relationship between the variables. The interpretation is as follows: if the estimated F-statistic value is higher than the upper and lower critical values at all levels of significance, then the null hypothesis is rejected in favor of cointegration. Conversely, if the F-statistic value is below the critical values, the null hypothesis is not rejected and there is no evidence for a long-run relationship between the variables (Turrisi et al., 2022; Natsiopoulos & Tzeremes, 2022).

Autocorrelation

In this study, the Breusch-Godfrey test was utilized to check for autocorrelation of the time series model. The test is utilized to check if residuals are correlated with the lagged value of their own. When significant, it means that the model could be mis-specified and may require some modifications, e.g., including additional lags or efforts in alternative model specifications.

Normality

The study employed the test for normality using Skewness and Kurtosis to determine whether the residuals of the model follow a normal distribution (Hatem, Zeidan, Goossens, & Moreira, 2022). In this test, the null hypothesis assumes that the residuals follow a normal distribution (Hatem et al., 2022). The null hypothesis is rejected when the chi-square statistic, the measures of skewness, and kurtosis are not statistically significant at 5% (Demir, 2022). But if the values are higher than the 5% level, then the null hypothesis is rejected, i.e., residuals are not normally distributed (Demir, 2022).

Ho: The error term is normally distributed.

Multicollinearity Check

Multicollinearity is encountered when two or more independent variables of a model are highly correlated (Bayman & Dexter, 2021). Correlation coefficients of 0.7 and higher are typically considered problematic, while coefficients above 0.8 are likely to result in multicollinearity (Chan et al., 2022). In this current study, multicollinearity was tested using pairwise correlation coefficients and the Variance Inflation Factor (VIF) (Ahmad, Balakrishnan, & Jha, 2021). The VIF demonstrates the extent to which the variance of a regression coefficient is inflated by collinearity, and any value higher than 10 indicates excessive multicollinearity (Bayman & Dexter, 2021).

Moreover, Tolerance values were examined as a proxy (Chan et al., 2022). Tolerance is calculated as 1 minus the R^2 of each independent variable and represents the amount of variance in a variable that other variables in the model cannot explain (Ahmad et al., 2021). A Tolerance of below 0.10 shows high correlation with other predictors and warns of potential multicollinearity issues (Bayman & Dexter, 2021).

4. Presentation and Interpretation of Findings

Descriptive Evidence of the Study

Information used in this study covered a period with no missing observations. Descriptive statistics were determined to provide an open picture of the features of the data as well as to ensure that it was suitable for analysis since using unsuitable data can lead to misleading findings. Specifically, the mean, minimum, maximum, and standard deviation of the variables were approximated. All data processing as well as analyses were conducted using STATA 14.

Summary Statistics of Study Variables

The summary statistics of the study variables are presented in Table 2 below, outlining the mean, maximum values, minimum values, and the standard deviations.

Table 2: Summary of study variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Man. Value Added	2,330,000,000	2,330,000,000	166,000,000	6,660,000,000
Govt Consumption	1,630,000,000	1,110,000,000	276,000,000	4,290,000,000
Value Added Tax	2,020,000,000,000	5,460,000,000,000	28.25	18,500,000,000,000
Short Term Debt	20.22	22.52008	0.52	87.97
GDP per capita	496.2586	282.7526	151.977	897.51

Observations = 32 (1990 – 2021). Source: Researcher's computation using secondary data

The descriptive analysis was charged with deciding the quality of data observed in representing the study and to extract patterns and variations across variables. Manufacturing Value Added (MVA) had an average of 2.33 billion USD, varying from 166 million USD to 6.66 billion USD, with considerable variation among observations. This means that although an average manufacturing output is approximately 2.33 billion USD, some industries contribute noticeably more and others noticeably less. The standard deviation of roughly 2.33 billion USD also captures the great fluctuations in output during production over the course of the dataset.

Government Consumption Expenditure lacked such a mean of 1.63 billion USD but also exhibited great variation, ranging from 276 million to 4.29 billion USD. Its standard deviation of roughly 1.11 billion USD captures the fact that government spending varies widely over the period covered. Value Added Tax (VAT) in Ugandan shillings also exhibited the highest variation among the variables. It had a mean value of 2.02 trillion UGX and a standard deviation of 5.46 trillion UGX, with its collection falling between 28.25 billion and 18.5 trillion UGX, suggesting differences in taxation policies and economic activity in Uganda.

Short-Term Debt as a percentage of exports had an average of 20.22% and a standard deviation of 22.52%, which signifies wide fluctuations in debt levels across observations. Some organizations had extremely low levels of short-term debt (0.52%), suggesting better financial health, while some had high levels of debt

(87.97%). GDP per capita had an average of 496.26 USD with a standard deviation of 282.75 USD, indicating a moderate range in individual prosperity. The minimum of 151.98 USD and the maximum of 897.51 USD reveal variances in income among the population.

Generally, the dataset reveals significant heterogeneity between principal economic indicators, indicative of varying economic conditions and trends. This heterogeneity is pertinent to be known to enable informed decisions and policy formulation. Due to the extensive variations in values ranging from millions to trillions, the research converted the variables to a logarithmic scale to stabilize distributions, eliminate extreme value effects, and enhance interpretability and comparability of growth rates in the passage of time.

Pre-Estimation Diagnostic Tests

Pre-estimation diagnostics are statistical tests carried out before model estimation to ensure that the selected variables are fit to be included in the model to be estimated.

The Test For Multicollinearity

Multicollinearity is a regression analysis issue that arises when an independent variable is highly correlated with one or more of the other model independent variables. If it exists, it will lower the statistical significance of the involved variables such that it becomes harder to explain their actual effects. Multicollinearity was examined at two levels within this study. First, the correlation analysis was conducted to identify the type and degree of association among the variables. Second, the Variance Inflation Factor (VIF) test was conducted on all the independent variables to see to what level each variable's variance is being inflated with correlation with other variables. The findings are presented below.

Pairwise Correlation Analysis Results

	1	2	3	4	5
Man. Value Added (1)	1.0000				
Govt. Consumption (2)	0.9363*	1.0000			
Value Added Tax (3)	0.7031*	0.6746*	1.0000		
Short Term Debt (4)	-0.5287*	-0.5940*	0.0071	1.0000	
GDP per capita (5)	0.9908*	0.9239*	0.6556*	-0.5530*	1.0000

* Indicates significance at the 0.05 level. All variables are logged. Source: Researcher's computation using secondary data

In a correlation matrix, values near 1 indicate a strong positive relationship, values near -1 indicate a strong negative relationship, and values near 0 indicate little or no linear relationship. Asterisks (*) are generally used to report statistical significance levels.

The results reveal some intriguing correlations. Government spending is found to have a highly positive correlation (0.9363) with manufacturing value added, which suggests that with rises in manufacturing output, government spending does the same. Similarly, a very high positive correlation (0.9908) of GDP per capita with manufacturing value added is found, which suggests that the more efficient the industries are in a place, the higher the per capita income.

Government expenditure also has a strong positive relationship with GDP per capita (0.9239) and a moderate relationship with value-added tax (0.6746), such that areas of higher government expenditure are more likely to have higher tax revenues and greater economic development. Value-added tax has a positive relationship with manufacturing value added (0.7031) and a moderate relationship with government consumption (0.6746), meaning industrial output and public spending both generate taxes.

Short-term debt, however, shows a very weak positive correlation with value-added tax (0.0071), reflecting a weak relationship. It also reflects a negative correlation with manufacturing value added and government consumption, which implies that higher short-term debt is anticipated with lower industrial output and lower government expenditure. Furthermore, GDP per capita and short-term debt reflect a weak negative correlation of -0.5530, which implies that higher debt nations will have lower incomes.

In brief, these results reveal positive strong correlations among manufacturing production, government expenditure, GDP per capita, and tax revenue, whereas short-term debt operates in the opposite direction.

Table 3: VIF Results

Variables	VIF	1/VIF
Log Govt. Consumption	9.79	0.102130
Log GDP per capita	7.04	0.142143
Log Value Added Tax	3.58	0.279477
Log Short Term Debt	2.97	0.336238
Mean VIF	5.84	

Source: Researcher's computation using secondary data

Values presented in Table 3 show the Variance Inflation Factor (VIF) of each variable, which is utilized to assess multicollinearity within regression models. Multicollinearity is experienced where independent variables are most likely to be highly related to one another, and thereby individual contributions of each to the dependent variable become difficult to discern.

For Log Government Consumption, VIF is 9.79, which is very high. Its 1/VIF value of 0.102130 suggests that around 10% of the variance in this variable is explained by its correlation with the other independent variables. This could be a sign of multicollinearity since Log Government Consumption could be very highly correlated with some of the other variables in the model. The VIF of 7.04 shows that log GDP per capita is moderately multicollinear. Its 1/VIF of 0.142143 shows that it shares about 14% of its variation with the other independent variables. While this percentage is apparent, it is not typically considered to be problematic.

Log Value Added Tax has 3.58 VIF, which represents moderate multicollinearity. With 1/VIF = 0.279477, about 28% of its variance is shared with other variables, which means a mild relationship but nothing over the top. Likewise, Log Short Term Debt has a VIF of 2.97, the lowest on the table, with 1/VIF = 0.336238. This also shows that about 33% of its variance is shared with other variables, which is a moderate and not so terrible correlation.

As posited by Suleiman (2019), VIFs below 10 are generally considered not to have severe multicollinearity. In this study, all variables have VIFs below 10 with a mean VIF of 5.84, indicating that multicollinearity does not pose a serious issue. This allowed the study to proceed with model estimation without fear.

Stationarity Tests on the Model Variables

The research also carried out stationarity tests of the model variables using the Augmented Dickey-Fuller (ADF) test, which is widely used in academic literature to test for stationarity. The ADF test tests for the presence of a unit root by testing the null hypothesis that a time series contains a unit root. If the ADF test statistic (t-statistic) is below the critical value at the 5% significance level, the null hypothesis cannot be rejected, indicating non-stationarity. The study tested for unit roots at the level of the variables and also after differencing first, and the results are given in Table 4.

Table 4: ADF Test Results

ADF			
Variables	**Levels**	**First difference**	**Integration**
Log Man. Value Added	0.743	-5.493***	I(1)
Govt. Consumption	-1.051	-4.464***	I(1)
Value Added Tax	-1.059	-2.991**	I(1)
Short Term Debt	-2.935**	-	I(0)
GDP per capita	-3.032***	-	I(0)

Source: Researcher's computation using secondary data

The results of the unit root tests in Table 4.4 above indicate that all the variables with the exception of Debt and GDP per capita are not stationary at levels but become stationary when differenced once. GDP per capita is, however, stationary at levels without differencing. The results thus indicate that the variables to be included in the model have mixed levels of stationarity.

Cointegration Test

One of the variables in this study was found to be unstable at its levels but stabilized following first differencing, reflecting the presence of a long-run relationship, as termed cointegration. In an effort to confirm this, the study performed the cointegration bounds test through the use of the Autoregressive Distributed Lag (ARDL) framework. The test is employed to test the null hypothesis of no cointegration among the variables. If the calculated F-statistic is greater than the upper and lower critical values at all levels of significance, then the null hypothesis is rejected, indicating a long-run relationship. The result of the test appears in Table 4.6.

Table 5: ARDL bounds test results

Wald F-statistic = 13.723*	**t = -7.343**	**k = 3, n = 28**
	Critical Value: Narayan (2005)	
Level of Significance	**Lower Bound**	**Upper Bound**
1%	4.29	5.61
5%	3.23	4.35
10%	2.72	3.77

Source: Researcher's computation using secondary data

The results in Table 5 show that the F-statistic (13.723) is greater than the upper bound critical value of 5.61 at a level of significance of 1%. The study thus rejected the bounds test null hypothesis of no cointegration. These results, therefore, verify the existence of a long-run relationship among the research variables.

Post Estimation Diagnostic Tests

After running the estimated model above, the study proceeded to carry out further diagnostic tests on the model to conclude that there are no common econometric problems.

Serial Correlation Test

The Breusch-Godfrey LM test was employed in the research to check for serial correlation in the model. The null hypothesis is that there is no serial correlation. A 5% significant chi-square value would not reject the null hypothesis; otherwise, it would be rejected. The chi-square value was 0.462, and it was not significant at 5%. Accordingly, the null hypothesis was not rejected and it shows that the model is free from serial correlation. The results are presented in Table 6.

Heteroskedasticity Test

The Breusch-Pagan test was used to determine whether heteroskedasticity in the model. The null hypothesis of this test is no heteroskedasticity. For the null to hold, the chi-square value must not be significant at 5%. The chi-square value for this test was 0.00 and not significant at 5% level. Accordingly, the null hypothesis was not rejected, indicating that the model is heteroskedasticity-free. The results are displayed in Table 6.

Table 6: Serial Correlation and Heteroskedasticity Test Results

Test	lags(p)	Chi (2)	df	Prob.
B-Godfrey test	1	0.462	1	0.4966
Breusch-Pagan		0.00		0.9708

Test For Normality of Residuals

The study employed the Skewness & Kurtosis test for Normality to examine the normal distribution of residuals in the model. Normality is the null hypothesis of the test. It cannot be ruled out that the null hypothesis is

rejected if the chi-square value, and the skewness and the kurtosis values are not significant at the 5% significance level. The results are presented in Table 7 below.

Table 7: Skewness & Kurtosis tests for Normality results

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
Residuals	28	0.0015	0.0091	13.06	0.0015

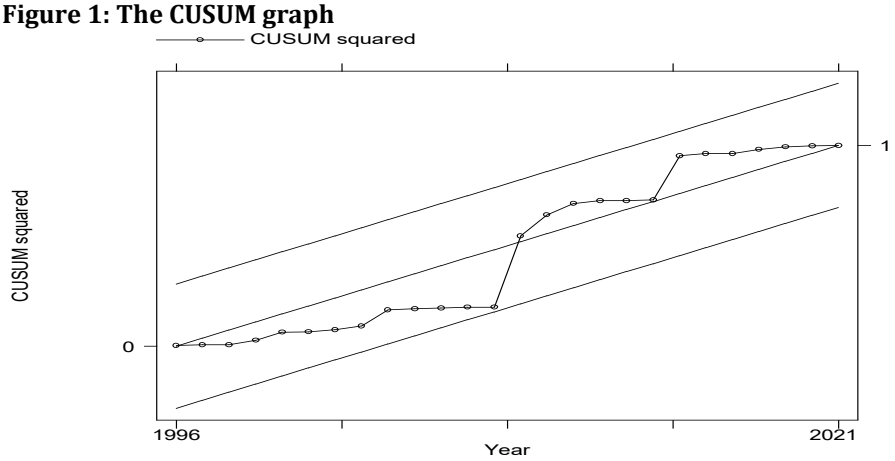
Ho: Normality. Source: Researcher's computation using secondary data

Table 8 presents the results of the skewness and kurtosis test for the model's residuals. The test confirms that the residuals, or the deviations between predicted and actual values, are normally distributed, a requirement of most statistical techniques. From the results, it is evident that the chi-square statistic and the skewness and kurtosis measures are significant at the 1% level, which is lower than 5%. This led to the rejection of the null hypothesis of normality, and the residuals are not normally distributed. This is a common phenomenon that happens in small sample analyses like this one, and the smaller number of observations can account for non-normality. However, as contested by Maydeu (2017), non-normal residuals do not invalidate estimates of model reliability given that other such problems as heteroskedasticity do not occur. The model did not therefore, experience any such issues, so the research concluded that the observed non-normality did not invalidate the findings.

Test For Model Stability

The study performed a stability test on the model fitted by the Cumulative Sum (CUSUM) test. This entails testing recursive residuals and drawing them against potential break points of the model, employing 5% critical boundaries as the standard. The model is valid if the line of CUSUM lies within these critical boundaries. The results of this stability test are in Figure 2 below.

Figure 1: The CUSUM graph



Model Estimation

Owing to the mixture of Stationarity of the model variables and the short time series utilized within this study, the ARDL model was found to be the most suitable estimation technique because it is extremely common in cases of small samples where data is characteristic of order mixtures of integration. The biggest merit of the ARDL approach, as stated by Enkoro (2016), is that, if properly supplemented, it evades serial correlation and endogeneity problems. Hence, for the ARDL model, industrial development was regressed against government spending, tax revenue, and public debt. The most appropriate lag length for the model was 3 lags for all the variables in the model. This was ascertained via the ARDL model as a first step in obtaining the error correction version of the final ARDL model. The results of the ARDL model in error correction form are shown below in Table 8.

Table 8: Results Of The Estimated ARDL Model

Dependent Variable: D(Log of Manufacturing Value Added)			
Independent Variables	Coefficient.	Std. Error	P>|t|
ADJ Log Man. Value Added $_{L1}$	-1.114794	0.2825689	0.003
Long Run			
Log Govt. Consumption	0.6115281***	0.1732858	0.006
Log Value Added Tax	-0.0262704**	0.0111637	0.043
Log Short Term Debt	0.3005434**	0.1062143	0.020
Log GDP per capita	2.109499***	0.2028893	0.000
Short run			
Log Manufacturing Value Added $_{t-1}$	0.6991852**	0.2928703	0.041
Log Manufacturing Value Added$_{t-2}$	0.22261	0.2195815	0.337
D(Log Govt. Consumption)	0.0852731	0.2262928	0.715
Log Govt. Consumption$_{t-1}$	-0.023523	0.1727819	0.895
Log Govt. Consumption$_{t-2}$	0.3739117*	0.1728283	0.059
D(Log Value Added Tax)	0.0328177**	0.0139154	0.043
Log Value Added Tax$_{t-1}$	0.0084017	0.0103189	0.437
Log Value Added Tax$_{t-2}$	-0.0012962	0.0093431	0.893
D(Log Short Term Debt)	-0.219274**	0.0859405	0.031
Log Short Term Debt $_{t-1}$	-0.087349	0.072996	0.262
Log Short Term Debt-2	-0.2232965**	0.0719915	0.013
D(Log GDP per capita)	-1.333935	0.7364722	0.104
Log GDP per capita$_{t-1}$	-0.7411823	0.4291039	0.118
Log GDP per capita$_{t-2}$	-1.438493**	0.5101669	0.020
Constant	-5.782707	3.81797	0.164

Notes: D = First difference in variable. ***, **, * Indicate significance at 1%, 5% and 10% levels respectively. ARDL regression (3, 3, 3, 3, 3). Source: Researcher's ARDL computation using secondary data

In the brief run, public consumption expenditures do not play a strong or impactful role in manufacturing value added (MVA). Only after about two years does it play a weakly positive role, meaning that long-term increases in government consumption over time can support manufacturing output more and more. Government consumption in the long term, however, clearly has a significant and positive effect on MVA, reflecting the significance of steady government spending in maintaining long-term industrial growth. Moreover, lagged values of government consumption reflect that its own past levels remain strongly significant in explaining manufacturing production at short as well as long horizons.

Value-added tax (VAT) has a positive effect on MVA in the short run, in that an increase of one percent in VAT has a corresponding 0.033 percent increase in manufacturing production. This is, however, a temporary occurrence; in the long run, VAT has a highly negative effect whereby an increase of one percent leads to a drop in MVA by 0.0263 percent. This indicates that while VAT reforms may appear to be favorable at first, as time passes, higher taxation discourages manufacturing growth.

Relative debt over exports has a large negative effect on MVA in the short run and the rise of one percent in debt lowers output by 0.22 percent. The effect is most pronounced for debt levels two years ago, and the effect last year is less. Contrary to expectations, in the long run, short-term debt is a positive driver of MVA, and one percent higher debt has a 0.30 percent higher manufacturing output, which means that access to finance favors industry and investment.

GDP per capita has a very weak, negative, but statistically insignificant effect on MVA in the short run. A year later, the negative impact remains slight, but two years later, a one percent rise in GDP per capita equals a 1.44 percent decline in manufacturing output. On the other hand, in the long run, GDP per capita is beneficial to MVA, and a one percent increase in GDP per capita equals a 2.11 percent increase in manufacturing value added, indicating that overall economic growth eventually encourages industrial growth.

The adjustment error term, or the speed at which deviations from the long-run equilibrium are being returned towards it, has a coefficient of -1.114794. This suggests that the adjustment process is moderate and that when manufacturing value added lies off the level of equilibrium, the system is restored towards equilibrium at a moderate rate. The minus sign indicates that every positive deviation in the earlier period will reduce the adjusted logarithm of MVA in this period, reflecting the tendency of the system to restore equilibrium.

Model Characteristics

Model properties are different statistical measures that tell us how well a model performs, how reliable the model is, and how well the model explains relationships among variables. Model properties allow us to determine the quality and usability of the model in explaining and predicting outcomes. R-squared is a statistic expressing the proportion of variation in the dependent variable, in this case, manufacturing value added (MVA), explained by the independent variables. The R-squared of 0.9637 means the model explains about 96.37% of the variability in MVA, an exceedingly good fit and suggests that the predictors chosen explain most of the variability in manufacturing output.

Adjusted R-squared adjusts for the number of variables in the model and penalizes for excessive complexity. The adjusted R-squared of 0.8870 shows that after adjusting for the number of predictors, the model still explains about 88.70% of the variance in MVA. This is a positive indication that the explanatory power of the model is strong and is not artificially high due to the inclusion of too many variables. Log likelihood measures how well the model fits the data, with higher values showing a better fit. The log likelihood value of 45.7275 shows that the model provides a good description of the observed data.

Root mean square error (RMSE measures the average difference between predicted and observed values. With an RMSE of 0.0898, the model predictions are very close to actual values, demonstrating good forecasting ability. Collectively, these measures in total suggest the model is robust and reliable and effective for analyzing the dynamics of manufacturing. The R-squared values being high confirm that the independent variables account for most of the variation in MVA, and the low RMSE confirms the predictions are accurate. These attributes give confidence in using the model for interpreting and understanding the effects that government spending, tax policies, debt, and other determinants have on manufacturing value added.

5. Discussion, Conclusion and Recommendations

Discussion

This study sought to achieve three ultimate objectives which were to be realized through hypothesis testing of three hypotheses. The objectives of the study were to examine the separate effects of government expenditure, taxation, and cost of public debt on the manufacturing growth in Uganda. The hypotheses would be verified through the inspection of the corresponding parameter estimate-related p-values as specified in the empirical model in equation 1 of Chapter Three. The results of the study are presented below:

Effect of Government Expenditure on Manufacturing and Industrial Growth in Uganda

Objective two in this study was to examine the effect of government consumption on industrial growth in Uganda. The hypothesis for this objective was that government consumption heavily determines industrial growth. The ARDL model indicated both short-run and long-run impacts:

In the short term, the expenditure on government consumption does not appear to influence the manufacturing value-added (MVA). While a small positive effect is observed in the second lag, it is marginally significant. This indicates that short-run changes in government consumption have no direct impact or have a very small impact on manufacturing output. This may be because manufacturing has long procurement, production, and distribution lead times. Therefore, it takes time for changes in government spending to trickle through as higher demand and production.

On the contrary, the long-term perspective paints a completely different picture. Government consumption expenditure has a significantly positive and positive impact on MVA in the long run. Higher government spending raises aggregate demand, which leads manufacturing firms to raise production and investment. In addition, government expenditure can directly fund specified industries, fund investment in infrastructure,

induce innovation and research, and enable technological advances. These long-term effects accentuate the necessity of ongoing and sustained government policies and assistance to ensure steady growth and development in the manufacturing sector.

Effect of Tax on Industrial Growth in Uganda

Objective two of this study was to establish the contribution of tax towards industrial growth in Uganda, and the corresponding hypothesis was that there is a considerable effect of tax on industrial growth in Uganda. By means of the ARDL model, it was established that value-added tax has a positive and significant effect on manufacturing value-added output in the short run, and by this, it follows that the current ups and downs in value-added taxation do not minimize manufacturing production. This can be attributed to the marginal direct effect of value-added taxation on manufacturing operations. The effect is best captured by a number of variables that capture the ability of firms to pass on the cost of taxation to consumers or modify their production process to mitigate the impact of taxation. In the long term, VAT has a negative and significant contribution to manufacturing output, such that higher value-added taxation contributes to a fall in manufacturing output.

This is attributed to the adverse effects of taxation on the competitiveness and profitability of manufacturing. Higher value-added taxes increase production costs, which can lead to reduced investment, reduced innovation, and reduced competitiveness of domestic manufacturing companies in international and local markets. These long-run effects emphasize the need for careful consideration of tax policies to facilitate manufacturing growth and competitiveness.

Effect of Debt on Industrial Growth in Uganda

Objective three of the research aimed at examining the effect of debt on industrial growth in Uganda, and the hypothesis was that debt has a significant effect on industrial growth. The ARDL model yielded various effects in the short and long runs. Short-term debt in the short run negatively affects manufacturing output. Increasing debt relative to exports leads to manufacturing activity declining, meaning that excess borrowing by the government can crowd out funds that otherwise would fund the manufacturing sector. This is particularly vital in Uganda, where government borrowing from domestically is frequent.

In the long run, though, debt's effect is positive and significant. Cumulative debt appears to raise manufacturing value-added output since, most likely, borrowed money goes to sectors that enhance production, such as infrastructure and other industrial-supporting investments. This means that, while short-term borrowing may put pressure on resources, prudent use of debt can support industrial progress in the long run.

Conclusion

The results of the study can be summarized and explained as follows:

The strong positive correlation between government consumption and the output of the manufacturing sector in the long run is expected, but the insignificant short-run effect is surprising. It implies that short-run changes in government spending have no direct effect on manufacturing activity in the short run. It indicates the need for long-term and consistent government support for stimulating sustainable growth in the sector. The strong negative long-run impact of the value-added tax on manufacturing is a source of concern. Excessive taxation can stifle the activities of manufacturing, reducing competitiveness and profitability. Policy makers should consider the effects of tax policies on the sector and how best to ease the tax burden to spur industrial development.

Short-term debt positively affects manufacturing in the short term, which is expected as it provides immediate relief in terms of finance. The long-term effects, however, are a cause for concern. Overutilization of debt will undermine long-term stability, and thus manufacturers must control debt effectively to ensure sustainable growth. The lack of a significant relationship between GDP per capita and manufacturing in the short term was unexpected, suggesting that income changes in the short term do not have an immediate impact on manufacturing. The significant positive long-term relationship indicates the importance of sustained economic development and rising living standards in stimulating long-run growth in manufacturing. This suggests the need for a long-term policy to entrench industrial capability.

Cumulatively, these findings defy some common presumptions and offer essential conclusions. They point to the need for long-term government commitment, prudent tax policy, careful debt management, and long-term planning in order to build a strong and successful manufacturing sector. These conclusions should be applied by policymakers, investors, and stakeholders in order to make informed choices and strategies towards sustainable industrial development in Uganda.

Policy Recommendations

Based on the effects of each variable on manufacturing, the following policy recommendations can be made from the study.

As there is a positive long-run relationship between government consumption and manufacturing production, it is incumbent on the part of policymakers to provide sustained and regular government support to the manufacturing sector. This can be achieved by making targeted investments in infrastructure development, research and development activities, and capacity-building initiatives. Policy also needs to be formulated to tackle bureaucratic bottlenecks, reduce red tape, and provide an enabling business environment for manufacturers to perform efficiently.

Strong negative long-run correlation between value-added tax (VAT) and manufacturing production suggests that policymakers have to carefully craft tax policies. The policymakers should estimate the impact of VAT rates on the manufacturing sector and attempt to mitigate the burden. This can involve giving tax exemptions or tax rebates for particular manufacturing activities or products, implementing VAT rebates to exporters, or conducting regular reviews to ensure VAT rates are conducive to the growth of the manufacturing industry.

While short-term debt might provide a boost to manufacturing in the near term, policymakers need to encourage prudent debt management. This includes instituting mechanisms to monitor and regulate borrowing by manufacturers, enabling access to long-term financing options, and providing access to financial literacy programs to allow manufacturers to make fully informed choices about debt management. Encouraging diversification of funding sources and promoting equity financing can also reduce over-reliance on short-term debt.

The positive long-run relationship between GDP per capita and manufacturing production underscores the importance of overall economic development. Policy makers have to prioritize policies that lead to inclusive economic growth, such as education and skill development spending, infrastructural growth, and technology absorption. Policies for the reduction in income inequality, improvement in access to finance for small and medium enterprises, and innovation and entrepreneurship development have to be taken up as well, since these result in long-run manufacturing growth.

Limitations and Areas For Further Study

The results of the research, as outlined in the analysis, are a product of correlation analysis and regression techniques. However, correlation does not necessarily imply causation. The research does not provide a causal relationship between the manufacturing output and the independent variables. Other unseen products or variables that are outside the scope of the analysis may influence the manufacturing activities. Therefore, one has to exercise caution when concluding causal relationships solely based on the research findings.

The research conclusions are derived from secondary sources of data. The quality and consistency of the data used may impair the validity of the findings. Data limitations to note include measurement errors, missing information, and variability in the quality of data between various sources. Additionally, sample size and study time period may limit the generalizability of the findings to other settings or time periods. Future studies would be advised to use more comprehensive and precise sources of data.

There is the possibility of omitted variable bias because the research is centered on a narrow number of variables. Technological progress, trade policy, market forces, and political stability are among the variables that could influence manufacturing output, but are not included. Omitting these variables could result in a partial explanation for the determinants of manufacturing. Future studies can incorporate a larger set of variables to account for a broader range of factors that will affect manufacturing outcomes.

References

Adewale, T. (2017). Fiscal policy and industrialization in emerging economies. *Journal of Economic Policy Research, 12*(3), 45–61.

Afonso, A., & Jalles, J. T. (2011). Economic performance and government size. *European Central Bank Working Paper Series, 1399*, 1–36.

Aghion, P., Akcigit, U., Cage, J., & Kerr, W. (2016). Taxation, corruption, and growth. *Journal of Economic Growth, 21*(4), 409–449.

Ahmad, F., Balakrishnan, B., & Jha, S. (2021). Variance inflation factor in regression diagnostics. *International Journal of Statistics and Economics, 22*(2), 12–24.

Akcigit, U., & Ates, S. T. (2021). Ten facts on declining business dynamism and lessons from endogenous growth theory. *American Economic Journal: Macroeconomics, 13*(1), 257–298.

Alex, O., & Ebieri, J. (2014). Government expenditure and economic growth in Nigeria: A disaggregated analysis. *Journal of Economics and Sustainable Development, 5*(4), 32–43.

Amaghionyeodiwe, L. A. (2019). Government expenditure on education and economic growth in ECOWAS countries. *International Journal of Economics and Finance, 11*(5), 112–122.

Bank, W. (2020). *World Development Indicators*. Washington, DC: World Bank.

Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy, 98*(5), 103–125.

Barro, R. J., & Sala-i-Martin, X. (1992). Public finance in models of economic growth. *Review of Economic Studies, 59*(4), 645–661.

Baum, A., Checherita-Westphal, C., & Rother, P. (2013). Debt and growth: New evidence for the euro area. *Journal of International Money and Finance, 32*, 809–821.

Bayman, S., & Dexter, K. (2021). Understanding multicollinearity in econometric modeling. *Applied Economics Letters, 28*(15), 1273–1277.

Behuria, P. (2021). Industrial policy in Uganda: A political settlements analysis. *Oxford Development Studies, 49*(1), 45–62.

Bonucchi, L., Federici, D., & Parisi, M. L. (2015). The impact of taxation on economic growth: A panel data analysis. *Economic Systems, 39*(2), 243–258.

Browning, E. K. (1976). The marginal cost of public funds. *Journal of Political Economy, 84*(2), 283–298.

Buda, G., & Ricz, J. (2023). Investment promotion and industrial policies in Uganda. *Journal of African Trade, 10*(1), 67–82.

Caner, M., Grennes, T., & Koehler-Geib, F. (2010). Finding the tipping point—When sovereign debt turns bad. *World Bank Policy Research Working Paper No. 5391*.

Chan, K. S., Wong, T., & Lee, C. (2022). Detecting multicollinearity: A comparative approach. *Journal of Applied Statistics, 49*(7), 1583–1599.

Checherita-Westphal, C., & Rother, P. (2012). The impact of high government debt on economic growth and its channels: An empirical investigation for the euro area. *European Economic Review, 56*(7), 1392–1405.

Chen, W., Karavias, Y., & Tzavalis, E. (2022). Unit root tests in small samples: A Monte Carlo study. *Econometrics and Statistics, 24*(2), 132–146.

Chudik, A., Mohaddes, K., Pesaran, M. H., & Raissi, M. (2017). Is there a debt-threshold effect on output growth? *Review of Economics and Statistics, 99*(1), 135–150.

Devarajan, S., Swaroop, V., & Zou, H. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics, 37*(2–3), 313–344.

Demir, A. (2022). Normality testing in econometrics: A comparative analysis. *International Journal of Economic Statistics, 8*(1), 21–37.

Ebaidalla, M. (2013). Causality between government spending and economic growth: Evidence from Sudan. *Journal of Economic Cooperation and Development, 34*(4), 61–76.

Eberhardt, M., & Presbitero, A. F. (2015). Public debt and growth: Heterogeneity and non-linearity. *Journal of International Economics, 97*(1), 45–58.

Egert, B. (2015a). Public debt, economic growth and nonlinear effects: Myth or reality? *Journal of Macroeconomics, 43*, 226–238.

Egert, B. (2015b). Debt and growth: Is there a robust non-linear relationship? *Economic Modelling, 48*, 248–265.

Elbadawi, I., Kaltani, L., & Schmidt-Hebbel, K. (2019). Why do countries have public debt? *Policy Research Working Paper Series, 4878*, World Bank.

Enkoro, M. (2016). Application of the ARDL model in small samples: Evidence from African economies. *African Journal of Econometrics, 7*(2), 88–104.

Esaku, S. (2021). Neoliberal reforms and industrialization in Uganda. *African Review of Economics and Finance, 13*(2), 65–84.

Gasparrini, A. (2021). Distributed lag models: Theory and applications. *International Journal of Epidemiology, 50*(3), 829–837.

Ggoobi, R. (2017). Industrial policy in Uganda: Challenges and prospects. *Economic Policy Research Centre Working Paper, 139*.

Ggoobi, R. (2020). Import substitution and fiscal policy in Uganda: Post-COVID strategies. *Uganda Economic Review, 28*(2), 55–78.

Ghosh, S., & Parab, P. (2021). Endogenous growth theory revisited: Lessons for developing economies. *Economic Modelling, 99*, 105491.

Gitana, M., Ristić, K., & Petrov, M. (2018). Government spending and growth: Evidence from the EU. *Economic Systems, 42*(1), 3–15.

Goel, A. (2023). Secondary data sources in industrial economics: Uganda's case. *African Statistical Journal, 36*(2), 102–115.

GoU. (2019). *Annual Budget Performance Report 2018/2019*. Kampala: Government of Uganda.

Goulder, L. H., & Summers, L. H. (1987). Tax policy, asset prices, and growth: A general equilibrium analysis. *Journal of Public Economics, 32*(1), 3–20.

Gregoriou, A., & Ghosh, S. (2009). The impact of government spending on growth: Empirical evidence from panel data. *Economic Research, 22*(2), 5–20.

Guesh, G. (1997). Public spending and economic growth: Evidence from Sub-Saharan Africa. *African Economic Policy Review, 5*(1), 21–39.

Hanssen, P., & Henrekson, M. (1994). Government size and growth: A survey and interpretation of the evidence. *Journal of Economic Surveys, 8*(1), 1–35.

Hatem, R., Zeidan, R., Goossens, C., & Moreira, R. (2022). Residual diagnostics in econometric modeling. *Applied Economics Letters, 29*(9), 734–740.

Hsieh, C. T., & Parker, J. (2007). Taxes and growth in Chile. *Journal of Public Economics, 91*(1–2), 75–91.

Huang, J., Chen, Y., Su, C. W., & Wu, T. P. (2020). Industrialization and economic self-reliance in developing countries. *Economic Modelling, 88*, 138–152.

Hussain, I., Haque, M., & Azam, M. (2012). Defense spending, taxation, and economic growth in Asia. *Journal of Asian Economics, 23*(1), 60–70.

Imbs, J., & Ranciere, R. (2015). Debt overhang: Cross-country evidence. *World Bank Economic Review, 29*(1), 23–45.

Jackson, M., & Jabbie, S. (2020). Fiscal policy responses to pandemics: Lessons for Africa. *African Development Review, 32*(S1), 72–90.

Jones, C. I. (2022). The facts of economic growth. *Handbook of Macroeconomics, 2A*, 3–69.

Kim, S., Lim, H., & Park, D. (2018). Government size and growth: Nonlinear relationships. *Economic Modelling, 72*, 239–254.

Kumar, M. S., & Woo, J. (2010). Public debt and growth. *IMF Working Paper, 10/174*.

Lee, Y., & Gordon, R. (2005). Tax structure and economic growth. *Journal of Public Economics, 89*(5–6), 1027–1043.

Liang, Z., Wang, Y., & Liu, S. (2024). Time series analysis methods in industrial economics. *Statistical Modelling, 24*(2), 125–144.

Liu, L., Wu, F., & Zhang, Y. (2008). Government expenditure and economic growth in China. *Journal of Macroeconomics, 30*(2), 350–362.

Lukwago, M. (2021). Fiscal expansion and industrialization in Uganda. *Uganda Journal of Economic Policy, 15*(1), 55–77.

Mazungunye, N. (2020). Industrialization in Sub-Saharan Africa: Opportunities and constraints. *Development Southern Africa, 37*(6), 935–950.

Maydeu, A. (2017). On the distribution of residuals in small samples. *Econometrics Letters, 9*(2), 67–74.

Mendoza, E., Milesi-Ferretti, G., & Asea, P. (1997). On the ineffectiveness of tax policy in altering long-run growth. *Journal of Public Economics, 66*(1), 99–126.

Mengistu, D. (2022). Fiscal policy and manufacturing growth: ARDL evidence from Ethiopia. *African Economic Policy Review, 14*(3), 45–65.

Nasir, M., & Morgan, P. (2025). Unit root testing and time series econometrics. *Econometrics and Statistics, 27*(1), 41–58.

Natsiopoulos, K., & Tzeremes, N. (2022). Bounds testing and cointegration in ARDL models. *Journal of Economic Modelling, 109*, 105789.

NPA. (2019). *National Planning Authority: Uganda Vision 2040 and NDP III (2020/21–2024/25)*. Kampala: Government of Uganda.

Olwor, B. (2023). Industrialization strategies and policy outcomes in Uganda. *Uganda Economic Journal, 34*(2), 145–167.

Opare, R. (2022). Public debt and economic growth: Evidence from Sub-Saharan Africa. *African Journal of Economic Policy, 29*(3), 87–103.

Patricia, A., & Izuhukwu, O. (2013). Government expenditure and economic growth: Evidence from Nigeria. *International Journal of Economics and Finance, 5*(1), 210–216.

Pattillo, C., Poirson, H., & Ricci, L. (2011). External debt and growth. *Review of Economics and Institutions, 2*(3), 30–67.

Poulson, B. W., & Kaplan, J. G. (2018). State income taxes and economic growth. *Cato Journal, 38*(1), 53–75.

Ranjan, K. D., & Sharma, C. (2008). Government spending and economic growth in India. *Economic Notes, 37*(2), 167–176.

Roşoiu, I. (2015). Government spending and economic growth: Evidence from Romania. *Procedia Economics and Finance, 32*, 526–533.

Rubin, J. (2025). Endogenous growth theory and technological innovation. *Journal of Economic Perspectives, 39*(1), 55–73.

Sankaran, C., Kumar, R., Arjun, S., & Das, P. (2019). Fiscal multipliers and industrial growth: Evidence from Asia. *Asian Economic Policy Review, 14*(2), 233–251.

Sedrakyan, L., & Candamio, L. (2019). Government spending and economic growth: Evidence from Armenia and Spain. *International Journal of Economic Policy, 16*(2), 89–107.

Sendi, J., Kaggwa, J., & Mugisha, E. (2022). Uganda's manufacturing sector: Challenges and opportunities. *Makerere Journal of Business and Management, 18*(1), 23–45.

Sokbae, L., Shin, Y., & Schmidt, P. (2017). Threshold effects of debt on growth: Panel evidence. *Journal of Econometrics, 198*(2), 234–251.

Stoilova, D. (2017). Tax structure and economic growth: Evidence from the European Union. *Contemporary Economics, 11*(1), 103–118.

Suleiman, M. (2019). Variance inflation factors in applied econometrics. *Journal of Applied Statistics, 46*(7), 1311–1324.

Szarowska, I. (2014). The effects of taxation on economic growth: Panel data analysis for EU countries. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 62*(4), 653–661.

Tosun, M. S., & Abizadeh, S. (2019). Economic growth and tax components: An analysis of OECD countries. *Applied Economics, 51*(5), 567–577.

Turrisi, G., Cigada, A., & Zappa, G. (2022). Cointegration analysis in economic time series. *Journal of Time Series Econometrics, 14*(3), 345–367.

Udo, U., Akpan, I., & Effiong, J. (2016). Government expenditure and economic growth in West Africa. *African Development Review, 28*(4), 543–556.

Usman, A., Mobolaji, H., Kilishi, A., & Yaru, M. (2011). Government expenditure and growth nexus in Nigeria: An empirical analysis. *Research Journal of Finance and Accounting, 2*(2), 45–54.

Vartia, L. (2008). How do taxes affect investment and productivity? *OECD Economics Department Working Paper No. 656*.

Wolff, P. (2020). Uganda's industrial development: Regional comparisons and lessons. *Journal of African Economies, 29*(2), 112–134.

World Bank. (2018). *World Development Indicators*. Washington, DC: World Bank.

Wu, S., Tang, J., & Lin, E. (2010). Government expenditure and economic growth: A causality analysis. *Journal of Applied Economics, 12*(2), 23–41.

Ye, Y., Gao, X., Fang, Y., Liu, Y., & Chen, M. (2021). Endogenous growth theory and technological knowledge creation. *Economic Research Journal, 56*(5), 87–105.