Financial Development and Industrial Output in Rwanda

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Abstract: - The study investigated the effect of financial development on industrial output in Rwanda since 2011-2022 pertaining that the significance of financial development and its function in financial intermediation has been contentious and financial development has played a major part in the growth of industrial output over decades and has assumed a prominent place in the economy. The study adopted e*x post facto* design. Ordinary Least Squares (OLS) were also adopted. Findings revealed that financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization and all share index jointly influenced positively industrial output ($Adj.R^2$ = 80.76%, p = 0.006702 < 0.05, F-stat = 10.23831) in Rwanda. The study concluded that financial development positively affected industrial output in Rwanda during the period under review. It is recommended that the government of Rwanda should still improve on financial development as there is still room for improvement in order to attain greater industrial output.

Key-words: - All share index, domestic credit to private sector, financial liberalization, industrial output, market capitalization, monetary policy rate

Received: June 2, 2025. Revised: September 23, 2025. Accepted: October 22, 2025. Published: February 5, 2026.

1 Introduction

It is undeniable that the industrial sector is typically seen as the engine of economic growth, the significance of its output in promoting sustainable economic growth has long been established. In the case of Rwanda, industrial output appears to have implemented the right policies and initiatives to produce the anticipated growth output in the industry sector.

According to World Bank [1], global financial conditions have tightened sharply, with risk appetite dampened by slowing global economic performance, persistently elevated inflation, and faster than expected monetary tightening. Aligning it with Hiroyuki and Masahiro [2], the effect of financial development on economic performance was recognized and has long been the subject of enquiry in the field of finance related to macroeconomic factors.

Numerous academic studies have underlined how important financial development is for boosting the economy by fostering investments, industries, the distribution of loanable funds, and wealth accumulation. However, because it has become increasingly important in financial development and has taken center stage in recent decades in terms of economic performance, the significance of financial development and its role in financial intermediation have generated controversy [22], [23] and [24].

Similarly, World Bank [1], documented that global economic performance decelerated to the point where, just three years after emerging from the pandemic-induced recession of 2020, the world economy is dangerously close to entering a recession, which is defined as a decline in annual global per capita income. Due to a dramatic decline in confidence, high inflation, and swift monetary policy tightening, economic performance conditions in advanced economies have deteriorated [1].

Due to tighter monetary policy and less fiscal stimulus than anticipated in the October 2021 forecast, the US economy was predicted to perform 1.5 percent worse in 2022. China's and the euro area's economic prospects have also declined, with growth estimates for 2022 and

2023 being lowered by roughly 1.5 and 1.2 percentage points, respectively [3].

In emerging markets and developing economies, economic growth prospects have significantly deteriorated, as indicated by the downgrade of the 2023 forecast by 0.8% point to a muted 3.4%. A major contributing factor to the downward revision is the tighter financing conditions and decreased external demand. Low-income countries are expected to grow 5.1% in 2023, with forecasts downgraded in about 65% of countries [1].

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In Nigeria, growth was predicted to peak at 3.4 percent in 2022 and then revert to 2.9 percent starting in 2024 [4]. Projected to stay high at 16.9% in 2022 and above pre-pandemic levels in 2023, rising food, diesel, and gas prices along with ongoing supply disruptions exacerbated by the conflict between Russia and Ukraine were the main causes of inflation [5]. In Tanzania, inflation stood at 3.3 percent in 2020 and 3.7 percent in 2023 due to tight monetary policies [6]. In 2020-2021, the value of the Tanzanian shilling barely decreased by 0.2% in relation to the US dollar [7].

Over time, the Rwandan financial system changed from being almost entirely dependent on financial intermediaries to, more recently, having a developing and reasonably active financial market. A variety of organizations, marketplaces, and financial infrastructure makeup Rwanda's financial sector [7]. These included 16 banks, 14 insurance companies, 459 microfinance companies, 13 pension plans, 97 foreign exchange dealers and remittance companies, and four lending-only registered institutions [7].

Moreover, at the end of June 2020, the total assets of these institutions in Rwanda were $5.865 billion, or 63 percent of GDP. The combined assets of conventional financial institutions, which include insurance, pensions, microfinance, and banks, were $5.834 billion, or roughly 62% of GDP. A crucial part of the Rwandan financial system is the capital market, which is overseen by the Capital Market Authority, or CMA [7].

On the same note, a strong legal and regulatory framework, and other measures have laid a strong foundation. With a market capitalization of US$ 3.31 billion as of December 2019, it accounted for 41% of Rwandan GDP. Even with its strong performance, the Rwanda Stock Exchange is still in its infancy and sees few transactions, which means that the banking industry since then and now is the major source of businesses funding [7].

The Financial Stability Committee reported that the banking sector remained dominant with 67.2 percent in 2021 and 67.3 percent in 2020 despite global pandemic. However, the cost of COVID-19 kept the fiscal deficit high in 2021 at 7.1% while the policy rate was raised to 5% to address anticipated spikes in inflation [6]. Even though it fell 2.6% versus the dollar in 2021, the Rwandan franc remained comparatively stable. In 2021, the debt-to-GDP ratio increased to 74.6% from 71.2% in 2020, but remained moderately compared to the threshold [6].

In 2024, the Composite Index of Economic Activities (CIEA) grew by 14.5 percent, reflecting Rwanda's strong economic performance in 2024. This robust growth was driven by both services and industry sectors, whose total turnovers increased by 12.0 percent. The growth in the industry sector in 2024 was primarily driven by robust performance in mining and quarrying, which capitalized on favorable international market prices. Additionally, the manufacturing sector saw gains, spurred by rising domestic demand, especially in textiles, printing products, and construction materials. The construction sector also experienced significant growth, fueled by ongoing infrastructure projects. Consequently,

industrial production showed substantial expansion, as reflected in the index of industrial production, which increased by 13.6 percent in 2024, up from 3.6 percent in 2023 [25].

Rwanda's economy maintained a strong growth momentum in 2024, expanding by 9.2 percent on average during the first three quarters. This growth was spurred by the good economic performance observed across all sectors. The services sector was the primary driver of Rwanda's economic growth in 2024, expanding by 10.3 percent and contributing 5.1 percentage points to overall GDP growth. This strong performance was mainly driven by robust growth in trade services and tourism-related activities, particularly transport, hotels, and restaurants, as well as information and communication and financial services [25]. Therefore, the study on financial development and industrial output in Rwanda is crucial.

1.1 Statement of the Problem

The industry sector recorded a growth of 11.2 percent, contributing 2.1 percentage points to the overall growth and all its sub sectors performed well in 2024. The most significant expansion was observed in the construction subsector, supported by the good implementation of infrastructure projects. Manufacturing industries benefited from increased domestic demand, mainly from cereal processing, textiles, wood-paper printing, chemicals, and metal production. Mining and quarrying activities were supported by high mineral prices on the international market [25]. Though the industrial sector performed well, its contribution to the GDP growth is still small.

In November 2023, the industrial output in the formal sector decreased by 6.2 percent compared to November 2022 [8]. According to the Index of Industrial Production (IIP), manufacturing output fell by 8.3% in June 2020 as compared to June 2019. The decline in manufacturing can be attributed primarily to the following: 16.9% less production of tobacco and beverages; 49.4% less production of textiles, apparel, and leather goods; 16.9% less production of non-metallic mineral products; and 9.4% less production of chemicals, rubber and plastic products [9]. Therefore, a study on the effect of financial development on industrial output in Rwanda is vital.

2 Literature Review

2.1 Financial Development

According to World Bank [10], financial development is the term used to describe long-term structural adjustments made to machinery and mechanisms that improve the effectiveness and efficiency of the transfer of funds from savers to investors and all other auxiliary processes that influence the transformation of financial resources into actual productive resources. The concept also comprises the financial products' dependability, comfort, continuity, and adaptability [10].

In the same line, financial development is therefore described by the World Bank [10], as the improved efficiency that results from lower costs for a nation's financial system to carry out these tasks; it can be categorized as an improvement in the financial system's accessibility, depth, efficiency, and stability. It has been explained to include reliability, convenience, continuity, and flexibility of financial product in the financial market [11].

However, according to IMF [12], regardless of considerable progresses in the basic measures of financial development over time, such as the ratio of broad money to GDP and private sector credit to GDP, sub-Saharan Africa still lags behind compared to other regions in terms of financial development. Poor financial infrastructure, among other things, has played a slight role in the region's financial systems.

From the foregoing, this study conceptualizes financial development as the financial policy driven mechanisms and process that enhance the efficiency and effectiveness of the financial sector, both money market and capital market that constitute Rwanda financial system to stimulate and sustain accelerated performance of a post-crisis economy in Rwanda.

2.2 Industrial Output

The total production of the economy's industrial establishments, including mining, manufacturing, electricity, gas and steam, and air conditioning, is referred to as the industrial sector output [13]. This indicator, which expresses change in the volume of production output, is typically measured as an index based on a reference period. Stated differently, the output of the industrial sector which generally consists of mining, manufacturing, utilities, and, occasionally, construction is measured by industrial production. Typically, it is interpreted as an index in terms of volume [14].

Thus, the change in the volume of industrial output relative to the prior year is reflected in the annual variation in industrial production as a percentage. This means that since the production of capital goods and consumer durables is likely to decline during a downturn in the economy, annual variations in industrial production offer insight into the state of the economic cycle. Because of its sensitivity to interest rates and consumer demand, the industrial sector which makes up a relatively small portion of the total output of an economy is a leading indicator of GDP growth and economic performance [14].

Because the marginal revenue products of labor in industries are typically higher than those in the agricultural sector, industries are a significant indicator of economic growth. For example, claimed that labor force migration from the agricultural to the industrial sectors raises labor's marginal product in the agriculture sector, which in turn affects the nation's overall output and revenue [15].

2.3 Theoretical Review

2.3.1 Endogenous Growth Theory

The endogenous growth theory as propounded by Romer [16] and Lucas [17] is adopted in this study. According to the endogenous growth theory, economic performance is enhanced by a strong financial sector, and policy actions can eventually affect the rate of economic growth. Romer [16] and Lucas [17] both emphasized the endogenous growth theory opining that human capital is an important element in explaining growth. It buttresses how the workforce with greater knowledge, education and training can help to increase the rate of technological advancements.

Information, innovation, and human capital investments are key drivers of economic growth, according to the endogenous growth model. The model also highlights how the positive externalities and spillover effects of a knowledge-based economy can promote economic growth. The model can be written as:

$Y = A\ (R)\ f\ (R_j\ K_j\ L_j)$

Where,

Y = Output growth

K_j = Stock of physical and human capital

R = Aggregate stock of knowledge

L_j = Stock of labor

R_j = Stock of research and development expenditures A country with initial higher level of K, experiences a higher rate of growth as human capital has increasing returns to scale, leading to a higher level of growth of capital income. The rate of growth depends on the type of capital a country invests in.

In support of the theory, Howitt [18] opined that there are reasons to believe that technological progress can depend on economic decisions of economic agents. In the endogenous growth theory, technology progress is seen as the core determinant of long run economic growths. Hence, technological progress becomes endogenous in endogenous growth theory.

The endogenous growth theory was criticized by Comin and Mulani [19], contending that the endogenous growth theory abstract from reality wrongly by assuming the symmetry of sectors in the economy or that there is a single product market. Inefficiencies arising from poor infrastructure, institutional inadequacies and perfect markets, institution and transaction costs are some common variables that impede economy growth in developing economies.

The theory is related to the study in a way that Rwanda is advancing in technology with also no

much resource, the financial development in Rwanda relies on its population as human capital. Therefore, the economic performance is derived from internal sources with aid of human capital and technology. Hence the endogenous growth theory.

2.4 Empirical Review

Ughulu [14], carried out a study on the relationship between industrial output and economic growth in emerging economies. Descriptive statistics, unit root and co-integration tests, long- and short-term analyses, and the error correction model (ECM) of econometrics were used in this study, which included evidence from Nigeria. These estimation procedures produced empirical results that were very informative. For example, there was a weak positive correlation between economic growth and the output of the industrial sector, given the magnitude of the effects. The country's current low level of industrial activity can be attributed to the negative relationships that capital expenditure and lending rates have on industrial output. The paper's stability test revealed a significant structural stability, confirming that the results have called for suitable policy options to achieve the targeted patterns of output growth in the industrial sector.

Another study by Oyebanji, Aderounmu and Ewert [20], researched on how industrialization affected Nigeria's economic growth. The long-term relationship and causality among variables are ascertained by applying the Granger causality test and the Johansen co-integration test. Real gross domestic product (GDP) is significantly impacted by industrial output, both directly and collectively, to the tune of 86%. It was also established that industrial output has a unidirectional causal impact on real GDP.

Sankaran, Vadivel and Abdul [21], conducted a stud in India as one of the fastest-growing nations in the world on the impact of dynamic variables on industrial output. The population, industrial production, agricultural output, exchange rate, export, oil price, and gross fixed capital formation were all taken into account in this study. The research utilized the Granger causality test-based error correction model, the ADF and PP unit root tests, and the Johansen co-integration test. According to this study, population, exports, and agricultural output drove manufacturing output. The primary influence that agricultural output had on manufacturing output indicated that, in the case of the rapidly expanding Indian economy, the agricultural sector continues to be the engine of economic development in general and manufacturing output in particular.

3. Material and Methods

As per study design, this study used annual time series and *ex post facto* design was used as secondary data sourced from World Bank, National Bank of Rwanda Statistical Bulletin and Rwanda Stock Exchange to determine the effect of financial development on industrial output in Rwanda over a period of 12 years spanning from 2011 to 2022.

3.1 Method of data analysis

The study used descriptive analysis and as well as inferential analysis to establish the effect of financial development on industrial output in Rwanda. The study used Ordinary Least Squares (OLS) and appropriate diagnostic tests such as normality, autocorrelation, heteroskedasticity, multicollinearity and stability test were used.

3.2 Model for investigating the effect of financial development on industrial output in Rwanda

The study adopted the econometric model where industrial output was regarded as dependent variable and financial development (financial liberalization, credit to private sector, monetary policy rate, market capitalization and all share index) were treated as independent variables. Hence, the model:

$INDO_t = (FL_t + DCPS_t + MPR_t + MC_t + ASI_t)$

The algebraic form of the econometric model shows the relationship between the variables. In

this case, industrial output was treated as linear function of financial development**.** Hence, the model:

$INDO_t = \alpha_0 + \alpha_1 FL_t + \alpha_2 DCPS_t + \alpha_3 MPR_t + \alpha_4 MC_t + \alpha_5 ASI_t + \mu_t$

Similarly, some variables were in natural log while others were not in the natural log. The reason to log some variables it is because variables have different units of measurement. Rates and percentages were not transformed. Hence, the natural log abate the likelihood of the variables prone to heteroskedasticity (Gujarati, 2013). Hence,

$LnINDO_t = \alpha_0 + \alpha_1 FL_t + \alpha_2 DCPS_t + \alpha_3 MPR_t + \alpha_4 MC_t + \alpha_5 lnASI_t + \mu_t$

Where:

INDO = Industrial Output

FL = Financial Liberalization

DCPS = Domestic Credit to Private Sector

MPR = Monetary Policy Rate

MC = Market Capitalization

ASI = All share index

Ln = Natural logarithm

t = number of observations

α_0 = Intercept, the mean value of the response variable when all independent variables are equal to zero.

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ are the coefficients or parameters to be estimated.

μ = Error Term: the deviation results from random variable represented in the model, which accommodates influences of other variables not explicitly included in the model.

3.3 A'*priori* Expectation

The *a' priori* expectation predicted that a unit increase in financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization and all share index leads to a unit increase in industrial output.

Table 1: A' *priori* expectation

Model	**Expected sign on INDO**
$LnINDO_t = \alpha_0 + \alpha_1 FL_t + \alpha_2 DCPS_t + \alpha_3 MPR_t + \alpha_4 MC_t + \alpha_5 lnASI_t + \mu_t$	$\alpha 0, \alpha 1, \alpha 2, \alpha 3, \alpha 4, \alpha 5 > 0$

Source: Researcher's compilation, 2025

4 Results and Discussion

The study investigated the effect of financial development on industrial output in Rwanda for a period of 12 years spanning from 2011-2022.

Table 3: Descriptive Statistics

Descriptive Statistics	**FL**	**DCPS**	**MPR**	**MC**	**LASI**	**INDO**
Mean	2.7317	20.567	12.508	31.426	2.1000	8.8500
Median	2.9754	20.800	12.515	33.500	2.1000	8.8250
Maximum	3.8110	28.600	17.670	47.060	2.2000	9.0300
Minimum	1.5001	13.270	8.3300	17.000	1.9000	8.7200
Std. Dev.	0.8248	4.3993	2.9486	8.8644	0.1044	0.1087
Skewness	-0.2045	0.1224	0.2059	-0.1120	1.0000	0.4539
Kurtosis	1.6765	2.3533	2.2159	2.3581	3.0000	1.7410
Jarque-Bera	0.9593	0.2400	0.3922	0.2311	2.0000	1.2004
Prob.	0.6189	0.8869	0.8219	0.8908	0.3678	0.5475
Sum	32.781	246.81	150.10	377.12	25.200	106.20
Sum Sq. Dev.	7.4847	212.89	95.638	864.35	0.1200	0.1302
Observations	12	12	12	12	12	12

Source: Source: E-views computation, 2025

Note: A ratio of DCPS to GDP and a ratio of MC to GDP.

The descriptive statistics of the variables adopted in the analysis of the sample was vital for the study. Table 3 presents the descriptive statistics of the data series used in the analysis.

The mean of financial liberalization showed that over 12 years since 2011-2022, the financial liberalization which is capital inflows over GDP was 2.7317 which is high meaning that capital inflows is high in Rwanda. The average mean for domestic credit to private sector was 20.567, implying that Rwanda gives credit to private sector at a considerable extent. The average mean for monetary policy rate was 12.508, implying that monetary policy rate in Rwanda is tight.

Averagely, market capitalization in Rwanda was $31.42 billion implying that market capitalization in Rwanda is improving considering that Rwanda Capital Market started in 2011. Though Rwanda Capital Market is still at infant level but, there is a significant improvement according the study findings. All share index also is improving as per study findings. On the average, industrial output is 8.8500 billion of USD. The industrial output is still small and there is always room for improvement by improving the financial development.

Financial liberalization reached 3.8110 value as maximum ratio of capital inflows over gross domestic product and 1.5001 minimum value of ratio of capital inflows over gross domestic product. Domestic credit to private sector reached its maximum of 28.6 as a ratio to GDP for the period of the study and 13.270 minimum value of DCPS to GDP ratio for the period of the study.

Monetary policy rate reached a maximum of 17.670% for the period of the study and 8.3300% minimum value of monetary policy rate for the period of the study. Market capitalization to real gross domestic product reached the maximum value of 47.060 and a minimum value of 17.000 for the period of the study. Industrial output reached a maximum of $9.0300 billion for the period under review.

The Jarque-Bera statistic indicated in the table above shows that financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization, all share index and industrial output are normally distributed. This is due to the assumption rule that if the probability of Jarque-Bera statistics is greater than 0.05.

Table 4: Financial development and industrial output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.908281	0.380397	23.41838	0.0000
FL	-0.014537	0.018510	-0.785373	0.4621
DCPS	0.030149	0.005502	5.479250	0.0015
MPR	-0.000444	0.005134	-0.086493	0.9339
MC	-0.005021	0.002006	-2.502780	0.0464
LASI	-0.226341	0.229184	-0.987595	0.3615
R-squared	0.895089	Mean dependent var		8.850000
Adjusted R-squared	0.807664	S.D. dependent var		0.108795
S.E. of regression	0.047713	Akaike info criterion		-2.940360
Sum squared resid	0.013659	Schwarz criterion		-2.697906
Log likelihood	23.64216	Hannan-Quinn criter.		-3.030124
F-statistic	10.23831	Durbin-Watson stat		1.814951
Prob(F-statistic)	0.006702			

Source: Source: E-views computation, 2025

Interpretation

$LINOP_t = 8.908281 - 0.014537FL_t + 0.030149DCPS_t - 0.000444MPR_t - 0.005021MC_t - 0.005021LASI_t + \mu_t$.

Table 4 shows the regression analysis of how financial development affect industrial output. The results of the explanatory variables of financial liberalization (FL), domestic credit to private sector (DCPS), monetary policy rate (MPR), market capitalization (MC) and all share index (LASI) affect industrial output. The probability of the t-test was used in determining the statistical significance of the effect of each indicator on industrial output (INOP) at 5% level of significance.

As per the findings, financial liberalization (FL) had a p-value of 0.4621, domestic credit to private sector (DCPS) had a p-value of 0.0015, monetary policy rate (MPR) had a p-value of 0.9339, market capitalization (MC) had a p-value of 0.0464 and all share index (LASI) had a p-value of 0.3615. This implies that domestic credit to private sector (DCPS) and market capitalization (MC) significantly affected industrial output since the p-values were less than 0.05 level of significance. On the contrary, the results indicated financial liberalization (FL), monetary policy rate (MPR) and all share index (LASI) do not affect industrial output.

The magnitude and direction of the effect of each of the explanatory variables of financial development, as estimated, revealed positive and negative effects on industrial output as some had a positive coefficients and others negative coefficients. The findings showed that financial liberalization (FL) and domestic credit to private sector (DCPS) exerted a positive effect while MPR, MC and LASI exerted a negative effect (β_1 = -0.014537, t = -0.785373 and p-value = 0.4621; β_2 = 0.030149, t = 5.479250 and p-value = 0.0015; β_3 = -0.000444, t = -0.086493 and p-value = 0.9339; β_4 = -0.005021, t = -2.502780 and p-value = 0.0464; β5 = -0.226341, t = --0.987595 and p-value = 0.3615) respectively. The findings suggest that a percentage change in FL, DCPS, MPR, MC and ASI will lead to -0.014537, 0.030149, -0.000444, -0.005021 and -0.226341 percentage change in industrial output. $AdjR^2$ measures the composition of the explanatory variables of financial development. In the effect, the values of the coefficient of the combined explanatory variables of financial development based on the adjusted R-square revealed 0.807664 this implies that the combined variations in financial development (FL), domestic credit to private sector (DCPS), monetary policy rate (MPR), market capitalization (MC) and all share index (ASI) resulted in 80.76% changes in industrial output (INDO), while the remaining changes of 19.24% resulted from other factors which are not captured by the model of the study.

Furthermore, the findings of the joint explanatory variables of financial development based on the results of the p-value representing five constructs of independent variable for a period of 12 years had a p-value of 0.006702 < 0.05 and F-statistic of 10.23831; implying that all the explanatory variables as financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization and all share index jointly had a positive and significant effect on industrial output. Thus, the study concludes that financial development affect positively industrial output in Rwanda.

As per discussion, the findings of the study revealed that financial management affect positively industrial output. The results showed that domestic credit to private sector (DCPS) and market capitalization (MC) significantly affected industrial output since the p-values were less than 0.05 level of significance. On the contrary, the results indicated financial liberalization (FL), monetary policy rate (MPR) and all share index (LASI) do not affect industrial output.

All the explanatory variables as financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization and all share index jointly had a positive and significant effect on industrial output. Thus, financial development affect positively industrial output in Rwanda. The findings of financial

liberalization, monetary policy rate, market capitalization and all share index on industrial output negated the *a priori* expectations. However, the findings of domestic credit to private sector on industrial output were in line with the *a priori* expectations. The findings of the study were in line with Ughulu [14], revealing that there existed a positive relationship between industrial sector output and economic growth.

The findings were supported by the endogenous growth theory as developed by Romer [16] and Lucas [17] assumes that a robust financial sector promotes economic growth and that policy decisions may eventually affect the rate of economic growth. Romer [16] and Lucas [17] Both highlighted the endogenous growth theory and held the view that a key component in growth explanation is human capital. It supports the idea that a workforce with higher levels of education, training, and experience can contribute to accelerating technological advancements.

Table 5: Diagnostic Tests

Test	**Coefficient**	**Decision**
Normality test	Jarque Bera (0.690152)	Normally distributed
Multicollinearity test	Variance Inflation (1.872298)	No multicollinearity
Heteroskedasticity test	Breusch-Pagan (0.5446)	No heteroskedasticity
Autocorrelation test	Breusch-Godfrey (0.5663)	No serial correlation
Stability test	Ramsey regression equation specification (0.2088)	Stable

Source: E-views computation, 2025

Given that the P-value is 0.690152 and the probability value of Jarque-Bera is greater than 0.05 based on the above result, the study does not reject the null hypothesis, which is that the residuals are normally distributed. The interpretation is not erroneous since the results demonstrate that the residuals of our model are normally distributed, which is in accordance with the guideline that the residuals should follow.

In order to ascertain whether there was sufficient and adequate evidence that multicollinearity existed and was a cause for concern, the researcher used the VIF test. Given that the VIF factor was less than 5 and that the recommended tolerance or acceptable value is 5, the results clearly indicated that multicollinearity was not a problem. Hence, there multicollinearity among the variables was not present.

The study conducted a Breusch-Pagan test to determine if heteroskedasticity existed (Gujarati, 2014). The null hypothesis is rejected when the p-value is less than the level of significance (0.05) which means that there is evidence of heteroskedasticity in the model. The findings of the study revealed that the p value at 0.5446 was higher than 0.05 which means that the study did not reject the null hypothesis and thus there was no heteroskedasticity.

The Breusch-Godfrey tests for the presence of serial correlation if present. From the findings, the p-value (0.5663), which is greater than the significance level (0.05) and hence the study accepted the null hypothesis that no serial correlation. These findings show that there is no serial correlation among the variables. Finally, the Ramsey regression equation specification test is a general specification test for the linear regression model. It specifically test whether non-linear combinations of the explanatory variables can explain the outcome variable. The Ramsey regression equation specification test (RESET) for this study was 0.2088 which is greater than the cut-of (0.05). Hence, the expletory variables of this study explains the response variable. Thus, there was stability in the model.

5 Conclusion and Recommendations

The role of financial development in the economy cannot be underrated as it influences the development every sector particularly industrial sector. Hence, the study concluded that financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization and all share index jointly affect positively industrial output in Rwanda. The study recommended that the Government of Rwanda should continue to support domestic industries by offering tax incentives to the local industries in a way of promoting local manufacturing firms. In the same vein, other studies can be done on financial sector development and industrial output in Sub-Saharan Africa. Further research can be done also to see what influences each sector in Rwanda, such as service sector, tourism sector and baking sector in relation to financial sector development.

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