

The Effect of Financial Development on Inflation Rate in Rwanda

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Abstract: - A well-developed financial system plays an important role in the economic performance of a country. Thus, the role of financial development and its functions in stimulating economic performance is concrete. However, the economy of Rwanda has experienced an accelerated inflation rate in recent times. The study adopted an *ex post facto design* to ascertain the effect of financial development on the inflation rate in Rwanda over a period of 12 years. Time series data were collected from 2011-2022. Ordinary Least Squares (OLS) were also adopted. The findings revealed that financial liberalization, domestic credit to the private sector, monetary policy rate, market capitalization, and all share indexes jointly did not influence the inflation rate in Rwanda ($Adj.R^2 = 14.39\%$, $p = 0.3524 > 0.05$, F-stat = 1.3699). The study concluded that financial development did not affect the inflation rate in Rwanda during the period under review. The study recommends that the government of Rwanda should improve on financial development through improving macroeconomic factors such as liberalization of the financial sector and strengthening the channels of credit to the private sector.

Key- Words: - All Share Index, Domestic Credit to Private Sector, Financial Liberalization, Market Capitalization, Monetary Policy Rate, Inflation Rate.

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1 Introduction

Controlling inflation is one of the major macroeconomic issues African countries have been working on in recent times. This is based on the evidence that a high inflation rate weakens the economic growth in the emerging market. According to [1], at the global level, financial conditions have tightened significantly with a persistently high level of inflation, slower than expected global economic growth, and quicker than expected monetary tightening all reducing risk appetite. Aligning it with [2], it has been recognized that the importance of financial development on economic growth has long been the subject of inquiry in the field of finance related to macroeconomic factors.

Scholars such as [3], [4] and [5], have emphasized the significance of financial development in stimulating economic performance through

promoting industries, investments, the distribution of loanable funds, and the accumulation of wealth.

Similarly, [1], reported that the pace of the world economy has slowed to the point where after 3 years from the global pandemic, the world economy was dangerously close to entering a recession. Due to a dramatic decline in confidence, high inflation, swift monetary policy tightening and economic performance conditions in advanced economies have deteriorated, [1]. Low-income countries are expected to grow 5.1% in 2023, with forecasts downgraded in about 65% of countries, [1].

Due to tighter monetary policy and less fiscal stimulus than was 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, [6].

In Nigeria, growth was predicted to peak at 3.4 percent in 2022 and then revert to 2.9 percent starting in 2024, [7]. 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, [8]. In Tanzania, inflation stood at 3.3 percent in 2020 and 3.7 percent in 2023 due to tight monetary policies, [9]. In 2020-2021, the value of the Tanzanian shilling barely decreased by 0.2% about the US dollar, [9].

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 make up Rwanda's financial sector, [10]. 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, [10].

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, [10].

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 Rwanda's GDP. Even with its strong performance, the Rwanda Stock Exchange is still at its infancy level and sees few transactions, which means that the banking industry since then and now is the major source of business funding, [10].

However, as other sectors grow, the banking sector's share has been steadily declining, compared to years when it was much higher. For example, in 2010 it held a 71% share. These other industries have enhanced the financial services provided by banks and have even made credit to private sector portfolios more dynamic. Examples of these industries include the agricultural sector and small and medium-sized

businesses that previously struggled to get credit because of things like collateral problems, [11].

Increases in services (12%), industry (13%), and agriculture (6%), were the main drivers of growth. After declining by 5.9% in 2020, Rwanda's GDP per capita increased by 7.4% in 2021. During that time, inflation decreased from 7.7% to 0.8%, mostly as a result of low food prices. Monetary policy remained accommodating, with the policy rate held at 4.5% from May 2020 to February 2022 to support economic recovery, [12].

The Financial Stability Committee reported that the banking sector remained dominant with 67.2 percent in 2021 and 67.3 percent in 2020 despite the 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, [12]. 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, [12]. Therefore, the study on financial development and inflation rate in Rwanda is crucial.

1.1 Statement of the Problem

According to [13], financial system development has a substantial impact on economic performance and stability. Countries with a sufficient level of financial sector development are most likely not affected by the global financial crisis at any point in time. That is why emerging countries are considerably more severely hit by financial crises than developed countries.

In September, 2023; the annual inflation rate accelerated to 18.4% compared to August's 17.4%, mainly due to soaring prices of food & non-alcoholic beverages (+33.1% vs +30.8%), notably vegetables (+53.5%), [14]. Additional upward pressure came from other CPI items, such as education (+13.9%, matching August's reading); alcoholic beverages, tobacco, narcotics (+11.4% vs +11.8%), and restaurants & hotels (+10.2% vs +10.6%). Every month, consumer prices jumped by 4% in September, the most in nearly a year, after a 1.2% rise in the previous month, [14].

Besides, a few studies such as [10], researched financial sector development and found out that using the financial development index, the effect of financial development on the inflation rate is almost absent. [15], also carried out a study in Rwanda on

financial development and economic growth in respect of real gross domestic product and the empirical analysis was built on quarterly data covering the period 2000Q1-2015Q4. Another study by [16], on financial development and economic growth in Rwanda and a study by [17], on the financial sector in Rwanda found that in the short run, financial development was measured by credit to the private sector, and money supply is insignificant. Another study by [18], on financial sector development and economic growth which focused on non-performing loans found that domestic credit to the private sector accounts for 36.28 percent of the fluctuations in real output growth in the first four quarters, and increases to 54.47 percent after eight quarters and 58.83 percent after 20 quarters.

To the researcher's knowledge, these few studies have examined the nexus between financial development on macroeconomic factors in the context of Rwanda and the current study investigated the effect of financial development on the inflation rate by measuring financial development using financial liberalization, monetary policy rate, domestic credit to private sector, market capitalization and all share index as proxies. Therefore, a study on the effect of financial development on the inflation rate in Rwanda is crucial.

2 Review of Literature

2.1 Financial Development

According to [19], 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, [19].

In the same line, financial development is therefore described by the [19], 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 products in the financial market, [11].

2.1.1 Financial Liberalization

Financial liberalization according to [20], basically calls for the financial system's constraints to be lifted. It also encompasses actions intended to weaken or eliminate regulatory oversight of the various financial sector agents' actions, instruments, and institutional frameworks. These may be associated with measures of liberalization, both internal and external.

In the same vein, [21], the secret behind stock market liberalization is to increase risk sharing between foreign and domestic investors by calculating the percentage of foreign ownership of listed equities on the local exchange. As per [22], different times and places around the world saw the start of the financial liberalization practice; unquestionably, the progress of financial liberalization contributes significantly to the world economy.

2.1.2 Domestic Credit to Private Sector

As defined by [23], domestic credit to the private sector is the financial resources that other depository corporations aside from central banks as deposit-taking corporations lend to the private sector. Examples of these financial resources include trade credits, purchases of non-equity securities, loans, and other accounts receivable that create a claim for repayment.

[24], highlighted private sector credit as the financial institutions that borrow money or any other form of financial instruments for repayment to the private sector. [25], views domestic credit to the private sector as being in line with deposit money banks, which take deposit liabilities and provide credit facilities to those who require them. While stock markets do not provide credit facilities, they do serve as a means for individuals to purchase shares of publicly traded companies and thereby become owners of a portion of the business.

2.1.3 Monetary Policy Rate

According to [26], a tool used by central banks to control, regulate, and stabilize the amount, cost, availability, and flow of credit in an economy is monetary policy rate (MPR). Its goals are to achieve specific macroeconomic policy objectives and to counteract any negative trends in the economy. The

monetary policy rate acts as a tool to achieve the financial stability of a country.

Monetary policy rate (MPR) is the rate used to regulate money in circulation at any given time, [27]. The truth is that the Monetary Policy Committee (MPC) frequently uses the communiqué technique to alert the market to a price spike. Instead of raising the headline rate of the monetary policy itself, a communicate is released to maintain rates on hold to maintain the current growth trajectory, [27].

2.1.4 Market Capitalization

According to [28], a market share price of a company is multiplied by its share price to determine its market capitalization. Large-cap firms are regarded as lower-risk investments because they typically possess more capital and assets. Small-cap companies typically have greater room for expansion and offer investors more chances to make capital gains.

Market capitalization is measured at the company level and it represents the whole wealth of a stock market, [29]. As also argued by [30], the primary function of the stock market is to act like a financial institution. This makes capital formation and distribution more feasible, gives governments and businesses the ability to increase long-term investments to fund new initiatives, and boosts other operations.

2.1.5 All Share Index

According to [31], investors and financial analysts use stock market indices as a tool to compare the returns on various investments and to characterize the market. One way to gauge the worth of a segment of the stock market is through the use of stock indices. A market index monitors the performance of a particular stock basket that is thought to represent a certain market or economic sector.

As per [32], to finance new projects, governments and companies can raise long-term capital through the stock market, which also helps them modernize and expand their industrial and commercial concerns. The ability of the stock market to provide corporate entities with non-financial, non-creative capital is one of its special advantages.

2.1.6 Inflation Rate

[33], assert that inflation is one of the most popular terms used in the global economy, there are several misconceptions surrounding it. Although there are

different schools of thought on inflation, economists generally agree that it is the ongoing increase in the average price of goods. Similarly, [34], conceptualized inflation rate as the continuous upsurge of prices of goods and services over time, or, to put it more plainly, as too much money chasing too few goods. The purchasing power of money continuously decreases during inflationary times. The overabundance of demand for commodities in the overall market can be interpreted as inflation.

Similarly, [35], emphasized that the effect of inflation on economic growth has roused the financial sector to mitigate the challenges and the role of inflation in facilitating the impression of economic growth and financial development is attracting more attention and traction in the different studies and literature. Aligning it with [36], a well-developed financial sector weakens inflation and leads to economic performance.

2.2 Theoretical Framework

2.2.1 Phillips Curve model

Phillips Curve was developed by [37], positing that when inflation rises at a high level, unemployment will slow down and it's vice versa. The Phillips curve equation can be derived from the (short-run).

$$Y = Y_n + \alpha (P - P_e) \quad (1)$$

Where y is the log value of the actual output, Y_n is the log of the natural level of constant. P stands for the log of the actual price while P_e is the log value of the expected price level.

The equation notes that when expectations of future inflation or future price level are correct and accurate, the last term drops out so that the actual output equals the natural level of real domestic product.

$$P = P_e + \frac{Y - Y_n}{\alpha}, \quad (2)$$

Next is to add unexpected exogenous shocks to the world supply μ , subtracting last year's price levels P_{-1} , will give us inflation rates, because;

$$P - P_{-1} \approx \pi \text{ and } P_e - P_{-1} \approx \pi_e \quad (3)$$

Where π and π_e are the inflation and expected inflation respectively.

There is a negative relationship between out and unemployment (as expressed by Okun's law) therefore, using;

$$\frac{Y-Y_n}{\alpha} = -b(U - U_n) \quad (4)$$

Where b is a positive constant, U is unemployment and U_n is the natural rate of unemployment. Therefore, the final form of the equation of the short-run Phillips cure is as:

$$\pi = \pi - b(U-U_n) + v \quad (5)$$

The Work by [38], supports Phillips Curve model implying that if in the event where inflation drops to zero percent, there will be a permanent 1.5% increase in unemployment. This is because workers are usually more tolerant of real wage cuts than they are of nominal ones. For instance, when inflation is three percent, a worker is more likely to accept a two percent wage increase than a one percent wage cut when inflation is zero.

The model was criticized by [39], claiming that the relationship between the Phillips curve was a temporary occurrence. After that, unemployment would start to return to its pre-crisis level, albeit with higher rates of inflation. This suggests that central banks shouldn't set unemployment targets below the natural rate, which makes it important from a practical standpoint.

The Phillips curve is related to this study in a way that financial development affects unemployment. The inflation rate rises as investors tend to do business, thus more job opportunities. So, it is the work and the responsibility of the Central Banks to implement monetary policies that will reduce the unemployment rate towards inflationary expectations.

2.3 Empirical Review

[40], examined the effect of interest rates on inflation in Nigeria. The study adopted an ex-post facto research design while the linear autoregressive distributed lag (ARDL) model was employed as a model estimation. The results of the study indicated that the effect of the combination of interest rates, money supply growth, and institution quality is only 48%. This implies that there are other factors outside the purview of the monetary policy that account for 52% of inflation in Nigeria.

[41], investigated whether inflation plays a role in financial development and economic growth

taking a case study from Sub-Saharan Africa. In the previous studies, it was revealed that financial development affected economic growth positively. However, studies that were carried out to examine if inflation influences financial development and economic growth revealed inconclusive findings. Therefore, using a panel and collecting data from 36 Sub-Saharan Africa, the findings of the study identified thresholds of 7.65 percent and 6.76 percent.

A study by [42], on inflation and financial development was carried out in Sub-Saharan African countries. The study adopted a pure cross sectional research design. In addition, the study used dynamic and non-dynamic panel threshold approaches to ensure improved results. The findings of the study showed that inflation negatively affects financial development and the more inflation rises the more financial development deteriorates. As per the threshold of 5% established by the study, financial development is positively affected by inflation when inflation is below 5%.

[43], investigated the link between financial inclusion, monetary policy and financial stability in 58 countries including 31 high financial development countries (HFDCs) and 27 low financial development countries (LFDCs) from 2004 to 2020 using the PVAR method. The findings of the study revealed that that in LFDCs, financial inclusion and financial stability are positively correlated, but are negatively correlated with the inflation rate and the money supply growth rate. In HFDCs, financial inclusion is positively correlated with inflation rate and money supply growth rate, while financial stability is negatively correlated with financial inclusion, inflation rate and money supply growth rate. The results suggest that in LFDCs, financial inclusion upsurges financial stability and decreases inflation. In HFDCs, on the contrary, financial inclusion increases financial instability, leading to long-term inflation.

[44], using the System GMM estimation technique, examined the impact of financial development on key economic indicators, such as employment, inflation, and economic growth, for a panel of 120 countries between 1997 and 2017. The findings show that the conventional supply-lending hypothesis is false and that financial development has a detrimental effect on economic growth. Furthermore, it was discovered that employment growth and inflation are positively correlated with financial development.

Another study by [45], using quarterly data spanning from 2002-2017 was conducted employing ARDL (Autoregressive distributed lag) in Nigeria. How inflation affects financial development in Nigeria was the objective of the study. The sub-variable of financial development used by the study was M2/GDP (percentage of money supply to gross domestic product). A positive and statistically significant effect between financial development and inflation in Nigeria was found.

[46], carried out a study using panel data covering the years 1985 to 2017 on the impact of financial intermediation on economic growth within the EAC (East African Community) employing principal component analysis under which the financial development index was considered. The DOLS since they account for serial correlation, heterogeneity, small sample bias, and endogeneity in the case of long-term relationships, and FMOLS models are computed. The findings suggest that, over time, financial intermediation significantly and favorably affects the economic performance of the EAC countries.

A study by [47], carried out a study in Uganda on the effect of private sector credit on the inflation rate. The study utilized Ordinary Least Squares (OLS) and the GARCH model. The results of the study indicated that private sector credit, inflation, and nominal exchange when lagged positively affected private sector credit growth whereas gross domestic product growth, interest rate, and financial innovation were not factors of private sector credit growth.

3 Materials and Methods

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

3.1 Method of Data Analysis

The study used descriptive analysis as well as inferential analysis to establish the effect of financial development on the inflation rate in Rwanda. The study used Ordinary Least Squares (OLS) and appropriate diagnostic tests such as normality,

autocorrelation, heteroskedasticity, multicollinearity, and stability tests were adopted.

3.2 Model for Determining the Effect of Financial Development on the Inflation Rate in Rwanda

The study employed the econometric model where inflation rate was the controlled variable and financial development (financial liberalization, domestic credit to private, monetary policy rate, market capitalization, and all share index) was treated as a control variable, the model is as follows:

$$\text{INFR}_t = f(\text{FL}_t, \text{DCPS}_t, \text{MPR}_t, \text{MC}_t, \text{ASI}_t) \quad (6)$$

The algebraic form of the econometric model indicates the relationship between the variables. In this instance, the inflation rate was treated as a linear function of financial development. Hence, the model:

$$\text{INFR}_t = \alpha_0 + \alpha_1 \text{FL}_t + \alpha_2 \text{DCPS}_t + \alpha_3 \text{MPR}_t + \alpha_4 \text{MC}_t + \alpha_5 \text{ASI}_t + \mu_t \quad (7)$$

Similarly, some variables were in the natural log while others were not in the natural log. The reason to log some variables is that variables have different units of measurement. Rates were not transformed. According to [48], transforming variables into the natural log is to avoid the occurrence of heteroskedasticity therefore, the model is as:

$$\text{INFR}_t = \alpha_0 + \alpha_1 \text{FL}_t + \alpha_2 \text{DCPS}_t + \alpha_3 \text{MPR}_t + \alpha_4 \text{MC}_t + \alpha_5 \ln \text{ASI}_t + \mu_t \quad (8)$$

Where:

INFR = Inflation Rate

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 a 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 in Table 1 predicted that financial liberalization affects inflation negatively, domestic credit to the private sector affects inflation negatively, monetary policy rate affects inflation positively, market capitalization affects inflation negatively and all share index affects inflation negatively.

Table 1. A’ priori expectation

Variables	INFR
Financial Liberalization	-
Domestic Credit to the Private Sector	-
Monetary Policy Rate	+
Market capitalization	-
All share index	-

Source: Researcher’s compilation, 2024

Table 2. Measurement and Sources

Variables	Measurement	Source(s)
Financial Liberalization	A ratio of capital inflows to GDP	World Bank (2023)
Domestic Credit to Private Sector	Resources such as finance provided to the private sector measured as a ratio to GDP	World Bank (2023)
Monetary Policy Rate	Inflation rate subtracting interest rate by banks measured in terms of percentage	National Bank of Rwanda (2023)
Market Capitalization	A ratio of market capitalization to GDP	Rwanda Stock Exchange (2023)
All Share Index	Number of shares in issue multiplied by the price of each issue.	Rwanda Stock Exchange (2023)
Inflation Rate	General persistent increase in the price of goods and services measured in percentage.	World Bank (2023)

Source: Researcher’s compilation, 2024

Table 2 shows the measurements and sources of the variables. Data were sourced from World Bank, National Bank of Rwanda and Rwanda stock exchange.

4 Findings of the Study

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

4.1 Descriptive Analysis

The study analyzed descriptive statistics such as mean, maximum, minimum, skewness, kurtosis, and Jarque-Bera to describe the effect of financial development on economic performance in Rwanda.

Table 3. Descriptive Statistics

Descriptive Statistics	FL	DCPS	MPR	MC	LASI	INFLR
Mean	2.7317	20.567	12.508	31.426	2.1000	4.7641
Median	2.9754	20.800	12.515	33.500	2.1000	4.5200
Maximum	3.8110	28.600	17.670	47.060	2.2000	13.880
Minimum	1.5001	13.270	8.3300	17.000	1.9000	0.8300
Std. Dev.	0.8248	4.3993	2.9486	8.8644	0.1044	3.6013
Skewness	0.2045	0.124	0.2059	-0.1120	-1.0000	1.2928
Kurtosis	1.6765	2.3533	2.2159	2.3581	3.0000	4.4206
Jarque-Bera	0.9593	0.2400	0.3922	0.2311	2.000	4.3521
Prob.	0.6189	0.8869	0.8219	0.8908	0.3678	0.1134
Sum	32.781	246.81	150.10	377.12	25.200	57.170
Sum Sq. Dev.	7.4847	212.89	95.638	864.35	0.1200	142.66
Observations	12	12	12	12	12	12

Source: Researcher’s computation, 2024

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 were vital for the study. The results presented in Table 3 depict descriptive statistics analysis.

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

Average, market capitalization in Rwanda was \$31.42 billion implying that market capitalization in Rwanda is improving considering that Rwanda’s Capital Market started in 2011. Though Rwanda Capital Market is still at the infant level, there is a significant improvement according to the study findings. All share indexes also improved as per study findings. The inflation rate in Rwanda averaged 4.7641, implying that inflation in Rwanda is moderately low.

Financial liberalization reached a 3.8110 value as the maximum ratio of capital inflows over gross

domestic product and 1.5001 minimum value of the ratio of capital inflows over gross domestic product. Domestic credit to the 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.

The 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. The inflation rate in Rwanda reached a maximum value of 13.880% and a minimum value of 0.8300% for the period of the study in Rwanda.

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

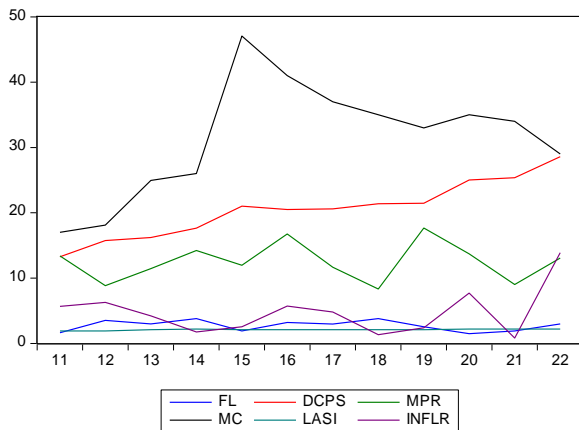


Fig. 1: Trend Analysis
Source: Researcher's computation, 2024

Figure 1 shows the trend analysis of financial liberalization, domestic credit to the private sector, monetary policy rate, market capitalization, log of all share index, and inflation rate. Financial liberalization (FL) remained moderately stable during the period under review (2011-2022), domestic credit to the private sector kept improving, the monetary policy rate was not stable, market capitalization increased and declined under the period under review while all share index kept increasing. The inflation rate kept also increasing.

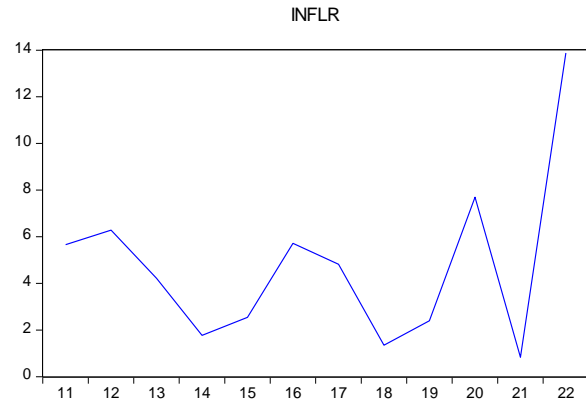


Fig. 2: Trend Analysis of inflation rate in Rwanda
Source: Researcher's computation, 2024

Figure 2 shows the trend analysis of the inflation rate in Rwanda. The figure shows that inflation declined in 2014, 2018, and 2021 but rose heavily in 2022. The inflation rate in Rwanda was not stable over the period under review (2011-2022).

Table 4. Correlation Matrix

Variables	FL	DCPS	MPR	MC	LASI
FL	1				
DCPS	-0.17568	1			
MPR	-0.14429	0.03091	1		
MC	-0.15994	0.54257	0.16798	1	
LASI	-0.00838	0.76308	0.16441	0.52786	1

Source: Researcher's computation, 2024

FL: Financial liberalization in Table 4 is not correlated with domestic credit to the private sector, monetary policy rate, market capitalization, and all share index. Since the explanatory variables are not correlated, they can predict the dependent variable (inflation rate).

DCPS: Domestic Credit to the Private Sector in Table 4 is not correlated with financial liberalization, monetary policy rate, market capitalization, and all share index. Since the explanatory variables are not correlated, they can predict the dependent variable (inflation rate).

MPR: The Monetary Policy Rate in Table 4 is not correlated with financial liberalization, domestic credit to the private sector, market capitalization and all share indexes. Since the explanatory variables are not correlated, they can predict the dependent variable (inflation rate).

MC: Market Capitalization in Table 4 is not correlated with financial liberalization, domestic credit to the private sector, monetary policy rate, and

all share indexes. Since the explanatory variables are not correlated, they can predict the dependent variable (inflation rate).

LASI: All Share Index in Table 4 is not correlated with financial liberalization, domestic credit to the private sector, monetary policy rate, and market capitalization. Since the explanatory variables are not correlated, they can predict the dependent variable (inflation rate).

Table 5. Financial development and inflation rate in Rwanda

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.08924	26.5648	1.13267	0.3006
FL	0.377998	1.29263	0.29242	0.7798
DCPS	0.889583	0.38425	2.31509	0.0598
MPR	0.416369	0.35853	1.16132	0.2896
MC	-0.218079	0.14008	-1.5567	0.1705
LASI	-20.48037	16.0047	-1.2796	0.2479
Mean dependent				
R-squared	0.53307var			4.764167
Adjusted R-squared	0.143962	S.D.dependent var		3.601339
S.E. of regression	3.332042criterion			5.551900
Sum squared resid	66.61501	Schwarz criterion		5.794354
Log likelihood	-27.31140	Hannan-Quinn		5.462136
F-statistic	1.369981	Durbin-Watson		2.436552
Prob(F-statistic)	0.352440			

Source: Researcher's computation, 2024

Interpretation

$$INFR_t = 30.08924 + 0.377998FL_t + 0.889583DCPS_t + 0.416369MPR_t - 0.218079MC_t - 20.48037LASI_t + \mu_t$$

Table 5 shows the regression analysis of how financial development affects the inflation rate. 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 the real gross domestic product. The probability of the t-test was used in determining the statistical significance of the effect of each indicator on the inflation rate (INFLR) at a 5% level of significance.

From the findings, financial liberalization (FL) had a p-value of 0.7798), domestic credit to the private sector (DCPS) had a p-value of 0.0598, monetary policy rate (MPR) had a p-value of 0.2896, market capitalization (MC) had a p-value of 0.1705 and all share index (LASI) had a p-value of 0.2479. This implies that financial liberalization (FL), domestic credit to the private sector (DCPS) monetary policy rate (MPR), market capitalization (MC), and all share index (LASI) do not affect the inflation rate.

The magnitude and direction of the effect of each of the explanatory variables of financial development, as estimated, revealed positive and negative effects on the inflation rate as some had positive coefficients and others negative coefficients. The findings showed that financial liberalization (FL), domestic credit to the private sector (DCPS) and monetary policy rate (MPR) exerted a positive effect while MC and LASI exerted a negative effect ($\alpha_1 = 0.377998$, $t = 0.292424$ and $p\text{-value} = 0.7798$; $\alpha_2 = 0.889583$, $t = 2.315099$ and $p\text{-value} = 0.0598$; $\alpha_3 = 0.416369$, $t = 1.161322$ and $p\text{-value} = 0.2896$; $\alpha_4 = -0.218079$, $t = -1.556732$ and $p\text{-value} = 0.1705$; $\alpha_5 = -20.48037$, $t = -1.279626$ and $p\text{-value} = 0.2479$) respectively. The findings suggest that a percentage change in FL, DCPS, MPR, MC, and ASI will lead to 0.377998, 0.889583, 0.416369, -0.218079, and -20.48037 percentage changes in the inflation rate.

AdjR² 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 0.143962 this implies that the combined variations in financial development (FL), domestic credit to the private sector (DCPS), monetary policy rate (MPR), market capitalization (MC) and all share index (ASI) resulted in 14.39% changes in the inflation rate (INFLR), while the remaining changes of 85.61% 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 the independent variable for a period of 12 years had a p-value of 0.352440 > 0.05 and F-statistic of 1.369981; implying that all the explanatory variables as financial liberalization, domestic credit to the private sector, monetary policy rate, market capitalization, and all share index jointly do not

significantly effect on inflation rate. This implies that there are some other factors that the government of Rwanda cannot handle to tackle the problem of inflation. As the population grows, the demand for money increases, and prices of commodities hike since what the country produces cannot meet the demand of the population. Thus, the study concludes that financial development does not affect the inflation rate in Rwanda.

As per discussion, the data of the analysis on the effect of financial development on the inflation rate revealed that financial liberalization (FL), domestic credit to the private sector (DCPS), monetary policy rate (MPR), market capitalization (MC) and all share index (LASI) do not affect inflation rate. Furthermore, the findings of the joint analysis of the effect of the combined financial development predictor variables insignificant effect on the inflation rate. The findings of financial liberalization, domestic credit to the private sector, and monetary policy rate on inflation rate negated the *a priori* expectations. Nevertheless, the findings of market capitalization and all share indexes on inflation rate were consistent with the *a priori* expectations.

The results of the study were in line with the results of, [40], claiming that the combined impact of interest rates, money supply expansion, and institutional quality on Nigeria's inflation rate is only 48%, suggesting that other factors outside the scope of the monetary policy mechanism are responsible for 52% of the country's inflation while, [41], revealed negative and positive results on effect of inflation on financial development and economic growth taking Sub-Saharan Africa as the case study and therefore, the finding were inconclusive. [42], the study on inflation and financial development taking Sub-Sahara African countries, revealed a negative impact of financial development on inflation in Sub-Saharan Africa. However, an average inflation rate below 5% revealed a positive effect of financial development on the inflation rate. Similarly, [49], revealed a statistically insignificant effect of commercial Banks' credit on economic growth when carrying out a study on the impact of commercial Banks' credit on economic growth.

The study is supported by the Phillips Curve Model stipulates that with economic growth, inflation rises too. The model claims that as the economy grows, there will be more job creation and less unemployment. Thus, the higher the inflation rate, the lower the unemployment rate, and vice versa.

4.2 Post-Estimation Diagnostic Tests

The study conducted diagnostics tests to check if the assumptions of the classical linear regression were not violated. The study used the following post-estimation diagnostic tests: Normality test, multicollinearity test, autocorrelation test, heteroskedasticity test, and stability test.

Table 6. Post-estimation diagnostic results

Test	Test coefficient	P-value	Decision
Normality test	Jarque-Bera	0.503141	Normal distribution
Multicollinearity test	Variance inflation factor (VIF)	1.87228	No multicollinearity
Heteroskedasticity test	Breusch-Pagan test	0.7076	No heteroskedasticity
Autocorrelation	Breusch-Godfrey test	0.5344	No autocorrelation
Stability Test	Ramsey regression equation specification test	0.2089	Stable

Source: Researcher's computation, 2024

Table 6 shows the post-estimation diagnostic tests. The probability value of Jarque-Bera of $0.50314 > 0.05$ revealed that residuals were normally distributed. Again, the study revealed that there was no multicollinearity since the value of VIF of $1.87228 < 5$. Further, the results showed that the value of Breusch-Pagan of $0.7075 > 0.05$ implying that the model was homoscedastic. In the same way, the Breusch-Godfrey value of 0.5344 revealed that there was no presence of serial correlation. Finally, the Ramsey regression equation specification test (RESET) for this study was 0.2089 which is greater than the cut-off (0.05). Hence, the expletory variables of this study explain the response variable. Thus, the model was stable.

5 Conclusion and Recommendations

The study investigated the effect of financial development on the inflation rate in Rwanda. The results revealed that financial liberalization, domestic credit to the private sector, monetary policy rate, market capitalization, and all share indexes do not influence the inflation rate in Rwanda. The

magnitude and direction of the effect of financial liberalization, domestic credit to the private sector, and monetary policy rate exerted positive effects while the magnitude and direction of market capitalization and all share index exerted negative effects. In effect, the values of the coefficient of the combined explanatory variables of financial development as revealed by the study is 0.14396, This implies that the combined variations in financial liberalization, domestic credit to private sector, monetary policy rate, market capitalization, and all share index resulted in 14.39% changes in inflation rate while the remaining changes of 85.61% resulted from other factors which are not captured by the model of the study. All of the diagnostic tests confirmed the robustness of the model of the study. The study concluded that financial liberalization, domestic credit to the private sector, monetary policy rate, market capitalization, and all share indexes insignificantly affected inflation rate as joined together. Therefore, financial development does not affect the inflation rate in Rwanda. The study recommends that the government of Rwanda should improve on financial development through improving macroeconomic factors such as liberalization of the financial sector and strengthening the channels of credit to the private sector. The study also recommends the government of Rwanda should impose interest rates when inflation rises. Another study, therefore, can be carried out on the determinants of the inflation rate in Rwanda.

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