Interest Rate Fluctuation, Savings Mobilization, and Capital Formation: Evidence from Bangladesh

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Abstract:

This paper focuses on the relationship among interest rate, savings, and capital formation which are macroeconomic indicators of Bangladesh, and provides a scenario of the economy using data from 1976 to 2021. Our analysis performed econometric models of the unit root test, cointegration test, OLS regression model, multicollinearity test, correlation matrix, VECM, and Granger causality test. The regression reveals that interest rate has a negative and statistically significant relationship with capital formation and a positive and statistically insignificant relationship with domestic savings. However, domestic savings and capital formation are negative and statistically insignificant in Bangladesh's economy. The VECM exhibits a long-term equilibrium association between interest rate and capital formation. Furthermore, Causality implies that there is a unidirectional causal relationship running from domestic savings and capital formation to interest rate. Yet, saving has no causal on capital formation. This outcome has a fantastic execution that can effortlessly stabilize the economy from any unanticipated circumstances. The economy should be concerned with this new study about maintaining a balance with these indicators. Suppose the outcomes of this research work are carried out into policy execution. In that case, that is, proper coordination of regulations on economic variables, progress in the real sector of the economy, velocity of expansion of capital growth, and grass-root mobilization of savings from the surplus market to the deficit market, it will lead to experienced long-run prosperity. We also recommend Policy formulators to accomplish our results properly for the betterment of savings and capital flows in Bangladesh.

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Key Words: Interest rate, Savings, Capital formation, Bangladesh.

1. Introduction:

For a state like Bangladesh to maintain a faster pace of growth capital formation is crucial. Every economy in the globe does not have the same level of access to money, natural resources, and produced ingredients. The amount of revenue invested instead of consumed is indicated by a capital formation reflected in the revenues and expenditures section of a country's gross domestic product. Savings which are the basis for capital accumulation appear when a portion of current income is set aside and invested. The soundness of the financial system and its capacity to properly carry out its job as a financial intermediary will significantly impact how much savings can influence capital formation and economic growth (Osundina & Osundina, 2014). After the outbreak, Bangladesh saw significant growth accompanied by macroeconomic stability, infrastructure upgrades, a booming digital economy, and escalating trade flows it reported a 7.2% GDP growth rate in the fiscal year 2021–2022 One of the countries with the quickest growth rates is Bangladesh. Investments are held by a sizeable quantity of savings from a variety of sources including household savings, physical savings, business sector savings, public sector savings, etc. When interest rates are low people desire to spend more because their income from savings is reduced. Once again, a lower rate of interest aids the company in accumulating and holding more capital as desired and increases demand for loanable money in the market and *vice versa*. In June 2021 Bangladesh's gross savings rate was 30.4%. In 2019–20 Bangladesh's gross domestic savings totaled TK 7,077,060 million. In December 2022, Bangladesh's Gross Fixed Capital Formation was estimated at 145.982 USD billion.

When making economic, financial, and policy decisions, the macroeconomic variables are significantly considered. Interest rates are an essential economic price because of their broad role in the economy, whether observed from the standpoint of cost of capital or opportunity cost of money, and they have a basic consequence for the economy as a whole. When interest rates are arbitrarily decided, they affect the cost of capital and the accessibility of credit; this is referred to as a fixed interest rate; when interest rates are managed by market forces, they are recognized as floating interest rates. Economic growth is fundamentally dependent on increased savings and their channeling into productive investment. In a developing economy like Bangladesh, a plethora of such channels may exist, resulting in a beneficial process of savings,

investment, and development. To begin with, savings may have a beneficial impact on expansion in Bangladesh since the country's economy works beyond the innovation frontier, with expansion arising from breakthroughs enabling its manufacturing sectors to keep up with frontier technology. Second, for nations such as Bangladesh, delayed savings are highly connected with increasing productivity rather than capital accumulation (Philippe et al. 2006).

Keynes (1936) identified the link between interest rates, savings, and investment in his preference for the liquidity concept. People, he believes, are more inclined to keep their money in the shape of interest-bearing investments when rates of interest rise. Savings accounts at financial institutions are one of these assets. An upsurge in interest rates is thus anticipated to increase savings mobilization, increasing the accessibility of investible money and, as a result, economic development. Capital formations are the net enhancements to the stock of funding in the economy that represent the true environment about investment levels. Investment promotes prospective economic expansion, creation of employment, and a rise in standard of living through increasing efficiency and anticipated output.

2. Literature Review

2.1 Theoretical framework

Interest can be defined as the return or yield on equity or the potential cost of delaying current spending into the future (Uchendu, 1993). According to Onwukwe (2002), interest is defined as "the variance between what is lent and what must be repaid after a specific period, expressed as a percentage of the amount lent." According to the explanations above, interest is not a unique phrase because the expression 'interest rate' has two aspects. Uchendu (1993) defines the first part as "interest on saving," which is commonly referred to as "borrowing rate." In the second sense, interest rate is defined as the cost of borrowing, sometimes known as 'lending rate'. According to the life-cycle hypothesis, the net impact of the real interest rate on savings is equivocal. The ultimate impact of real interest rates on savings can be categorized into two parts. By the substitution effect, a greater interest rate raises the current price of purchasing compared to the anticipated price, hence substantially increasing savings. The income effect suggests that if the household is a net financier, a rise in the rate of interest will increase lifespan income, raising spending and minimizing saving (El-Seoud, 2014). Keynes argued in his Keynesian theory of interest rates, often known as the liquidity preference theory, that interest rates had no substantial impact on the increase of savings in households and enterprises as retained earnings and investment (Keynes, 1936). According to the Classical Theory of Interest

Rates, interest rates are an equilibrium factor between the inclination to save and the investment demand. The Neo Keynesian Modern Theory of Interest Rates contends that both Keynesians and classical theories (loans funds theory) have significant flaws and are indeterminate. In monetarism, general, new classical thought, and reasonable expectations, post-Keynesian interest rate theory contradicts neoclassical economics (Xaba, 2019).

2.2 Previous Empirical Studies

Many economic circumstances are directly influenced by interest rates. That's why researchers in the macroeconomics field are always concerned and have disclosed huge research on interest rates. However, the interest rate also influences savings and capital formation likewise the savings and capital formation too. Again, in an economic concept, it is said that savings and investment carry a vital relationship. Akinola et al. (2013) revealed a positive coefficient from all parameter estimates and showed that GDP has a stronger influence on both GNS and GCF than the influence of GNS and GCF on GDP. Again studies of (El-Seoud, 2014; Bayar, 2014; ER et al., 2014; Rehman et al., 2015; Nagawa et al., 2020) indicated that in the long run, the Gross Domestic Product growth rate has a positive and statistically significant effect on gross domestic savings. According to the studies mentioned above, a healthy balancing of economic growth might result in capital formation from surplus units to deficit units as well as the mobilization of savings. By wisely utilizing savings as a deposit in banks or other institutions or sectors, economic growth can be driven to a point where it can easily transition into investment in any expanding economic environment.

Besides, Moyo et al. (2018) focused that interest rate reforms have a positive impact on economic growth through savings and investments. This means that not only does economic growth stimulate savings and capital formation but also interest rate has a great influence too. This similarity was also illustrated by Abusomwan (2017) investigated the long-run and short-run dynamic impact of interest rate and output on gross domestic savings and gross capital formation and also found that interest rate is not a significant determinant of savings and Investment in Nigeria in both the long run and short run. By adding that, Chinyere (2015) also analyzed interest rate do not significantly impact savings in Nigeria. But considering the factors like income (GDP) the result indicated that by combining interest rate and income, savings can be significantly influenced. However, interest rates carried a strong link for savings in bank deposits, other financial institutions, and flow of capital formation as an investment in the economy. That's why (Simwami and Kawina, 2020; El-Seoud, 2014; Bayar, 2014; Khan and

Sarker, 2016; Hussein et al., 2017; Chowdhury, 2001; Felici et al., 2022) showed a significant positive strong link between interest rates and aggregate savings, which resulted in an increase in aggregate savings in the economy. Raza et al. (2017) studied the effect of interest rates on savings and deposits of scheduled banks and other financial institutions and showed savings is adversely influenced by interest rate (Tun et al., 2020; Aizenman et al., 2019) but comparatively interest rate is strongly significant for savings.

Warman and Thirlwall (2015) made the important distinction between financial saving and total saving. Financial saving is found to be positively related to real interest rates partly through capital flows and partly through domestic asset substitution, but total saving is invariant concerning real interest rates. While interest rates are a significant explanatory variable to always keep in mind, other explanatory variables additionally have an impact on savings. Katircioglu (2006) suggested no existence of a long-run equilibrium relationship between domestic savings and FDI. But after that, a consensus, (Bashier, 2007; Salahuddin et al., 2010; Nagawa et al., 2020) demonstrated the existence of the long-run combination between FDI and domestic savings. Investment through FDI held in foreign countries for better returns along with proper market diversification and augmentation of foreign savings. In an economic recession, the inflation rate is uplifted, and when a rise in prices declines the purchasing power. This means that destroys savings, discourages investment, less productivity, and a lower standard of living. Nevertheless, El-Seoud (2014) found the inflation rate has a positive and significant effect on the national saving rate. ER et al. (2014) expressed inflation has positive impacts and no significant relationship to the savings in the Turkish economy. However, the study conducted by Dash and Kumar (2018) revealed there was no threshold inflation in the context of the inflation–saving relationship. That is, they found that inflation has a significant negative effect on savings (Premik and Stanisławska, 2017; Panhwar, 2016; Tun et al., 2020).

People are inclined to borrow less and may even keep lending entirely as a result of the rising interest rates. Moreover, investment has an inverse association with a real interest rate indicated by (Muhammad et al., 2013; Malawi and Bader, 2010; Warman and Thirlwall, 2015; Eregha, 2010; Simwami and Kawina, 2020). Investments typically decline as interest rates increase because businesses must bear the greater cost of borrowing as well as the potential earnings-diminishing consequences of falling consumer demand. A mild inverse relationship was found by Wuhan et al. (2015) that in the long run, rate, and investment have a positive relationship. Reducing the rate will promote investment in Jiangsu. But at the same time, it is observed that although the interest rate affects investment, it has a relatively weak impact. Sharpe and Suarez

(2013) found that most firms claim to be quite insensitive to decreases in interest rates, and only mildly more responsive to interest rate increases. But surprisingly, they found that investment is also less interest-sensitive among firms expecting greater revenue growth. Interest sensitivity affects the investors to invest some of their time, effort, money, or other resources in the money market and capital market, among other financial sectors, in anticipation of future benefits. By the way, Desroches and Francis (2010) first, identified the relative weakness in investment demand as more important than the relative increase in desired global savings to explain the decline in global interest rates. Second, the results indicated that the key factors explaining movements in savings and investment are variables that evolve relatively slowly over time, such as labor force growth and age structure. Investment and the provision of more goods and services resulting from the acquisition of capital stock, should enhance the population's wealth and boost demand. Thus, Mishra et al. (2010) found that both the Gross Domestic Savings and Gross Domestic Capital Formation are cointegrated thereby exhibiting the long-run equilibrium relationship between them (Tehranchian and Behravesh, 2011; Latif, 2015; Narayan, 2005).

Afzal (2010) examined no long-run relationship between savings and investment in seven countries of the sample, which implies an increased degree of capital mobility and weakening of the savings and investment relationship since the early 1970s. There is a bidirectional causality between savings and investment in South Africa, while there is a unidirectional causality from savings to investment in Pakistan and Sri Lanka. There is no causality in India, the Philippines, Malaysia, and Iran. In South Africa investment has a causal on savings but savings have no causal on investment inciting more savings needed for investing in available convenient investment sectors. Contrarily, no causal countries (India, Philippines, Malaysia, and Iran) inciting their savings do not affect investment and at the same time investment too. The other macroeconomic factors can plan their investment. (Akani, 2019) determined the relationship between the savings nexus as broken down into different compartmentalizations and its resultant effect on capital formation in Nigeria. The empirical results predict that demand deposit has a positive yet insignificant relationship to capital formation; the regression result found that savings deposit has a negative and insignificant effect on capital formation, while time deposit has a positive and significant relationship on gross fixed capital formation in Nigeria.

Many researchers focus on the relationship of many macroeconomic variables. However, from these reviews, it is shown that domestic savings help to make capital formation in an economy and the interest rate also influences savings and capital formation. So, together our point of

view is that the relationship between savings and investment along with the real interest rate affects domestic savings and capital formation has never been examined before in Bangladesh.

3. Objective of Study

As we know the interest rate, domestic savings, and capital formation are closely related. So, the main objective of our study is to find out:

- Are the interest rate, savings, and capital formation integrated among them?
- Again, to what extent do the variables have a long-run equilibrium relationship if the variables are integrated?
- How do the explanatory variables correlate with the dependent variables interest rate, savings, and capital formation?

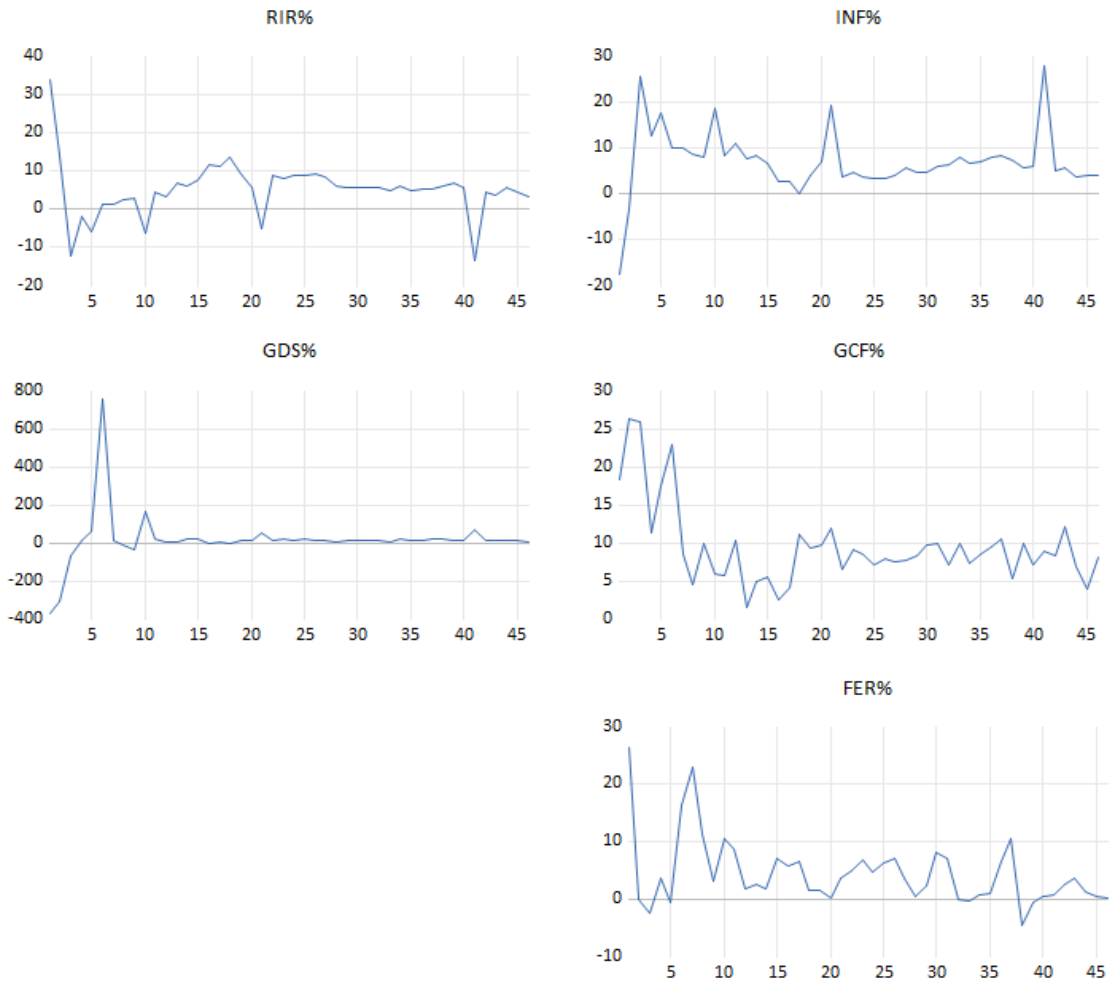
Lastly, whether any causality remains between the variables or not?

4. Methodology

4.1 variables selection and data sources

We measure the linkup among the variables interest Rate, savings, and capital formation. That's why we analyzed and established a relationship of the real interest rate, domestic savings, and capital formation with time series data from 1976 to 2021 in Bangladesh's economy. Our dependent variables are gross domestic savings (GDS) and capital formation (GCF). Our independent variable is real interest rate (RIR). We have taken control variables inflation (INF) and foreign exchange rate (FER) to fulfill our study smoothly. Each variable was harvested from the secondary source World Development Indicators on an annual basis (World Data Bank Online Version).

Graph: Fluctuation of Variables



4.2 Empirical Model

The study considers the OLS (Legendre, 1805) and ECM estimation techniques to estimate the time series data of GCF, GDS, INF, RIR, and FER from the period of 1976-2021. The model is specified on the dependent variables GCF, INT, and GDS one by one, and the INF, FER contribute as control variables. Totally three models are taken for this purpose of the study. Before going to analysis, all the variables are transformed in their natural log value (ln) to avoid heteroscedasticity problems and all analyses are conducted using *EViews 12.*

Model 1

$$lnGCF = \alpha + \theta_1 lnGDS + \theta_2 lnRIR + \theta_3 lnINF + \theta_4 lnFER + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$\boldsymbol{\alpha}$ is constant while $\theta_1, \theta_2, \theta_3, \theta_4$ are the coefficient of explanatory variables and $\boldsymbol{\mu}$ is the error term**.**

By stating the error correction model (ECM) from equation (1), the model becomes;

$$\Delta lnGCF_t = \alpha \ + \theta_1 \Delta lnGDS_t + \theta_2 \Delta lnRIR_t + \theta_3 \Delta lnINF_t + \ \theta_4 \Delta lnFER_t + \theta_5 \mu_{t-1} + \varepsilon_t$$

…… (2)

Where $\mu_{t-1}$the Error Correction term, t-1 means the variables were lagged by one period and ε_t is Residual.

Model 2

$$lnGDS = \ \beta + \lambda_1 lnGCF + \lambda_2 lnRIR + \lambda_3 lnINF + \ \lambda_4 lnFER + \mu \quad \ldots\ldots\ldots\ldots\ldots \textit{(3)}$$

The coefficient of explanatory variables are $\lambda_1, \lambda_2, \lambda_3, and\ \lambda_4$ respectively where β is constant and μ is the error term.

By stating the error correction model (ECM) from equation (3), the model becomes;

$$\Delta lnGDS_t = \beta + \lambda_1 \Delta lnGCF_t + \lambda_2 \Delta lnRIR_t + \lambda_3 \Delta lnINF_t + \ \lambda_4 \Delta lnFER_t + \lambda_5 \mu_{t-1} + \varepsilon_t \ \ldots. \textit{(4)}$$

Where $\mu_{t-1}$the Error Correction term, t-1 means the variables were lagged by one period and ε_t is Residual.

Model 3

$$lnRIR = \rho + \Pi_1 \text{lnGCF} + \Pi_2 \text{lnGDS} + \Pi_3 lnINF + \Pi_4 lnFER + \ \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots .. (5)$$

The coefficient of explanatory variables is $\Pi_1, \Pi_2, \Pi_3, and\ \Pi_4$ respectively where the ρ is constant.

By stating the error correction model (ECM) from equation (5), the model becomes;

$$\Delta lnRIR_t = \rho + \Pi_1 \Delta \text{lnGCF}_t + \Pi_2 \Delta \text{lnGDS}_t + \Pi_3 \Delta lnINF_t + \Pi_4 \Delta lnFER_t + \Pi_5 \mu_{t-1} + \varepsilon_t \quad \ldots\ldots$$
(6)

Where $\mu_{t-1}$the Error Correction term, t-1 means the variables were lagged by one period and ε_t is Residual

Further analysis unit root test and cointegration test suggest the vector error correction (equations 2, 4, 6) to measure the long-run equilibrium then the pairwise causality test is also

required to examine the actual causality of this study as well as I also prefer to descriptive analysis and correlation matrix.

5. Results and Discussions

5.1 Unit Root Test

A time series property known as the stationary test (Dickey and Fuller, 1979; Phillips and Perron, 1988; Shin and Schmidt, 1992) indicates that the mean and variance of the variable do not change over time.

Table 1: ADF, PP, and KPSS stationary test

Variables	***T-statistic***			***Order of integration***		
	Intercept	Trend and intercept	None	ADF	PP	KPSS
lnGCF	(-9.5019)* (-11.9844)** (0.14833)***	(-9.5780)* (-12.0954)** (0.11643)***	(-9.4532)* (-12.0178)**	l (1)	l (1)	l (0)
lnGDS	(-4.5676)* (-5.2833)** (0.43087)***	(-4.4892)* (-6.02646)** (0.12805)***	(-3.0995)* (-3.1179)**	l (0)	l (0)	l (0)
lnRIR	(-4.6764)* (-4.7306)** (0.25938)***	(-4.9547)* (-4.9338)** (0.15634)***	(-2.6135)* (-3.37710)**	l (0)	l (0)	l (0)
lnFER	(-4.9841)* (-5.0784)** (0.65333)***	(-5.3080)* (-5.1907)** (0.10159)***	(-4.4231)* (-4.4897)**	l (0)	l (0)	l (0)

lnINF	(-7.8087)* (-6.0475)** (0.09406)***	(-7.8638)* (-5.9128)** (0.06491)***	(-7.8725)* (-2.1285)**	l (1)	l (0)	l (0)
Critical values	*(-3.5847)[a]* *(-3.5847)[b]* *(0.73900)[c]*	*(-4.1756)[a]* *(-4.1756)[b]* *(0.21600)[c]*	*(-2.6173)[a]* *(-2.6173)[b]*			

Note: (…)*, (…)**, (……)*** indicate t-statistic of ADF, PP, & KPSS and (...)[a], (…)[b], (….)[c] indicate critical values of ADF, PP, & KPSS respectively. Statistical significance at the 1 % level.

From the above table, the study used ADF, PP, and KPSS stationary tests to identify the order of trend in data to meet the stationary of the variables lnFER, lnRIR, lnGDS, lnGCF, and lnINF. Using different stationary tests, some variables are stationary at the level and some are stationary at first.

5.2 Cointegration Test Result

Before estimating the Johansen cointegration test (Johansen, 1991) first we had to select the optical lag length criteria using the VAR standard model. According to the FPE (final prediction error) and LR test statistic criteria, the optimal lag interval is 1.

Table 2: Unrestricted Cointegration Rank Test (Trace) and (maximum Eigenvalue)

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical value**	**Prob ** **	**Max-Eigen Statistic**	**0.05 Critical value**	**Prob ** **
*None **	0.646127	138.2107	76.97276	0.0000	45.70799	34.80587	0.0017
*At most 1**	0.553673	92.50279	54.07903	0.0000	35.49499	28.58808	0.0055
*At most 2**	0.443343	57.00780	35.19275	0.0001	25.77548	22.29962	0.0156
*At most 3**	0.388616	31.23232	20.26183	0.0010	21.64936	15.89209	0.0055
*At most 4**	0.195709	9.582959	9.164545	0.0416	9.582959	9.164545	0.0416

Trace and maximum eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level

** Denotes rejection of the hypothesis at the 0.05 level*

***MacKinnon- Haug-Michelis (1999) p-values*

Long-term interaction between the variables is indicated by the null hypothesis is rejected at none*, at most 1*, at most 2*, at most 3*, and at most 4* in the above maximum Eigenvalue statistic table, where the probability is less than the significant level of 0.05, or where the critical value is less than the statistic value, which also indicates the same thing.

5.3 Regression result of Model 1

Table 3: result of regression

Dependent variable: LNGCF				
Variables		*Coefficient*	*Prob.*	*significance*
LNGDS		-0.005906	0.8721	*Negatively insignificant*
LNRIR		-0.248727	0.0008**	*Negatively significant*
LNINF		-0.269211	0.0167**	*Negatively significant*
LNFER		-0.035423	0.4741	*Negatively insignificant*
c		2.908737	0.0000	
Adjusted R-squared	0.209977			
Prob(F-statistic)	0.007975			
Durbin-Watson stat	1.668968			

** Statistical significance at the 5 % level

OLS regression coefficients of GDS (-0.0059), and RIR (-0.24) exist in a negative relationship with the GCF in Bangladesh shown by Table 3 analysis. But, the real interest rate (RIR) is statistically significant whereas GDS is statistically insignificant. According to the Adjusted R-squared, the other explanatory variables account for 21% of Bangladesh's gross capital formation variation. The model is meaningful since the Adjusted R-squared value of 0.209977 is less than the Durbin-Watson statistic of 1.668968. Once more, the F-statistic likelihood is 0.007975, less than 5%, demonstrating that the model is significant universally.

5.4 Regression result of Model 2

Table 4: result of regression

Dependent variable: LNGDS			
Variables	Coefficient	Prob.	significance
LNGCF	-0.108214	0.8721	*Negatively insignificant*
LNRIR	0.497480	0.1387	*Positively insignificant*
LNINF	1.810059	0.0001**	*Positively significant*
LNFER	0.217408	0.3030	*Positively insignificant*
c	-1.753129	0.4238	

Adjusted R-squared	0.374921
Prob(F-statistic)	0.000096
Durbin-Watson stat	1.330853

** Statistical significance at the 5 % level

The regression result of Table 4 shows the coefficient of the explanatory variable gross capital formation (-0.10) is negative and the coefficient of the real interest rate (0.49) is positive to the gross domestic savings both are statistically insignificant. The remaining independent explanatory variables are responsible for 37% of the variation in Bangladesh's gross domestic savings, according to the Adjusted R-squared. The Adjusted R-squared value of 0.374921 is below the Durbin-Watson statistic of 1.330853, which indicates that the model has significance.

5.5 Regression result of Model 3

Table 5: result of regression

Dependent variable: LNRIR			
Variables	Coefficient	Prob.	*significance*
LNGCF	-0.969931	0.0008**	*Negatively significant*
LNGDS	0.105880	0.1387	*Positively insignificant*
LNINF	-1.071403	0.0000**	*Negatively significant*
LNFER	-0.060851	0.5337	*Negatively insignificant*
C	4.938421	0.0000	

Adjusted R-squared	0.584506
Prob(F-statistic)	0.000000

** Statistical significance at the 5 % level

Durbin-Watson stat	1.790201

Table 5 explains the coefficient of gross capital formation (-0.97) is negatively and statistically significant whereas only the gross domestic savings (0.10) is positively and statistically significant relationships to the real interest rate in Bangladesh's economy through my analysis. According to the Adjusted R-squared, the other independent explanatory variables account for 58 percent of Bangladesh's gross capital formation variation. The model is meaningful since the Adjusted R-squared value of 0.584506 is less than the Durbin-Watson statistic of 1.790201. Once more, the F-statistic likelihood is 0.000000, less than 5%, demonstrating that the model is significant universally.

5.6 Multicollinearity test

Table 6: Values of VIF

Model 1		*Model 2*		*Model 3*	
Variable	*Centered VIF*	*Variables*	*Centered VIF*	*Variables*	*Centered VIF*
LNGDS	1.754753	LNGCF	1.388390	LNGDS	1.663387
LNRIR	2.0043045	LNRIR	2.502440	LNGCF	1.054117
LNINF	3.028915	LNINF	2.354275	LNINF	1.621224
LNFER	1.034893	LNFER	1.020981	LNFER	1.038098
C	NA	C	NA	C	NA

The study of the model shown above shows that there is no multicollinearity between the explanatory variables as their centered variance inflation factor (VIF) is less than 10 according to Table 6.

5.7 Correlation matrix analysis

Table 7: correlation Matrix

Correlation	LNRIR	LNGDS	LNGCF	LNINF	LNFER
LNRIR	1.000000				

LNGDS	-0.250233	1.000000			
LNGCF	-0.285455	-0.214646	1.000000		
LNINF	-0.677743	0.605605	-0.125462	1.000000	
LNFER	0.053194	0.075043	-0.088221	-0.082259	1.000000

Considering Table 7, according to Wooldridge (2015), multicollinearity is present if the correlation coefficient is found to be higher than 0.7. As can be seen in Table 7.7, the association between variables is weak, demonstrating that multicollinearity is not a severe problem in this analysis.

5.8 Vector Error Correlation Estimations

According to the vector error correction equations 2, 4, and 6 the VECM estimates (Engle and Granger 1987) to what extent the variables have long-term effects from one time period to another. As there prevails a cointegrating relationship, now we move to VECM to evaluate the short-term dynamics and long-run causality among the variables.

Table 8: Vector Error Correlation

Error correlation	D(LNRIR)	D(LNINF)	D(LNGDS)	D(LNGCF)	D(LNFER)
CointEq1	-0.599257 (0.10185) [-5.88362]	0.402104 (0.07949) [5.05798]	0.873692 (0.19762) [4.42091]	-0.021281 (0.05218) [-0.40783]	-0.015101 (0.15831) [-0.09539]
D(LNRIR(-1))	-0.341781 (0.14313) [-2.38776]	-0.004661 (0.11172) [-0.04172]	-0.465232 (0.27773) [-1.67507]	0.0602889 (0.07333) [0.82209]	-0.227345 (0.22248) [-1.02183]
D(LNINF(-1))	0.134560 (0.23174) [0.58064]	-0.469548 (0.18088) [-2.59583]	-0.828829 (0.44966) [-1.84321]	-0.066325 (0.11873) [-0.55860]	-0.054640 (0.36021) [-0.15169]

D(LNGDS(-1))	-0.159440 (0.08439) [-1.88929]	0.147066 (0.06587) [2.23264]	0.229231 (0.16374) 1.39989]	0.033418 (0.04323) [0.77289]	-0.036425 (0.13117) [-0.27769]
D(LNGCF(-1))	0.576470 (0.31036) [1.85737]	-0.384629 (0.24225) [-1.58771]	-0.476519 (0.60222) [-0.79127]	-0.387179 (0.15901) [-2.43484]	0.475809 (0.48242) [0.98630]
D(LNFER(-1))	0.094129 (0.10541) [0.89291]	-0.088335 (0.08228) [-1.07355]	0.112996 (0.20454) [0.55242]	-0.090995 (0.05401) [-1.68477]	-0.226018 (0.16385) [-1.37937]
C	-0.005469 (0.15088) [-0.03625]	0.055247 (0.11777) [0.46910]	0.172125 (0.29276) [0.58792]	-0.045342 (0.07730) [-0.58653]	0.008052 (0.23452) [0.03433]

Note: standard error indicates by (….) and t-statistic [….]

The above table 8 confirms that the coefficient of error correlation term is negative (-0.599) indicating that variables exist in a long equilibrium relationship running from gross domestic savings, gross capital formation, inflation, and foreign exchange together flourishes to Real Interest Rate (RIR). The speed of the error correction term is -0.599, which also means that 60% of the disequilibrium caused by the shock from the previous year returns to the long-run equilibrium in the current year. The disequilibrium between the short-run and long-run values is fully adjusted after (1/0.599=1.66) one and a half years in Bangladesh. The error term is also negative (-0.021) indicating the variables exist in a long-run equilibrium relationship running from the interest rate, inflation, gross domestic saving, and foreign exchange rate unitedly promote Gross Capital Formation (GCF). The speed of error correction term is 2 percent which implies the disequilibrium between the short-run and long-run values is fully adjusted after (1/0.021= 47) forty-seven years.

5.9 Pairwise Granger casualty test

The Granger casualty (Bates and Granger, 1969) test aids in determining how one time-series variable affects another. By using the appropriate lag value 1, we checked to see if there is any

Granger casualty that refutes the null hypothesis when the F-statistic is notable. Decision Rule: The hypothesis of no causality is rejected if the p-value is less than 0.05.

Table 9: Pairwise Granger casualty

Null Hypothesis:	**Obs**	***F-Statistic***	***Prob.***	***Decision***
LNRIR does not Granger Cause LNGCF	45	0.21821	0.6428	Accept H0
LNGCF does not Granger Cause LNRIR		5.78050	0.0206	Reject H0
LNINF does not Granger Cause LNGCF	45	4.75798	0.0348	Reject H0
LNGCF does not Granger Cause LNINF		4.23013	0.0459	Reject H0
LNGDS does not Granger Cause LNGCF	45	2.68399	0.1088	Accept H0
LNGCF does not Granger Cause LNGDS		0.68621	0.4121	Accept H0
LNFER does not Granger Cause LNGCF	45	1.41580	0.2407	Accept H0
LNGCF does not Granger Cause LNFER		1.41580	0.9264	Accept H0
LNINF does not Granger Cause LNRIR	45	0.74285	0.3936	Accept H0
LNRIR does not Granger Cause LNINF		0.20471	0.6532	Accept H0
LNGDS does not Granger Cause LNRIR	45	9.45754	0.0036	Reject H0
LNRIR does not Granger Cause LNGDS		2.27057	0.1393	Accept H0
LNFER does not Granger Cause LNRIR	45	8.02907	0.0070	Reject H0
LNRIR does not Granger Cause LNFER		5.04604	0.0299	Reject H0
LNGDS does not Granger Cause LNINF	45	1.95662	0.1692	Accept H0
LNINF does not Granger Cause LNGDS		4.89025	0.0325	Reject H0
LNFER does not Granger Cause LNINF	45	7.23557	0.0102	Reject H0
LNINF does not Granger Cause LNFER		7.63465	0.0084	Reject H0
LNFER does not Granger Cause LNGDS	45	7.12052	0.0107	Reject H0
LNGDS does not Granger Cause LNFER		2.10101	0.1546	Accept H0

The result of table 9 shows that there exists a unidirectional causal running from GCF and GDS to RIR; and from INF and FER to GDS. The results also show a bi-directional causal relationship between INF and GCF; FER and RIR; FER and INF. There is no uni or bi-

directional causal relationship between GDS and GCF; FER and GCF; INF and RIR in the perspective of Bangladesh's economy.

6. Conclusion

This paper is highly focused on the relationship among interest rate, savings, and capital formation that provides an actual scenario of Bangladesh's economy from 1976 to 2021. We took three OLS regression model analyses to measure the actual relationship among these macroeconomic variables. The variables were integrated by cointegration analysis. According to the OLS regression models: interest rate and capital formation are negatively and statistically significant; interest rate and savings are positively and statistically insignificant; savings and capital formation are negatively and statistically insignificant. Our analyses are meaningful since the Adjusted R-squared values of all three models are less than the Durbin-Watson statistics as well as there is no multicollinearity in the model of study. Then the VECM demonstrates interest rate and capital formation have a long-run equilibrium relationship. The variables there exists a unidirectional causal running from capital formation and savings to the interest rate and no causal prevails between savings and capital formation. However, our analysis shows when savings increased, capital formation in Bangladesh was not growing. That means as the interest rate increased over a period that's when the people of Bangladesh save more except for investing money in fixed assets, levels of inventories, institutional sectors, or the whole economy. Individuals, as well as companies, are saving more for the reason there are fewer possibilities for investments in the economy as a result of political conflict, shoddy infrastructure, or a lack of business credit, which prevents savings compared to increasing capital formation. Instead of investing in companies or industries, people may decide to preserve their savings in low-yield assets like deposit accounts or invest in idle assets like gold or real estate. Capital production can be hampered by a lack of proper financial intermediation, in which money is efficiently channeled from savers to investors. Besides, Inflation should be handled because excessive or unexpected inflation rates are harmful to a nation's economic health. Capital investment should be raised, which will boost expansions for product demand. Increased demand and production will encourage investment in new capital gear, which will assist in sustaining economic development by increasing long-run overall supply.

In the end, we arrive at the recommendation that since interest rates are not a major factor in capital formation or savings as the study suggests, the implication for policy is that income and expenditure policies rather than interest policies, would be more operative in reviving savings

and capital formation in the economy. Government regulations and policies are capable of having a big impact on capital formation. Therefore, the regulatory framework for company investment should be favorable, and government policies are required to encourage investment.

7. References

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