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Factors Influencing Financial Development in Bangladesh: An ARDL Bounds Testing Approach

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Abstract

Financial sector development is essential for achieving sustained economic growth. However, there has been insufficient and unequal financial development in Bangladesh. So, it is crucial to determine the variables that have an impact on the development of the financial sector. Therefore, the focus of this research is to explore the factors that have influenced Bangladesh's financial development from 1976 to 2019 by using the Autoregressive Distributed Lag (ARDL) bounds testing method. The dependent variable is broad money as a percentage of GDP, whereas the independent variables are gross fixed capital formation, the lending interest rate, external debt, inflation, and trade openness. The findings of the ARDL bound test show that there is a stable long-run relationship between the variables. The empirical outcomes show that financial development in Bangladesh is positively and significantly affected by trade openness and gross capital formation in the long run. In contrast, inflation and interest rates both have adverse effects on financial development in the long run, implying that these factors have a detrimental effect on Bangladesh's financial development. However, external debt doesn't influence financial development significantly over the long term. The error correction estimation result shows that the adjustment parameter is negative (0.442), which indicates that

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short-term departure from the long-term equilibrium is adjusted at a rate of 44.2%. This finding is significant at the 1% level of statistical analysis. In order to boost financial development in Bangladesh, this study recommends that the government of Bangladesh maintain a favorable market structure, maintain a low inflation rate and lower lending interest rates.

Keywords: Autoregressive Distributed Lag Model, External debt, Financial Development, Inflation, Interest rate, Trade Openness.

1. Introduction

Financial system development is a crucial element of sustainable economic development. It is considered an important catalyst for economic growth (Tran & Nguyen, 2020) and for reducing poverty (Kousar, Rais, Mansoor, Zaman, Shah, & Ejaz, 2019). It is noteworthy because it provides finances accessible for the country's development through the effective utilization of financial resources. Financial development also allows for more efficient resource allocation (Cherif & Dreger, 2016). It is mentionable that mobilization of savings, distribution of capital, facilitation of investment, and risk management are all crucial components of a well-functioning financial system, which plays a vital role in the overall economy. The scope and depth of the financial sector are important factors that differentiate developed countries from developing ones. The financial system is vital to an economy since it manages resource allocation. Financial institutions and markets are important for the functioning of economic development, particularly for the allocation of financial resources to productive activity. The significance of this has been extensively studied and recorded in empirical research by using various econometric techniques. Beck et al. (2000) revealed that sound financial markets and institutions promote long-term economic growth. Financial intermediaries can help economic development by reducing inflation and transactions, improving resource allocation (via liquidity management, risk diversification, screening, monitoring, and fund pooling), raising savings rates, and encouraging the development of financial instruments as well as markets that allow risk sharing and promote economic growth.

Conversely, there have been different perspectives on assessing the

financial industry's progress. The International Monetary Fund (IMF) contends that financial development should be centered on the expansion of financial markets and institutions, particularly the banking sector as well as the stock market. Earlier studies concentrated exclusively on assessing financial progress from the point of view of the banking industry, and they didn't pay much attention to the stock market at all. Consequently, analyzing financial development comprehensively to identify its fundamental causes is a fascinating issue for further study, particularly in developing countries like Bangladesh. This study provides an outline of Bangladesh's financial development, focusing on the question: Which variables affect financial development in Bangladesh? Identifying the determining factors that influence financial development is essential. As a result, this research utilizes an ARDL model to explore the variables that impede the expansion of the financial industry in Bangladesh.

2. Literature review

The researchers classified all of the exogenous and endogenous elements influencing financial development into five categories. They are government intervention, legal tradition institutions, political economic variables, and openness policy (Voghouei et al. , 2011). The overall advancement of the nation's financial sector can be determined by comparing the quantity and price level, specifically the stock flow and interest rate spread. Numerous scholars employed various financial development indicators. For example, Asratie (2021), Arcand et al. (2015), and Huang (2005) all utilized private credit as a percentage of GDP. Additionally, Asratie (2021), Badeeb and Lean (2017), Saci and Holden (2008), and King and Levine (1993) all utilized liquid liability (M2) as a percentage of GDP.

Baltagi et al. (2007) carried out an empirical study by utilizing panel data methodologies and yearly data to examine the connection between financial openness, trade, economic institutions, and financial development differences across nations. Their findings revealed that nations with the least open financial systems can profit substantially from expanding their trade and capital accounts. Opening both sectors would bring substantial profits to certain countries, whereas opening only one would still result in the banking industry expanding.

Countries that are already open, on the other hand, profit the least from increased openness. Similarly, Takyi and Obeng (2013) used an ARDL model to identify the elements driving Ghana's financial development. According to their findings, they revealed that trade significantly contributes to a nation's financial development. Whereas interest rates and inflation both have a significant detrimental effect on the financial progress of a nation over both the long and short term. However, external debt does not appear to have any influence on the nation's financial progress. They concluded that trade had a beneficial influence on financial development, while reliance on natural resources had an adverse consequence. Similarly, Fu et al. (2020), Badeeb and Lean (2017), and Benya (2010) also came to the same conclusion and illustrated that there is a significant beneficial connection between financial development and trade. Basically, trade openness is considered one of the most important factors that influence a nation's financial development (Caporale et al. , 2022; Khan et al. , 2020; Zhang et al. , 2015; Law, 2009). Moreover, Dehesa et al. (2007) carried out an empirical study across 120 countries on the determinants of financial deepening from 1997 to 2004. They concluded that in an environment with high inflation, it is important to prioritize controlling inflation and reducing macroeconomic volatility.

Additionally, Elsherif (2015) looked into the factors that contributed to Egypt's financial development during a 39-year period from 1974 to 2012 by using the ARDL model. He observed that trade openness, economic growth, human capital, and gross capital formation are all factors that contribute positively to the financial development of Egypt. Similarly, Jiang et al. (2021) investigated the factors that contributed to China's financial development during a 38-year period from 1981 to 2018 by using the quantile autoregressive distributed lag (QARDL) model. They observed that trade openness and gross capital formation positively contribute to China's financial development. Conversely, he noticed that inflation had a detrimental influence on the progress of the financial industry. Hofmann (2001) conducted another investigation and concluded that real interest rates have a detrimental influence on financial development.

Furthermore, Ellahi et al. (2021) explored the influence of institutional components on the financial sector in a study on the South Asian Association of Regional Cooperation (SAARC). They employed the

generalized method of moments (GMM) and observed that institutional variables and trade positively impacted financial depth. Conversely, inflation had a significant negative effect. Several latest research examined numerous elements that influence the finance-growth relationship, either positively or adversely. Similarly, in the West African region, Ehigiamusoe et al. (2019) investigated the influence of inflation on the connection between economic growth and finance. Their research revealed that there is an adverse connection between financial development and the inflation rate. One of the significant contributions of the study was the identification of the inflation threshold, which was found to be 5. 6% or higher. Beyond this level, the link between economic growth and finance could be negatively impacted. The researchers recommended that, instead of attempting to increase both inflation and financial development, policymakers should focus on improving financial development while simultaneously reducing the inflation rate to achieve better economic outcomes. Likewise, Ehigiamusoe et al. (2019) investigated the concept that the stability of the economy is a key indicator of financial development in a related investigation. They emphasized that the stability of the economy is a critical factor that has significant effects on financial sector growth, as shown by their analysis of the West African region.

Thus, there is still a research gap in the empirical literature associated with the conduct of influential factors and their impact on Bangladesh's financial development utilizing time series data analysis. Therefore, the objectives of this research are as follows:

i) To identify the determining factors of financial development in Bangladesh.

ii) To investigate the factors that hinder and facilitate the development of the financial sector in Bangladesh.

3. Data sources and econometric methodology

3. 1 Characteristics of the data

To explore the determinants of financial development, this research has incorporated some important factors, such as trade, external debt, gross fixed capital formation, inflation, and interest rates, to identify the connection between these variables. We used the yearly time series

data that was provided by the World Development Indicators (WDI), which included 44 observations and covered the years from 1976 to 2019. Gross capital formation, inflation, trade, interest rate, and external debt are used as explanatory variables, while the broad money proxy for financial development is used as the dependent variable. The comprehensive summary of both dependent and independent variables is reported in Table 1.

Table1: Variables with their symbols, measurement, data type, and the sources of data

Variables Names	Symbols	Measurement	Expectation	Data Sources
Financial development	FD	Broad money (% of GDP)	-	WDI
External debt	DEBT	External debt stocks (% of GDP)	Negative	WDI
Gross fixed capital formation	GCF	Gross fixed capital formation (% of GDP)	Positive	WDI
Interest rate	IR	Lending rate (annual %)	Negative	WDI
Inflation	INF	GDP deflator (annual %)	Negative	WDI
TRADE	TRADE	Total of imports and exports of products and services (% of GDP)	Positive	WDI

Note: WDI= World Development Indicators, World Bank

3. 2 Operational definition of the variables

3. 2. 1. Financial development

The way of expanding the quantity, quality, and efficiency of financial intermediaries' services is referred to as financial development. It is expressed as a percentage of broad money to gross domestic product (GDP).

3. 2. 2. External Debt

External debt is a debt owed to nonresidents that can be repaid in cash, goods, or services. It is anticipated to be negatively related to financial development. A high level of external debt has the capacity to crowd out private-sector financing.

3. 2. 3. Gross Fixed Capital Formation

Gross Fixed Capital Formation consists of the purchase of plant, machinery, land improvements, and equipment, as well as the construction of railways, roads, and the like, as well as the construction of schools, offices, hospitals, industrial and commercial buildings, and individual dwellings. It is expressed as a proportion of the GDP. It is anticipated that it will have a beneficial influence on financial expansion. The investment rate is a key determinant for financial development since higher investment indicates financial development.

3. 2. 4. Interest rate

Interest rate is the lending "bank rate that usually meets the short and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. The terms and conditions attached to these rates differ by country, however, limiting their comparability" (WDI, 2021). It is anticipated to be negatively related to financial development. Lower interest rates are beneficial for enhancing financial institution activity as well as encouraging financial sector expansion.

3. 2. 5. Inflation; GDP deflator (annual %)

Inflation is defined as follows: "Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency" (WDI, 2021). Inflation is anticipated to be adversely related to financial development. It reduces the purchasing power of money over time. When there is an increase in prices, the value of savings and investments will go down. Because of the decline in real returns, individuals are less likely to save money and invest it in financial instruments such as bonds, bank deposits, and stocks. A decrease in the rates of saving and investing can be detrimental to the development of the financial sector.

3. 2. 6. Trade

Trade is defined as, "the sum of exports and imports of goods and services measured as a share of gross domestic product" (WDI, 2021). It is expressed as a proportion of GDP. It is also anticipated to be positively related to financial development. More nations are

embracing the liberalization of trade as a consequence of globalization, which has been empirically shown to be beneficial for financial development.

3. 3 Econometric methodology

In this study, it is postulated that some factors affect financial development directly. The literature provides several econometric methodologies for inspecting the long-run co-integration connection between the variables. There are many other co-integration methods, including those proposed by Johansen and Juselius (1990), Johansen (1988), and Engle and Granger (1987), however, each model requires the data series to be in a specific order of integration. Therefore, the utilization of the ARDL approach is more flexible in situations in which the data series does not have a specific integration order. This method can be used with variables having different degrees of integration, such as I(0) or I(1). Yet, it is ineffective if each of the factors is I(2). So, the ARDL estimation technique was used to investigate the long-term connection between independent and dependent variables. This study employs the ARDL Model, which was initially proposed by (Pesaran et al. , 1997). The ARDL technique is preferred beyond other approaches due to the fact that this method ignores the issue of order of integration, is appropriate for usage with a small number of samples size, and generates consistent results. Additionally, it can be applied effectively to small datasets to get reliable outcomes (Haug, 2002). Moreover, if both independent and dependent variables are selected with a lag, it provides additional flexibility and can deal with endogeneity problems in variables. Based on the analysis of the relevant literature, the basic regression can be written as follows:

$$FD_t = f\,(DEBT_t, GCF_t, IR_t, INF_t, TRADE_t) \quad (1)$$

We can write our model as follows:

$$FD_t = \mu_0 + \mu_1 DEBT_t + \mu_2 GCF_t + \mu_3 IR_t + \mu_4 INF_t + \mu_5 TRADE_t + \varepsilon_t \quad (2)$$

Where FD stands for financial development, DEBT denotes External debt (% of GDP), GCF indicates Gross fixed capital formation (% of GDP), similarly, IR indicates Lending rate (annual %) whereas INF denotes GDP deflator (annual %) and TRADE indicates Trade (% of GDP). Where is the error term, t represents the time period, and and are the parameters for the respective variables used in this analysis.

The ARDL model is generated in a mathematical framework in accordance with the previous equation of financial development determinants.

$$\Delta FD_t = \eta_0 + \sum_{i=1}^{p} \eta_1 \Delta FD_{t-i} + \sum_{i=0}^{p} \eta_2 \Delta DEBT_{t-i} + \sum_{i=0}^{p} \eta_3 \Delta GCF_{t-i} + \sum_{i=0}^{p} \eta_4 \Delta IR_{t-i} + \sum_{i=0}^{p} \eta_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \eta_6 \Delta TRADE_{t-i} + \eta_7 FD_{t-1} + \eta_8 DEBT_{t-1} + \eta_9 GCF_{t-1} + \eta_{10} IR_{t-1} + \eta_{11} LnINF_{t-1} + \eta_{12} LnTRADE_{t-1} + \varepsilon_t (3)$$

Where represents the constant term, represents the first difference operator, while p represents the appropriate lag length. The ARDL bound test is utilized to check the long-run co-integration relationship of variables based on two hypotheses, the null hypothesis is (Ho): There is no long-run connection among the variables whereas the alternative hypothesis is (Hi):There is a long term connection among the variables. The null hypothesis is rejected if the calculated F is more than the critical threshold value for I (1) or accept if the estimated F value is lower than the critical threshold value for I (0) independent variables. After examining the co-integration of variables, both long- and short-run ARDL models are set up to help understand how the factors that affect financial development change over time. Consequently, the error correction model given by Equation (4) is presented as the short-term model.

$$FD_t = \theta_0 + \sum_{i=1}^{p} \theta_1 \Delta FD_{t-i} + \sum_{i=0}^{p} \theta_2 \Delta DEBT_{t-i} + \sum_{i=0}^{p} \theta_3 \Delta GCF_{t-i} + \sum_{i=0}^{p} \theta_4 \Delta IR_{t-i} + \sum_{i=0}^{p} \theta_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \theta_6 \Delta TRADE_{t-i} + \lambda ECT_{t-1} + \varepsilon_t (4)$$

Where ECT is the error correction term that measures how quickly each period adjusts to get back to balance after a shock, and is the associated parameter that provides this measure. The anticipated value of the relevant ECT parameter changes between 0 and -1, A value of 0 means that there is no convergence into equilibrium, while a value of -1 means that there is optimal convergence, which means that any shock during this period is properly adjusted in the following period.

We conducted a number of diagnostic procedures. Firstly, we applied

the Breusch-Godfrey LM test to check whether the residuals were linked to each other in a series. Secondly, we used the Jarque-Bera normality test to assess whether the residuals of the model were normally distributed or not. Thirdly, we verified the proper functional form by employing the Ramsey RESET test. Fourthly, we utilized the Breusch-Pagan-Godfrey test to evaluate whether the improved ARDL model's residuals were heteroscedastic or not. Finally, the cumulative sum (CUSUM) as well as the cumulative sum of squares (CUSUMSQ) of the recursive residual tests were also utilized for verifying the model's stability.

4. Findings

4. 1. Overview of descriptive statistics

As mentioned before, we used the yearly time series data that was provided by the World Development Indicators (WDI), which included 44 observations and covered the years from 1976 to 2019. Table 2 delivers an overview of the descriptive analysis of the data utilized in this study. It illustrates that the mean of financial development, external debt, gross fixed capital formation, trade, interest rate, and inflation rates were 35. 144%, 28. 164%, 21. 42%, 28. 82%, 12. 25%, and 84. 19%, respectively. Calculation shows that the highest value of financial development in Bangladesh is 64. 51%, the lowest value is 11. 42%, and the standard deviation is 17. 35%. However, the large range and considerable standard deviation indicate that financial development in Bangladesh fluctuates.

Table 2: Summary of descriptive statistics analysis

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
FD	35.144	28.356	64.506	11.418	17.350	44
DEBT	28.164	27.907	45.872	14.508	8.358	44
GCF	21.417	21.969	31.570	9.911	6.054	44
IR	12.252	12.695	14.846	9.540	1.598	44
INF	84.186	43.970	656.327	0.024	125.809	44
TRADE	28.824	27.258	48.111	16.688	9.660	44

4.2. Findings of unit root test

According to econometric analysis, the majority of macroeconomic

time series variables are not stationary at levels (Engle & Granger, 1987). Although the ARDL co-integration method doesn't necessitate unit root checks, they must be conducted to ensure that no variables in the analysis are integrated into the second order, i. e. , I (2). Before conducting time series data analysis, it is crucial to check the stationarity property of the variables, because ARDL techniques are ineffective when working with I (2) variables. To prevent inconsistencies in coefficient estimation, the series must be stationary (Gujarati & Porter, 2009). According to Hill, Griffiths, and Judge (2001), it's essential to avoid using non-stationary time-series variables in any regression to prevent spurious regression. Therefore, ensuring the stationarity of all variables is crucial. Hence, the selection of techniques for time series analysis mainly relies on the outcomes of unit root checks, which identify the level of stationarity of the variable. To analyze the stationarity of FD, DEBT, GCF, IR, INF, and TRADE, we utilize standard unit testing methods like the Augmented Dickey-Fuller (ADF) unit-root test introduced by Dickey and Fuller (1979) and the Phillips-Perron (P-P) tests introduced by Phillips and Perron (1988), respectively. Table 3 displays the outcomes of the unit root testing. According to the findings of our tests, each of our variables has values of I (1) or I (0). We utilize the ARDL bounds testing method to check for co-integration in the long-term connection among the variables due to the mixing order. The following stage is to verify the correct lag order, which can be found in Table 4.

Table 3: Findings of unit root tests

	ADF				P-P				
	Levels I(0)		First difference I(1)		Levels I(0)		First difference I(1)		Status
Variables	C	C & T	C	C & T	C	C & T	C	C & T	I(d)
FD	-0.786	-1.405	-5.462***	-5.398***	-0.808	-1.687	-5.469***	-5.406***	I(1)
DEBT	-0.905	-1.614	-5.115***	-5.894***	-0.905	-1.724	-5.202***	-5.280***	I(1)
GCF	-0.520	-3.067	-4.809***	-4.736***	-0.924	-2.635	-5.261***	-5.099***	I(1)
IR	-2.281	-2.176	-4.152***	-4.367***	-1.714	-1.464	-4.046***	-4.109***	I(1)
INF	-6.209***	-7.471***	-15.550***	-15.340***	-6.260***	-7.433***	-36.598***	-38.603***	I(0)
TRADE	-0.898	-2.215	-6.453***	-6.358***	-0.898	-2.279	-6.453***	-6.3582***	I(1)

*Note: *, **, and *** represent statistically significant results at 10%, 5%, and 1%, correspondingly. Here, C represents the intercept, while T represents the trend.*

4. 3 Lag length criteria

After analyzing the findings of the unit root checks, the lag order for co-integration must be determined; this is an essential part of the ARDL model. In order to capture the dynamics of long-run interactions between the variables, the optimal lag order selection is important. We employ several metrics, including the final prediction error (FPE), the sequentially modified LR test statistic (LR), the Schwarz information (SC), the Akaike information criterion (AIC), and the Hanna-Quinn information criterion (HQ), to determine the optimal lag period to use. To keep the error correction terms from being linked jointly in a chain, it is important to find the most optimal order of lags. Since the data is yearly, the model can initially be determined with four lags, then three lags, then two lags, and finally one lag (Altintas & Taban, 2011). Table 4 displays the maximum criterion used to compute the F-statistics at Lag 4 to demonstrate the co-integration connection among the variables. The AIC was utilized to select the lag length. Lütkepohl (2006) argued that we choose an optimal lag following AIC since, compared to another criterion, the AIC's lag order gives strong and accurate feedback. Furthermore, based on the AIC for this analysis, the ideal lag length is found to be 3.

Table 4: The outcomes of the lag length criterion

Lag length criterion						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-755.3046	NA	1.37e+09	38.065	38.318	38.157
1	-546.452	344.606*	247014.6*	29.423	31.196*	30.064*
2	-509.526	49.851	267199.6	29.376	32.670	30.567
3	-472.267	39.122	356526.5	29.313*	34.127	31.054
4	-440.161	24.079	963950.4	29.508	35.841	31.798

4. 4 Results of the ARDL bounds test approach

This section discusses the long-run connection between Bangladesh's trade, inflation, gross fixed capital formation, external debt, interest rate, and financial development. Table 5 below highlights the outcomes of the ARDL bounds test. The estimated results verified the presence of a long-term connection between the variables. For the ARDL estimate, we have chosen a maximum lag order of 3 using AIC.

The model was generated considering that there is no trend with a constant. The findings of the ARDL bound test reveal that the estimated F-statistics is 5.165, which is greater than both the upper bound I(1) and lower bound I(0) stated by Pesaran et al. (2001) in the 1, 2. 5, 5, and 10% significant levels, implying that the null hypothesis should be rejected and the alternative hypothesis should be accepted, which indicates that the long-run relationship does exist among the variables. So, the ARDL bounds test findings reveal that the variables are co-integrated in the long term. The next stage is to look at the model for both long- and short-term connections.

Table 5: The outcomes of the ARDL Bound test estimation

K	F-Statistic	Significant	Lower Bound,I(0)	Upper Bound,I(1)
		10%	2.26	3.35
5	5.165	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

4. 5 Findings of the Long run relationship

The findings of the long-run regression are displayed in Table 6, and the study reveals that the trade coefficient is significant at the 1% level of significance. It implies that increased trade has the possibility to improve Bangladesh's overall financial development during the research period. This finding is in line with the conclusions of Rajan and Zingales (2003), who contend that increased trade openness is connected to shifts in the structure of the economy's sectors, resulting in a higher demand for external financing that has the potential to improve financial institutions' internal functioning. Similar results were observed by Boopen et al. (2011) and Huang and Temple (2005) for Mauritius and lower-income groups such as Vietnam and Pakistan, respectively.

In addition, the inflation coefficient does indeed have the expected negative value, and its significance is at the 10% level of statistical significance. It indicates that inflation, which is a signal of unstable macroeconomic conditions, has a substantial negative effect on Bangladesh's financial sector. This is an essential issue for the country. This finding is in line with the McKinnon's (1991) theory, which posits that maintaining stability in prices is essential for the processes of

financial intermediaries and that an excessive rate of inflation discourages long-term shrinking, worsens moral hazard and informational asymmetry, and hampers the development of the financial sector. Furthermore, inflation slows down financial growth because it reduces the amount of money in circulation and limits the resources that can be used for investment. Too much inflation also makes it more expensive to keep money in the bank, which hurts the effectiveness of financial institutions and slows the development of the financial sector. These observations are in line with the conclusions of a large number of empirical research that has been published in the academic literature, including studies conducted by Bittencourt (2008) in Brazil and Takyi and Obeng (2013) in Ghana, both of which concluded that inflation has a negative impact on the development of the financial sector.

Table 6: The long-run ARDL estimation findings

Based on AIC, ARDL model (2, 3, 3, 1, 0, 0) was chosen			**Dependent Variable: FD**	
Regress or	**Co-efficient**	**Standard Error**	**T-Ratio**	**P-values**
Constant	-7.081	5.611	-1.262	0.218
DEBT	0.030	0.194	0.157	0.877
GCF	1.134	0.401	2.826	0.009***
IR	-0.039	0.877	-0.045	0.965
INF	-0.024	0.014	-1.773	0.088*
TRADE	1.124	0.238	4.729	0.000***

*Note: *, **, and *** reflect the statistical significance at the 10%, 5%, and 1% levels, correspondingly.*

Moreover, gross capital formation is positively related to financial development, and this linkage is significant at the 1% level. This result suggests that the investment rate is an important indicator of financial development since higher levels of investment indicate higher financial development. The empirical research supports the conclusions of Elsherif (2015), who revealed that gross capital formation positively impacts financial development in Egypt. Also, as expected, the interest rate coefficient has an adverse sign, but it is not statistically significant. Hence, across the study period, interest rates had a detrimental impact on financial progress in the Bangladeshi economy. It is suggested here that the central bank's high-interest rates have the potential to widen banks' spreads of interest (the difference

between deposit and lending rates). This indicates that the banking industry's interest rate spread is causing problems for potential savers, who are not seeing significant returns on their deposits. This, in turn, limits financing options for potential borrowers. It coincides with the empirical findings of Cottarelli and Kourelis (1994), who observed that interest rates have a detrimental impact on Germany's, South Africa's, and Belgium's financial development. Therefore, the external debt coefficient is positive but statistically insignificant. It indicates that the rising level of external debt is not a barrier to the private sector. This insignificant finding is similar to Asratie's (2021) and Takyi and Obeng (2013) findings for Ethiopia and Ghana, respectively.

4. 6 Findings of the Short-run Relationship

After analyzing the long-term link of the provided model, we investigated the short-term variations in the ECM-ARDL model. In Table 7, the short-term outcomes are ambiguous.

The short-run coefficients of DEBT have a significant positive correlation at the current level (t) and at lag 2 (t-2), but this correlation does not exist at lag 1, which is consistent with the outcomes over the long term. Additionally, the coefficient of gross capital formation is negative but statistically insignificant at the current level (t) and lag 1 (t-1) but has a significant negative impact at lag 2 (t-2). When it comes to interest rates, the short-term result is significant. Furthermore, the interest rate coefficient is also detrimental and significant at the 10% level.

Table 7: The findings of short-run Error Correction Model estimation

Based on AIC, ARDL model (2, 3, 3, 1, 0, 0) was chosen			**Dependent Variable: FD**	
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**P-values**
Constant	-7.081	1.396	-5.072	0.000***
D(FDB(-1))	0.184	0.120	1.534	0.137
D(DEBT)	0.420	0.128	3.283	0.002
D(DEBT(-1))	-0.110	0.117	-0.943	0.354
D(DEBT(-2))	0.317	0.115	2.747	0.011**
D(GCF)	-0.368	0.475	-0.775	0.445
D(GCF(-1))	-0.503	0.472	-1.064	0.297
D(GCF(-2))	-1.517	0.520	-2.916	0.007***

D(IR)	-0.855	0.469	-1.825	0.079*
ECM(-1)	-0.442	0.073	-6.078	0.000***
R-squared		Adjusted R-squared		Durbin–Watson(D–W)
0.609		0.495		2.173

*Note: *, **, and *** reflect the statistical significance at the 10%, 5%, and 1% levels, correspondingly.*

The ECT represents the pace of adjustment toward equilibrium over the long run in a model with one period of shock. The ECT refers to the speed of convergence towards long-run equilibrium in a model with one period of shock. According to the proposition that was provided by Pahlavani et al. (2005), a stable model of ECT needs to satisfy two key requirements. Initially, the term must be statistically significant, which is the first requirement. The second requirement is that it must have a negative sign. As can be seen in Table 7, the predicted sign of the lagged error correction term, shown by ECT (-1), is negative and statistically significant at the 1% level. It indicates that any shock from a prior period must be adjusted at a speed of 44. 2% over the long-run equilibrium. The value is 0. 609, which indicates that the explanatory variables can explain 60. 9% of the variation in the dependent variable. Besides, the adjusted value is 0. 495%. Additionally, the D-W value is 2. 173, which indicates that the variables are not connected to each other, implying that no autocorrelation exists in the model. All statistical outcomes (D-W, Adj.) point to the fact that the estimated model is reliable and accurately fits the data.

4. 7 ARDL Diagnostic Test

To establish the validity of the results, diagnostic tests were used in this part of the study. The results were validated using a number of tests, including normality, functional form, heteroscedasticity, and serial correlation tests. Table 8's findings for these tests demonstrated that the residuals from the test that was applied were normally distributed. None of the models demonstrated serial correlation, The Breusch-Pagan-Godfrey test was also utilized to assess the heteroscedasticity of the enhanced ARDL model's residuals. according to the findings of the heteroscedasticity tests, indicating that none of the models had autoregressive conditional heteroscedasticity.

Table 8: ARDL Diagnostic Test

	Obs*R-squared	Chi-Square p-value	F version	p-value
Serial Correlation	3.927	0.140	1.271	0.299
Normality	Not Applicable	-	5.640	0.060
Functional Form	Not Applicable	-	0.426	0.520
Heteroscedasticity	11.318	0.661	0.708	0.747

Furthermore, the CUSUM as well as the CUSUMSQ tests were also utilized for verifying the model's stability. Brown et al. (1975) also utilized these tests to determine model stability. As shown in Figures 1 and 2, the CUSUM and CUSUMSQ statistics fall within the threshold limits, indicating the model's stability over time.

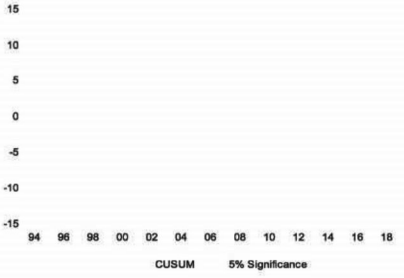

Fig 1: Plot of CUSUM test.

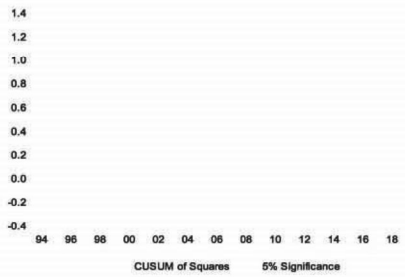

Fig 2: Plot of CUSUMSQ test.

5. Conclusion and policy recommendations

It is essential to enhance the financial sector's performance in order to maximize social welfare and ensure sustained economic growth. Financial system development is regarded as an important component of economic growth. But so far, financial development in Bangladesh has been slow and uneven. So, determining the factors of financial development is thus important. As a result, the main goal of this research is to investigate the determinants of the development of the financial sector in Bangladesh. To fulfill this objective, yearly data for time series from 1976 to 2019 was utilized. In this analysis, the ARDL estimation technique is used. The error correction estimation indicated that the adjustment coefficient was significant at the 1% level of significance and negative (-0. 442). This would imply that any

divergence from the long-run equilibrium that occurs over the short term would be rectified at a rate of 44. 2%. Mentionable that the findings of the long run align with the conclusions of other empirical research, indicating that trade and gross capital formation are vital components that have a positive significant effect on Bangladesh's financial development. Moreover, inflation plays a significant part in the process of financial development; nevertheless, its effect is detrimental over the duration of a longer period of time. In addition, the interest rate has a detrimental impact both in the short term and in the long run, but the short term is the only time period in which it is statistically significant. Conversely, a country's overall financial development is not significantly impacted by external debt over the long term. Based on these findings, the authors of this article propose some policy recommendations:

i. Governments in developing countries that have not opened their economies to foreign trade yet have a chance to do so now. This will help their financial sectors grow. More specifically, the government of Bangladesh needs to improve its trade so that its banking sector can work well and all of the benefits that come with that can be utilized.

ii. The policymakers of Bangladesh should emphasize accelerating the gross-capital formation in order to sufficiently help in infrastructural development, and facilitate growth of both domestic and foreign private fixed investment. Moreover, financial institutions should be well-functioning and welcoming in the matter of funding large-scale infrastructural projects.

iii. The Bangladeshi government must implement measures aimed at maintaining a low inflation rate. This is due to the fact that bad macroeconomic performance has negative consequences for a growing economy, such as excessive inequality, unstable development, and most significantly, a limited financial sector.

iv. Furthermore, Bangladeshi financial institutions may consider cutting their lending interest rates in order to encourage private-sector borrowing and promote economic progress in the financial industry.

v. Finally, in order to assure the progress of the financial industry,

the government must first assure financial development by providing macroeconomic stability.

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