Macroeconomic Determinants of Inflation in Bangladesh

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ABSTRACT

The paper intends to investigate the key determinants of inflation in Bangladesh using the data for the period 2009-10 to 2019-20. The variables used in the study are broad money supply, foreign direct investments, GDP growth, foreign exchange rates and trade balance. Ordinary least squared method has been used to conduct the empirical analysis. The results found that broad money supply, foreign direct investments and trade balance has positive and significant association with the inflation. GDP growth has negative and insignificant relation with the inflation whereas foreign exchange has positive but insignificant association with the inflation. The unexpected event of Covid-19 has also found to have some contribution in affecting the inflation rate.

Keywords: Covid-19, GDP, Inflation, Money Supply.

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I. INTRODUCTION

Inflation is defined as the persistent increase in the general price level that reduces the purchasing power of the consumers in an economy. Inflation makes the goods and services costlier and have a substantial impact on the other economic indicators. Inflation occurs when the volume of money and credit in an economy increases compared to the goods and services available. Most of the countries measure inflation using the consumer price index (CPI) and gross domestic product (GDP) deflator. In Bangladesh, the CPI mainly used to calculate the inflation for food and non-food items. The CPI measures the average change in the prices for a basket of goods and services purchased by the consumer over time. the CPI mainly uses the price data for food items, utilities, fuel etc. Macroeconomic researchers try to identify the root cause of inflation and how it is contained to a certain level. Although some inflation is always good for economic growth, but high inflation can have significant negative effect on economic growth and prosperity. The impact of inflation is quite far reaching and have long term impact on the consumers budgetary decisions. Inflation affects the other macroeconomic variables such as interest, savings, investments, real wages, income, unemployment etc. Inflation reduces the value of domestic currency and enhance the value of foreign currencies which make the imports more expensive. The control of inflation is a key issue for the Central Bank and the government.

deficit in the trade balance, higher inflation, and decreased industrial capacity for several years. But the long-term balance of payment, domestic savings, agricultural production, and government expenditure was growing. Bangladesh has faced two digits inflations very few times, although the inflation rate is higher than GDP growth for many years. Due to expansionary economic and favorable investment policies, the GDP growth rate surpassed the inflation rate in recent years. [1]. Covid-19 affected the global macroeconomic variables and inflation, and Bangladesh is not an exception. Ahmed, [2] described that inflation is a key component of capital market efficiency.
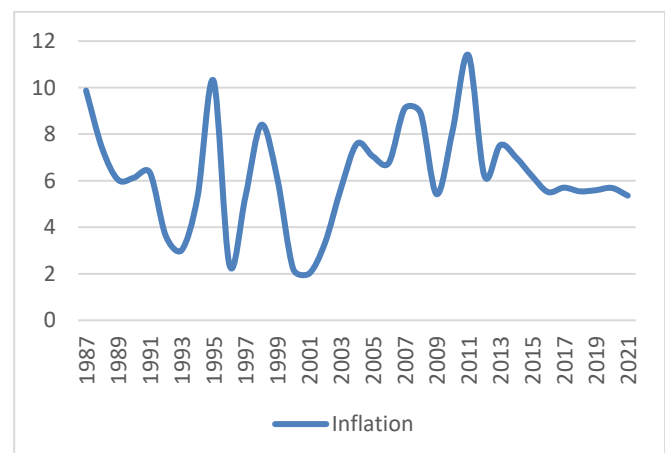

Fig. 1. Inflation History of Bangladesh.

II. INFLATION IN BANGLADESH

The economy of Bangladesh has seen several shocks from internal and external sources where the macroeconomic determinants have witnessed large fluctuation. There are three major sectors of the country's economy: manufacturing, service and agricultural. Among all these three segments the service sector contributes heavily on the GDP growth. Bangladesh has faced budget deficits, the

III. LITERATURE REVIEW

Several researchers have tried to analyze the macroeconomic determinants of inflation over the years. There exists only few research on empirical analysis of inflation and its determinants in Bangladesh.

Laryea & Sumaila [3] identified the determinants of inflation using the quarterly time series data from 1992-1998 in Tanzania. The study uses ordinary least square

method, ADF test for unit root and error correction model to examine the major determinants both in the long-run and short-run. The study revealed that output and monetary factors influence the inflation in the short run whereas in the long run foreign exchange also impact the inflation. Kim (2001) examined the inflation determinants in Poland for the years 1990-1999. The study uses cointegration and error correction models to identify that the monetary, labor, and external sector are the core sources of inflation. Ahmed, [4] figured out that macroeconomic variables also impact the corporate boards, audit committees and voluntary disclosure to Saatsioglu & Korap [5] explored the possible reasons for high inflation in Turkey using monthly data from the period of 1989-2004. The results found that exchange rate, wage indexation and real interest rate have substantial effect on inflation whereas the demand-pull monetary factors don't affect the inflation rate. Khan [6] studied the determinants of inflation in Pakistan using the data from 1973-2006. Using the ordinary least square method, Breusch-Godfrey Serial Correlation LM and Augmented Dickey-Fuller tests the researchers concluded that public-private sector borrowing, import prices, real demand, exchange rate, previous years inflation has direct impact in the inflation of the country. Ahamed [7] also found that public-private sector borrowing can have direct impact on the factors of production growth and therefore affecting inflation.

Basir *et al.* [8] explored the inflation determinants in Pakistan for the period from 1972 to 2010 using Johansen Co-integration and Vector Error Correction approach. The study finds that money supply, gross domestic product, government expenditures and imports significantly affect the inflationary movement. Similarly, Abidemi & Maliq [9] traced the relationship between inflation and its determinants in Nigeria between 1970 and 2007. The study reveals that the money supply, imports, interest rate, and GDP growth has positive impact on the inflation rate whereas variables like fiscal deficit and exchange rate has indirect association. Khathlan [10] examined the determinants of inflation in Kingdom of Saudi Arabia for the period 1980 to 2009 and found that in the long run the global inflation rate and exchange rate have substantial influence whereas in the short run, money supply and supply bottlenecks are the major determinants of inflation. Pramanik & Polansky, [11] found an efficient optimization technique to control the macroeconomic variables to reach an optimum solution. Similarly, Pramanik [12] and & Pramanik & Polansky [13] reached the same conclusion using the dynamic profit function.

Mosayed & Mohammad [14] explored the determinants of inflation in Iran using data from 1971 to 2006 using the autoregressive and distributed lag model. The study concluded that exchange rate, GDP growth, money supply and price changes have direct association with the inflation in the country. Simiarly, Mahmoudi, [15] concluded that macroeconomic variables and crude oil price affects the economic growth and inflation. Shahabuddin studied the major determinants of inflation in India using 54 time series quarterly observations using the Johansen Juselius cointegration methodology. The study determined that broad money and GDP growth has positive association with the inflation whereas interest rate and exchange rate have

negative association. Alam, [16] analyzed the output, employment, and price effects on the US tax rate which affects the purchasing power of the consumers. The empirical findings show that the expansionary tax cut rate has positive impact on the price and contribute to inflation.

Excess demand in goods and services also contribute to the determinants of inflation. Sudden migration crisis can create more than normal pressure on the food and oil market. Minar, [17] argued that strong foreign policy can help avoid the inflationary crisis by controlling the population shift. Minar, [18] and Minar, & Abdul, [19] explored the Swot analysis to identify the positive and negative impact on the migration across the borders. The argument was supported by Minar, [20] in the security risk of migration which consist of food and non-food products security for the host nation. Alam, & Hossain, [21] identified that proper resource utilization and entrepreneurial activities to mitigate the food security.

Taslim [22] analyzed the determinants of inflation in Bangladesh. The study finds that one year lagged money supply has positive association with the inflation. Khanam & Rahman [23] studied the factors of inflation in Bangladesh from 1973-1992 by applying the ordinary least square method and found that import prices and monetary wages have positive impact on inflation. Ahmed & Das [24] figured out that global food and fuel price also contributed to higher inflation. Global prices trigger the interest rate, foreign exchange rates and stock prices that affects the purchasing power of the money. Mahmoudi, & Ghaneei, [25] explored the impact of crude oil market on Canadian stock market applying the Markov Regime-Switching approach and find out that the crude oil market has positive effect on the stock market. Joint research conducted by Bangladesh Bank, IMF and CPD explained that M2 growth, private sector credit growth, market capitalization growth, growth of government borrowing, remittance growth, exchange rate change, market syndicate etc. contributed as the determinants of inflation in Bangladesh. Alam, et. al. [26] worked on the current account dynamics to determine the impact on macroeconomic variable and found positive association. Khan, [6] emphasized the importance of exchange rate on the economic growth.

IV. RESEARCH METHODOLOGY

A. Data & Variables

The panel data series for the analysis has been collected from secondary sources for the period 2009-10 to 2019-20. The data has been obtained from World Development Indicators (WDI), Bangladesh Bureau of Statistics (BBS), and Bangladesh Bank (BB). The study period includes major reform, economic shift, regime changes, etc., to reflect the price volatility on economic growth.

B. Empirical Model

In this study, the time series data estimations allow to control for observable and unobservable heterogeneity. The specification of the empirical model is:

$$INF_j = \alpha_0 + \alpha_1 M2_j + \alpha_2 FDI_j + \alpha_3 GDP_j + \alpha_4 FX_j + \alpha_5 TB_j + e_j$$

where, INF is the inflation rate, M2 means broad money growth rate, FDI means foreign direct investment as percentage of GDP, GDP implies Economic growth rate, FX indicates the nominal exchange rate and TB means trade balance. To linearize the model FX variable are converted in the natural log form.

The study used Augmented Dickey-Fuller Test and Phillips-Perron Unit Root Test to identify unit-roots existence. Phillips and Perron have generalized the Augmented Dickey-Fuller tests to the situations where the disturbance process in error term is serially correlated. The Phillips-Perron test is intended to add a 'Correction Factor' to the Augmented Dickey-Fuller test statistic.

C. Results and Discussions

The Augmented Dickey-Fuller Test and Phillips-Perron Unit Root Test find that the variables are stationary and automatically cointegrated. So there exists a relationship between the independent and dependent variables. The p values for both variables in ADF and PP tests are less than the significance level of 5%. As a result, we reject the null hypothesis of non-stationarity. All the variables are integrated of order zero, so the Ordinary Least Square method is appropriate for the analysis

TABLE I: ORDINARY LEAST SQUARE (OLS) SUMMARY

Variables	Estimate (Std. Error)	Mean (Std. Dev.)	Min	Max
INF	N/A	0.0679 (0.0176)	0.0551	0.114
M2	0.3955* (0.2093)	0.1475 (0.0398)	0.0924	0.2134
FDI	0.0032* (0.003)	0.1364 (0.2931)	-0.3904	0.5337
GDP	-0.3481 (0.8633)	0.0662 (0.0091)	0.0524	0.0815
FX	0.1610 (0.3556)	1.8938 (0.0263)	1.8419	1.9286
TB	0.0278* (.0205)	0.1258 (0.2812)	-0.1764	0.5999
R-Squared	0.7666			
Adjusted R-Squared	0.5332			
Observations	66			

* 10% Significance level.
**5% Significance level.
***1% Significance level.

The R-squared and adjusted R-squared are 0.7666 and 0.5332, respectively which means most of the variation of the dependent variable are explained by the independent variables. The empirical results of ordinary least squared method depict that broad money supply have positive and significant association with inflation. Higher money supply leads to higher level of inflation. The foreign direct investment also has slight positive but significant relationship with the factors of inflation. The economic growth of the country has negative and insignificant association with the inflation. Previous studies found that inflation has negative effects on the economic growth of the country. The foreign exchange rate also has positive return with the inflation. Higher foreign exchange rate means weaker domestic currency and foreign investors are willing to invest more money which influences the higher money supply and therefore increases inflation. The trade balance is

positively related with the inflation and the results showing it has strong association. Bangladesh is facing negative trade balance over the years and thus contributing to inflation in a deterministic way. The macroeconomic variables mostly have positive association with the inflation determination. Unexpected events like Covid-19 have been integrated with the last year's macroeconomic variables and impacted the inflation for short run.

TABLE II: CORRELATION MATRIX

	INF	M2	FDI	GDP	FX	TB
INF	1.0000					
M2	0.7858	1.0000				
FDI	-0.2883	-0.1454	1.0000			
GDP	-0.3990	-0.5810	0.4664	1.0000		
FX	-0.6333	-0.8550	-0.0983	0.4831	1.0000	
TB	0.3572	-0.0016	-0.2338	0.3598	-0.0367	1.0000

Multicollinearity is a situation where independent variables in a multiple regression equation are highly interrelated. A general rule regarding multicollinearity is that if the correlation between two independent variables is between -0.70 and 0.70, there is likely no problem using both the independent variables. Fortunately for the data being analyzed, there is no significant multicollinearity problem exists. So, for the analysis, the study can use all the independent variables together. The correlation matrix also confirms the relationships identified by the OLS model.

V. CONCLUSION

The aim of the paper was to determine and establish relationship between inflation, money supply, foreign direct investments, GDP growth, foreign exchange, and trade balance. The study suggests that money supply, foreign direct investments, trade balance etc. have strong relationship in determining the inflation rate. There are other variables such as global prices, interest rates, unexpected events, oil prices etc. also influence the general price level and affect the consumer price index. The main goal of the central bank is to control the inflation through affecting the macroeconomic variables such as money supply, interest rate etc. Controlling inflation requires strong collaborative effort from the government, central bank, and other relevant stakeholders. This empirical study will be helpful for the regulators to identify the determinants of inflation and determine the fiscal and monetary policy.

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