INFLATIONARY DYNAMICS AND CAUSAL NEXUS OF BUDGETARY GAPS AND MONETARY EXPANSIONS: A TIME SERIES ANALYSIS WITH ARDL MODELLING FOR BANGLADESH

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ABSTRACT

This paper examines the causal relationships between inflation, budget deficit, and money supply in Bangladesh from 1980 to 2023 using the Autoregressive Distributed Lag (ARDL) approach. Short-run causality analysis reveals unidirectional influences from budget deficits and money supply to inflation. Contrary to common conjectures that link budget deficits to inflation through increased money supply, our findings reveal no causality between money supply and inflation in both the short-run and long-run. The study contributes to the empirical literature by focusing on the unique economic context of Bangladesh, which has not been extensively explored in this trivariate relationship. The results suggest that conventional economic theories may not fully apply to developing countries like Bangladesh, where monetary expansions do not necessarily lead to inflationary pressures in the long run. The paper concludes with policy recommendations based on the analysis of the ARDL model and diagnostic tests confirming the model's stability.

Keywords: Inflation, Budget Deficit, Money Supply, ARDL Model, Causality Analysis

JEL Codes: C32, E31, E52, H62

INTRODUCTION

Amidst the dynamic economic landscape of Bangladesh, the government's projected budget deficit for the year ending in June 2024 is uncertain. It depends a lot on how the economy grows. Yet, as cautioned by Fitch Ratings, the deficit might not stay as expected, especially if the optimistic growth targets aren't realized. This could potentially unsettle the nation's economic stability. Bangladesh's consumer price inflation stands as a testament to the nation's economic intricacies. Over the past decade, inflation has gone up by an average of 6.2%, which is far beyond the average in the Asia-Pacific region, to be precise of 4.1 substantial

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margin points. Notably, in 2022, prices went up by an average of 7.7%, underscoring the persistence of inflationary pressures in the country's economic landscape. The Austrian School of Economics describes inflation as an increase in money and credit, not just rising prices. According to the Austrian school of economics, government deficits are inflationary. While governments print money to pay off debts by increasing the money supply, it causes inflation. The Austrian school believes that any increase in the money supply not supported by a corresponding increase in the production of goods and services leads to an increase in prices, but not all goods' prices increase simultaneously. In his pioneering work "Ten Great Economic Myths," Murray N. Rothbard debunks the idea that budget deficits don't cause inflation. According to Rothbard, deficit financing, or printing money, became a tool for governments to spend beyond their means, which initiates inflation. Printing money is the easiest thing. Every government is clever enough to do it. The government denies responsibility for inflation; they blame it on "bad actors" like unions or corporations. However, inflation results from the government's decision to increase the money supply. The government tries to manage inflation by setting prices, but it hides its own function in making it happen. Inflation occurs when the money supply increases faster than the supply of goods, which leads to a rise in prices. This cycle can persist if there's a check on the government's ability to expand the money supply. Ultimately, governments are often responsible for destabilizing monetary systems through unrestrained inflation (Rothbard, 1984). Budget deficits, emblematic of a government's proposed expenditure exceeding its available public revenues for a fiscal year, are pervasive in the economic narratives of developing nations. These deficits, often termed fiscal gaps, present a nuanced lens through which to analyze the economic trajectories of nations poised on the cusp of development (Amin & Murshed, 2017; Jimmy, 2014; Aworinde, 2013; Chihi & Normandin, 2008; Saleh & Harvie, 2005). In the pursuit of funding public projects, developing countries frequently turn to foreign sources, including aid from international donor agencies and developed nations (Amin & Murshed, 2018). The macroeconomic repercussions of budget deficits have spurred myriad investigations aimed at deciphering their interplay with key economic indicators (Burdekin & Langdana, 2015; Nguyen, 2015; Willett & Laney, 2014; Laubach, 2009). However, the discourse surrounding budget deficits lacks uniformity. While some studies advocate for their presence, linking deficits to economic growth, particularly in developing economies, others highlight their adverse effects on overall economic stability (Oladipo & Akinbobola, 2011). Rooted in Keynesian export-led growth theory, proponents of deficit spending argue that it stimulates aggregate demand, fostering economic expansion (Oladipo & Akinbobola, 2011). Conversely, critics point to the inflationary pressures and escalating public debt associated with sustained deficits (Biza et al., 2015; Lee & Ng, 2015). Amid these debates, the trinity of inflation (INF), budget deficits (BD), and money supply (M2) emerges as pivotal macroeconomic variables subject to extensive scrutiny by economists worldwide. Persistent government deficits and burgeoning

debt have assumed critical importance for both developed and developing economies, spurred by declining tax revenues during recessions and escalating debt service payments (Biza et al., 2015). Bangladesh, a nation in the throes of development, mirrors this narrative, grappling with budgetary deficits and relying on foreign aid to bridge fiscal gaps. Against this backdrop, this paper embarks on a novel exploration, delving into the causal relationship between BD, M2, and INF within the context of Bangladesh from 1980 to 2014.

Unveiling insights previously unexplored, this study employs the Autoregressive Distributed Lag (ARDL) econometric model to dissect the interplay between these macroeconomic variables. By elucidating the impacts of M2 on BD and INF across both short and long run horizons, this paper seeks to address fundamental conceptions. If a long-term relationship exists between BD, M2, and INF in Bangladesh and if a causal link exists between these macroeconomic variables, our study aims to unveil these intricacies. Through this research, we endeavor to fill a void in the empirical literature, offering fresh perspectives on the economic dynamics of Bangladesh and contributing to a deeper understanding of the global discourse on fiscal policy and economic development.

LITERATURE REVIEW

During the early 1920s, economist Ludwig Von Mises lived through hyperinflation in Austria. He defined the relationship between monetary inflation and prices in three phases. In the first phase, prices rise sporadically while people remain optimistic. Assets excluded from inflation statistics still get more expensive due to money and credit expansion. The second phase involves widespread price increases, individuals shift preferences from money to goods, and they blame speculation for inflation. Finally, in the third phase, people rapidly lose faith in currency. As people rush to spend money before it becomes worthless, this leads to a "crack-up boom" (Mises, 1949). In a study by Parida et al. (2002), the relationship between fiscal deficit (BD), money supply (M2), and price level in India was scrutinized using a Vector Auto Regression (VAR) model over a 40-year period from 1961 to 2001. The findings unveiled bidirectional causality between fiscal deficit and M2, alongside unidirectional causal links from price level to both fiscal deficit and M2. Solomon & De Wet (2004) delved into Tanzania's economic landscape, characterized by historically elevated inflation rates and persistent fiscal deficits. Employing data spanning from 1967 to 2001, the authors investigated the causal nexus between fiscal deficit and inflation. Their analysis suggested that shocks in fiscal deficit and GDP adversely affected inflation in Tanzania, echoing earlier assertions by Sargent and Wallace (1981) and Easterly and Schmidt-Hebbel (1994) regarding the multifaceted nature of inflationary pressures. Oladipo & Akinbobola (2011) explored the relationship between fiscal deficit and other macroeconomic variables in Nigeria. Utilizing data from 1971 to 2005, the authors employed pairwise Granger causality tests to examine causal relationships among fiscal deficit, inflation rate, exchange rate, and GDP. Their findings highlighted a unidirectional

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causality from fiscal deficit to inflation in the long run, accompanied by an indirect effect whereby fiscal deficit led to exchange rate fluctuations, subsequently fueling inflation.

Abel et al. (2012) investigated the impact of the fiscal deficit on inflationary pressures in the Nigerian economy using data from 1980 to 2009. Employing cointegration analyses and Vector Error-Correction Model (VECM) causality techniques, the authors identified a unidirectional causal relationship from the fiscal deficit to inflation without feedback, alongside a similar causal link from the fiscal deficit to the money supply. However, the study focused solely on short-run causal relationships, overlooking long-term dynamics. A common limitation across these studies is the emphasis on either short-run or long-run causal analyses, without elucidating potential variations in causal relationships over time horizons. Additionally, the literature predominantly focuses on African developing countries, neglecting insights into South Asian contexts. Thus, this paper seeks to address these gaps by analyzing causal associations within the context of Bangladesh. The empirical model employed in this study builds upon the framework of Parida et al. (2002), adapting it to accommodate relevant data on the macroeconomic variables under scrutiny. The regression model posits inflation as a function of the fiscal deficit and the money supply, reflecting the dynamic interplay between government fiscal policies and monetary expansion. While fiscal deficit-induced monetary expansion may stimulate economic growth and revenue generation, it may also precipitate inflationary pressures due to heightened demand for goods and services, underscoring the intricate balance between fiscal and monetary policy objectives.

The economic landscape of Bangladesh has been the subject of extensive research, particularly in relation to inflation and its determinants. Studies have consistently highlighted the significant influence of GDP, money supply, exchange rate, and interest rates on inflation (Uddin et al., 2014). Government expenditure and imports are also noted to have a positive impact on inflation, with exports exerting a negative effect (Arif & Ali, 2012). Al-Mukit (2015) further corroborates these findings, emphasizing the acceleration of inflation due to GDP growth, money supply, exchange rate fluctuations, and government expenditure. In contrast, other research across different countries, including Bangladesh, Jordan, Malaysia, and OECD countries, presents varied results regarding the factors influencing inflation (Ferdous & Sultana, 2017; Hossain, 2002; Begum, 1996; Mukitadar-Al-Mukit et al., 2015; Alawin & Oqaily, 2014; Islam et al., 2017; Bowdler & Nunziata, 2006). These disparities underscore the complexity of inflation dynamics and the need for context-specific analyses. The literature on inflation's determinants presents a diverse range of findings. Al-Mutairi et al. (2020) explored the impact of goods and tax revenue on inflation in Kuwait, concluding that goods have a positive and significant influence, while tax revenue can reduce inflation levels. In Bahrain, Al-Ezzee (2016) found that monetary instruments such as money supply, nominal effective exchange rate, and nominal interest rate have a long-term positive effect on the Consumer Price Index (CPI), with government expenditure

also contributing to inflation (Al-Ezzee, 2016). The study of Ubide (1997) identified seasonal impacts due to agricultural production and policy changes as key determinants of inflation in Mozambique. Dragos et al. (2013) conducted a multiple regression analysis on the emerging economies of the USA and China, revealing that money supply, interest rate, and exchange rate policy significantly influence inflation in both nations (Dragos et al., 2013). Pourroy (2012) observed that in the short run, external shocks and currency depreciation create inflation, while in the medium term, the intensity of the impact depends on money supply and domestic demand. The economic implications of inflation, budget deficits, and money supply have been extensively studied across various countries. (Basher & Elsamadisy, 2012) explored the determinants of inflation in Gulf Arab states and found that money supply and exchange rate significantly influence inflation rates in both the short and long run. Similarly, (Odusanya & Atanda, 2010) concluded that GDP, money supply, lagged inflation, real import, and exchange rate are crucial determinants of the inflation rate in Nigeria. In Ghana, (Adu & Marbuah, 2011) employed the ARDL model to reveal that real output, exchange rate, money supply, interest rate, and fiscal deficit significantly impact the inflation rate. The study conducted by (Kim, 2001) on Poland utilized Co-integration and ECM methodologies to conclude that currency appreciation and wage increase reduce the inflation rate, while the impact of monetary policy instruments is passive on inflation. In Pakistan, (Bashir et al., 2016) found that in the long run, inflation is increased by government expenditure, import, government revenue, and public debt, whereas it is reduced due to an increase in foreign direct investment and electricity generation growth. Another research on Saudi Arabia concluded that oil price, domestic demand, and the fall in the price of the dollar are the main determinants of inflation in the long run (Alotwaijri, 2011). Lastly, another study by (Bashir et al., 2011) focusing on Pakistan using Johansen Cointegration and VECM methodologies revealed that money supply, import, and government expenditures have a positive innovation on inflation, whereas government revenue reduces inflation in the long run. A study by Islam et al. (2022) investigates the determinants of inflation in Bangladesh using time series ARDL model. The research finds that gross domestic product (GDP), broad money supply (M2), export growth (XG), import growth (MG), and population growth (PG) are major determinants of inflation in Bangladesh. While some earlier studies argue that deficits and inflation aren't related, (Rothbard, 1984) explains that during the 1982–83 period, despite accelerating deficits and decreasing inflation, the overall relationship between deficits and inflation still holds true because inflation depends on both money supply and demand, which can fluctuate due to various economic factors. Murray Rothbard cautioned that if central banks directly fund the government, like what happens with quantitative easing (QE), it could cause serious inflation.

Theoretical Paradigm

Macroeconomic principles posit that as the disparity between government spending and

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revenue widens, governments often resort to expansionary monetary policies, leading to an increase in the money supply (M2) in the economy. This strategic maneuver aims to bolster government revenues, predominantly sourced from both direct and indirect taxation. Consequently, augmenting national income becomes imperative, necessitating injections of monetary capital into the economy to elevate investment levels and foster greater employment opportunities. Thus, the surge in fiscal deficit (BD) can be correlated with an upsurge in M2 through this mechanism.

However, traditional economic tenets also suggest that expansionary monetary policies may spur inflation (π) in the economy. This is due to the disruption in the local money market whenever the government adjusts the level of M2. Such disequilibrium imposes adverse effects on the broader economy. In order to restore equilibrium, the domestic price level increases as a mechanism to offset the decline in the marginal value of money. To analyze the relationship between fiscal deficits, money supply, and inflation, the Quantity Theory of Money (QTM) is used. The equation is typically expressed as:

$M V = P Y$

Here,

M is the money supply,

V is the velocity of money,

P is the price level,

Y is the real output of goods and services.

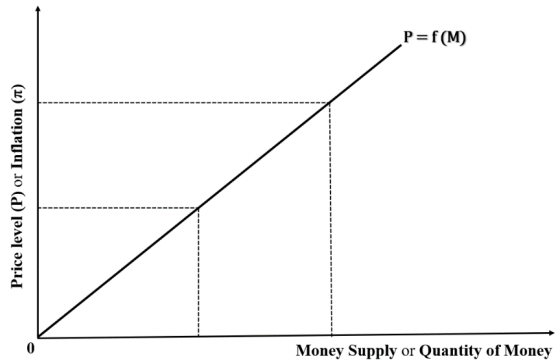

Fig. 1: Quantity Theory of Money (QTM)

According to this theory, when there's more money supply (M) or M2, the price level (P) or inflation (π) usually goes up, ceteris paribus. Consequently, an increase in money supply (M) or M2 may serve as a catalyst for inflation (π) within the economy. This clear relationship between money supply and inflation can be illustrated graphically in figure 1.

We can rearrange this equation to solve for the price level (P):

P = MV/ Y

This equation implies that the price level (*P*) is determined by the ratio of the money supply (*M*) to the real output of goods and services (*Y*), multiplied by the velocity of money (*V*).

Now, let's introduce fiscal deficit (BD) into the model. Fiscal deficit implies government spending (*G*) exceeds government revenue or tax (*T*); this can be represented as:

BD = G – T

Now, let's consider the government's financing alternative choices for the deficit. One option is to borrow funds from the

central bank, which will increase the money supply (M). The change in the money supply is denoted as ΔM. So, the change in money supply (ΔM) due to fiscal deficit (BD) can be expressed as,

$$\Delta M = B\ D$$

Now, let's consider the impact of this change in money supply on the price level (P) or inflation (π). We Assume that the velocity of money (V) and real output (Y) are constant, we can rewrite the Quantity Theory of Money equation as:

$$\Delta M = P \times \Delta Y$$

Here, ΔY represents the change in real output. Now, we substitute $\Delta M = BD$ into the equation,

$$BD = P \times \Delta Y$$

So, this equation shows that the fiscal deficit (BD) affects the price level (P) or inflation (π) by changing real output (ΔY).

DATA AND METHODOLOGY

Data description and Model

This study delves into a comprehensive analysis spanning four decades, from 1980 to 2023, utilizing extensive time series data. In this investigation, inflation (π) takes the spotlight as the dependent variable, while the budget deficit (BD) and broad money supply (M2) assume roles as explanatory variables.

The regression model is represented as:

$$\Pi t = \phi 0 + \phi 1\ (\omega)t + \phi 2\ (\eta)t + \varepsilon t \quad [1]$$

Here,

∏t is the inflation at time t.

$\phi 0$ is the intercept term.

$\phi 1$ and $\phi 2$ are the coefficients for the budget deficit (ω) and broad money supply (η), respectively, at time t.

εt is the error term at time t.

Unit Root Test

In time series and panel data analysis, a key question is whether the series stay the same or change over time, known as the unit root phenomenon. Unit root means the average and spread change over time, helping researchers choose the best models for figuring out cause and effect. It's difficult for forecasting because the average and spread change over time. As the need for forecasting grows for making policies, unit root tests become really important for understanding how economic factors change. These tests help us figure out if variables like inflation, budget deficit, and broad money are connected and cause each other.

Autoregressive Distributed Lag (ARDL) Bound Test Method

The Autoregressive Distributed Lag (ARDL) bound test method is a stalwart model for probing long-run co-integration among variables. Normally, in an effort to show these long-term connections, it requires the mean and variance of time series data to remain constant over time—a rare thing in the real world (Emeka & Kelvin, 2016). However, the ARDL model doesn't require such stringent assumptions. Even if the experimental variable has different properties, either I(1) or I(0), it still presents reliable approximations of the

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long-run coefficient. Through the ARDL Bound test, this model offers a range of values that are perfectly fit for factors that are purely I(1), purely I(0), or a mix of both, making it easier to find long-run associations. This method is more dependable than traditional F-statistics and t-statistics, especially when it's hard to fathom the exact order of integration for the regressands.

The Unrestricted Error Correction Model (UECM) for the ARDL Bound Test approach can be represented as:

Here, in this equation Δyt is the differenced dependent variable at time t. $\Delta yt{-}i$ is the lagged differenced values of the dependent variable. $\Delta xt{-}i$ is lagged differenced values of the explanatory variable. $ECt{-}1$ is the lagged error correction term. $\alpha 0$, α, βi, and γ are the coefficients, and εt represents the error term. This model integrates both short-run dynamics with long-run equilibrium without losing long-run information. The error correction term (ECt-1) is included to capture the long-run relationship between the variables. If the coefficient γ is negative and statistically significant, it suggests that the previous period's disequilibrium is being corrected.

EMPIRICAL ANALYSIS

Stationarity Tests

Table 1: Outcomes of Augmented Dickey-Fuller test (BD(ω) at level data)

Null Hypothesis: ω has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.293268	0.4267
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Source: Authors' estimation

Findings: The test statistic is -2.293268with a p-value of 0.4267, which is higher than the critical values at significance levels, indicating that BD is non-stationary at level data.BD likely has a unit root at this level. This means it may have a time-varying mean and variance (Table 1).

Table 2: Outcomes of Augmented Dickey-Fuller test (BD(ω) at 1st difference data)

Null Hypothesis: D(ω) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.378314	0.0000
Test critical values:	1% level	-4.205004	
	5% level	-3.526609	
	10% level	-3.194611	

*MacKinnon (1996) one-sided p-values.

Source: Authors' estimation

Findings: It is observed from the (Table 2), that the test statistic is -6.378314with a p-value of0.0000, which is lower than the critical values, suggesting that BD becomes stationary after the first difference. Once we take the first difference, it shows that BD is integrated of order one, I(1).

Table 3: Outcomes of Augmented Dickey-Fuller test (M2(η) at level data)

Null Hypothesis: η has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag=9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.979865	0.7518
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	
*MacKinnon (1996) one-sided p-values.			

Source: Authors' estimation

Findings: The test statistic is -0.979865 with the p-value of 0.7518, indicating that the null hypothesis (that M2 has a unit root) cannot be rejected at the significance levels. It suggests that the money supply series is non-stationary and have a unit root at level data (Table 3).

Table 4: Outcomes of Augmented Dickey-Fuller test (M2 (η) at 1st difference)

Null Hypothesis: D(η) has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag=9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.479353	0.0000
Test critical values:	1% level	-3.600987	
	5% level	-2.935001	
	10% level	-2.605836	
*MacKinnon (1996) one-sided p-values.			

Source: Authors' estimation

Findings: It is observed from the (Table 4), The test statistic is -5.479353with a p-value of 0.0000, which is well below the 5% level of significance. So, we reject the null hypothesis, and this implies that the M2 series is stationarity at the first difference.

Table 5: Outcomes of Augmented Dickey-Fuller test (Inflation ($\prod$) at level data)

Null Hypothesis: $\prod$ has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag=9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.192170	0.0020
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	
*MacKinnon (1996) one-sided p-values.			

Source: Authors' estimation

Findings: The test statistic is -4.1921705 with a p-value of 0.0020, which is below the critical values, also below the 5% level of significance. This indicates a 95% chance that the inflation series is stationarity and does not have a unit root at level data (Table 5).

Regression Analysis:

The regression model utilized for this analysis is,

$$\Delta\prod = \phi 0 + \phi 1\ \Delta\prod t{-}1 + \phi 2\ \Delta\prod t{-}2 + \phi 3\ \Delta\omega t{-}1 + \phi 4\ \Delta\eta t{-}2 + \phi 5\ \Delta\eta t{-}1 + \phi 6\ \Delta\eta t{-}2 + \phi 7\ \prod t{-}1 + \phi 8\ \omega t{-}1 + \phi 9\ \eta t{-}1 + \varepsilon t$$

In the scope of this equation, $\Delta\prod$ is the change in inflation. $\Delta\omega$is the change in budget deficit. $\Delta\eta$ represents the change in money supply.

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The (t-1) and (t-2) denote the lagged values of the variables. $\phi 0,1$, $\phi 2,\ldots,\phi 9$ are the coefficients andεt represents the random error term.
Source: Authors' estimation

Findings: The (Table 6) presents the results of a regression analysis with inflation as the dependent variable. As shown in this table, the coefficients of $\prod t-1$ and $\prod t-2$ reveal that there is a negative relationship between past inflation and current inflation. The past budget deficit has a diverse impact on current inflation, since the coefficient of $\Delta\omega t-1$ is positive, and the coefficient of $\Delta\omega t-1$ is negative. The money supply also has a mixed impact on current inflation. The one-year lagged inflation with a negative coefficient is only a statistically significant variable at the 5% level. This suggests that past inflation negatively affects current inflation in the short run.

Table-6: Outcomes of Regression

Dependent Variable: D(∏)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.941228	2.338656	1.685253	0.1023
D(∏ (-1))	-0.015432	0.210489	-0.073317	0.9420
D(∏ (-2))	-0.160539	0.163165	-0.983901	0.3330
D(ω (-1))	48.32527	53.33944	0.905995	0.3722
D(ω (-2))	-10.21858	51.79255	-0.197298	0.8449
D(η (-1))	-0.048445	0.173530	-0.279172	0.7820
D(η (-2))	0.102397	0.181814	0.563198	0.5775
∏ (-1)	-0.705001	0.260180	-2.709669	0.0110
ω (-1)	-53.80898	35.01487	-1.536746	0.1348
η (-1)	-0.017909	0.031002	-0.577659	0.5678
R-squared	0.459503	Mean dependent var		-0.120500
Adjusted R-squared	0.297354	S.D. dependent var		3.225951
S.E. of regression	2.704120	Akaike info criterion		5.039748
Sum squared resid	219.3679	Schwarz criterion		5.461968
Log likelihood	-90.79496	Hannan-Quinn criter.		5.192409
F-statistic	2.833833	Durbin-Watson stat		2.110447
Prob(F-statistic)	0.015370			

Source: Authors' estimation

Findings: This (Table 7) exhibits an analogous regression analysis with slight variations. The coefficient for differenced inflation with lag 2 is negative, indicating a potential inverse relationship with current inflation. The coefficients for $\Delta\omega t-1$, $\Delta\omega t-2$, $\Delta\eta t-1$, and $\Delta\eta t-2$ suggest a mixed impact of prior budget deficit and earlier money supply (M2) on current inflation. The most significant predictor of current inflation is the previous year's inflation. Previous year's inflation ($\prod t-1$) has a negative coefficient with a p-value of 0.0003, signifying a strong inverse relationship.

Table-8: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.185489	Prob. F(2,29)	0.3200
Obs* R-squared	3.023149	Prob. Chi-Square(2)	0.2206

Source: Authors' estimation

Findings: In (Table 8), we examined the presence of serial correlation in the residuals of a regression model. The p-values are above the conventional 5% significance levels, indicating that there is no serial correlation in the model.

Table-7: Outcomes of Alternative Regression

Dependent Variable: D(∏)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.048880	1.790831	2.260895	0.0309
D(∏ (-2))	-0.153869	0.133260	-1.154649	0.2571
D(ω (-1))	48.89257	51.82167	0.94166	0.3536
D(ω (-2))	-9.649605	50.37964	-0.191538	0.8494
D(η (-1))	-0.049180	0.170438	-0.288551	0.7748
D(η (-2))	0.100180	0.176382	0.567973	0.5741
∏ (-1)	-0.718846	0.176074	-4.082634	0.0003
ω (-1)	-55.01215	30.43087	-1.807775	0.0804
η (-1)	-0.018851	0.027754	-0.679224	0.5020
R-squared	0.459406	Mean dependent var		-0.120500
Adjusted R-squared	0.319898	S.D. dependent var		3.225951
S.E. of regression	2.660386	Akaike info criterion		4.989927
Sum squared resid	219.4073	Schwarz criterion		5.369925
Log likelihood	-90.79854	Hannan-Quinn criter.		5.127322
F-statistic	3.293047	Durbin-Watson stat		2.109230
Prob(F-statistic)	0.007774			

Source: Authors' estimation

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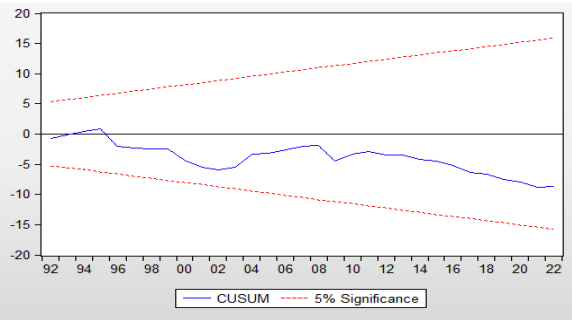

Fig.2: Stability Test

Source: Authors' estimation

Findings: This (Figure 2) represents CUSUM analysis. We used this test to check the stability of our econometric model over time. The chart displays that the value fluctuates within the 5% significance level boundaries. This suggests that the process is stable throughout the period.

Table-9: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	5.759062	(3, 31)	0.0030
Chi-square	17.27719	3	0.0006

Source: Authors' estimation

Source: Authors' estimation

Findings: The Wald Test results suggest the presence of a long-run relationship among the variables, as the F-statistic exceeds the upper bound value (Table 9). Thus, we reject the null

Table-10: Outcomes of ARDL

Dependent Variable: D(∏)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.173411	0.466378	-0.371824	0.7125
D(∏ (-2))	-0.269677	0.136330	-1.978114	0.0566
D(ω (-1))	-1.372787	45.78724	-0.029982	0.9763
D(ω (-2))	67.02989	44.08585	-1.520440	0.1382
D(η (-1))	-0.048718	0.163047	-0.298797	0.7670
D(η (-2))	0.118792	0.167191	0.710519	0.4825
ECT(-1)	-0.776608	0.172433	-4.503828	0.0001
R-squared	0.472979	Mean dependent var		-0.026154
Adjusted R-squared	0.374163	S.D. dependent var		3.211729
S.E. of regression	2.540795	Akaike info criterion		4.863979
Sum squared resid	206.5804	Schwarz criterion		5.162567
Log likelihood	-87.84760	Hannan-Quinn criter.		4.971110
F-statistic	4.786446	Durbin-Watson stat		2.023326
Prob(F-statistic)	0.001381			

Source: Authors' estimation

hypothesis of no cointegration. This implies that despite the lack of short-run effects, there may be a long-run equilibrium relationship between inflation, budget deficit, and money supply.

Findings: This (Table 10) presents the results of an Autoregressive Distributed Lag model. It shows that the error correction term (ECT) is significant, with a coefficient of -0.776608. This indicates a speed of adjustment towards long-run equilibrium of approximately 77.6%, and any short-run disequilibrium in inflation will be corrected at this rate towards the long-run equilibrium. The F-statistic is significant, so this infers a good fit of the model.

Table-11: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.167157	Prob. F(2,29)	0.8468
Obs* R-squared	0.429818	Prob. Chi-Square(2)	0.8066

Source: Authors' estimation

Source: Authors' estimation

Findings:As shown in Table 11, the F-statistic and Obs R-squared values suggest that there is no serial correlation in the model. Both p-values are higher than the 5% significance level. So, this insinuates that the residuals are not correlated over time.

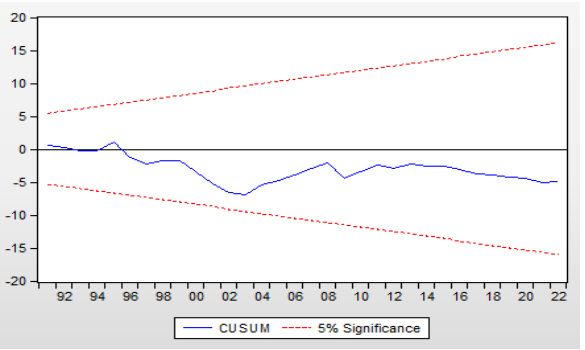

Fig.3: Stability Test

Source: Authors' estimation

Findings: This (Figure 3) represents CUSUM analysis of residuals. The diagram demonstrates that the CUSUM line does not cross the red dashed lines of 5% significance

Table-12: Wald Test for Budget Deficit Causality

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	1.156799	(2, 32)	0.3273
Chi-square	2.313597	2	0.3145
Null Hypothesis: C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(3)		-1.372787	45.78724
C(4)		-67.02989	44 08585
Restrictions are linear in coefficients.			

Source: Authors' estimation

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levels. This implies that the values are consistent without any major fluctuations.

Findings:In this (Table 12), we used the Wald test to examine if budget deficit (BD) causes inflation in the short run. The test statistic values suggest no significant causality from BD to inflation. The null hypothesis that budget deficit (ω) does not cause inflation in the short run cannot be rejected.

Findings:As shown in Table 13, the test statistic values indicate that money growth does not significantly cause inflation in the short run. The null hypothesis that M2 does not cause inflation in the short run is accepted. So, this suggests that changes in the money supply do not have an immediate effect on inflation rates.

CONCLUSION

The 21st century is marked by both extreme political conflict and enormous economic challenges all around the world. Over recent years, significant events like the COVID-19 pandemic, the Russia-Ukraine conflict, and the Iran-Israel proxy war have shaped the global economic landscape. The effects of inflationary pressures have a heterogeneous effect across countries due to factors such as economic structure, monetary policy, and fiscal policy framework. In this age of inflationary impulsiveness, our study aimed to unveil the relationship between budget deficits, money supply, and inflation in the context of the emerging Asian tiger "Bangladesh," over the period of 1980 to 2023. We have applied the Augmented Dickey-Fuller test to determine the stationarity of the series. The ADF test reveals that the inflation rate is stationary at the level, whereas budget deficits and money supply are stationary at first difference. In the short run, there exists a unidirectional causality from the budget deficit to inflation, as well as from money supply to the current inflation rate. This suggests that when the government

Table-13: Wald Test for Money Growth Causality

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	0.265787	(2, 32)	0 7683
Chi-square	0.531573	2	0.7666
Null Hypothesis: C(5)=C(6)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(5)		-0.048718	0.163047
C(6)		0.118792	0.167191
Restrictions are linear in coefficients.			

Source: Authors' estimation

spends more than its revenue, it may lead to inflationary pressure. The most momentous regressor of current inflation is the previous year's inflation. The results of the Breusch-Godfrey Serial Correlation LM test reveal that there is no serial correlation in the model. The CUSUM analysis also substantiates the stability of our econometrics model. The Autoregressive Distributed Lag ARDL (2,2) model was selected based on AIC and SIC criteria. It showed that broad money supply (M2), budget deficit (BD), and inflation are integrated in Bangladesh's economy, and the ARDL model reveals that there is no significant long-run or short-run impact of money supply (M2) and Budget Deficit (BD) on inflation in Bangladesh. Even though the money supply has proliferated, inflation has stayed quite steady in Bangladesh. This indicates that more money in the system doesn't always mean there will be a lot of inflation over time. The absence of a direct association between money supply and inflation could mean that other factors, such as economic growth, demand, and external factors, might be influencing inflation more significantly than the money supply itself. The F-statistics demonstrate long-run cointegration among the variables and also suggest a stable relationship over time.

POLICY SUGGESTIONS

Monetary and government institutions should look beyond M2 and BD as primary factors of inflation. They should also consider other potential determinants. The government needs to manage the budget deficit very efficiently because the mismanagement of budget deficit can influence inflation rates. Monetary authorities should not solely rely on money supply adjustments; they ought to develop a robust monetary policy framework that can effectively respond to various economic conditions. The findings of this study emphasize the need for long-term strategies to ensure economic stability and control inflation.

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