Monetary Policy and Economic Growth of SAARC Countries

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Abstract

The debate on economic policies continues in both the local and global economies. All of the academics are interested in monetary and fiscal policy and how it affects the economy. The study attempts to explore whether there is any evidence that the SAARC countries' economic growth can be influenced by monetary policy. The study applies the Pedroni cointegration approach for panel autoregressive distributed lag (ARDL) with the Pooled Mean Group (PMG) to study the relationship between monetary policy and economic growth of six SAARC nations over the period from 1983 to 2020. The recent study addresses the empirical gap within the context of the southeastern regions of the globe. Overall stylized facts show that monetary policy is causally linked and successful in the long run to accelerate economic growth. Money supply, one of the most crucial variables under study, contradicts the monetarist claim that monetary policy is too effective in the short term. The study also notes that currency devaluation is a serious concern for both short- and long-term growth while inflation is only a short-term one. In the SAARC countries, domestic credit to the private sector is better for short-term economic growth even though it has no long-term benefits. Thus, monetary authorities and the government of the SAARC nations should maintain an adequate level of money supply, adopt an export-led policy to appreciate currency, promote short-run domestic credit to the private sector, and stabilize the short-term price level to accelerate economic growth and development.

Keywords: Monetary policy, growth, SAARC, ARDL, pool mean group

JEL classification: C23, E51, E31, E52, F31, O47

Introduction

Monetary and fiscal policy are the twin policy mechanisms of modern economies to the exigencies of achieving the rapidly changing development needs of

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the economy. Monetary policy is deliberately directed toward economic growth and development by altering the quantity of money supply and cost of finance. Froyen (2013) states that a central bank's control of the money supply and interest rates influences economic activity. In addition to controlling money, credit, and interest rates, monetary policy also helps stabilize the economy. Coins, currencies, and banking systems are governed by the monetary policy (Mankiw, 2016) which ultimately manages the rift between output and price volatility in the economy.

The topic of whether or under what circumstances a modern economy might produce enough aggregate demand to allow for continued growth interested Keynes, Harrod, and Duesenberry. All of them had something to do with the potential growth inhibitor function of capital accumulation. However, despite their differences, all three took a demand-side approach to the growth challenge (Ackley, 1974). The quantity of money in circulation controls both the nominal income and the price level in the classical system. In this respect, classical economists placed a lot of importance on monetary policy. Modern Keynesians and monetarists agree that monetary policy has significant impacts on nominal income (Froyen, 2013). Friedman (1968) stated that the three main objectives of economic policy are high employment, price stability, and rapid growth.

By affecting aggregate demand and thereby money income, monetary policy is primarily responsible for helping to attain such goals as full employment, stable prices, and economic growth (Shapiro, 2000). Monetary policy is designed by a monetary authority that tries to accelerate growth and other macroeconomic objectives by managing the quantity of money and altering the cost of borrowing. It helps to maintain the stability of the economy and hastens steady and sustainable growth via distinct channels. Monetary policy stimulates saving and investment, determines the capacity to borrow and consume, alters the interest rates that necessarily determine the liquidity position and its affordability, and affects economic activities via the exchange rate channel. Due to that, developing economies always bring expansionary monetary policy to give up economic backwardness and a logjam of economic wellbeing.

Numerous studies have provided support for a notably positive relationship between monetary policy and economic growth, as evidenced by the works of Monamodi and Choga (2022), Mehar (2022), and Ali et al. (2008). Conversely, some research has indicated an adverse impact of monetary policy on economic growth, as found in studies conducted by Srithilat and Sun (2017) and Younsi & Nafla (2019). The

South Asian Association for Regional Cooperation (SAARC) plays a prominent role as a regional economic bloc in the East. Every SAARC member nation has a developing economy and is working to create a strong, independent economy through effective policy. As the counterpart of economic activities, the study of monetary policy urges every academia. In light of these contradictions and due to limited studies on the region, 'Is there any proof that monetary policy has significantly influenced the economic growth in the SAARC countries' economies?' is the issue that this study seeks to answer.

The purpose of this paper is to examine the short and long-run relationship between monetary policy and economic growth in SAARC countries. To answer the abovementioned question and to achieve the purpose of the study, it has assessed the impact of major monetary instruments and economic growth of SAARC countries quantitatively. Apart from the introduction, this paper is arranged in the literature review, materials and methods, result and discussion, and conclusion and implication respectively.

Literature Review

Keynesian theory is less focused on monetary policy. However, it believes that the role of monetary policy in income is indirect and mainly focused on aggregate spending. According to the Keynesian monetary transmission, every change in monetary policy will lead to changes in commercial bank reserves and money supply, which will ultimately change the interest rate and subsequently investment, which will change GDP (McConnell & Brue, 2008).

Keynes' theory of monetary policy is based on three concepts: the investment multiplier, the marginal efficiency of capital, and the interest rate. A long-term equilibrium is defined by full employment, and according to Keynes, the monetary authority's objective is to change the interest rate to push the economy away from its position at that equilibrium (represented by unemployment) and towards that equilibrium (represented by full employment) (Dickens, 2011). On the contrary, monetarists advocate that there is a paramount and direct role of monetary policy in GDP. The basic ideas of monetarists can be expressed in the following equation:

$$MV = PY$$

Where, M, V, P, and Y indicate the money supply, velocity of money, price level, and total output. A change in monetary policy, according to the monetarists'

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monetary transmission mechanism, will alter commercial bank reserves, which will alter the money supply, alter aggregate demand, and alter GDP (McConnell & Brue, 2008).

Goodfriend and King (1997) stated that the New Neoclassical Synthesis (NNS), made popular by Paul Samuelson, offers several significant insights regarding the function of monetary policy. *First,* according to NNS models, slow changes in both individual prices and the overall price level can have a significant impact on real economic activity. *Second,* the models predict little long-run trade-off between inflation and real activity even in environments with expensive price adjustments. *Third,* the models predict that eliminating inflation would result in substantial advantages due to improved transaction efficiency and decreased relative price distortions. *Fourth,* the models suggest that credibility is crucial to comprehending how monetary policy affects the economy.

Gnawali (2019) conducted a study by applying VECM and causality test to estimate the effect of money supply on economic growth which reveals that there is a positive and significant impact of money supply on the economic growth of Nepal with data from 1965 to 2020. He demonstrated that there is a long-run link between monetary policy and GDP growth. Likewise, the results of Granger Causality revealed that there is a two-way causal relationship between the money supply and GDP growth (Joshi, 2022).

An empirical study that employed the panel ARDL and pooled mean group (PMG) estimation to assess the impact of fiscal and monetary policy on economic growth in the Southern African Customs Union (SACU) using data from 1980 to 2017 revealed that the findings show that these policies have a long-term, considerable impact on economic growth. According to Granger causality findings, inflation, real interest rate, and exchange rate cointegrate in a way that leads to economic growth (Monamodi and Choga, 2022). Credit to the private sector and foreign debt finance the infrastructural development, which is a crucial ingredient of gross domestic product growth, according to four equations derived using the panel least square technique with data from 186 nations. There is empirical evidence that more firms use banks to finance their investments, as well as a larger broad money supply, which governs the direction of credit to the private sector (Mehar, 2022).

A study by Younsi and Nafla (2019), analyzing data from 1993 to 2015 across 40 several developed and developing nations, revealed that financial crises, low bank

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liquid reserves, high bank nonperforming loans, and inflation were all detrimental factors negatively affecting financial stability, financial development, and economic growth. Ali et al. (2008) also found positive associations between monetary policy, particularly monetary supply, and both long-run and short-run economic growth, using panel ARDL error correction models with data from South Asian countries from 1990 to 2007.

Arora and Cerisola (2000) highlighted the vital role of American monetary policy in stabilizing capital flows and enhancing capital market conditions, fostering economic growth in developing nations. Additionally, favorable impacts of monetary policy on economic growth have been documented in Iran (Alavinasab, 2016), Malaysia and Singapore (Tan, et al., 2020) Nigeria (Akujuobi, 2010), and Malaysia specifically (Akalpler & Duhok, 2018)

The money supply, interest rates, and inflation rates, on the other hand, have negative effects on real GDP per capita in the long run, with the sole exception of the real exchange rate, which has a positive trajectory, according to research by Srithilat and Sun (2017) evidence from Lao PDR. Additionally, the paper contends that there is a temporary causal relationship between the real exchange rate, money supply, and real GDP per capita.

The reviewed literature highlights the significant causal relationship between monetary policy components—such as inflation, interest rates, exchange rates, and credit mobilization—and the overall economic output. However, it also underscores the potential negative impact of monetary policy on GDP growth, with variations observed among different types of economies. This study aims to address the dearth of empirical research in the context of SAARC, an emerging economic powerhouse in southern Asia. Specifically, we seek to fill these gaps by investigating the effects of monetary policies on economic growth in South Asian developing nations (SAARC) using panel ARDL and panel cointegration techniques.

Materials and Methods

Data, Sources and Variables

The study adopts the panel data of six SAARC countries— Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka—throughout 1983 to 2020 and excludes Afghanistan due to insufficiency of data availability. However, data covers only from 1983 to 2019 of Sri Lanka due to missing data for 2020. Panel data has been taken from

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the World Development Indicator (WDI) database published by the World Bank. Following the reviewed empirical studies, economic growth (GDP) as the target variable is proxied by GDP growth as an annual percentage, and explanatory variables––broad money as a percentage of GDP (M2); inflation, which is GDP deflator annual percentage (Inf); domestic credit to the private sector as the percentage of GDP (DCPS); and official exchange rate in LCU (local currency unit) per US$ as period average (Ex) are proxied as the determinants of monetary policy have considered under the study. All the variables have transformed in natural logarithmic form except GDP due to negative figures across the countries.

Methods

This study is aimed to investigate the impact of monetary policy on the economic growth of SAARC countries. It is a quantitative study. In this study, all the ideas have been inferred objectively. The general model specification for this study can be as the following function

$$GDP = f\,(LnM2, LnEx, LnInf, LnDCPS)$$

This function can be presented in the following form of a panel model:

$$GDP_{it} = \phi_0 + \phi_1 LnM2_{it} + \phi_3 LnEx_{it} + \phi_2 LnInf_{it} + \phi_4 LnDCPS_{it} + \varepsilon_{it}$$

This study has estimated to employ the panel autoregressive distributed lag (ARDL) with the Pooled Mean Group (PMG) estimator to determine the presumed relationship. It will be conveyed through the panel unit root and cointegration test.

Panel Unit Root

Before employing panel causality and ARDL with the PMG estimator, the study confirmed the unit root of the series. The popular panel unit root tests including LLC (Levin, Lin, &, 2000), IPS (Im, Pesaran, & Shin, 2003), ADF–Fisher χ^2 (Maddala, & Wu, 1999), and PP–Fisher χ^2 (Choi, 2001) were applied to test the stationarity of the series. These tests confirm the stationarity of the panel series with a null hypothesis as each panel contains a unit root.

Panel Cointegration

After the unit root test, the optimal lag has been determined with the standard VAR-based lag order selection criteria. Then the panel cointegration test is employed to determine the long-run association between variables of interest. Among different conventional cointegration tests, this study applied the Pedroni residual cointegration

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test (Pedroni, 1999, 2004) with a null null-hypothesis in which there is no cointegration between the variables. The Pedroni (1999) residual cointegration test can be estimated by the following regression.

$$Y_{i,t} = \alpha_i + \delta_i t + \beta_{1,i} X_{1i,t} + \beta_{2i} X_{2i,t} + \ldots\ldots + \beta_{Mi} X_{Mi,t} + e_{i,t}$$

Where, t = 1, 2, …,T; i = 1, 2, ….N; and m = 1, 2, ….,M. Here, *T* represents the total number of observations across time, *N* indicates the panel cross-sectional units and M is the number of regressors or explanatory variables. The slope coefficients β_{1i}, β_{2i}, ….., β_{Mi} are permitted to vary across individual members of the pane. α_i is the fixed effects or member-specific intercept which is allowed to differ across individual members. The deterministic time trends, $\delta_i t$ may or may not be used in the model. Difference the original series for each member, and compute the residuals for the differenced regression as:

$$\Delta Y_{i,t} = b_{1,i} \Delta X_{1i,t} + b_{2i} \Delta X_{2i,t} + \ldots\ldots + b_{Mi} \Delta X_{Mi,t} + \eta_{i,t}$$

For cointegration test, $\hat{L}^2_{i,t}$ as the long run variance of $\hat{\eta}_{i,t}$ using any kernel estimator. Pedroni (1999) used the seven test statistics for long-run relationships. Three of the first is known as parametric statistics and the rest of the four are parametric statistics. For the parametric statistics, the following components are to be computed. Where, $\hat{e}_{i,t} = \hat{\gamma}_i \hat{e}_{i,t-1} + \hat{u}_{i,t}$, and apply the residuals to estimate the long-run variance of $\hat{u}_{i,t}$ denoted $\hat{\sigma}_i^2$. The term $\hat{\lambda}_i$ can then be computed as $\hat{\lambda}_i = \frac{1}{2}(\hat{\sigma}_i^2 - \hat{s}_i^2)$ where, $\hat{s}_i^2$ is the sample variance of $\hat{u}_{i,t}$. The parametric statistics proposed by Pedroni are as follows:

1. Panel *v*: $T^2 N^{3/2} Z_{\hat{v}_{N,T}} \equiv T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2\right)^{-1}$
2. Panel ρ: $T\sqrt{N} Z_{\hat{\rho}_{N,T-1}} \equiv T\sqrt{N} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2\right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i\right)$
3. Panel t: $Z_{t_{N,T}} \equiv \left(\tilde{\sigma}_{N,T}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2\right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i\right)$

For the parametric statistics, determine $\hat{e}_{i,t} = \hat{\gamma}_i \hat{e}_{i,t-1} + \sum_{k=1}^{K_i} \hat{\gamma}_{i,k} \Delta \hat{e}_{i,t-k} + \hat{u}_{i,t}^*$ and use the residuals to determine sample variance of $\hat{u}_{i,t}^*$, signified $\hat{s}_{i,t}^*$. The parametric statistics proposed by Pedroni (1999, 2004) are as follows:

4. Panel t: $Z_{t_{N,T}}^* \equiv \left(\tilde{s}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2}\right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^*$

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5. Group $\rho: TN^{-1/2}\tilde{Z}_{\hat{\rho}_{N,T-1}} \equiv TN^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{e}_{i,t-1}^{2}\right)^{-1}\sum_{t=1}^{T}\left(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_i\right)$

6. Group t: $N^{-1/2}\tilde{Z}_{t_{N,T}} \equiv N^{-1/2}\sum_{i=1}^{N}\left(\hat{\sigma}_i^{2}\sum_{t=1}^{T}\hat{e}_{i,t-1}^{2}\right)^{-1/2}\sum_{t=1}^{T}\left(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_i\right)$

7. Group *(ADF)* t: $N^{-1/2}\tilde{Z}^{*}_{t_{N,T}} \equiv N^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{s}_i^{*2}\hat{e}_{i,t-1}^{*2}\right)^{-1/2}\sum_{t=1}^{T}\hat{e}^{*}_{i,t-1}\Delta\hat{e}^{*}_{i,t}$

Panel ARDL

The cointegration test confirms the long-run relationship between variables of interest. To estimate the short-run and long-run dynamics of the relationship of variables, the panel ARDL model with PMG estimator was applied. The model proposed by Pesaran, Shin, and Smith (1999). They contend that while the intercepts, short-run coefficients, and error variances can vary freely across groups under the PMG, the long-run coefficients must remain constant. We can study long-run homogeneity using the PMG estimator without requiring short-run parameter homogeneity. The ARDL (p, q, q,…, q) model can be expressed as:

$$\mathrm{GDP}_{it}=\sum_{j=1}^{p}\lambda_{ij}\mathrm{GDP}_{i,t-j}+\sum_{j=0}^{q}\delta_{1j}\mathrm{LnM2}_{i,t-j}+\sum_{j=0}^{q}\delta_{2j}\mathrm{LnEx}_{i,t-j}+\sum_{j=0}^{q}\delta_{3j}\mathrm{LnInf}_{i,t-j}+\sum_{j=0}^{q}\delta_{4j}\mathrm{LnDCPS}_{i,t-j}+\mu_i+\varepsilon_{it}$$

Here, periods, t = 1, 2.., T, and groups, i = 1, 2, …, N, p is the lags of the target variable, and q is the lags of regressors. Likewise, $LnM2_{it}$, $LnEx_{it}$, $LnInf_{it}$, and $LnDCPS_{it}$ are (k × 1) vectors of regressors; μ_i indicates the fixed effects, the coefficients of the lagged $\mathrm{GDP}_{i,t-j}$, λ_{ij}, are scalars, and δ_{it} are (k × 1) coefficient vectors. Now, the error correction form can be expressed as follows:

$$\Delta GDP_{it}=\phi_i\left(GDP_{i,t-1}-\theta_{0i}-\theta_{1i}LnM2_{it}-\theta_{2i}LnEx_{it}-\theta_{3i}LnInf_{it}-\theta_{4i}LnDCPS_{it}\right)+\delta_{11i}\Delta LnM2^{d}_{it}+\delta_{21i}\Delta LnEx_{it}+\delta_{21i}\Delta LnInf_{it}+\delta_{21i}\Delta LnDCPS_{it}+\varepsilon_{it}$$

Where, $\theta_{0i}=\frac{\mu_i}{1-\lambda_i}, \theta_{1i}=\frac{\sum\delta_{1j}}{1-\lambda_i}, \theta_{2i}=\frac{\sum\delta_{2j}}{1-\lambda_i}, \theta_{3i}=\frac{\sum\delta_{3j}}{1-\lambda_i}, \ \theta_{4i}=\frac{\sum\delta_{4j}}{1-\lambda_i}, \phi_i=-(1-\lambda_i).$

In the error correction equation, ϕ_i refers to the error correction term (ECT), θ indicates the long-run coefficients, and δ is the short-run coefficients.

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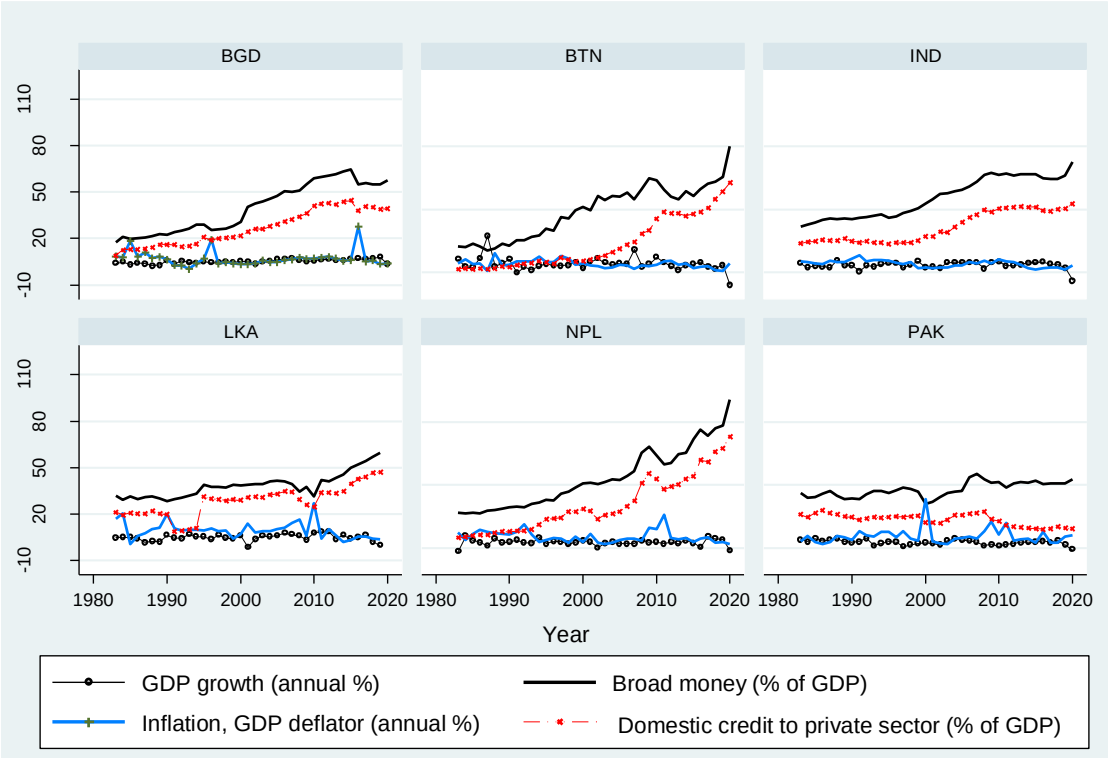
Results and Discussion

Trends of Panel Data

The upper panel of Figure 1 demonstrates that broad money supply (M2) and domestic credit to the private sector (DCPS) as a percentage of the GDP of all countries have fluctuated and trended upward with a similar pattern where M2 is higher than GDPS. Inflation in India and Bhutan is more stable but fluctuating than in all other countries. Inflation has been skyrocketing experience in some observations of Bangladesh, Sri Lanka, Nepal, and Pakistan. On the other hand, the GDP growth of all cross-sectional countries is more or less similar trending, and stable over the study period. The lower panel of Figure 1 illustrates the official exchange rate of local currency units per US$ of all sampled countries. The overall exchange rate of all the countries has been trending upward. The local currency of South-East Asian nations has tremendously depreciated in recent years.

Figure 1

Plots of Panel Data of Variables



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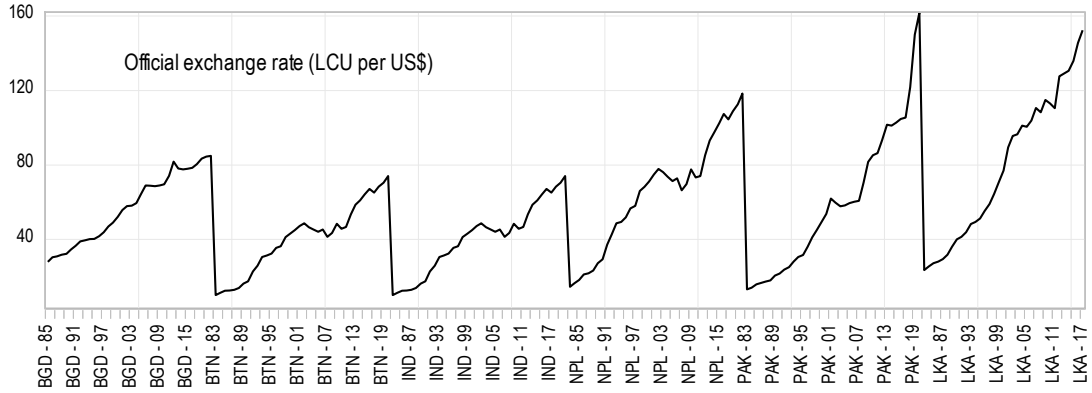

Note. BGD = Bangladesh, BNT = Bhutan, IND = India, NPL = Nepal, PAK = Pakistan, LKA = Sri Lanka

Test of Stationarity

Unit root process is essential to run the ARDL model for the elimination of whether there may be any spurious relationship between the variables. Levin, Lin, and Chu test is employed to test stationarity and assume that there is a common unit root process across countries. Im, Pesaran, and Shin test, Fisher's ADF, and Fisher's PP tests are also applied for unit root detection which assume that there is individual unit root process across countries. These all-test results of the unit root process are presented in Table 1.

Table 1

Results of Panel Unit Root Tests

Method	GDP	LnM2	ΔLnM2	LnEx	LnInf	LnDCPS	ΔLnDCPS
LLC t-statistic	-3.01787*	0.64966	-12.0810*	-5.31857*	-6.50904*	-0.61180	-9.81124*
IPS W-statistic	-6.66943*	3.05831	-11.8997*	-2.28711**	-6.63502*	1.51285	-9.92272*
ADF - Fisher χ^2	66.8013*	3.14996	126.410*	26.4603*	66.5365*	5.77089	106.408*
PP - Fisher χ^2	80.1844*	3.28436	133.077*	44.0812*	75.0599*	6.39280	129.372*

Note. * Significant at 1%, ** Significant at 5 %, LLC = Levin, Lin and Chu, IPS = Im, Pesaran and Shin, PP = Pesaran Panel, ADF = Augmented Dickey-Fuller

All the unit root test statistics confirm that GDP, LnInf, and LnEx are significant at a 1 percent level except IPS W-statistics of LnEx which is significant at a 5% level of significance. Moreover, all the test statistics of LnM2 and LnDCPS are significant at the 1 percent level at the first difference. The unit root test reveals that the panel has no problem with unit root. There is a mixed order of integration in the panel.

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LnM2 and LnDCPS are integrated at order 1 and the rest of the variables are integrated at order 0. The panel unit root test confirms that none of the variables are integrated greater than 1. It is an evident that the panel cointegration and ARDL model are appropriate to establish the presumed relationships.

Selection of Optimal Lag

The appropriate lag is crucial to determine the short-run and long-run dynamics of the variable of interest under panel ARDL. The Akaike information criterion (AIC) and Schwarz information criterion (SC) are the most used criteria for optimal lag selection. The VAR lag order selection criteria are presented in Table 2. Most of the criteria including FPE, AIC, SC, and HQ suggest that a 1-period lag is optimal for the model.

Table 2

VAR Lag Order Selection Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.008464	9.417473	9.500803	9.451205
1	1949.979	4.02e-07*	-0.538036*	-0.038056*	-0.335640*
2	46.59447*	4.03e-07	-0.534737	0.381894	-0.163678
3	23.05408	4.58e-07	-0.408300	0.924981	0.131422
4	26.01993	5.11e-07	-0.302334	1.447597	0.406051
5	24.98707	5.71e-07	-0.194650	1.971931	0.682398

Notes. * Indicates lag order selected by the criterion. LR = sequential modified LR test statistic, FPE = Final prediction error, AIC = Akaike information criterion, SC = Schwarz information criterion, HQ = Hannan-Quinn information criterion.

Panel Cointegration Test

The panel cointegration test process is used to know whether there is the long run relationship between monetary policy and economic growth of SAARC countries or not. This paper, except for all other conventional panel cointegration tests, the Pedroni test for cointegration has been performed which accounts for heterogeneity by employing particular parameters that permit variation between different sample countries. The study assumes that there is a deterministic intercept and trend to test the null hypothesis in which there is no cointegration. Table 3 reports the seven Pedroni test statistics.

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Table 3

Results of Pedroni Residual Cointegration Test

Within-dimension test	Statistic	Prob.	Weighted Statistic	Prob.
Panel *v*-statistic	0.588636	0.2781	0.926295	0.1771
Panel ρ-statistic	-1.062609	0.1440	-2.011312	0.0221
Panel PP-statistic	-3.377583	0.0004	-5.575127	0.0000
Panel ADF-statistic	-1.435830	0.0755	-2.920908	0.0017
Between-dimension test	Statistic	Prob.		
Group ρ-statistic	-1.253600	0.1050		
Group PP-statistic	-5.901114	0.0000		
Group ADF-statistic	-2.790084	0.0026		

Table 3 displays the seven test statistics of the Pedroni residual cointegration test. The first four-panel tests—v statistic, ρ-statistic, PP- statistic, ADF-statistic—are within-dimension tests, and the remaining three group tests—ρ-statistic, PP- statistic, ADF-statistic—are between-dimension tests. Pedroni test reveals that panel PP-statistic and panel ADF statistics are significant at 1 percent (0.0004 < 0.01) and 10 percent (0.0755 < 0.1) respectively. Moreover, weighted statistics for within-dimension tests are significant except for panel v-statistics. Among all between-dimension tests statistics, the group ρ-statistic is not significant and the rest of all are significant 1 percent level of significance. The Pedroni residual cointegration test confirms that there is evidence of cointegration and a long-run relationship between monetary policy and economic growth across the six SAARC countries because the most of statistics are significant which is consistent with the study by Halkos, and Trigoni (2010) and Islam et al. (2021).

Panel ARDL: Long-run and Short-run Dynamics

The Pedroni residual cointegration test shows that monetary policy and economic growth have a long-term link. To assess the long-run dynamics among the panel variables under study across the studied nations, the panel ARDL model has been used. The Hausman test χ^2 statistics with 4 degrees of freedom that is 748766 which fails to reject the null hypothesis which reveals that the pooled mean group (PMG) is the efficient estimator. In this study, the PMG estimator is used for estimating long-run coefficients that are identical but allow short-run coefficients and error variances to differ for each group. The short-run and long-run coefficients of the selected panel ARDL (1, 1, 1, 1, 1) model with PMG estimates at 1 period lag are displayed in table 4.

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Table 4

ARDL with PMG Estimates: Long-run Dynamics

Variable (GDP)	Coefficient	Std. Error	t-Statistic	Prob.*
LnM2	4.512706	1.332470	3.386722	0.0009
LnEx	-1.317001	0.480815	-2.739099	0.0068
LnInf	0.114854	0.302854	0.379238	0.7049
LnDCPS	-1.993045	0.798029	-2.497458	0.0134

The negative and significant error correction term, ECT, of Table 5 indicates the long-run relationship between monetary policy and economic growth of cross-section countries. Table 4 reports the long-run coefficients of variables under study obtained from the PMG estimator. The two most crucial variables including LnM2 and LnEx are significant at a 1 percent level of significance. LnDCPS is also significant at 5 percent. However, LnInf is not significantly inclined to the economic growth of the sample nations in the long run. As the previous studies (Chaitip et al., 2015; Akalpler & Duhok, 2018; Islam et al., 2021), the result also reveals that there is a positive relationship between money supply and economic growth in the long-run. When 1 percent rise in LnM2, GDP grew by 0.0451 units. The positive relationship between money supply and economic growth can be attributed to the fact that an increase in money supply tends to lower interest rates, stimulate investment, boost consumer spending, enhance economic confidence, and provide liquidity, all of which contribute to higher economic output in the long run.

Moreover, when a 1 percent increase in LnEx and LnDCPS, the GDP growth is reduced by 0.01317 and 0.01993 units respectively. The causes behind these findings may involve factors such as decreased export competitiveness and excessive import as indicated by the study by Gajurel (2022) that there is an inverse relationship between exchange rate and foreign reserve in the short run with the current account deficit, in the case of LnEx, and institutional constraints on private sector credit, in the case of LnDCPS, in contrast with Mehar (2022), which can hinder economic growth. However, results reveal that in the long run, inflation has not any significant effects. The PMG results demonstrate that monetary policy has a massive effect on the SAARC countries' economic growth in long run. The short-run PMG result of selected ARDL (1, 1, 1, 1, 1) is presented in Table 5.

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Table 5

ARDL with PMG Estimates: Short-run Dynamics

Variables (GDP)	Coefficient	Std. Error	t-Statistic	Prob.*
ECT	-0.786254	0.093446	-8.413963	0.0000
ΔLnM2	-20.21369	8.899852	-2.271238	0.0243
ΔLnEx	-10.15528	4.905950	-2.069992	0.0398
ΔLnInf	-1.484226	0.811937	-1.828006	0.0691
ΔLnDCPS	6.600435	2.572853	2.565415	0.0111
C	0.289650	0.459829	0.629908	0.5295

Table 5 shows the short-run PMG estimates. All the regressors are significant such as the coefficient of LnM2, LnEx, and LnDCPS are significant at 5 percent and the coefficient of LnInf is significant at 10 percent level of significant. In contrast with long-run relations, LnM2 and LnDCPS are reversed on GDP in the short-run. However, LnInf and LnEx are negatively significant to GDP growth in the short-run. The PMG results indicate that when 1 percent rise in money supply, GDP growth will be reduced by 0.2021 units. Similarly, a 1 percent rise in LnEx and LnInf are also caused to fall in GDP growth by 0.1016 and 0.01484 units respectively in the short run. In the short-run, when a 1 percent rise in LnDCPS, GDP growth rose by 0.066 units. The findings suggest that a boost in money supply leads to a short-term decrease in GDP across SAARC nations (in contrast with Ali et al., 2008), potentially due to ineffective monetary policies in developing countries and the inflationary pressure arising from excessive demand relative to the supply of goods and services, as reflected in the negative relationship between inflation and GDP. This situation may also result in increased imports, as indicated by the negative correlation between the exchange rate and GDP. Positive domestic credit to the private sector can enhance the effectiveness of monetary policy in the long run by promoting financial deepening across countries to accelerate economic growth which is consistent with Mehar (2022).

Moreover, the negative and significant ECT refers to the presence of a long run relationship and causality between monetary policy and economic growth of the panel countries. The coefficient of ECT is -0.786254 which implies that any disturbances or shock or disequilibrium in monetary policy in the previous year is adjusted or converged back by 78.63% per year in the long-run in the context of full-sampled period and nations. To adjust or set back any errors or disturbances in variables in the

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previous year, it takes approximately 1.27 (=1/0.786254) years which is so fast to restore long-run equilibrium. To assess the long-run causality between monetary policy and economic growth, the ECT of each panel country is presented in Table 6.

Table 7

Error Correction Term: Causality of each Panel

Countries	Coefficient	Std. Error	t-Statistic	Prob.*
Bangladesh	-0.713750	0.030599	-23.32569	0.0002
Bhutan	-0.631262	0.016948	-37.24704	0.0000
India	-1.012796	0.020121	-50.33458	0.0000
Nepal	-1.133996	0.020903	-54.24991	0.0000
Pakistan	-0.625332	0.027489	-22.74876	0.0002
Sri Lanka	-0.600390	0.024034	-24.98096	0.0001

According to Table 6, the error correction term of all six countries is negative and significant at a 1 percent level of significance which is evidence of long-run causality between monetary policy and economic growth of every sample nation. Any previous year's shocks in variables in India and Nepal can be adjusted within a year. Apart from that, all other countries' shocks will be adjusted within approximately one and a half years. The highest speed of adjustment in Nepal is very fast and very low in Sri Lanka. The result concluded that there is strong long-run as well as short-run causality between monetary policy and economic growth.

Conclusion and Implication

The study aims to determine whether there is any evidence that monetary policy can affect the economic growth of the SAARC nations. The paper examines the association of monetary policy and economic growth in six SAARC nations from 1983 to 2020 using the panel ARDL model with the PGM estimator. The broad money supply, domestic credit to the private sector, and exchange rate are fluctuating upward. However, economic growth and inflation fluctuate as a regular wave. The Pedroni residual test of cointegration confirms that there is a long-run association between monetary policy and the economic growth of the SAARC countries. The study reveals that there is a positive and significant impact of the money supply and domestic credit to the private sector in economic growth and a negative and significant impact of foreign exchange in economic growth. In the long run, inflation does significantly influence economic growth. Error correction terms (ECT) also confirm that there is a long run association and causal link between monetary policy and economic growth of SAARC countries which is also evidenced by the nation-wise ECT. In the short run, all

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the regressors are significant and most of the proxies—broad money supply, exchange rate, and inflation—have a negative impact on the economic growth of SAARC countries. However domestic credit to the private sector is positive on the economic growth of sampled countries.

The overall stylized facts reveal that monetary policy is a more effective and causal linkage to accelerate economic growth in the long-run than the short run. One of the most important variable—money supply, doesn't support the monetarist argument which advocates the excessive effectiveness of moetary policy in the short-run. Additionally, the study reports that inflation is only a short-run issue and currency devaluate is a severe problem in short-run as well as long-run growth. However, domestic credit to the private sector is more beneficial in short-run economic growth, albeit it is not beneficial in the long run in the SAARC nations. To enhance short-term domestic credit to the private sector and price stability, monetary authorities and SAARC governments should ensure an appropriate money supply level, implement policies to boost exports and currency appreciation, and maintain price stability.

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