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Determinants of inflation in Pakistan, India, Bangladesh and Sri Lanka: A panel data analysis.

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Abstract

This article examines inflation issues in Pakistan, India, Bangladesh, and Sri Lanka. This study used 1980–2020 World Bank panel data. Diagnostic tests precede model selection, guide us to choose the Robust System GMM model. The finding was significant, showing that trade factors like current account balance and exchange rate favour inflation in such locations. The RIR also affects inflation in those four countries. These insights will help these countries develop inflation-controlling policies.

Keywords*: Inflation, broad money, exchange rate, current account balance, interest rate*

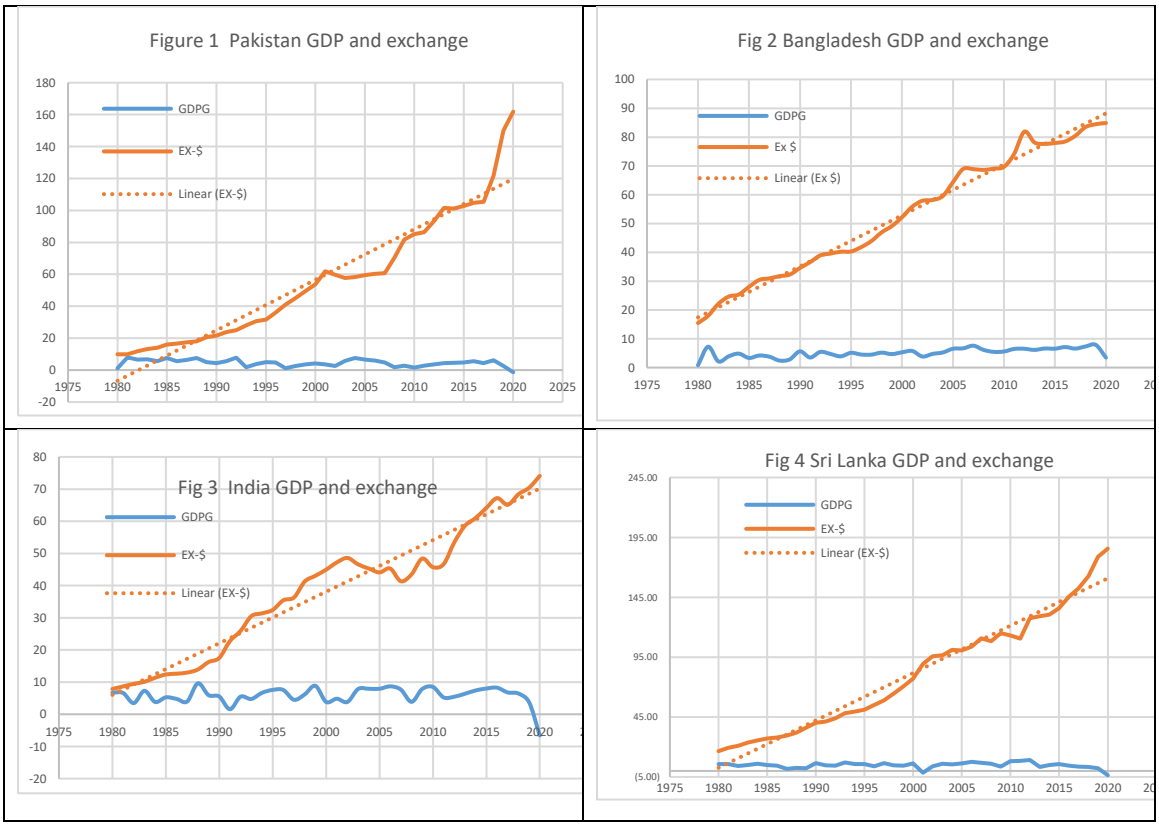
Introduction

Pakistan, India, Sri Lanka, and Bangladesh are historically subcontinents with nearly identical environments, climates, and economic structures. These countries, like others, are dealing with the problem of inflation. It is difficult to obtain a precise estimate of inflation, which is defined as an increase in the general level of prices. There is a lot of price information available, making it simple to maintain track of average price indices such as the Wholesale Price Index, which keeps track of the pricing of commodities traded in wholesale markets. Other indices, such as the Customer Price Index, track the costs that the average consumer spends for various items and services. Other, more thorough indices exist, such as the GDP deflator, which is based on the country's entire gross domestic output. Economists and policymakers disagree on whether inflation is caused by demand-side variables (an increase in economic activity) or supply-side variables (a decline in available resources) (an rise in the cost of production) (Das & Senapati, 2007). Inflation can occur as a result of both an increase in aggregate demand (also known as demand pull inflation) and a decrease in aggregate supply (cost push inflation). Other factors that lead to inflation have been discovered by (Madito & Odhiambo, 2018) and (Mankiw, 2012). Monetary variables (such as an increase in the money supply) and structural issues are among them (such as the degree of independence of the monetary authority). Furthermore, Friedman & Schwartz, 1963 asserted that "inflation is always and everywhere a monetary phenomenon," implying that the primary cause determining inflation is an increase in the supply of money compared to production Das & Senapati, 2007. (A. W. Phillips, 1958) studied for the first time the relationship between changes in money wages and unemployment. Later on, Paul Samuelson and Robert M. Solow popularised the Phillips curve as a trade-off between inflation and unemployment rates. According to the Brunner-Meltzer model (Brunner & Meltzer, 1976), the higher the price level, the bigger the share of government debt in the process of financing the government budget deficit. According to some economists, such as (Harry G, 1963) and (MUNDELL, 1971), balance payment contributes to global inflation and money supply, and so inflation is not just a close economy phenomenon, but also an open economy one. As the rate of inflation is a weighted average of the previous period's actual and projected rates of inflation, the Adaptive Expectations model of Milton Friedman, Keynesian, Monetarists, and Phillips Curve can be interoperated (Birol, 2013). The rational expectancies model of neoclassicism: According to (Muth, 1961), "rational" indicates that the expected rate of inflation is an unbiased predictor of the actual rate of inflation given all prior knowledge. Another

economist from the 1980s discovered that inflation is a fiscal issue as well as a monetary one. Following that, several economists proposed various features of inflation, with their own economic and political situations; post and prewar, pandemic, and climate disasters. This article focuses solely on the factors that contribute to inflation in Pakistan, India, Sri Lanka, and Bangladesh from 1980 to 2020.

Review of literature

From the above-mentioned model detail, which determines the elements impacting global inflation. In this review, we will look at the inflationary factors in India, Pakistan, Bangladesh, and Sri Lanka. According to **Iqbal et al., 2022**, the elements determining inflation (CPI) in Pakistan include GDP growth rate, Money Supply growth rate (in percentage), Oil Price growth rate, and Official Exchange Rate growth. According to **Ajmair et al., 2022**, the money supply, gross domestic product, commerce (import plus export), population, and government spending all have a substantial impact on Pakistan's inflation rate. According to **Ali et al., 2015**, the fiscal deficit and broad money supply in Pakistan were the primary causes of inflation in both the short and long run. **Khan & Gill, 2010** discovered empirically that the exchange rate (Rupees/Dollar), annual interest rate, value of annual imports in rupees, and annual support prices of sugarcane, rice, wheat, and cotton in rupees all had a substantial influence on the inflation rate assessed in CPI, WPI, and SPI. Pakistan's GDP deflator. M2, Wheat Support Price in Rupees/40 Kg, Budget Deficit, and GDP Growth Rate were all insignificant. According to **Ahmed et al., 2014** research, the factors impacting the inflation rate in Pakistan are M2, GDP, government current expenditure, government development spending, and the lag value of CPI. According to Indian study, the deposit rate, exchange rate, GDP, import value, broad money, crude oil prices, prime lending rate, and export value were the determinants of inflation **(Saxena & Archana, 2014)**. **Ratnasiri, 2011** discovered that GDP, money supply (M2), real exchange rate (ER), interest rate (IR), and lagged consumer price index are closely associated to inflation in Bangladesh. **(Colombage, 2005)**. Money supply, exchange rate, monetary sector, GDP (real sector), exports, imports (external sector), government expenditure, and government revenue are the elements that have influenced the shift in inflation in Bangladesh **(Alam, 2018).**. Other studies conducted in other parts of the world, such as (Madito & Odhiambo, 2018), suggested that inflation expectations, real effective exchange rate, final government consumption expenditure, real GDP, import prices, nominal unit labour cost, and money supply are all factors that influence inflation in South Africa. **Moser, 1994** discovered a substantial relationship between M2, oil prices, and rice prices and inflation in Nigeria. In Kenya, the elements that generate inflation are the money supply, central bank rates, exchange rates, wages, food prices, oil prices, political instability, and corruption **(Nkirote, 2014)**.



Figures 1 showing the trend of exchange rate of Pakistan which is moving along the linear trend up to 2015 and after it is moving upward steeply and goes beyond the linear trend. Fig 2 – Fig 4 provide the exchange rate trend of Bangladesh, India and Sri Lanka which are near to the linear trend. Now we will analyse the date first.

Variables	Vari. Obs.	Mean	Std. Dev.	Min	Max
INF_GDP	164	7.35	5.09	0.15	38.51
INF_GDP (L1)	….	…….	……	……	…….
BM_TRR	163	10.01	6.80	1.11	49.98
CAB_GDP	164	-2.23	2.78	-16.28	4.82
EXG	164	0.05	0.04	-0.05	0.23
RIR	163	4.61	3.98	-13.64	13.74
EXP_GDP	164	14.62	5.50	2.19	25.95

OLS	FE robust	GMM Differ.	GMM System
Dep.	Dep.	Dep.	Dep.
…	…….	0.174 (0.293)	0.193 (0.251)
-0.017 (0.79)	-0.014 (0.85)	.028 (0.871)	0.025 (0.864)
0.171 (0.49)	0.188 (0.596)	0.546 (0.072)	0.535 (0.079)
12.44 (0.17)	12.157 (0.111)	22.395 (0.050)	20.406 (0.067)
-0.828 (0.00)	-0.83 (0.125)	-1.025 (0.018)	-1.007 (0.067)
0.076	0.066	0.078	0.0483

Cons.						(0.45) 9.917 (0.000)	(0.484) 10.09 (0.012)	(0.711) ……	(0.819) 9.430 (0.011)
Number of obs.						78	78	72	75
Number of inst.								45	45
F-stat Prob > F						8.93 0.0000		20.74 0.047	20.74 0.047
R-squared						0.3829	0.3773		
Adj R-squared						0.3400			

Table 1 Source: World Bank. Value in parentheses are P-value

Data and methodology

The World Bank source is used to choose the statistics for Pakistan, India, Bangladesh, and Sri Lanka from 1980 to 2020. Use Stata software to analyse the data for several models after converting the data into panel data. We chose the GDP deflator as the dependent variable based on the literature review. Gross domestic product growth in percentage terms (GDPG) is used as an instrumental variable in GMM analysis. Broad money to total reserves ratio in percentage terms (BM TRR), current account balance in percentage terms of GDP (CAB GDP), and exchange rate growth in percentage terms (EXG) are chosen as independent variables.

Table 1 presents the summary analyses of the data, which demonstrates that the INF_GDP variable indicates that there were 164 observations. In that area, inflation ranged from 15 percent at the lowest point to 38.5 percent at the highest. The money multiplier impact is expressed as the ratio of M2 to total reserve ratio (BM_TRR). BM_TRR had a minimum value of 1.11 percent and a maximum value of 50%. The average capital account balance to GDP ratio (CAB_GDP) is -2.23, indicating that these nations are primarily experiencing current account deficits. The growth of the exchange rate ranged from -5 percent to 23 percent with a mean value of -2.23 percent, indicating that it is advancing gradually. The mean value of 4.61 percent demonstrated that, for the most part, the nominal interest rate was higher than the inflation rate, but the negative minimum value of real interest rate indicated that, at times, the inflation rate was higher than the nominal interest rate.

From the review of literature we have the following hypothesis

Ho: Money supply is +ve to Inflation

Recommended by (Iqbal et al., 2022), (Ajmair et al., 2022), (Ali et al., 2015), (Madito & Odhiambo, 2018), (Khan & Gill, 2010), (Moser, 1994), (Ahmed et al., 2014), (Nkirote, 2014), (Saxena & Archana, 2014), (Ratnasiri, 2011), (Alam, 2018) and (Colombage, 2005).

H1: Trade is +ve to inflation

Recommended by (Ajmair et al., 2022) used trade(Import and export); (Madito & Odhiambo, 2018), (Saxena & Archana, 2014) and (Khan & Gill, 2010) use import price; (Ahmed et al., 2014) used export price as a proxy of trade

H2: Exchange rate is +ve to inflation

Recommended by (Madito & Odhiambo, 2018), (Khan & Gill, 2010), (Nkirote, 2014), (Saxena & Archana, 2014), (Ratnasiri, 2011), (Alam, 2018)

H3: Interest rate is -ve to inflation
(Khan & Gill, 2010), (Saxena & Archana, 2014) use prime interest rate as a proxy of interest rate

The Correlation matrix in table 2 showing that no correlation among the variables

Table 2

	BM_TRR	**CAB_GDP**	**EXG**	**RIR**	**EXP_GDP**	**_cons**
BM_TRR	1.0000					
CAB_GDP	0.5018	1.00				
EXG	-0.0599	0.07	`1.00			
RIR	-0.1237	-0.28	-0.02	1.0000		
EXP_GDP	0.2438	0.41	-0.20	-0.1914	1.0000	
_cons	`-0.4558	-0.25	-0.08	`-0.2731	-0.7367	1.00

Since the value of VIF is less than 5%, there is no multicollinearity among the variables, and table 2 shows the outcome of the presence of multicollinearity. The three tests for heteroscedasticity listed in Table 3 all indicate that the model has heteroscedasticity. Robust regression is what we utilise to get around this issue. The Hausman test indicates that the robust fixed effect model is preferable when using the fixed effect (FE) and random effect (RE) models. The Durbin (score) and Wu-Hausman diagnostic tests are used to

examine the endogeneity of the variables. The results of these tests are shown in Table 2, which reveals that the BM_TRR and EXG variables have endogeneity issues. We employ a one-step system GMM and a one-step difference GMM model to resolve this issue. Equation 1, one step system Robust GMM, will be used to interpret the final model.

INF_GDP = 9.430 + 0.193 INF_GDP (-1)+0.025 BM_TRR + 0.535 CAB_GDP + 20.406 EXG -

*(0.011)**** (0.251) (0.864) (0.079)*** (0.067)***

1.007RIR + 0.0483 EXP_GDP ---------- ***1***

(0.067)*** (0.819)

Result

The significant value of intercept (constant) indicates that these economies have some positive inflation, which is 9.4 percent, even without the influence of these variables. The leg value of inflation has no effect on current inflation. The insignificant effect of money supply (BM_TRR) is the rejection of H0, which states that broad money supply has no effect on inflation in these countries. As indicated in equation 1 and table 1, trade factors such as current account balance and exchange rate have a significant impact on inflation. Inflation is increased by 0.535 percent for every one percent increase in CAB_GDP. In contrast, a unit rise in the EXG raises inflation by 20.4 percent. Because these data are consistent with hypotheses 1 and 2, we accept H1 and H2. The real interest rate (RIR) is inversely related to inflation; a one-unit increase in RIR reduces inflation by 1.07 percent, in accordance with the H3.

The relevance of this study is that the inflation in South Asian countries is attributable to trade rather than money supply. Because of currency depreciation, they are experiencing imported inflation; the current account balance shortfall is attributed to an increase in import pricing rather than volume. Imports become more expensive as the currency depreciates. The real interest rate is the monetary tool, with a higher interest rate creating inflation in that region. The governments in these regions can reduce inflation by implementing a contractionary monetary policy, which involves raising interest rates. The exchange rate policy is also appropriate for these economies, as it controls the exchange rate and prevents the currency from depreciating against the US dollar.

` Table 3 test of Heteroscedasticity			**Table 4 Test of selection between RE and FE models**
Breusch-Pagan / Cook-Weisberg	White's test	IM-test	Hausman Test
chi2(1) = 32.08 Prob. = 0.0000	chi2(20) = 43.26 Prob. = 0.0019	chi2(20) = 43.26 Prob. = 0.0019	chi2(5) 0.04 prob. 1.0000
Ho: Homoskedasticity			Ho RE model is appropriate

Table2		**Table 5 Tests of endogeneity**	
Variable	**VIF**	**Durbin (score)**	**Wu-Hausman**
CAB_GDP	1.67	chi2 =0.4206 p value = 0.51***	F(1,69)=0.389 p value = 0.53
BM_TRR	1.35	chi2 =5.924 p value = 0.01	F(1,69)=5.918 p value= 0.01
EXP_GDP	1.31	chi2 =0.132 p value = 0.715***	F(1,69)=0.122 p value = 0.727
RIR	1.10	chi2 =0.003 p value = 0.956***	F(1,69)=0.002 p value = 0.957
EXG	1.09	chi2 =10.37 p value = 0.001	F(1,69)=11.08 p value = 0.001
Mean VIF	**1.30**	**Ho: variables are exogenous *** **	

Conclusion

The purpose of this article is to investigate the various factors that have an impact on the rate of inflation in the countries of Pakistan, India, Bangladesh, and Sri Lanka. For the purpose of this study, we decided to use the panel data from the World Bank that covers the years 1980 through 2020. First, we do the diagnostic tests, and only then will we select the suitable model for analysis. The results of the heteroscedasticity tests and the endogeneity tests imply that the model has a problem with heteroscedasticity and endogeneity. The results of the correlation matrix are shown in table 2, and the VIF result

of multicollinearity is shown in table 3. We have decided to use the Robust system GMM model in order to get around these diagnostic errors. The finding was quite substantial, suggesting that trade factors such as current account balance and exchange rate have a favourable influence on inflation rate in those regions. The real interest rate, or RIR, is another element that affects inflation in those four countries. These findings will be of assistance to the governments of these regions as they work to implement policies that can bring inflation under control.

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