Catalysts Of Inflation In Pakistan: Twin Deficit Or Money Supply

Dominance

Raza Ali Khan 1 Talha Ahmed Siddiqui 2 Syeda Zuimah Wasim 3
Economics and Management Sciences Department, NED University of Engineering and Technology, Karachi, Pakistan

ABSTRACT

This study examines long run and short run impacts of budget deficit, money supply, and current account deficit on inflation in Pakistan using quarterly data from 2002Q1 to 2022Q4 by applying autoregressive distributive lagged (ARDL) estimation and Granger causality test. The results confirm presence of long-term and stable impacts of budget deficit, money supply and current account deficit on inflation through ARDL bounds test. Budget deficit was found to strongly impact inflation in long run but its impact gets weaker in short run. Moreover, current account deficit and money supply are reported to exert little impact on inflation in both short run and long run. Furthermore, budget deficit and money supply were noted as key inflation drivers. It is recommended that fiscal policy should be greatly focused, budget deficit must be narrowed and money supply must be prudently controlled by increasing revenues, diversifying its exports and implementing sustainable economic policies.

Keywords: Budget deficit, inflation, money supply, Pakistan, current account balance, ARDL, Granger causality

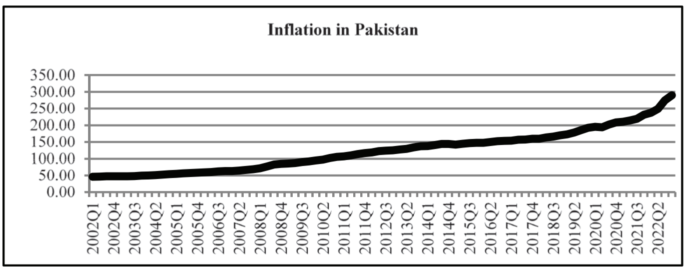
Introduction

Ever growing inflation in Pakistan has garnered huge attention due to its detrimental effects on economy and lives of populace. Governments of Pakistan have tried to keep inflation low but these attempts seem to be futile given the fact that inflation has continued to escalate and currently poses a double digit figure as depicted in Figure 1. In presence of skyrocketing inflation in Pakistan, debate remains inconclusive whether demand or supply side factors are its main contributors. Thus, *demanding a dire need for this study at an opportune time especially in backdrop of present deteriorating economy and ballooning twin deficit for effective policy formulation and implementation.*

Pakistan's persistently growing public debt, widening twin deficit and huge price instability has instilled interest among researchers and policymakers to deeply examine underlying causes behind rapidly rising inflation.

Corresponding author, Talha Ahmed Siddiqui– e-mail: Talhaahmed@neduet.edu.pk

Figure 1: Consumer Price Index (CPI) of Pakistan from 2002Q1 to 2022Q4



Source: (IMF, 2022)

Classical, Monetarists as well as Keynesians and Structuralists remain divided on finding main determinants of inflation. In this vein, several scholars have attempted to investigate relation among inflation, money supply and budget deficit such as (Duodu et al.,2022) in Ghana, (Nasir et al., 2020) in UK and New Zealand, (Nyguyen, 2015) in 9 Asian countries. Furthermore, association among current account deficit, money supply and inflation has been evaluated by (Al Mutairi et al, 2020) in Kuwait, (Bilgrami & Maryam, 2022) in Asian countries and (Jadoon & Guang, 2019) but results have remained mixed and inconclusive.

Pakistan has been struggling with widening current account deficit for more than 50 years indicating serious threat to its economic viability. According to (World Bank, 2022), Pakistan's imports have constituted as lowest as 58% and as highest as 86% of total exports showing its consistently ballooned huge import bill .This massive import bill is comprised of costly capital goods and products to fulfill its energy requirements with rising *oil prices having played a crucial role in taking it to this huge level.*

According to (Observatory of Economic Complexity, 2021) Pakistan's imports of crude petroleum were $3.53 billion in 2021 making it the third largest imported product of Pakistan indicating graveness of situation. In addition to this, decline in remittances have also contributed to this current account deficit due to Covid-19 pandemic as many overseas Pakistanis lost their jobs. Moreover, Pakistan's limited export and import diversification has made it vulnerable to external factors and geopolitical situation such as witnessed by Ukraine-Russia war that has stifled its trade

Objective

This study aims to determine long run and short run impacts of budget deficit, current account deficit and money supply on inflation in Pakistan from 2002 to 2022 using quaterly data.

Research hypothesis

This paper tests following hypotheses
H1: Budget deficit causes inflation
H2: Current account deficit causes inflation
H3: Money sypply causes inflation

Contribution of this study

This is the first study ,to the best of our knowledge, that has examined impacts of all these variables namely budget deficit, current account deficit and money supply on inflation plus hardly any paper had examined causation and its direction among these variables.Hence, this study fills an important research gap. Extant literature has explored influences of either current account deficit or budget deficit on inflation such as (Alawin & Oqaily, 2017). Others had investigated only fallouts of money supply and fiscal deficit on inflation such as (Nyguyen, 2015) and (Ramu, 2014)

Second contribution of this study is that unlike earlier *researches that used annual data, this study employs quarterly data from 2002Q1 to 2022Q4 to add granularity and to depict clearer picture of nexus among these variables.*

The sensitivity of this research is heightened by the fact that Pakistan's economy is fast approaching a grinding halt given currently experienced economic slowdown due to government policies, rupee depreciation, Covid-19 pandemic, inefficient tax collection, impacts of global financial crisis of 2007-08, war on terror, depressed economy and geopolitical events. Hence, this research is important as work on this topic remains under researched.

This paper is structured as follows: Section 1 presents introduction, contribution of this study to literature, objectives of study and background. Section 2 highlights literature review. Section 3 elucidates data sources and methodology employed followed by Section 4 that explains findings of this study. Lastly, Section 5 concludes, gives policy implications and future research directions

Literature Review

This section describes theories and empirical researches on nexus among twin deficit, money supply and inflation

2.1 Theoretical framework

According to classical theory, which underpins quantity theory of money, changes in nominal money supply impacts a country's inflation level. It also asserts that real output is actually influenced by inflation due to rise in nominal money supply. As a result, they see inflation as a monetary phenomenon. Monetarist theory, enrooted in quantity theory of money, elucidates that prices are determined by money supply. Its supporters claim that any variation in the money supply (nominal) from the anticipated real balance results in price fluctuation. Additionally, monetarists think that the budget deficit *affects inflation via change in money supply. This is due to the fact that a budget deficit forces government to print more money or issue government-backed securities through open market operations, resultantly, changing money supply and price levels in an economy. (Duodu, et al., 2022). High budget deficit creates crowding out effect, raises interest rates, reduces net exports, curbs private investment and consumer spending, leading to high inflation and high taxes*

On the other hand, fiscal theory of price level (FTPL) clashes with monetary approach and contends that prices are actually determined by government debt and fiscal policy and not directly by monetary policy. It views government's inter-temporal budget constraint (GBC) as a tool connecting monetary and fiscal policy. GBC is said to be in equilibrium when the current amount of government debt is less than or equal to the discounted present value of future primary surpluses (tax revenue minus non-interest costs). Prices increase at a given discount rate if discounted value of primary surplus falls below nominal amount of government debt, restoring GBC to equilibrium (Javid & Arif, 2014). Hence, higher government debt generates more distortion necessitating price rise to restore GBC. FTPL has been supported by (Lozano-Espitia, 2008)

Classical and Monetarist theories explain nexus among money supply, budget deficit and inflation through quantity theory of money whereas FTPL is founded on quantity theory of government debt. Nevertheless, Keynesians claim that inflation occurs when aggregate demand exceeds aggregate supply. While, social and economic characteristics are considered as drivers of inflation in underdeveloped and developing economies by Structuralists.

Hence, researchers remain divided on determining causes of inflation which has inspired researchers both in developed and developing economies to delve and ascertain definite reasons on inflation.

Marshall Lerner condition and J curve phenomenon explain association between trade balance and prices. It advocated that balance of trade can be improved in long run if price elasticity of demand for imports and exports *becomes greater than 1 in absolute terms. Despite the fulfillment of this condition, persistent deterioration of trade balance led to introduction of J curve effect which states that trade balance first deteriorates and then improves, resembling letter J. Whenever value of currency changes, it gets depicted in two ways on trade balance: first, price and second the volume effect. Price effect gets manifested in this way that when currency depreciates imports increase in value in short run while volume of traded products might not alter considerably. Hence, resulting in worsened trade balance. Nevertheless, in case when currency devalues in future, it leads to exports outpacing imports. Thus, causing trade balance to improve (Jadoon & Guang, 2019)*

2.2 Empirical literature

This section encompasses nexus among budget deficit, current account deficit, money supply and inflation as scrutinized by various strands of literature.

Budget deficit and inflation

(Duodu et al., 2022) analyzed effects of budget deficit and money supply(M2) on inflation in Ghana from 1999 to 2019 by employing Vector Errror Correction Model (VECM) and established that budget deficit positively influences while money supply negatively impact inflation; thus, supporting FTPL. It claims that the financing of budget deficit through issue of government securities or printing of money creates disequilibrium in money market; hence, causing prices of products to increase sharply. Moreover, (Rehman et al. , 2021) examined determinants of inflation in Pakistan from 1960 to 2010 and concluded positive relation between inflation and budget deficit in the short run by applying Vector Autoregression (VAR) but no long run association was found between budget deficit, money supply and inflation by applying Autoregressive Distributed Lag method (ARDL). Likewise, (Ali et al., 2015) explored effects of budget deficit and money supply on inflation in Pakistan using annual data from 1960 to 2010 using

ARDL and VAR approaches. The results report an insignifcant relation between these variables in long run but positive relation between budget deficit and inflation in short run. Another research by (Nguyen et al., 2022) explored influences of fiscal and monetary policies on inflation in Vietnam from 1997 to 2020 by applying VAR approach. It found that inflation is positively affected by government expenditure, fiscal deficit and money supply. In addition to this, (Durguti, 2020) inspected effects of budget deficit, GDP, government debt, unemployment and real exchange rate on inflation in Western Balkan economies from 2001 to 2017 using VECM and multivariate time series analysis. It reported that budget deficit, GDP, government debt and exchange rate positively affect inflation. Furthermore, (Sriyana, 2019) explored impact of monetary and fiscal policies in Indonesia from 1970 to 2017 by employing Error Correction Model (ECM) and reported that budget deficit, narrow money, GDP and exchange rate positively affect inflation. Hence, supporting demand-pull inflation theory. Moreover, (Ramu, 2014) found similar results when it applied ARDL in context of India by contending that when expenditures exceed revenues it leads to increase in money supply; consequently, causing inflation.

However, there are studies that contradict the findings of abovementioned researches such as (Saleem et al.,2013) in Pakistan, (Adom et al., 2015) and (Adu, 2011) in Ghana. Study conducted by (Saleem, et al., 2013) investigated relationship among inflation, fiscal deficit interest rate, GDP and unemployment in Pakistan from 1990 to 2016 and concluded that unemployment and fiscal deficit have negative association with inflation whereas GDP and interest rate have positive relation with it.

Current account deficit and inflation

The benefits that trade engenders for an economy are manifold such as trade engenders technology development due to greater competition (Gries & Redlin, 2020) boosts economic growth, curtails poverty and creates jobs. Nexus between current account deficit and *inflation is studied by multiple studies as mentioned. Study by (Mehran & Gholani, 2023) on Iranian economy examined non-linear association among inflation, current account deficit, financial balance, net foreign assets, real effective exchange rates, total investment, terms of trade, GDP per capita growth and KOF index by deploying nonlinear boundary (NARDL) approach. It confirmed the presence of co-integration between current account deficit and inflation.*

(Alawin & Oqaily, 2017) found positive effect of current account deficit on inflation in short run while its adverse effect in long run in Jordanian economy. This is because long run provides sufficient time to substitute imports, hence, subduing imminent domestic inflation. Another research by (Bilgrami & Maryam, 2022) examined determinants of inflation in Pakistan, India, Bangladesh and Sri Lanka from 1980 to 2020 by using robust generalized methods of moments (GMM) technique and concluded that exchange rate and current account balance favor inflation. (Yıldırım, 2022) examined nexus between current account balance and inflation in Turkish economy from 2002 to 2021 using NARDL test method and found existence of long run non-linear association between current account balance and inflation. Furthermore, (Rehman & Khan, 2015) analyzed food inflation in Pakistan from 1990 to 2013 by using VECM and Johansen co-integration test. It concluded that indirect taxes and food exports positively and significantly and positively influence food price inflation whereas GDP and government subsidies have negative relation with it.

However, contradictory findings are noted by other researchers such as by (Jadoon & Guang, 2019) that applied ARDL and reported negative association between inflation and money supply with balance of trade of Pakistan in long run. It mentioned that surge in money supply escalates inflation, increases inputs costs. Thus, making exports more expensive and less competitive in international markets.

Money supply and inflation

(Van, 2020) examined relation between inflation and money supply on Chinese and Vietnamese economies from 2012 to 2016 and found that persistent surge in money engenders inflation in long run, but continual rise in growth of money supply does not result in inflation in short run; hence, seconding, monetary quantity theory. Furthermore, (Emerenini & Eke, 2014) inspected influences of expected inflation, money supply, and exchange rate in Nigeria and concluded presence of long run association among variables by applying co-integration test. Studies such as (Dinh, 2018) , (Ujiju & Etale, 2016) and (Kumo, 2015)have highlighted that money supply influences CPI (consumer price index) because money supply is direct money quantity in circulation. In contrast, (Duodu et al., 2022) concluded that money supply has negative association with inflation in Ghana.

Methodology And Data

The purpose of this study is to investigate long and short term dynamics among budget deficit, inflation, money supply, current account deficit, GDP growth rate, interest rate and exchange rate in context of Pakistan from 2002Q1 to 2022Q4. This study has used Augmented Dickey–Fuller (ADF) and Phillips & Perron (PP) tests to check the stationarity of data. The short run and long run dynamics are analyzed using Autoregressive distributed lag (ARDL) model. The causality among variables are assessed using Granger causality test. The description of variables, data sources and empirical framework are discussed below.

3.1 Data sources and description of variables

A quarterly time series data covering the period from 2002Q1 to 2022Q4 is used by this study by obtaining data mainly from Pakistan Economic Survey and IFS (International Financial Statistics) published by Ministry of Finance, Pakistan and IMF (International Monetary Fund) respectively. The description and data sources are shown below in the Table 1

Table 1
Description of variables and data sources

Variables	Description	Abbreviation	Source
Inflation	Log of Consumer Price Index(2010=100)	CPI	International Financial Statistics (IFS)
Budget deficit	Budget deficit as a percentage of GDP	BDG	Pakistan Economic Survey
GDP Growth rate	Quarterly growth rate of Real GDP	GDP	Pakistan Economic Survey
Money Supply	Broad Money Supply as a percentage of GDP	MSP	International Financial Statistics (IFS)
Interest Rate	Quarterly Discount rate	INT	International Financial Statistics (IFS)
Current Account deficit	Current account deficit as a percentage of GDP	CRA	International Financial Statistics (IFS)
Exchange rate	Currency exchange rate per USD	EXC	International Financial Statistics (IFS)

3.2 Empirical Framework

This study explores link between inflation, money supply, budget deficit and current account deficit using control variables namely GDP growth rate, exchange rate and interest rate. The model is specified as follows:
INF= f (BDG, CA, MS, GDPGR, EXC, INT)
This research has employed ARDL estimation technique to analyze and estimate short-run dynamics and long-run relationship. The resulting model specification for short term and long term, following the work of (Pesaran et al.,2001) is as follows:

$$INF_t = \gamma_0 + \gamma_1\ INF_{t-1} + \gamma_2\ BDG_{t-1} + \gamma_2\ CRA_{t-1} + \gamma_3\ MS_{t-1} + \gamma_4\ GDP_{t-1} + \gamma_5\ INT_{t-1} + \gamma_6\ EXC_{t-1} + \beta_1 \sum_{i=1}^{n} \Delta INF_{t-i} + \beta_2 \sum_{i=0}^{n} \Delta BDG_{t-i} + \beta_3 \sum_{i=0}^{n} \Delta CRA_{t-i} + \beta_4 \sum_{i=0}^{n} \Delta MS_{t-i} + \beta_5 \sum_{i=0}^{n} \Delta GDP_{t-i} + \beta_6 \sum_{i=0}^{n} \Delta INT_{t-i} + \beta_7 \sum_{i=0}^{n} \Delta EXC_{t-i} + \delta_t \quad \text{....... Eq (1)}$$

Where:
β_1 = Constant
β_(2)to β_8 = Short run coefficients
γ_(1)to γ_6 = long run coefficients
∆ = Difference operator
n= lag lengths
δ_t = Error term

Error Correction Model is specified as follows

$INF_t = \beta_1 + \sum_{i=1}^{n} \beta_2 \ \Delta INF_{t-i} + \sum_{i=0}^{n} \beta_3 \ \Delta BDG_{t-i} \ + \sum_{i=0}^{n} \beta_4 \ \Delta CRA_{t-i} \ + \ \sum_{i=0}^{n} \ + \beta_5 \ \Delta MS_{t-i} + \sum_{i=0}^{n} \beta_6 \ \Delta GDP_{t-i} \ + \sum_{i=0}^{n} \beta_7 \ \Delta INT_{t-i} \ + \ \sum_{i=0}^{n} \beta_8 \ \Delta EXC_{t-i} \ + \omega_1 \ ECM_{t-1} + \ \mu_t$ ……. Eq (2)

Where
ω_(1)= Coefficient of Error correction term
μ_t = Error term

Results And Discussion

4.1 Descriptive Statistics and Correlation analysis

The descriptive statistics for the selected variables is shown by Table 2. Inflation is reported to be slightly negatively skewed with a value of -0.18 which coincides with the findings of (Hussain et al.,2021). The reason behind negative skewness of inflation is a sudden rise in price level during the last two quarters of 2022. It can be linked to rise in oil prices at international level. Whereas the remaining variables i.e. budget deficit, current account deficit, exchange rate, money supply interest rate and GDP growth are reported to be positively skewed. The pair wise correlation matrix is shown in Table 3 which portrays that GDP growth rate and current account deficit are negatively correlated with inflation while all other variables are positively correlated with the inflation

Table 2
Descriptive Statistics

	CPI	BDG	GDP	MSP	INT	CRA	EXC
Mean	4.688	1.496	1.821	19.255	9.813	-8.423	103.382
Median	4.816	1.3	-0.193	18.177	9.5	-8.64	101.316
Maximum	5.668	4.3	24.104	41.097	16	0.855	124.486
Minimum	3.833	0.4	-12.924	8.347	6.25	-16.058	93.179
Std. Dev.	0.521	0.809	7.553	8.218	2.619	3.584	7.488
Skewness	-0.187	1.631	1.104	0.797	0.502	0.6	1.272
Kurtosis	1.836	5.784	3.877	2.95	2.211	3.652	3.83
Observations	84	84	84	84	84	84	84

Table 3
Correlation matrix

	CPI	BDG	GDP	MSP	INT	CRA	EXC
CPI	1	0.275	-0.126	0.93	0.137	-0.48	0.218
BDG	0.275	1	-0.116	0.263	0.108	-0.137	-0.039
GDP	-0.126	-0.116	1	-0.232	-0.109	0.308	0.08
MSP	0.93	0.263	-0.232	1	0.195	-0.463	-0.029
INT	0.137	0.108	-0.109	0.195	1	-0.205	-0.581
CRA	-0.48	-0.137	0.308	-0.463	-0.205	1	-0.057
EXC	0.218	-0.039	0.08	-0.029	-0.581	-0.057	1

4.2 Unit root test

Time series analysis necessitates an in-depth evaluation of stationarity of series. Therefore, unit root tests namely ADF and PP tests are deployed to determine stationary of variables. Table 4 reports stationarity results by employing ADF and PP tests with an assumption of intercept in the series. Because both tests revealed that the variables are of mix order integration; therefore, ARDL estimation technique will be employed to assess long run and short run relationships among variables. An important premise of ARDL technique is that variables must be integrated at level or at first difference. If any variable is integrated at second difference, then the F-test becomes invalid for making a judgement about the presence of long-run relationship.

Table 4
Unit root tests

	ADF			PP		
Variables	**(at level)**	**(1st difference)**	**Integration Order**	**(at level)**	**(1st difference)**	**Integration Order**
CPI	0.632	-5.06***	I(1)	4.025	-3.037**	I(1)
BDG	-1.698	-22.20***	I(1)	-5.031***	-	I(0)
GDP	-2.87*	-	I(0)	-1.384	-13.028	I(1)
MSP	0.782	-2.892*	I(1)	-7.550***	-	I(0)
INT	-2.138	-5.617***	I(1)	-1.800	- 5.581***	I(1)
CRA	-2.060	-9.173***	I(1)	-2.039	-9.173***	I(1)
EXC	-1.601	-7.893***	I(1)	-1.783	-7.864***	I(1)

****, **, and * indicates stationary at 1%, 5% 10% level respectively*

4.3 Lag Selection

To apply bounds testing approach of ARDL, an appropriate lag order must be selected. The selection of lag length should be done with care, since an erroneous lag length might cause problem and yield biased results which cannot be used in policy formulation. Hence, (AIC) Akaike information criterion is used to select right lag length to ensure that lag length is suitably meets criteria as mentioned by Pesaran et al. (2001) and Narayan & Narayan (2005). When compared to other criteria, the AIC gives robust results with efficient performance. Table 5 summarizes these findings. According to AIC criterion, lag 7 is appropriate for sample selected for this study. Furthermore, polynomial graph in Figure 2 provides validation for identifying a suitable lag duration under VAR technique. All of the blue dots in this graph are inside the circle, indicating that estimations would be suitable at lag 7.

Figure 2: Polynomial graph showing inverse root of AR characteristics

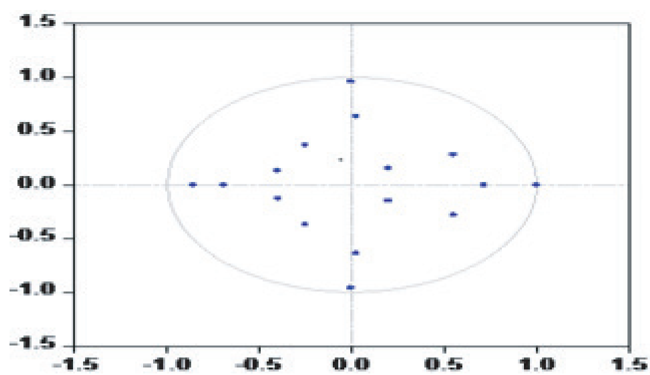


Table 5
Selection criteria for Lag order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1169.618	NA	44195.920	30.562	30.775	30.647
1	-561.779	1089.375	0.022	16.046	17.75*	16.72*
2	-493.384	110.143	0.014	15.542	18.739	16.821
3	-421.962	102.032	0.008*	14.960	19.648	16.835
4	-373.307	60.660	0.010	14.969	21.148	17.441
5	-325.171	51.262	0.013	14.991	22.662	18.060
6	-269.053	49.558	0.017	14.807	23.969	18.471
7	-167.998	70.86949*	0.009	13.45450*	24.108	17.716

*Note: *denotes the lag order selected by the criterion*

4.4 Bound test

To apply ARDL approach, first presence of a long-run relationship between among research variables is assessed and then F-statistics of unconstrained ARDL findings is matched with critical values of bound test (Pesaran test). Second, if the long-run link between research variables is proved, then long-run relationship coefficients are estimated. The ARDL technique is used to estimate coefficients of this relationship. The constrained or Error correction model (co-integration) is then calculated.

Table 6 summarizes outcomes of co-integration test performed using ARDL bound testing approach. The calculated F-statistics is 5.328, which exceeds lowest and upper bounds for 1%, 2.50%, 5%, and 10% critical values. The bound test findings reject null hypothesis asserting no co-integration since it exceeds the critical thresholds. The bound test findings reveal that variables namely inflation, budget deficit, interest rate, money supply, GDP growth rate and current account deficit have a long-run relationship.

4.5 Short-run and Long run analysis

The study established long-run co-integrating association between inflation and its determinant Now under this section, this study shows presence of long-run and short-run elasticities

Table 6
F-Bounds test

F-statistic	5.328736	
Significance level	I(0)	I(1)
10%	1.75	2.87
5%	2.04	3.24
2.50%	2.32	3.59
1%	2.66	4.05

using Equations 1 and 2. For the long-run results as presented in Table 7, all explanatory variables positively and significantly affected inflation except GDP growth rate which turns out to be negative and insignificant.

The long-run impact of budget deficit on inflation is positive and statistically significant. An surge of 1% in budget deficit leads to about 27% surge in inflation. These results are consistent with findings reported by (Duodu et al, 2022) in Ghana and (Sriyana, 2019) in Indonesia (Durguti, 2020) in Western Balkan states. This is because by printing more money or issue of government bonds unsettles money market drastically, consequently, causing prices to see upward trajectory.

Similarly, money supply is positively and positively related to inflation. It is found that a 1% growth in money supply increases inflation by 5.5%. Hence, endorsing quantity theory of money advocated by classical theorists These findings are consistent with researches by (Van, 2020) and (Emerenini & Eke, 2014) .This is because when money supply rises, demand for products by consumers also grows concurrently. Hence, they end up bidding prices up , subsequently, fueling inflation.

Similarly, inflation will escalate by 6.6% percent, 2.5% and 2.7% due to a 1 % rise in interest rate, current account deficit and exchange rate respectively.

Table 7
Long run coefficients

Variable	Coefficient	Stand Error	t-Statistic	Prob.
BDG	0.267**	0.124	2.143	0.038
GDP	-0.003	0.003	-0.985	0.330
MSP	0.055***	0.004	13.555	0.000
INT	0.066***	0.020	3.230	0.002
CRA	0.025***	0.010	2.469	0.017
EXC	0.027***	0.001	21.228	0.000

The results of the short-run coefficients of ARDL are shown in Table 8. The sign and coefficient related to ECM (error correction term) are the most essential features of short-run model. In event of a short-run shock, it reflects convergence towards equilibrium. An effective ECM term, according to Banerjee et al (1998), provides crucial evidence for building a stable long-term connection among variables. In model of this study, the ECM term is -0.075, which is negative and statistically significant at 1% level of significance. The magnitude of error correction term is not very high showing a modest adjustment towards long-run equilibrium.

The budget deficit has a positive and significant result with the inflation in the short run as well. These results are aligned with results found by study by (Rehman & Khan, 2015) carried out in Pakistan.

The money supply was noted to have negative relation with inflation though with a lag from the fifth quarter and onwards. The same results were found by (Aimola and Odhiambo,2021) and (Van, 2020) that found positive money supply-inflation long run relation but a negative one in short run.

The results further show that if current account deficit rises by1%, it will lead to 0.01% decrease in inflation after the fourth quarter. This conclusion contradicts what was discovered for the long term effect of the current account deficit. In particular, an increase in the current account causes inflation to rise in the long run as noted by (Yıldırım, *2022) but fall in the short run. Current account deficit is result of surge in imports compared to those of exports; hence, resulting in imported inflation. The result is in contradiction with the findings of (Alawin & Oqaily, 2017).The exchange rate was found to have a minute impact on inflation after fifth quarter.*

Table 8
Short run coefficients

Variable	Coefficient	Standard Error	t-Statistic	Prob.
Constant	0.081	0.010	8.449	0.000
D(CPI(-1))	-0.033	0.111	-0.297	0.768
D(CPI(-2))	-0.237	0.120	-1.985	0.054
D(BDG)	0.006	0.002	3.325	0.002
D(BDG(-1))	-0.012	0.003	-4.635	0.000
D(BDG(-2))	-0.008	0.002	-3.560	0.001
D(GDP)	-0.001	0.000	-2.499	0.017
D(GDP(-1))	0.003	0.001	5.363	0.000
D(GDP(-2))	0.002	0.001	4.328	0.000
D(GDP(-3))	0.001	0.001	2.602	0.013
D(GDP(-4))	0.002	0.000	3.852	0.000
D(MSP)	-0.001	0.002	-0.362	0.720
D(MSP(-1))	0.002	0.002	1.436	0.159
D(MSP(-2))	-0.006	0.002	-3.771	0.001
D(MSP(-3))	-0.006	0.002	-4.033	0.000
D(MSP(-4))	0.001	0.002	0.488	0.628
D(MSP(-5))	-0.007	0.002	-3.541	0.001
D(INT)	0.009	0.001	6.954	0.000
D(INT (-1))	0.000	0.002	0.088	0.931
D(INT (-2))	-0.004	0.001	-2.990	0.005
D(EXC)	0.001	0.000	3.138	0.003
D(EXC (-1))	0.000	0.000	-0.229	0.820
D(EXC (-2))	0.000	0.000	-1.026	0.311
D(EXC(-3))	0.000	0.000	-0.079	0.937
D(EXC(-4))	0.000	0.000	0.201	0.841

4.6 Diagnostic tests

Multiple diagnostic tests were used to assess model stability, including Jarque-Bera normality test, LM serial correlation test, and BG Pagan heteroscedasticity test. The results are shown in Table 9. The selected models passed all of the diagnostic tests, according to results. Additionally, this study investigated long- and short-run parameter stability using two stability tests namely CUSUM and CUSUMSQ. Brown et al. (1975) and Pesaran and Shin (1999) proposed these stability tests. Figures 3 and 4 depict graphs of both stability tests demonstrating that plots for both stability tests are within critical boundaries.

Test	Test statistic	Probability
LM Test	0.063	0.939
BG Pagan Test	1.302	0.2074
Jarque-Bera	0.106	0.948

Figure 3: CUSUM

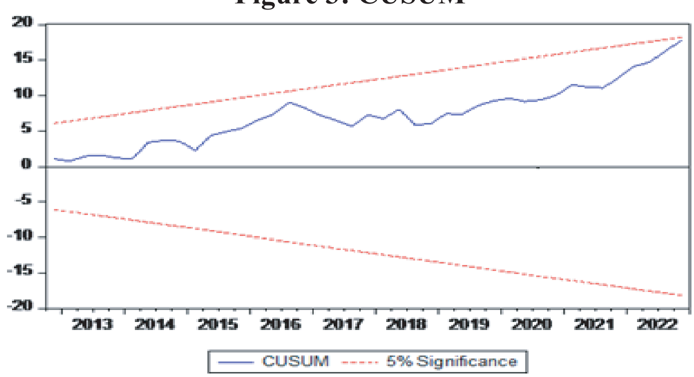
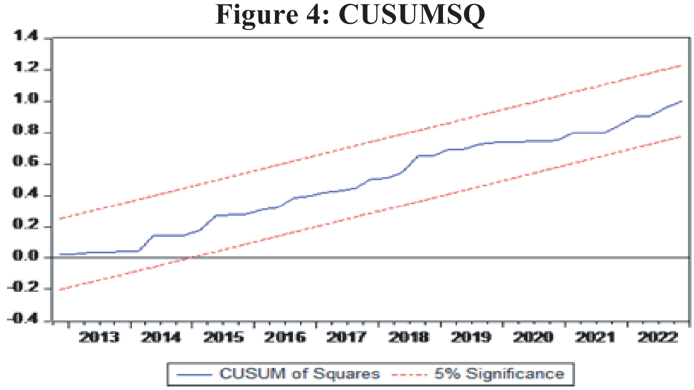


Figure 4: CUSUMSQ



4.7 Granger Causality test

Granger causality test is employed to assess causation between variables after establishing co-integration among variables. It is assumed that unidirectional or bidirectional causation exists between the series if co-integration is examined among variables. The results of the pairwise granger causality test are shown in Table 10 below.

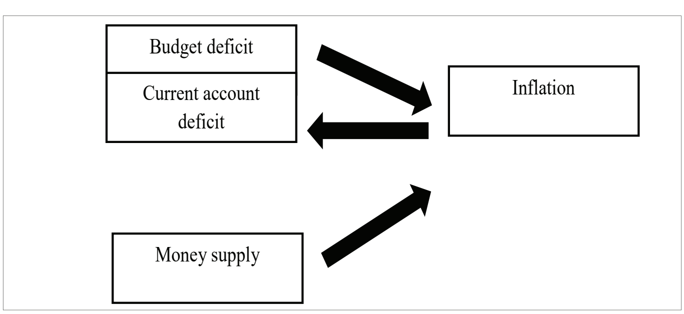
Table 1
Description of variables and data sources

Dependent Variable	Independent Variable	F-Statistics	Probability	Existence of Causality
Budget deficit	CPI	5.386	0.000*	**Yes**
CPI	Budget deficit	0.824	0.536	**No**
Money Supply	CPI	2.717	0.020*	**Yes**
CPI	Money Supply	0.233	0.964	**No**
Current Account Deficit	CPI	0.615	0.689	**No**
CPI	Current Account Deficit	4.518	0.000*	**Yes**

** indicate rejection of null hypothesis at 5% level of significance*

The results of granger causality test show unidirectional relation among inflation, budget deficit, money supply and current account deficit as portrayed in Figure 5 below. The budget deficit and money supply are found to cause inflation. Hence, accepting hypothesis 1 and 3 but inflation does not cause budget deficit and money supply. Whereas inflation causes current account deficit but current account deficit does not cause inflation; thus, rejecting hypothesis 2

Figure 5: Results of Granger causality pictorially depicted



Conclusion, Policy Implications And Future Researches

Using quarterly data, this study attempts to investigate variables that may have contributed to inflation in Pakistan by utilizing ARDL co-integration technique. The findings suggest that there is a significant and positive connection between budget deficit and inflation in long run. Therefore, in long run, fiscal deficits are inflationary in Pakistan. Results also note that money supply, current account deficit, and exchange rate have slight impact on inflation whereas the impact of GDP growth rate is insignificant in long run. As a result, it is concluded that inflation in Pakistan is more of a fiscal problem rather than a monetary phenomenon.

On the premise of abovementioned results it is recommended that in order to subdue crippling effects of high and persistent inflation in Pakistan government authorities and policymakers should intensify their anti-inflation efforts through implementation of stringent fiscal policy and serious efforts must be directed to lessen the ever burgeoning budget deficit. This can be done by increasing its revenues by expanding tax net and reducing debt servicing by relying on internally generated funds. In addition to this, Pakistan must diversify its export baskets and markets so its exports are not sensitive to external shocks. Moreover, imports of some products should be reduced and must be substituted with domestically produced products in order to curtail its current account deficit. Furthermore, sound, stable and sustainable economic plans must be formulated and implemented in letter and spirit. These steps can decrease current account deficit and subsequent inflationary pressures arising from it.

Future researchers can undertake similar study by doing a comparative assessment of Pakistan and other developing economies such as SAARC (South Asian Association for Regional Cooperation). Furthermore, monthly data can be employed to evaluate this same study and comparison and contrast can be highlighted.

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